CERATIZIT GROUP

01\2020

NEW DEVELOPMENTS AND PRODUCT ENHANCEMENTS

# UP2DATE

## Ultimate. Universal. Ultra-quick.

SilverLine – The classic now even better with Dragonskin!

**MULTILOCK**
The exchangeable head system for advanced performance

**THE MULTI-APPLICATION GRADE**
Many materials,
many requirements...
... only one indexable insert!

TEAM CUTTING TOOLS

CUTTING SOLUTIONS BY CERATIZIT · KOMET · WNT · KLENK

CERATIZIT is a high-tech engineering group specialised in tooling and hard material technologies.

**Tooling the Future**

www.ceratizit.com

# Welcome!

Placing your order is quick and easy

## Customer Service Centre

**Freephone Number**

UK: 0800 073 2073
Ireland: 1800 93 22 55

**Freefax Number**

UK: 0800 073 2074

**E-Mail**

info.uk@ceratizit.com

On-site technical support

## Your Local Technical Sales Engineer

It couldn't be easier

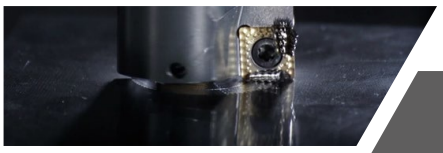
## Ordering via the Online Shop

http://cuttingtools.ceratizit.com

Your customer number

CUTTING SOLUTIONS BY CERATIZIT

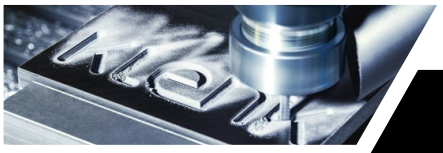
SPECIALIST FOR INDEXABLE INSERT TOOLS
FOR TURNING, MILLING AND GROOVING



KOMET

THE QUALITY LABEL FOR
EFFICIENT BORE PRODUCTION

EXPERTS FOR ROTATING TOOLS,
TOOL HOLDERS AND CLAMPING SOLUTIONS



KLENK

CUTTING TOOLS
FOR THE AEROSPACE INDUSTRY

# SilverLine

Ultimate, universal, ultra-quick

DRAGONSKIN

## SilverLine is now even stronger with Dragonskin!

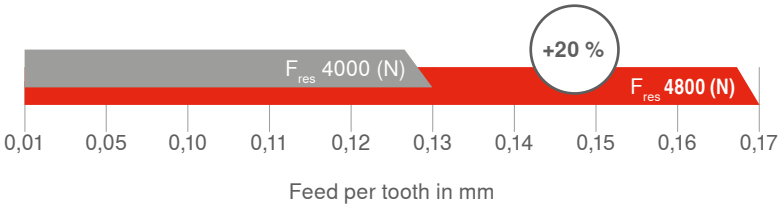
Simply spectacular! In the new, expanded SilverLine generation, we have really tightened up the performance. Thanks to the legendary Dragonskin coating and the optimised geometry, you can now machine a variety of materials even more efficiently.

The ultimate all-rounders increase your productivity, giving you maximum flexibility and a valuable competitive edge. Take advantage of this opportunity and start using the new SilverLine high-performance milling cutters now.

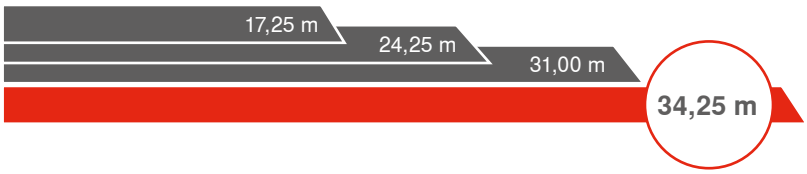
## Test Report

| | | |
|---|---|---|
| Material number | 1.2379 | SilverLine – New |
| $v_c$ | 160 m/min | SilverLine – Old |
| Diameter | 10 mm | Competitor |

**Break test**

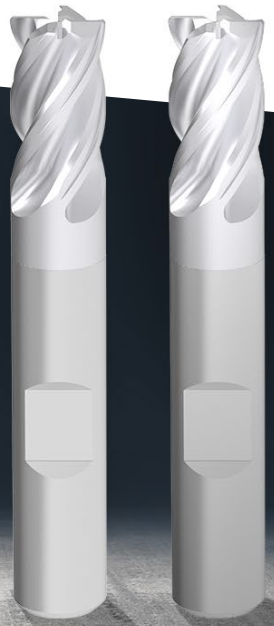



**Tool life in m**




> Initially we were very sceptical, but switching to the SilverLine was one of our best decisions. Since then our productivity has taken a great leap forwards.

Managing Director Heinz Knöpfle GmbH, Christian Knöpfle



# The new SilverLine

You won't see the difference –
**you'll feel it!**

# The upgrade – feel the difference!

Increased process security

## Optimised core geometry

- Less vibration even with high angles of contact
- Significantly increased fracture resistance

Improved performance

## Latest Dragonskin coating

- Processing of almost all materials
- Increased temperature resistance
- Wet and dry machining

Increased stability

## Improved chip clearance

- Smoother processing
- Lower forces during chip formation
- Reduced heat generation

More flexibility

## Expanded product range

- Greater range of diameters
- Increased range of flute options
- HA shank options
- Versions with thro' coolant
- Roughing-finishing milling cutters
- Rough milling cutters
- Full slot milling cutters

> The test results speak for themselves: Our tried-and-tested SilverLine is far exceeded by the upgrade in terms of performance and service life. The new milling cutters give our customers a unique competitive edge.

Product Manager CERATIZIT, Michael Wucher

... and it still mills!

# Product programme

## Endmill

▲ also with thro' coolant

N

z 2–4

Ø DC mm 3–20

HA

HB

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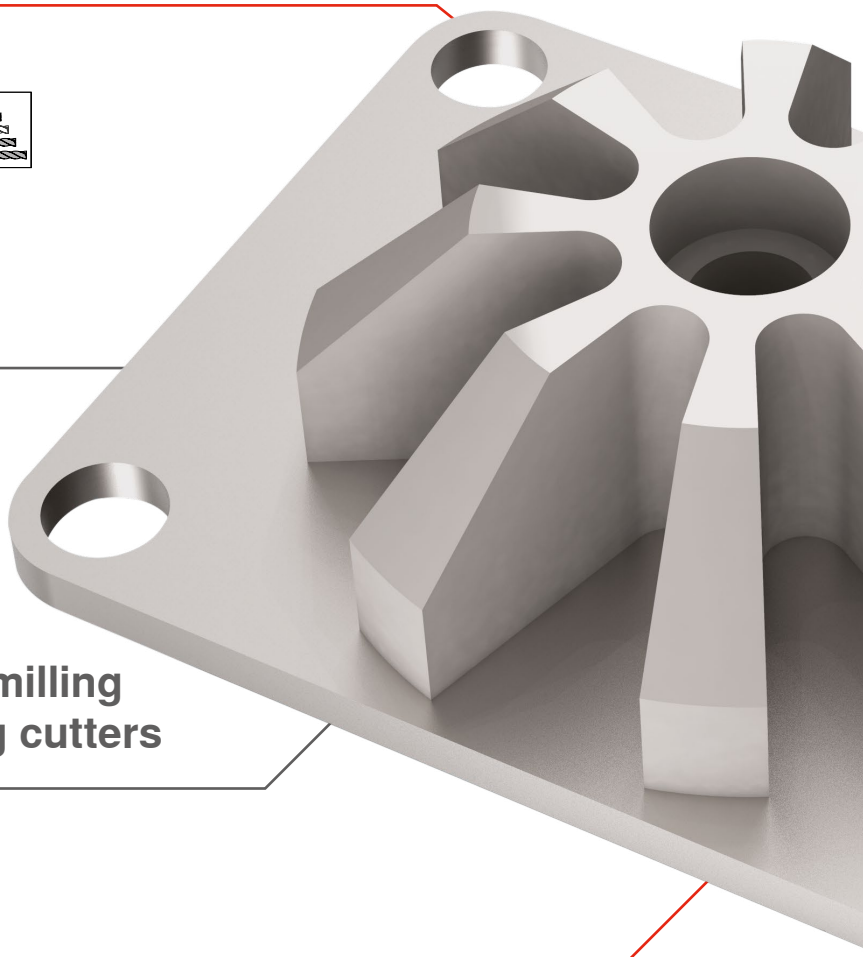


## Roughing-finishing milling cutters/rough milling cutters

NF

NR

z 4

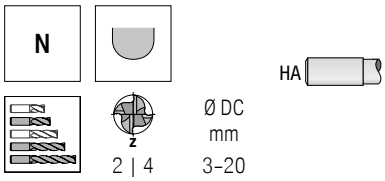
Ø DC mm 3–20

HB

→ Page 55+56

Our product video for the SilverLine can be found here:
cuttingtools.ceratizit.com/gb/en/silverline

## Ball nose end milling cutters

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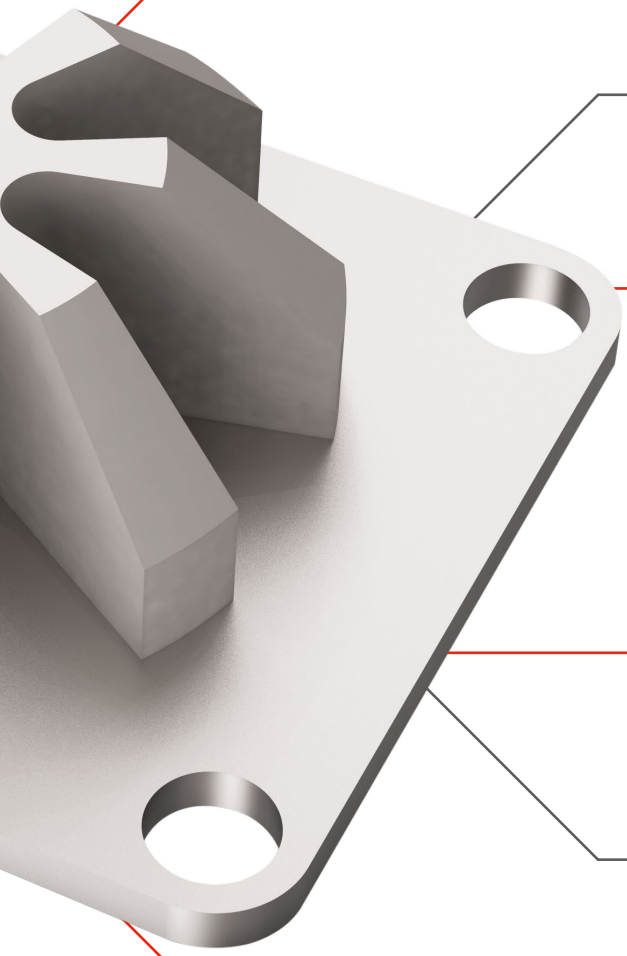
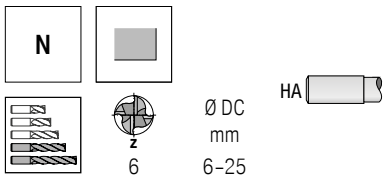


## High-precision finish milling cutters

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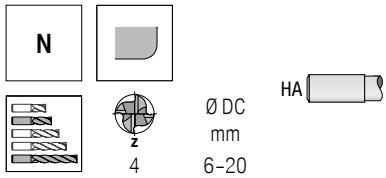
## Torus face cutters

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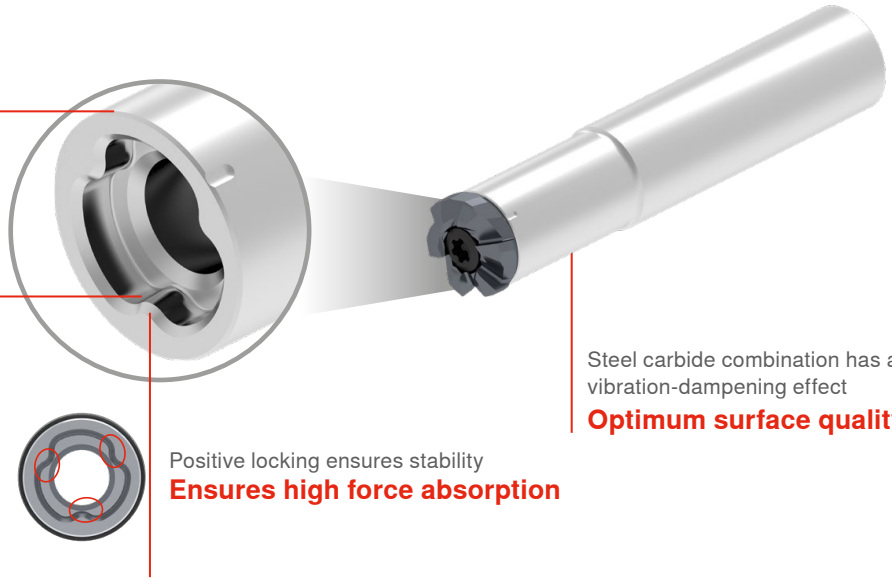
# MultiLock

## The exchangeable head system for advanced performance

Conventional exchangeable head systems as a cost-effective alternative to solid carbide milling cutters are now obsolete. With MultiLock, we have developed an advanced exchangeable head system that performs much better than comparable products due to its precision-sintered, positive-locking interface. Thanks to our wide range of adapters, your work can be extremely flexible, economical and resource-efficient. So you no longer have to make any compromises. If you want an exchangeable head system, choose MultiLock.

Further information on the product can be found on page 81–84

# OPTIMUM PERFORMANCE THANKS TO UNIQUE INTERFACE TECHNOLOGY



High-precision interface
**For longer tool service life**

Flat, stable interface with face contact
**High stability and very resource-efficient**

Steel carbide combination has a vibration-dampening effect
**Optimum surface quality**

Positive locking ensures stability
**Ensures high force absorption**

**+ Wide product range for standard applications**

*Torus end milling cutters*

*High Feed Cutter*

*Ball nose end milling cutters*

*Deburring cutters*

DRAGONSKIN

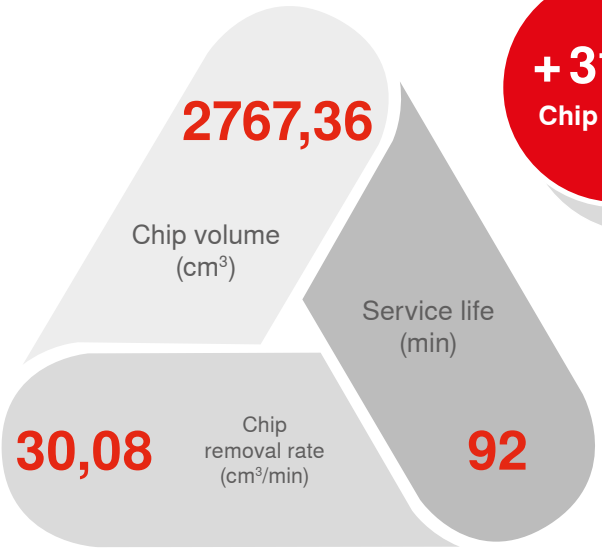
*Our exchangeable heads are coated with the innovative Dragonskin technology, and therefore are particularly high-performance.*

## Test report on the phenomenal service life of MultiLock

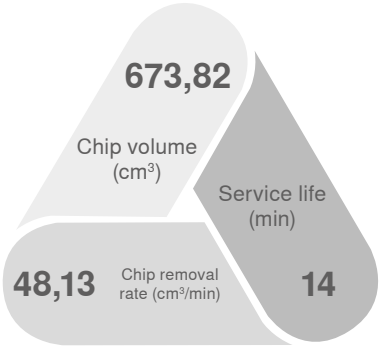
Material: 1.2379

**+310 %**
**Chip volume**

Excellent performance thanks to perfectly adapted cutting data values on the interface and cutting edge geometry.




**MultiLock**




**Competitor**

# The multi-application grade

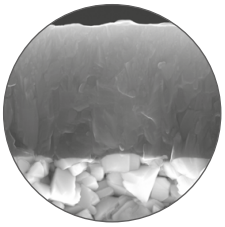
## Many materials, many requirements... ... only one indexable insert!

CUTTING SOLUTIONS BY CERATIZIT

**Features**

- CTPX710 is the first multi-application grade for turning from CERATIZIT. It impresses thanks to outstanding performance in the processing of steel, stainless steel, super alloys and non-ferrous metals.
- The AlTiN coating revamped with Dragonskin technology in connection with the optimised microstructure and a special fine-grained carbide ensure this grade can be used for a wide range of applications.
- From now on, users wanting to process several materials only need one grade: the CTPX710. You not only benefit from the universal application options and the excellent machining characteristics. With this grade, you also avoid incorrect applications and improve the clarity of your tool selection.

DRAGONSKIN



The perfect combination of state-of-the-art high-performance substrates and advanced coating structure achieves high cutting speeds and increased process security.

- **The Dragonskin technology guarantees a revolutionary smooth coating without imperfections, resulting in perfect removal of the chips.**
- **The extremely high layer thickness precision guarantees ultimate precision of shape and dimensional stability in the indexable insert.**

> Our X7 Line impresses with universal application options and a wide range of uses.
>
> CERATIZIT Product Manager, Stefan Karl

Further information on the product can be found on page 29–40

## Grade description

# CTP X7 10/15

**Main application – material**

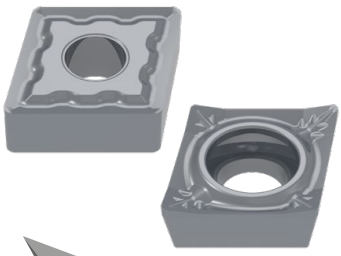
| | |
|---|---|
| P | Steel |
| M | Stainless steel |
| K | Cast iron |
| N | Light and non ferrous metals |
| S | Super alloys, titanium |
| H | Hard materials |
| X | Universal application |

**Application**

| | |
|---|---|
| 1 | Turning |
| 2 | Milling |
| 3 | Grooving |
| 4 | Drilling |
| 5 | Thread turning |
| 6 | Others |
| 7 | Multiple procedures* |

**Degree of hardness**

| | |
|---|---|
| 10 | ISO 10 |
| 15 | ISO 15 |
| ... | |



Universal application range

P M K N S

*In future multiple procedures possible turning | grooving | milling

# DRAGONSKIN

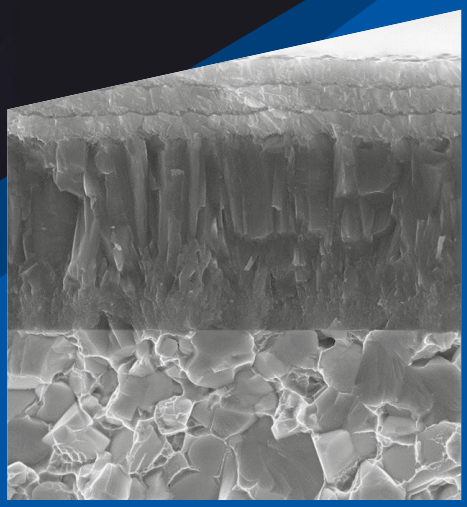
by CERATIZIT

## The latest generation of coating technology

Decades of experience coupled to consistent and constant development are in the unique Dragonskin coating technology. Thanks to our innovative design and expertise in powder metallurgy, we – and above all you – achieve an unmatched level of performance in machining.

Like the Dragon's invulnerability, Dragonskin Coating Technology offers the highest levels of protection against wear and is designed with its impermeable layer for the most adverse requirements. The result is an extremely hard and durable surface with a satin finish.

The perfect combination of state-of-the-art high-performance substrates and new coating structures enable high cutting speeds and increased process reliability. **A proven – up to 80 % – increased performance** through the latest Dragonskin coating technology offers you a significant competitive advantage.



Dragonskin Coating

## Dragonskin – The coatings for the highest performance

The product category Dragonskin is intended to help make tools easily recognizable and quick to find using CERATIZIT's high-performance coating technology. All products that are marked with the Dragonskin icon represent unmatchable performance, maximum tool life and maximum process reliability.

# SilverLine

## Ultimate, universal, ultra-quick

## Solid Carbide milling cutters

SilverLine – the next level 44–79

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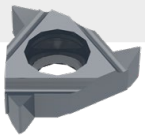

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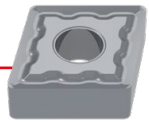

## Solid Carbide milling cutters

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## Adapters

Precision chuck 100–103

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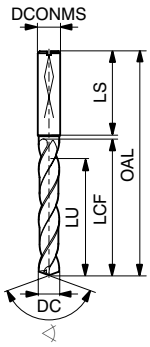
Continue to the product pages

# WTX – High Speed Drill, DIN 6537

- For corrosion and acid-resistant steels
- Developed for high cutting speeds
- Three guide lands for low friction

≤ 12xD

NOF = 2




Speed VA

Ti800

135°

Solid carbide

| DC m7 | DCONMS h6 | OAL | LCF | LU | LS | NEW T4 Article no. 10 774 ... | |
|---|---|---|---|---|---|---|---|
| mm | mm | mm | mm | mm | mm | £ | |
| 3.00 | 6 | 92 | 54 | 48 | 36 | 169.10 | 03000 |
| 3.10 | 6 | 92 | 54 | 48 | 36 | 169.10 | 03100 |
| 3.20 | 6 | 92 | 54 | 48 | 36 | 169.10 | 03200 |
| 3.30 | 6 | 92 | 54 | 48 | 36 | 169.10 | 03300 |
| 3.40 | 6 | 92 | 54 | 48 | 36 | 169.10 | 03400 |
| 3.50 | 6 | 92 | 54 | 48 | 36 | 169.10 | 03500 |
| 3.60 | 6 | 92 | 54 | 48 | 36 | 169.10 | 03600 |
| 3.70 | 6 | 92 | 54 | 48 | 36 | 169.10 | 03700 |
| 3.80 | 6 | 102 | 64 | 58 | 36 | 169.10 | 03800 |
| 3.90 | 6 | 102 | 64 | 58 | 36 | 169.10 | 03900 |
| 4.00 | 6 | 102 | 64 | 58 | 36 | 169.10 | 04000 |
| 4.10 | 6 | 102 | 64 | 58 | 36 | 169.10 | 04100 |
| 4.20 | 6 | 102 | 64 | 58 | 36 | 169.10 | 04200 |
| 4.30 | 6 | 102 | 64 | 58 | 36 | 169.10 | 04300 |
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| 4.50 | 6 | 102 | 64 | 58 | 36 | 169.10 | 04500 |
| 4.60 | 6 | 102 | 64 | 58 | 36 | 169.10 | 04600 |
| 4.70 | 6 | 102 | 64 | 58 | 36 | 169.10 | 04700 |
| 4.80 | 6 | 116 | 78 | 70 | 36 | 169.10 | 04800 |
| 4.90 | 6 | 116 | 78 | 70 | 36 | 169.10 | 04900 |
| 5.00 | 6 | 116 | 78 | 70 | 36 | 169.10 | 05000 |
| 5.10 | 6 | 116 | 78 | 70 | 36 | 169.10 | 05100 |
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| 5.60 | 6 | 116 | 78 | 70 | 36 | 169.10 | 05600 |
| 5.70 | 6 | 116 | 78 | 70 | 36 | 169.10 | 05700 |
| 5.80 | 6 | 116 | 78 | 70 | 36 | 169.10 | 05800 |
| 5.90 | 6 | 116 | 78 | 70 | 36 | 169.10 | 05900 |
| 6.00 | 6 | 116 | 78 | 70 | 36 | 169.10 | 06000 |
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| 6.20 | 8 | 146 | 108 | 94 | 36 | 194.28 | 06200 |
| 6.30 | 8 | 146 | 108 | 94 | 36 | 194.28 | 06300 |
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| 9.30 | 10 | 162 | 120 | 110 | 40 | 253.37 | 09300 |
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| 9.50 | 10 | 162 | 120 | 110 | 40 | 253.37 | 09500 |
| 9.60 | 10 | 162 | 120 | 110 | 40 | 253.37 | 09600 |
| 9.70 | 10 | 162 | 120 | 110 | 40 | 253.37 | 09700 |
| 9.80 | 10 | 162 | 120 | 110 | 40 | 253.37 | 09800 |
| 9.90 | 10 | 162 | 120 | 110 | 40 | 253.37 | 09900 |
| 10.00 | 10 | 162 | 120 | 110 | 40 | 253.37 | 10000 |
| 10.10 | 12 | 204 | 156 | 142 | 45 | 345.33 | 10100 |
| 10.20 | 12 | 204 | 156 | 142 | 45 | 345.33 | 10200 |
| 10.30 | 12 | 204 | 156 | 142 | 45 | 345.33 | 10300 |
| 10.40 | 12 | 204 | 156 | 142 | 45 | 345.33 | 10400 |
| 10.50 | 12 | 204 | 156 | 142 | 45 | 345.33 | 10500 |
| 10.60 | 12 | 204 | 156 | 142 | 45 | 345.33 | 10600 |
| 10.70 | 12 | 204 | 156 | 142 | 45 | 345.33 | 10700 |
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| 10.90 | 12 | 204 | 156 | 142 | 45 | 345.33 | 10900 |
| 11.00 | 12 | 204 | 156 | 142 | 45 | 345.33 | 11000 |
| 11.10 | 12 | 204 | 156 | 142 | 45 | 345.33 | 11100 |
| 11.20 | 12 | 204 | 156 | 142 | 45 | 345.33 | 11200 |
| 11.30 | 12 | 204 | 156 | 142 | 45 | 345.33 | 11300 |
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| 11.50 | 12 | 204 | 156 | 142 | 45 | 345.33 | 11500 |
| 11.60 | 12 | 204 | 156 | 142 | 45 | 345.33 | 11600 |
| 11.70 | 12 | 204 | 156 | 142 | 45 | 345.33 | 11700 |
| 11.80 | 12 | 204 | 156 | 142 | 45 | 345.33 | 11800 |
| 11.90 | 12 | 204 | 156 | 142 | 45 | 345.33 | 11900 |
| 12.00 | 12 | 204 | 156 | 142 | 45 | 345.33 | 12000 |
| 12.20 | 14 | 230 | 182 | 166 | 45 | 490.77 | 12200 |
| 12.50 | 14 | 230 | 182 | 166 | 45 | 490.77 | 12500 |
| 12.80 | 14 | 230 | 182 | 166 | 45 | 490.77 | 12800 |
| 13.00 | 14 | 230 | 182 | 166 | 45 | 490.77 | 13000 |
| 13.50 | 14 | 230 | 182 | 166 | 45 | 490.77 | 13500 |
| 13.80 | 14 | 230 | 182 | 166 | 45 | 490.77 | 13800 |
| 14.00 | 14 | 230 | 182 | 166 | 45 | 490.77 | 14000 |
| 14.20 | 16 | 260 | 208 | 192 | 48 | 629.66 | 14200 |
| 14.50 | 16 | 260 | 208 | 192 | 48 | 629.66 | 14500 |
| 15.00 | 16 | 260 | 208 | 192 | 48 | 629.66 | 15000 |
| 15.10 | 16 | 260 | 208 | 192 | 48 | 629.66 | 15100 |
| 15.20 | 16 | 260 | 208 | 192 | 48 | 629.66 | 15200 |
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| 15.80 | 16 | 260 | 208 | 192 | 48 | 629.66 | 15800 |
| 16.00 | 16 | 260 | 208 | 192 | 48 | 629.66 | 16000 |
| 17.00 | 18 | 285 | 234 | 216 | 48 | 865.83 | 17000 |
| 17.50 | 18 | 285 | 234 | 216 | 48 | 865.83 | 17500 |

| | |
|---|---|
| Steel | ○ |
| Stainless steel | ● |
| Cast iron | ○ |
| Non ferrous metals | ○ |
| Heat resistant alloys | ○ |

# Cutting data standard values – WTX – Speed VA

| | Index | Material | Strength N/mm² / HB / HRC | Drilling depth 12xD Speed VA 10 774 ... $v_c$ m/min with through coolant | Ø 3–5 f mm/rev. | Ø 5–8 f mm/rev. | Ø 8–12 f mm/rev. | Ø 12–16 f mm/rev. | Ø 16–20 f mm/rev. |
|---|---|---|---|---|---|---|---|---|---|
| P | 1.1 | General construction steel | < 800 N/mm² | 200 | 0,10 | 0,13 | 0,17 | 0,20 | 0,23 |
| | 1.2 | Free cutting steel | < 800 N/mm² | 240 | 0,17 | 0,21 | 0,27 | 0,33 | 0,37 |
| | 1.3 | Hardened steel, non alloyed | < 800 N/mm² | 200 | 0,13 | 0,17 | 0,21 | 0,26 | 0,29 |
| | 1.4 | Alloyed hardened steel | < 1000 N/mm² | 160 | 0,11 | 0,14 | 0,19 | 0,23 | 0,25 |
| | 1.5 | Tempering steel, unalloyed | < 850 N/mm² | 180 | 0,13 | 0,17 | 0,21 | 0,26 | 0,29 |
| | 1.6 | Tempering steel, unalloyed | < 1000 N/mm² | 160 | 0,11 | 0,14 | 0,19 | 0,23 | 0,25 |
| | 1.7 | Tempering steel, alloyed | < 800 N/mm² | 160 | 0,11 | 0,14 | 0,19 | 0,23 | 0,25 |
| | 1.8 | Tempering steel, alloyed | < 1300 N/mm² | 120 | 0,09 | 0,12 | 0,15 | 0,18 | 0,21 |
| | 1.9 | Steel castings | < 850 N/mm² | 180 | 0,13 | 0,17 | 0,21 | 0,26 | 0,29 |
| | 1.10 | Nitriding steel | < 1000 N/mm² | 120 | 0,09 | 0,12 | 0,15 | 0,18 | 0,21 |
| | 1.11 | Nitriding steel | < 1200 N/mm² | 100 | 0,08 | 0,11 | 0,14 | 0,16 | 0,18 |
| | 1.12 | Roller bearing steel | < 1200 N/mm² | 120 | 0,09 | 0,12 | 0,15 | 0,18 | 0,21 |
| | 1.13 | Spring steel | < 1200 N/mm² | 120 | 0,09 | 0,12 | 0,15 | 0,18 | 0,21 |
| | 1.14 | High-speed steel | < 1300 N/mm² | 100 | 0,08 | 0,11 | 0,14 | 0,16 | 0,18 |
| | 1.15 | Cold working tool steel | < 1300 N/mm² | 100 | 0,09 | 0,12 | 0,15 | 0,18 | 0,21 |
| | 1.16 | Hot working tool steel | < 1300 N/mm² | 100 | 0,09 | 0,12 | 0,15 | 0,18 | 0,21 |
| M | 2.1 | Cast steel and sulphured stainless steel | < 850 N/mm² | **90** | 0,10 | 0,13 | 0,17 | 0,20 | 0,23 |
| | 2.2 | Stainless steel, ferritic | < 750 N/mm² | **75** | 0,08 | 0,11 | 0,14 | 0,18 | 0,20 |
| | 2.3 | Stainless steel, martensitic | < 900 N/mm² | **90** | 0,08 | 0,10 | 0,13 | 0,16 | 0,18 |
| | 2.4 | Stainless steel, ferritic / martensitic | <1100 N/mm² | **60** | 0,08 | 0,10 | 0,13 | 0,16 | 0,18 |
| | 2.5 | Stainless steel, austenitic / ferritic | < 850 N/mm² | **65** | 0,08 | 0,10 | 0,13 | 0,16 | 0,18 |
| | 2.6 | Stainless steel, austenitic | < 750 N/mm² | **75** | 0,08 | 0,11 | 0,14 | 0,18 | 0,20 |
| | 2.7 | Heat resistant steel | < 1100 N/mm² | **50** | 0,07 | 0,09 | 0,12 | 0,14 | 0,16 |
| K | 3.1 | Grey cast iron with lamellar graphite | 100–350 N/mm² | 140 | 0,17 | 0,22 | 0,28 | 0,34 | 0,38 |
| | 3.2 | Grey cast iron with lamellar graphite | 300–500 N/mm² | 100 | 0,15 | 0,20 | 0,25 | 0,30 | 0,34 |
| | 3.3 | Gray cast iron with spheroidal graphite | 300–500 N/mm² | 120 | 0,19 | 0,25 | 0,32 | 0,38 | 0,43 |
| | 3.4 | Gray cast iron with spheroidal graphite | 500–900 N/mm² | 75 | 0,15 | 0,20 | 0,25 | 0,30 | 0,34 |
| | 3.5 | White malleable cast iron | 270–450 N/mm² | 170 | 0,22 | 0,28 | 0,35 | 0,42 | 0,48 |
| | 3.6 | White malleable cast iron | 500–650 N/mm² | 140 | 0,19 | 0,25 | 0,32 | 0,38 | 0,43 |
| | 3.7 | Black malleable cast iron | 300–450 N/mm² | 170 | 0,19 | 0,25 | 0,32 | 0,38 | 0,43 |
| | 3.8 | Black malleable cast iron | 500–800 N/mm² | 140 | 0,15 | 0,20 | 0,25 | 0,30 | 0,34 |
| N | 4.1 | Aluminium (non alloyed, low alloyed) | < 350 N/mm² | | | | | | |
| | 4.2 | Aluminium alloys < 0.5 % Si | < 500 N/mm² | | | | | | |
| | 4.3 | Aluminium alloy 0.5–10 % Si | < 400 N/mm² | | | | | | |
| | 4.4 | Aluminium alloys 10–15 % Si | < 400 N/mm² | | | | | | |
| | 4.5 | Aluminum alloys > 15 % Si | < 400 N/mm² | | | | | | |
| | 4.6 | Copper (non alloyed, low alloyed) | < 350 N/mm² | | | | | | |
| | 4.7 | Copper wrought alloys | < 700 N/mm² | | | | | | |
| | 4.8 | Special copper alloys | < 200 HB | | | | | | |
| | 4.9 | Special copper alloys | < 300 HB | | | | | | |
| | 4.10 | Special copper alloys | > 300 HB | | | | | | |
| | 4.11 | Short-chipping brass, bronze, red bronze | < 600 N/mm² | 200 | 0,24 | 0,31 | 0,39 | 0,47 | 0,54 |
| | 4.12 | Long-chipping brass | < 600 N/mm² | 200 | 0,21 | 0,27 | 0,35 | 0,42 | 0,47 |
| | 4.13 | Thermoplastics | | | | | | | |
| | 4.14 | Duroplastics | | | | | | | |
| | 4.15 | Fibre-reinforced plastics | | | | | | | |
| | 4.16 | Magnesium and magnesium alloys | < 850 N/mm² | | | | | | |
| | 4.17 | Graphite | | | | | | | |
| | 4.18 | Tungsten and tungsten alloys | | | | | | | |
| | 4.19 | Molybdenum and molybdenum alloys | | | | | | | |
| S | 5.1 | Pure nickel | | 50 | 0,06 | 0,08 | 0,10 | 0,12 | 0,13 |
| | 5.2 | Nickel alloys | | 25 | 0,06 | 0,08 | 0,10 | 0,12 | 0,13 |
| | 5.3 | Nickel alloys | < 850 N/mm² | 25 | 0,06 | 0,08 | 0,10 | 0,12 | 0,13 |
| | 5.4 | Nickel molybdenum alloys | | 25 | 0,06 | 0,08 | 0,10 | 0,12 | 0,13 |
| | 5.5 | Nickel-chromium alloys | < 1300 N/mm² | 25 | 0,06 | 0,08 | 0,10 | 0,12 | 0,13 |
| | 5.6 | Cobalt Chrome Alloys | < 1300 N/mm² | 25 | 0,06 | 0,08 | 0,10 | 0,12 | 0,13 |
| | 5.7 | Heat resistant alloys | < 1300 N/mm² | 50 | 0,06 | 0,08 | 0,10 | 0,12 | 0,13 |
| | 5.8 | Nickel-cobalt-chromium alloys | < 1400 N/mm² | 15 | 0,06 | 0,08 | 0,10 | 0,12 | 0,13 |
| | 5.9 | Pure titanium | < 900 N/mm² | 50 | 0,12 | 0,16 | 0,20 | 0,25 | 0,28 |
| | 5.10 | Titanium alloys | < 700 N/mm² | 40 | 0,15 | 0,19 | 0,25 | 0,31 | 0,35 |
| | 5.11 | Titanium alloys | < 1200 N/mm² | 40 | 0,12 | 0,16 | 0,20 | 0,25 | 0,28 |
| H | 6.1 | Tempered steel | < 45 HRC | | | | | | |
| | 6.2 | | 46–55 HRC | | | | | | |
| | 6.3 | | 56–60 HRC | | | | | | |
| | 6.4 | | 61–65 HRC | | | | | | |
| | 6.5 | | 65–70 HRC | | | | | | |

The cutting data depends extremely on the external conditions, the material and machine type. The indicated values are possible values which have to be increased or reduced according to the application conditions.

# Table of contents


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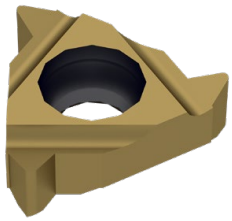
|---|---|
| Overview + explanation of symbols | 18 |
| Inserts | 19–23 |
| Tool holder | 24 |
| Technical Information | |
| Cutting data + grade description | 25+26 |


## WNT \ Performance

Premium quality tools for high performance.

The premium quality tools from the **WNT Performance** product line have been designed for specific applications and are distinguished by their outstanding performance. If you make high demands on the performance of your production and want to achieve the very best results, we recommend the Premium tools in this product line.



### Mini 08

Full profile

M

21

Partial profile

60°

21+22

55°

22+23

### Mini 06

Full profile

M

19

BSW

19

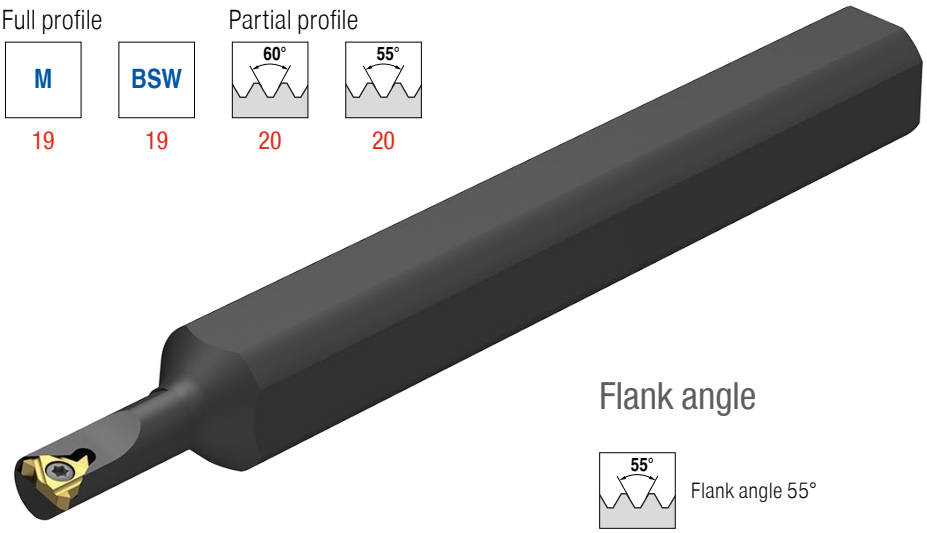
Partial profile

60°

20

55°

20



### Flank angle

55° Flank angle 55°

60° Flank angle 60°

### Tool holder

Size 06

24

Size 08

24

### Threading

M ISO metric coarse thread DIN 13

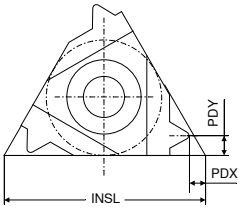
BSW British Whitworth thread BS 84

# Right hand internal thread turning insert – Mini size 06

▲ Full profile
▲ Thread production from diameter 6mm

M | 60°

CCN2520



| Designation | TP mm | PDX mm | PDY mm | INSL mm | IR NEW X3 Article no. 71 224 ... £ | |
|---|---|---|---|---|---|---|
| 06 IR 0,5 | 0.50 | 0.9 | 0.5 | 6 | 26.57 | 35700 |
| 06 IR 0,75 | 0.75 | 0.8 | 0.5 | 6 | 26.57 | 36100 |
| 06 IR 1,0 | 1.00 | 0.7 | 0.6 | 6 | 25.01 | 36500 |
| 06 IR 1,25 | 1.25 | 0.6 | 0.6 | 6 | 26.57 | 36700 |

| | |
|---|---|
| Steel | |
| Stainless steel | ● |
| Cast iron | |
| Non ferrous metals | |
| Heat resistant alloys | ● |

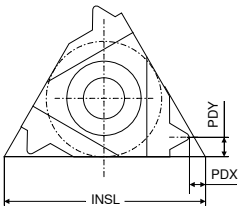
→ $v_c$ Page 26

# Right hand internal thread turning insert – Mini size 06

▲ Full profile
▲ Thread production from diameter 6mm

BSW | 55°

CCN2520 CCN1525



| Designation | TPI 1/" | PDX mm | PDY mm | INSL mm | IR NEW X3 Article no. 71 230 ... £ | | IR NEW X3 Article no. 71 230 ... £ | |
|---|---|---|---|---|---|---|---|---|
| 06 IR 26 | 26 | 0.7 | 0.6 | 6 | | | 22.80 | 13500 |
| 06 IR 26 | 26 | 0.6 | 0.6 | 6 | 26.57 | 33500 | | |
| 06 IR 22 | 22 | 0.6 | 0.6 | 6 | 26.57 | 33100 | 22.80 | 13100 |
| 06 IR 20 | 20 | 0.6 | 0.6 | 6 | 26.57 | 32900 | | |
| 06 IR 20 | 20 | 0.6 | 0.7 | 6 | | | 22.80 | 12900 |
| 06 IR 18 | 18 | 0.6 | 0.6 | 6 | 26.57 | 32500 | | |
| 06 IR 18 | 18 | 0.6 | 0.7 | 6 | | | 22.80 | 12500 |

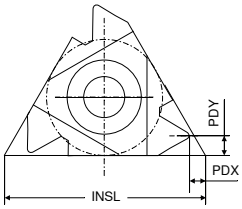
| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | ● | ● |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | ● | |

→ $v_c$ Page 26

# Right hand internal thread turning insert – Mini size 06

▲ Partial profile
▲ Thread production from diameter 6mm

CCN2520



| Designation | TP | INSL | PDX | PDY | IR NEW X3 Article no. 71 272 ... £ | |
|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | | |
| 06 IR A60 | 0,5 - 1,25 | 6 | 0.6 | 0.6 | 26.57 | 30000 |

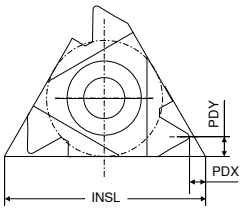
| | |
|---|---|
| Steel | |
| Stainless steel | ● |
| Cast iron | |
| Non ferrous metals | |
| Heat resistant alloys | ● |

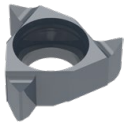
→ $v_c$ Page 26

# Right hand internal thread turning insert – Mini size 06

▲ Partial profile
▲ Thread production from diameter 6mm

CCN2520 CCN1525



| Designation | TPI | INSL | PDX | PDY | IR NEW X3 Article no. 71 272 ... £ | | IR NEW X3 Article no. 71 272 ... £ | |
|---|---|---|---|---|---|---|---|---|
| | 1/" | mm | mm | mm | | | | |
| 06 IR A55 | 48 - 20 | 6 | 0.5 | 0.6 | 26.57 | 30100 | 22.80 | 10100 |

| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | ● | ● |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | ● | |

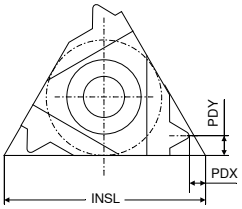
→ $v_c$ Page 26

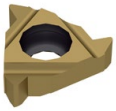
# Right hand internal thread turning insert – Mini size 08

▲ Full profile
▲ Thread production from diameter 8mm

M | 60°

CCN2520 | CCN1525





| Designation | TP mm | PDX mm | PDY mm | INSL mm | IR NEW X3 Article no. 71 224 ... £ | | IR NEW X3 Article no. 71 224 ... £ | |
|---|---|---|---|---|---|---|---|---|
| 08 IR 0,5 | 0.50 | 0.6 | 0.5 | 8 | 26.57 | 34300 | 26.57 | 14300 |
| 08 IR 0,75 | 0.75 | 0.6 | 0.5 | 8 | 26.57 | 33700 | 26.57 | 13700 |
| 08 IR 1,0 | 1.00 | 0.6 | 0.6 | 8 | 25.01 | 33300 | 26.57 | 13300 |
| 08 IR 1,25 | 1.25 | 0.6 | 0.7 | 8 | 26.57 | 33100 | 26.57 | 13100 |
| 08 IR 1,5 | 1.50 | 0.6 | 0.7 | 8 | 25.01 | 32900 | 26.57 | 12900 |
| 08 IR 1,75 | 1.75 | 0.6 | 0.8 | 8 | 26.57 | 32700 | 26.57 | 12700 |
| 08 IN 2,0 | 2.00 | 1.0 | 4.0 | 8 | 31.80 | 32500 1) | | |
| 08 IN 2,0 | 2.00 | 0.9 | 4.0 | 8 | | | 26.57 | 12500 1) |

| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | ● | ● |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | ● | |

1) Neutral version (N)

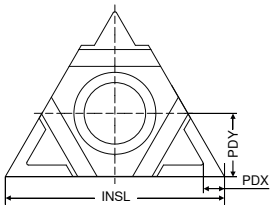
→ $v_c$ Page 26

# Right hand internal thread turning insert – Mini size 08

▲ Partial profile
▲ Thread production from diameter 8mm

60°

CCN2520 | CCN1525



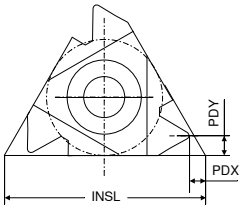
| Designation | TP mm | PDX mm | PDY mm | INSL mm | IN NEW X3 Article no. 71 273 ... £ | | IN NEW X3 Article no. 71 273 ... £ | |
|---|---|---|---|---|---|---|---|---|
| 08 IN M60 | 1,75 - 2,0 | 0.8 | 4 | 8 | 31.80 | 30800 | 26.57 | 10800 |

| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | ● | ● |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | ● | |

→ $v_c$ Page 26

# Right hand internal thread turning insert – Mini size 08

▲ Partial profile
▲ Thread production from diameter 8mm




CCN2520

CCN1525

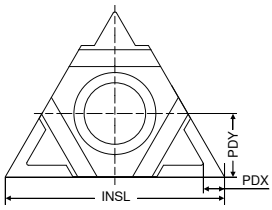
| Designation | TP | PDX | PDY | INSL | IR NEW X3 Article no. 71 272 ... £ | | IR NEW X3 Article no. 71 272 ... £ | |
|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | | | | |
| **08 IR A60** | 0,5 - 1,25 | 0.6 | 0.6 | 8 | | | 26.57 | **10600** |
| **08 IR A60** | 0,5 - 1,5 | 0.6 | 0.7 | 8 | 26.57 | **30600** | | |

| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | ● | ● |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | ● | |

→ $v_c$ Page 26

# Right hand internal thread turning insert – Mini size 08

▲ Partial profile
▲ Thread production from diameter 8mm




CCN2520

CCN1525

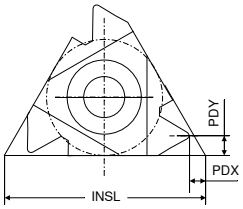
| Designation | TPI | INSL | PDX | PDY | IN NEW X3 Article no. 71 273 ... £ | | IN NEW X3 Article no. 71 273 ... £ | |
|---|---|---|---|---|---|---|---|---|
| | 1/" | mm | mm | mm | | | | |
| **08 IN M55** | 14 - 11 | 8 | 0.9 | 4 | 31.80 | **30900** | 26.57 | **10900** |

| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | ● | ● |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | ● | |

→ $v_c$ Page 26

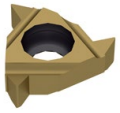
# Right hand internal thread turning insert – Mini size 08

- Partial profile
- Thread production from diameter 8mm




CCN2520

CCN1525

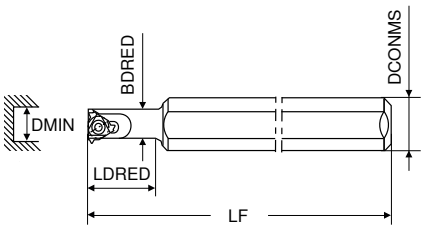


| Designation | TPI | INSL | PDX | PDY | IR NEW X3 Article no. 71 272 ... | | IR NEW X3 Article no. 71 272 ... | |
|---|---|---|---|---|---|---|---|---|
| | 1/" | mm | mm | mm | £ | | £ | |
| **08 IR A55** | 48 - 16 | 8 | 0.6 | 0.7 | 26.57 | **30700** | 26.57 | **10700** |

| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | ● | ● |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | ● | |

→ $v_c$ Page 26

# Right Hand Internal Thread Holder – Mini size 06



| Designation | LF mm | LDRED mm | DCONMS mm | BDRED mm | DMIN mm | Insert | Right-hand NEW Y2 Article no. 71 282 ... £ | |
|---|---|---|---|---|---|---|---|---|
| **SI R 0005 H06** | 100 | 12 | 12 | 5.1 | 6 | 06 .. | 190.68 | **00500** |
| **SI R 0005 H06 C** | 100 | 26 | 6 | 5.1 | 6 | 06 .. | 339.97 | **10500** [1] |

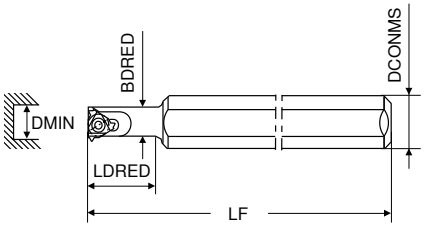
1) Solid Carbide Shank with Thro' Coolant

Y2

Clamping screw

| Spare parts for Article no. | Article no. 71 950 ... £ | |
|---|---|---|
| 71 282 00500 | 1.86 | **23800** |
| 71 282 10500 | 1.86 | **23800** |

# Right Hand Internal Thread Holder – Mini size 08



| Designation | LF mm | LDRED mm | DCONMS mm | BDRED mm | DMIN mm | Insert | Right-hand NEW Y2 Article no. 71 282 ... £ | |
|---|---|---|---|---|---|---|---|---|
| **SI R 0007 K08** | 125 | 18 | 16 | 6.6 | 7.8 | 08 .. | 190.68 | **00700** |
| **SI R 0007 K08U** | 125 | 21 | 16 | 7.3 | 9.0 | 08 .N | 217.01 | **00800** [1] |
| **SI R 0007 K08C** | 125 | 30 | 8 | 6.6 | 7.8 | 08 .. | 385.83 | **10700** [2] |

1) Neutral insert indicated by marking (N)
2) Solid Carbide Shank with Thro' Coolant

Y2

Clamping screw

| Spare parts for Article no. | Article no. 71 950 ... £ | |
|---|---|---|
| 71 282 00700 | 1.96 | **23900** |
| 71 282 00800 | 1.96 | **23900** |
| 71 282 10700 | 1.96 | **23900** |

# Material examples referring to the cutting data tables

| | Index | Material | Strength N/mm² / HB / HRC | Material number | Material designation | Material number | Material designation | Material number | Material designation |
|---|---|---|---|---|---|---|---|---|---|
| P | 1.1 | General construction steel | < 800 N/mm² | 1.0402 | EN3B | | | | |
| | 1.2 | Free cutting steel | < 800 N/mm² | 1.0711 | EN1A | | | | |
| | 1.3 | Hardened steel, non alloyed | < 800 N/mm² | 1.0401 | EN32C | | | | |
| | 1.4 | Alloyed hardened steel | < 1000 N/mm² | 1.7325 | 25 CD4 | | | | |
| | 1.5 | Tempering steel, unalloyed | < 850 N/mm² | 1.5752 | EN36 | 1.0535 | EN9 | | |
| | 1.6 | Tempering steel, unalloyed | < 1000 N/mm² | 1.6582 | EN24 | | | | |
| | 1.7 | Tempering steel, alloyed | < 800 N/mm² | 1.7225 | EN19 | | | | |
| | 1.8 | Tempering steel, alloyed | < 1300 N/mm² | 1.8515 | EN40B | | | | |
| | 1.9 | Steel castings | < 850 N/mm² | 0.9650 | G-X 260 Cr 27 | 1.6750 | GS-20 NiCrMo 3.7 | 1.6582 | GS-34 CrNiMo 6 |
| | 1.10 | Nitriding steel | < 1000 N/mm² | 1.8509 | EN41B | | | | |
| | 1.11 | Nitriding steel | < 1200 N/mm² | 1.1186 | EN8 | 1.1160 | EN14A | | |
| | 1.12 | Roller bearing steel | < 1200 N/mm² | 1.3505 | 534A99 | | | | |
| | 1.13 | Spring steel | < 1200 N/mm² | | EN45 | | EN47 | | EN43 |
| | 1.14 | High-speed steel | < 1300 N/mm² | 1.3343 | M2 | 1.3249 | M34 | | |
| | 1.15 | Cold working tool steel | < 1300 N/mm² | 1.2379 | D2 | 1.2311 | P20 | | |
| | 1.16 | Hot working tool steel | < 1300 N/mm² | 1.2344 | H13 | | | | |
| M | 2.1 | Cast steel and sulphured stainless steel | < 850 N/mm² | 1.4581 | 318 | | | | |
| | 2.2 | Stainless steel, ferritic | < 750 N/mm² | 1.4000 | 403 | | | | |
| | 2.3 | Stainless steel, martensitic | < 900 N/mm² | 1.4057 | EN57 | | | | |
| | 2.4 | Stainless steel, ferritic / martensitic | <1100 N/mm² | 1.4028 | EN56B | | | | |
| | 2.5 | Stainless steel, austenitic / ferritic | < 850 N/mm² | 1.4542 | 17-4PH | | | | |
| | 2.6 | Stainless steel, austenitic | < 750 N/mm² | 1.4305 | 303 | 1.4401 | 316 | 1.4301 | 304 |
| | 2.7 | Heat resistant steel | < 1100 N/mm² | 1.4876 | Incoloy 800 | | | | |
| K | 3.1 | Grey cast iron with lamellar graphite | 100–350 N/mm² | 0.6015 | Grade 150 | 0.6020 | Grade 220 | 0.6025 | Grade 260 |
| | 3.2 | Grey cast iron with lamellar graphite | 300–500 N/mm² | 0.6030 | Grade 300 | 0.6035 | Grade 350 | 0.6040 | Grade 400 |
| | 3.3 | Gray cast iron with spheroidal graphite | 300–500 N/mm² | 0.7040 | SG 400-12 | 0.7043 | SG 370-17 | 0.7050 | SG 500-7 |
| | 3.4 | Gray cast iron with spheroidal graphite | 500–900 N/mm² | 0.7060 | SG 600-3 | 0.7070 | SG 700-2 | 0.7080 | SG 800-2 |
| | 3.5 | White malleable cast iron | 270–450 N/mm² | 0.8035 | GTW-35 | 0.8045 | GTW-45 | | |
| | 3.6 | White malleable cast iron | 500–650 N/mm² | 0.8055 | GTW-55 | 0.8065 | GTW-65 | | |
| | 3.7 | Black malleable cast iron | 300–450 N/mm² | 0.8135 | GTS-35 | 0.8145 | GTS-45 | | |
| | 3.8 | Black malleable cast iron | 500–800 N/mm² | 0.8155 | GTS-55 | 0.8170 | GTS-70 | | |
| N | 4.1 | Aluminium (non alloyed, low alloyed) | < 350 N/mm² | 3.0255 | 1050 A | 3.0275 | 1070 A | 3.0285 | 1080 A (A8) |
| | 4.2 | Aluminium alloys < 0.5 % Si | < 500 N/mm² | 3.1325 | 2017 A (AU4G) | 3.4335 | 7005 (AZ5G) | 3.4365 | 7075 (AZ5GU) |
| | 4.3 | Aluminium alloy 0.5–10 % Si | < 400 N/mm² | 3.2315 | A- G S1 | 3.2373 | A-S9 G | 3.2151 | A-S 6 U4 |
| | 4.4 | Aluminium alloys 10–15 % Si | < 400 N/mm² | 3.2581 | A-S12 | 3.2583 | A-S12 U | | |
| | 4.5 | Aluminum alloys > 15 % Si | < 400 N/mm² | | A-S18 | A-S17 U4 | | | |
| | 4.6 | Copper (non alloyed, low alloyed) | < 350 N/mm² | 2.0040 | Cu-c1 | 2.0060 | Cu-a1 | 2.0090 | Cu-b1 |
| | 4.7 | Copper wrought alloys | < 700 N/mm² | 2.1247 | Cub2 (Berylium Copper) | 2.0855 | CuN2S (Nickel Copper) | 2.1310 | CU-Fe2P |
| | 4.8 | Special copper alloys | < 200 HB | 2.0916 | Cu-A5 | 2.1525 | Cu-S3 M | | Ampco 8 (Cu-A6Fe2) |
| | 4.9 | Special copper alloys | < 300 HB | 2.0978 | Cu-Al11 Fe5 Ni5) | | Ampco 18 (Cu- A10 Fe3) | | |
| | 4.10 | Special copper alloys | > 300 HB | 2.1247 | Cu Be2 | | Ampco M4 | | |
| | 4.11 | Short-chipping brass, bronze, red bronze | < 600 N/mm² | 2.0331 | Cu Zn36 Pb1,5 | 2.0380 | Cu Zn39 Pb2 (Ms 56) | 2.0410 | Cu Zn44 Pb2 |
| | 4.12 | Long-chipping brass | < 600 N/mm² | 2.0335 | Cu Zn 36 (Ms63) | 2.1293 | Cu Cr1 Zr | | |
| | 4.13 | Thermoplastics | | PE | PVC | PS | Polystyrene | | Plexiglas |
| | 4.14 | Duroplastics | | PF | Bakelite | | Pertinax | | |
| | 4.15 | Fibre-reinforced plastics | | | Carbon Fibre | | Fibreglass | | Aramid Fibre (Kevlar) |
| | 4.16 | Magnesium and magnesium alloys | < 850 N/mm² | 3.5812 | Mg A7 Z1 | 3.5662 | Mg A9 | 3.5105 | Mg Tr3 Z2 Zn 1 |
| | 4.17 | Graphite | | | R8500X | | R8650 | | Technograph 15 |
| | 4.18 | Tungsten and tungsten alloys | | | W-Ni Fe (Densimet) | | W- Ni Cu (Inermet) | | Denal |
| | 4.19 | Molybdenum and molybdenum alloys | | | TZM | | MHQ | | Mo W |
| S | 5.1 | Pure nickel | | 2.4066 | Ni99 (Nickel 200) | 2.4068 | Lc Ni99 (Nickel 201) | | |
| | 5.2 | Nickel alloys | | 1.3912 | Fe-Ni36 (Invar) | 1.3917 | Fe -Ni42 (N42) | 1.3922 | Fe-Ni48 (N48) |
| | 5.3 | Nickel alloys | < 850 N/mm² | 2.4375 | Ni Cu30 Al (Monel K500) | 2.4360 | Ni Cu30Fe (Monel 400) | 2.4668 | |
| | 5.4 | Nickel molybdenum alloys | | 2.4600 | Ni Mo30Cr2 (Hastelloy B4) | 2.4617 | Ni Mo28 (Hastelloy B2) | 2.4819 | Ni Mo16Cr16 Hastell. C276 |
| | 5.5 | Nickel-chromium alloys | < 1300 N/mm² | 2.4951 | Ni Cr20TiAl (Nimonic 80A) | 2.4858 | Ni Cr21Mo (Inconel 825) | 2.4856 | Ni Cr22Mo9Nb Inconel 625 |
| | 5.6 | Cobalt Chrome Alloys | < 1300 N/mm² | 2.4964 | Co Cr20 W15 Ni10 | | Co Cr20 Ni16 Mo7 | | Co Cr28 Mo 6 |
| | 5.7 | Heat resistant alloys | < 1300 N/mm² | 1.4718 | Z45 C S 9-3 | 1.4747 | Z80 CSN 20-02 | 1.4845 | Z12 CN 25-20 |
| | 5.8 | Nickel-cobalt-chromium alloys | < 1400 N/mm² | 2.4851 | Ni Cr23Fe (Inconel 601) | 2.4668 | Ni Cr19NbMo (Inconel 718) | 2.4602 | Ni Cr21Mo14 Hastelloy C22 |
| | 5.9 | Pure titanium | < 900 N/mm² | 3.7025 | T35 (Titanium Grade 1) | 3.7034 | T40 (Titanium Grade 2) | 3.7064 | T60 (Titanium Grade 4) |
| | 5.10 | Titanium alloys | < 700 N/mm² | | T-A6-Nb7 (367) | | T-A5-Sn2-Mo4-Cr4 (Ti17) | | T-A3-V2,5 (Gr18) |
| | 5.11 | Titanium alloys | < 1200 N/mm² | 3.7165 | T-A6-V4 (Ta6V) | | T-A4-3V-Mo2-Fe2 (SP700) | | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
| H | 6.1 | Tempered steel | < 45 HRC | | | | | | |
| | 6.2 | | 46–55 HRC | | | | | | |
| | 6.3 | | 56–60 HRC | | | | | | |
| | 6.4 | | 61–65 HRC | | | | | | |
| | 6.5 | | 65–70 HRC | | | | | | |

# Cutting data standard values

| | Mini CCN1525 | Mini CCN2520 |
|---|---|---|
| **Index** | $v_c$ in m/min | |
| **1.1** | **80–100** | 120-180 |
| **1.2** | **80–100** | 120-180 |
| **1.3** | **80–100** | 120-180 |
| **1.4** | **60–80** | 80-130 |
| **1.5** | **90–110** | 120-180 |
| **1.6** | **90–110** | 120-180 |
| **1.7** | **50–60** | 80-130 |
| **1.8** | **50–60** | 80-130 |
| **1.9** | **60–80** | 80-130 |
| **1.10** | **50–60** | 60-80 |
| **1.11** | **50–60** | 60-80 |
| **1.12** | **50–60** | 60-80 |
| **1.13** | **50–60** | 60-80 |
| **1.14** | **50–60** | 60-80 |
| **1.15** | **50–60** | 60-80 |
| **1.16** | **50–60** | 60-80 |
| **2.1** | **40–50** | **90-130** |
| **2.2** | **40–50** | **90-130** |
| **2.3** | **40–50** | **90-130** |
| **2.4** | **40–50** | **90-130** |
| **2.5** | **40–50** | **90-130** |
| **2.6** | **40–50** | **90-130** |
| **2.7** | **40–50** | **90-130** |
| **3.1** | **60–80** | 120-130 |
| **3.2** | **60–80** | 120-130 |
| **3.3** | **60–80** | 100-130 |
| **3.4** | **60–80** | 100-130 |
| **3.5** | **50–70** | 100-130 |
| **3.6** | **50–70** | 100-130 |
| **3.7** | **50–70** | 100-130 |
| **3.8** | **50–70** | 100-130 |
| **4.1** | 550–570 | |
| **4.2** | 300–330 | |
| **4.3** | 300–330 | |
| **4.4** | 300–330 | |
| **4.5** | 300–330 | |
| **4.6** | 120–150 | |
| **4.7** | 110–130 | |
| **4.8** | 110–130 | |
| **4.9** | 110–130 | |
| **4.10** | 100–120 | |
| **4.11** | 100–120 | |
| **4.12** | 100–120 | |
| **4.13** | 180–200 | |
| **4.14** | 180–200 | |
| **4.15** | 180–200 | |
| **4.16** | 60–80 | |
| **4.17** | 60–80 | |
| **4.18** | 60–80 | |
| **4.19** | 60–80 | |
| **5.1** | | **25-60** |
| **5.2** | | **25-60** |
| **5.3** | | **25-60** |
| **5.4** | | **25-60** |
| **5.5** | | **25-60** |
| **5.6** | | **25-60** |
| **5.7** | | **25-60** |
| **5.8** | | **25-60** |
| **5.9** | | **35-45** |
| **5.10** | | **35-45** |
| **5.11** | | **35-45** |
| **6.1** | | 35-45 |
| **6.2** | | 35-45 |
| **6.3** | | |
| **6.4** | | |
| **6.5** | | |

# Grade description

**CCN1525**

- Carbide, TiN-coated
- ISO | **P25** | **M25**
- The coated carbide grade for machining steels and stainless steels at low cutting speeds

**CCN2520**

- Carbide, TiAlN-coated
- ISO | P25 | **M25** | K25 | **S25**
- The coated carbide grade for the machining of stainless steels at medium to high cutting speeds

The cutting data depends extremely on the external conditions, the material and machine type. The indicated values are possible values which have to be increased or reduced according to the application conditions.

SIL 0032 S16
SIR 0005 H06CB

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|---|---|
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| Indexable inserts, negative | 29–34 |
| Indexable inserts, positive | 35–40 |
| Technical Information | |
| Cutting Data | 41+42 |
| Chip Breaker Types and Grade Overview | 43 |


## CERATIZIT \ Performance

Premium quality tools for high performance.

The premium quality tools from the **CERATIZIT Performance** product line have been designed for specific applications and are distinguished by their outstanding performance. If you make high demands on the performance of your production and want to achieve the very best results, we recommend the Premium tools in this product line.

# Overview of inserts

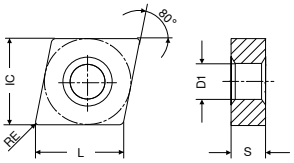
| Negative | | | Steel P | Stainless steel M | Cast iron K | Non ferrous metals N | Heat resistant S | Geometry CN.. | DN.. | SN.. | VN.. | WN.. | TN.. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | -M34 | | ● | ● | ○ | ○ | ● | 29 | 30 | 31 | 32 | 33 | 34 |

| Positive | | | | | | | | Geometry CC.. | DC.. | RC.. | SC.. | TC.. | VC.. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | -25P | | ● | ● | ○ | ● | ● | 35 | 36 | | 38 | | 40 |
| | -25Q | | ● | ● | ○ | ● | ● | 35 | 36 | | | | 40 |
| | -27 | | ● | ● | ○ | ● | ● | 35 | 36 | 37 | 38 | 39 | 40 |

Matching tool holders and boring bars can be found in our main catalogue → **Chapter 9, Turning tools**

# CNMG

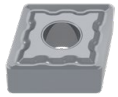
| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| CNMG 1204.. | 12.9 | 4.76 | 5.16 | 12.7 |




# CNMG

-M34
CTPX710

DRAGONSKIN



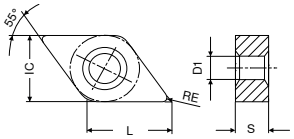
M
CNMG
NEW 1A/08

| ISO | RE | £ | Article no. 75 003 ... |
|---|---|---|---|
| | mm | | |
| 120404EN | 0.4 | 11.19 | 62800 |
| 120408EN | 0.8 | 11.19 | 63000 |
| 120412EN | 1.2 | 11.19 | 63200 |
| 120416EN | 1.6 | 11.19 | 63400 |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ○ |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |

# DNMG

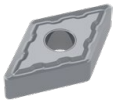
| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| DNMG 1504.. | 15.5 | 4.76 | 5.16 | 12.7 |
| DNMG 1506.. | 15.5 | 6.35 | 5.16 | 12.7 |




# DNMG

-M34
CTPX710

DRAGONSKIN



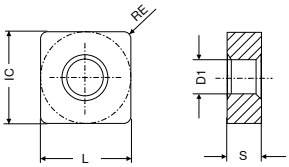
M
DNMG
NEW 1A/08

| ISO | RE | Article no. 75 004 ... | |
|---|---|---|---|
| | mm | £ | |
| 150404EN | 0.4 | 15.45 | 61600 |
| 150408EN | 0.8 | 15.45 | 61800 |
| 150412EN | 1.2 | 15.45 | 62000 |
| 150608EN | 0.8 | 16.78 | 63000 |
| 150612EN | 1.2 | 16.78 | 63200 |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ○ |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |

# SNMG

| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| SNMG 1204.. | 12.7 | 4.76 | 5.16 | 12.7 |




# SNMG

-M34
CTPX710

DRAGONSKIN

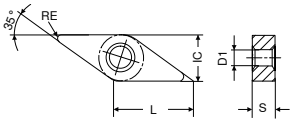
M
SNMG
NEW 1A/08

| ISO | RE | Article no. 75 005 ... | |
|---|---|---|---|
| | mm | £ | |
| 120408EN | 0.8 | 12.50 | 61800 |
| 120412EN | 1.2 | 12.50 | 62000 |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ○ |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |

# VNMG

| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| VNMG 1604.. | 16.6 | 4.76 | 3.81 | 9.52 |




# VNMG

-M34
CTPX710

DRAGONSKIN

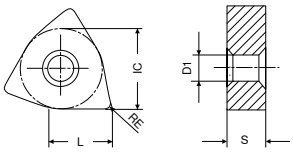
M
VNMG
NEW 1A/08

| ISO | RE | | Article no. 75 009 ... |
|---|---|---|---|
| | mm | £ | |
| 160404EN | 0.4 | 19.21 | 61600 |
| 160408EN | 0.8 | 19.21 | 61800 |
| 160412EN | 1.2 | 19.21 | 62000 |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ○ |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |

# WNMG

| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| **WNMG 0804..** | 8.6 | 4.76 | 5.16 | 12.7 |




# WNMG

**-M34**
**CTPX710**

DRAGONSKIN

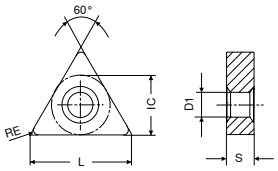
**M**
WNMG
NEW 1A/08
**Article no.**
**75 008 ...**
£

| ISO | RE mm | £ | |
|---|---|---|---|
| **080408EN** | 0.8 | 13.32 | **61800** |
| **080412EN** | 1.2 | 13.32 | **62000** |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ○ |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |

# TNMG

| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| **TNMG 1604..** | 16.5 | 4.76 | 3.81 | 9.52 |
| **TNMG 2204..** | 22.0 | 4.76 | 5.16 | 12.70 |




# TNMG

**-M34**
**CTPX710**

DRAGONSKIN

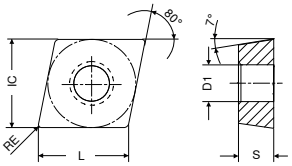
**M**
TNMG
NEW 1A/08

| ISO | RE | | Article no. 75 006 ... |
|---|---|---|---|
| | mm | £ | |
| **160408EN** | 0.8 | 10.61 | **61800** |
| | | | |
| **220404EN** | 0.4 | 14.65 | **62800** |
| **220408EN** | 0.8 | 14.65 | **63000** |
| **220416EN** | 1.6 | 14.65 | **63400** |

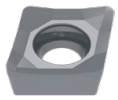
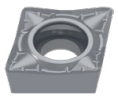
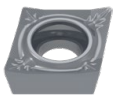
| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ○ |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |

# CCGT

| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| CCGT 0602.. | 6.4 | 2.38 | 2.8 | 6.35 |
| CCGT 09T3.. | 9.7 | 3.97 | 4.4 | 9.52 |
| CCGT 1204.. | 12.9 | 4.76 | 5.5 | 12.70 |

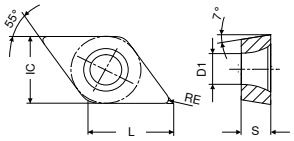



# CCGT

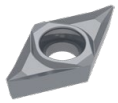
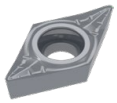
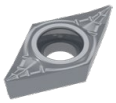
| | | -27 CTPX715 | | -25Q CTPX710 | | -25P CTPX710 | |
|---|---|---|---|---|---|---|---|
| | | DRAGONSKIN | | DRAGONSKIN | | DRAGONSKIN | |
| | |  | |  | |  | |
| | | M | | M | | M | |
| | | CCGT | | CCGT | | CCGT | |
| | | NEW 1A/90 | | NEW 1A/90 | | NEW 1A/90 | |
| ISO | RE | Article no. 70 254 ... | | Article no. 70 248 ... | | Article no. 70 248 ... | |
| | mm | £ | | £ | | £ | |
| 060202FN | 0.2 | 13.24 | 80200 | | | 13.71 | 70200 |
| 060204FN | 0.4 | 13.24 | 80400 | 16.55 | 75400 | 13.71 | 70400 |
| 09T302FN | 0.2 | 13.71 | 81400 | | | 14.65 | 71400 |
| 09T304FN | 0.4 | 13.71 | 81600 | 17.02 | 76600 | 14.65 | 71600 |
| 09T308FN | 0.8 | 13.71 | 81800 | 17.02 | 76800 | 14.65 | 71800 |
| 120402FN | 0.2 | 16.55 | 82600 | | | | |
| 120404FN | 0.4 | 16.55 | 82800 | 19.00 | 77800 | 17.49 | 72800 |
| 120408FN | 0.8 | 16.55 | 83000 | 19.00 | 78000 | 17.49 | 73000 |
| Steel | | | ● | | ● | | ● |
| Stainless steel | | | ● | | ● | | ● |
| Cast iron | | | ○ | | ○ | | ○ |
| Non ferrous metals | | | ● | | ● | | ● |
| Heat resistant alloys | | | ● | | ● | | ● |

# DCGT

| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| DCGT 0702.. | 7.75 | 2.38 | 2.8 | 6.35 |
| DCGT 11T3.. | 11.60 | 3.97 | 4.4 | 9.52 |

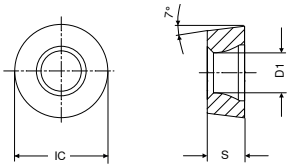



# DCGT

| | | -27 CTPX715 | | -25Q CTPX710 | | -25P CTPX710 | |
|---|---|---|---|---|---|---|---|
| | | DRAGONSKIN | | DRAGONSKIN | | DRAGONSKIN | |
| | |  | |  | |  | |
| | | M | | M | | M | |
| | | DCGT | | DCGT | | DCGT | |
| | | NEW 1A/90 | | NEW 1A/90 | | NEW 1A/90 | |
| ISO | RE | Article no. 70 260 ... | | Article no. 70 263 ... | | Article no. 70 263 ... | |
| | mm | £ | | £ | | £ | |
| 070202FN | 0.2 | 12.38 | 80200 | | | 13.15 | 70200 |
| 070204FN | 0.4 | 12.38 | 80400 | | | 13.15 | 70400 |
| 11T302FN | 0.2 | 14.65 | 81400 | | | 15.22 | 71400 |
| 11T304FL | 0.4 | | | 17.49 | 75700 | | |
| 11T304FN | 0.4 | 14.65 | 81600 | 17.49 | 75600 | 15.22 | 71600 |
| 11T304FR | 0.4 | | | 17.49 | 75800 | | |
| 11T308FN | 0.8 | 14.65 | 81800 | 17.49 | 76000 | 15.22 | 71800 |
| Steel | | ● | | ● | | ● | |
| Stainless steel | | ● | | ● | | ● | |
| Cast iron | | ○ | | ○ | | ○ | |
| Non ferrous metals | | ● | | ● | | ● | |
| Heat resistant alloys | | ● | | ● | | ● | |

# RCGT

| Designation | S | D1 | IC |
|---|---|---|---|
| | mm | mm | mm |
| RCGT 0803.. | 3.18 | 3.4 | 8 |
| RCGT 1003.. | 3.18 | 4.0 | 10 |




# RCGT

-27
CTPX715

DRAGONSKIN

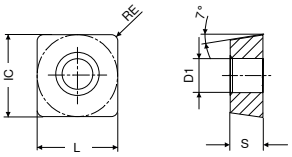
M
RCGT
NEW 1A/90

| ISO | RE | £ | Article no. 70 266 ... |
|---|---|---|---|
| | mm | | |
| 0803MOFN | 4 | 9.55 | 80200 |
| 1003MOFN | 5 | 9.93 | 80400 |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ○ |
| Non ferrous metals | ● |
| Heat resistant alloys | ● |

# SCGT

| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| SCGT 09T3.. | 9.52 | 3.97 | 4.4 | 9.52 |
| SCGT 1204.. | 12.70 | 4.76 | 5.5 | 12.70 |

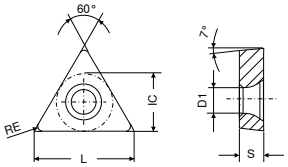



# SCGT

| ISO | RE | -27 CTPX715 | | -25P CTPX710 | |
|---|---|---|---|---|---|
| | | DRAGONSKIN | | DRAGONSKIN | |
| | | | | | |
| | | M | | M | |
| | | SCGT | | SCGT | |
| | | NEW 1A/90 | | NEW 1A/90 | |
| | | Article no. 70 270 ... | | Article no. 70 283 ... | |
| | mm | £ | | £ | |
| 09T304FN | 0.4 | 14.27 | 80400 | | |
| 09T308FN | 0.8 | 14.27 | 80600 | | |
| 120408FN | 0.8 | | | 16.83 | 71600 |
| Steel | | ● | | ● | |
| Stainless steel | | ● | | ● | |
| Cast iron | | ○ | | ○ | |
| Non ferrous metals | | ● | | ● | |
| Heat resistant alloys | | ● | | ● | |

# TCGT

| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| TCGT 1102.. | 11.0 | 2.38 | 2.8 | 6.35 |
| TCGT 16T3.. | 16.5 | 3.97 | 4.4 | 9.52 |




# TCGT

-27
CTPX715

DRAGONSKIN

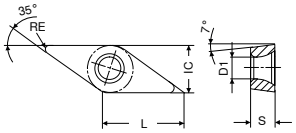
M
TCGT
NEW 1A/90
Article no.
70 276 ...

| ISO | RE mm | £ | |
|---|---|---|---|
| 110204FN | 0.4 | 14.27 | 81600 |
| | | | |
| 16T308FN | 0.8 | 15.98 | 83000 |

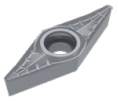
| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ○ |
| Non ferrous metals | ● |
| Heat resistant alloys | ● |

# VCGT

| Designation | L | S | D1 | IC |
|---|---|---|---|---|
| | mm | mm | mm | mm |
| VCGT 1103.. | 11.1 | 3.18 | 2.9 | 6.35 |
| VCGT 1604.. | 16.6 | 4.76 | 4.4 | 9.52 |
| VCGT 2205.. | 22.1 | 5.56 | 5.5 | 12.70 |




# VCGT

| ISO | RE | -27 CTPX715 | | -25P CTPX710 | |
|---|---|---|---|---|---|
| | | DRAGONSKIN | | DRAGONSKIN | |
| | | | |  | |
| | | M | | M | |
| | | VCGT | | VCGT | |
| | | NEW 1A/90 | | NEW 1A/90 | |
| | | Article no. 70 280 ... | | Article no. 70 282 ... | |
| | mm | £ | | £ | |
| 110302FN | 0.2 | 17.77 | 81400 | 18.05 | 71400 |
| 110304FN | 0.4 | 17.77 | 81600 | 18.05 | 71600 |
| 160404FN | 0.4 | 20.27 | 82800 | 21.94 | 72800 |
| 160408FN | 0.8 | 21.08 | 83000 | 21.94 | 73000 |
| 160412FN | 1.2 | | | 21.94 | 73200 |
| 220530FN | 3.0 | | | 29.59 | 75000 |
| Steel | | ● | | ● | |
| Stainless steel | | ● | | ● | |
| Cast iron | | ○ | | ○ | |
| Non ferrous metals | | ● | | ● | |
| Heat resistant alloys | | ● | | ● | |

# Material examples referring to the cutting data tables

| | Index | Material | Strength N/mm² / HB / HRC | Material number | Material designation | Material number | Material designation | Material number | Material designation |
|---|---|---|---|---|---|---|---|---|---|
| P | 1.1 | General construction steel | < 800 N/mm² | 1.0402 | EN3B | | | | |
| | 1.2 | Free cutting steel | < 800 N/mm² | 1.0711 | EN1A | | | | |
| | 1.3 | Hardened steel, non alloyed | < 800 N/mm² | 1.0401 | EN32C | | | | |
| | 1.4 | Alloyed hardened steel | < 1000 N/mm² | 1.7325 | 25 CD4 | | | | |
| | 1.5 | Tempering steel, unalloyed | < 850 N/mm² | 1.5752 | EN36 | 1.0535 | EN9 | | |
| | 1.6 | Tempering steel, unalloyed | < 1000 N/mm² | 1.6582 | EN24 | | | | |
| | 1.7 | Tempering steel, alloyed | < 800 N/mm² | 1.7225 | EN19 | | | | |
| | 1.8 | Tempering steel, alloyed | < 1300 N/mm² | 1.8515 | EN40B | | | | |
| | 1.9 | Steel castings | < 850 N/mm² | 0.9650 | G-X 260 Cr 27 | 1.6750 | GS-20 NiCrMo 3.7 | 1.6582 | GS-34 CrNiMo 6 |
| | 1.10 | Nitriding steel | < 1000 N/mm² | 1.8509 | EN41B | | | | |
| | 1.11 | Nitriding steel | < 1200 N/mm² | 1.1186 | EN8 | 1.1160 | EN14A | | |
| | 1.12 | Roller bearing steel | < 1200 N/mm² | 1.3505 | 534A99 | | | | |
| | 1.13 | Spring steel | < 1200 N/mm² | | EN45 | | EN47 | | EN43 |
| | 1.14 | High-speed steel | < 1300 N/mm² | 1.3343 | M2 | 1.3249 | M34 | | |
| | 1.15 | Cold working tool steel | < 1300 N/mm² | 1.2379 | D2 | 1.2311 | P20 | | |
| | 1.16 | Hot working tool steel | < 1300 N/mm² | 1.2344 | H13 | | | | |
| M | 2.1 | Cast steel and sulphured stainless steel | < 850 N/mm² | 1.4581 | 318 | | | | |
| | 2.2 | Stainless steel, ferritic | < 750 N/mm² | 1.4000 | 403 | | | | |
| | 2.3 | Stainless steel, martensitic | < 900 N/mm² | 1.4057 | EN57 | | | | |
| | 2.4 | Stainless steel, ferritic / martensitic | <1100 N/mm² | 1.4028 | EN56B | | | | |
| | 2.5 | Stainless steel, austenitic / ferritic | < 850 N/mm² | 1.4542 | 17-4PH | | | | |
| | 2.6 | Stainless steel, austenitic | < 750 N/mm² | 1.4305 | 303 | 1.4401 | 316 | 1.4301 | 304 |
| | 2.7 | Heat resistant steel | < 1100 N/mm² | 1.4876 | Incoloy 800 | | | | |
| K | 3.1 | Grey cast iron with lamellar graphite | 100–350 N/mm² | 0.6015 | Grade 150 | 0.6020 | Grade 220 | 0.6025 | Grade 260 |
| | 3.2 | Grey cast iron with lamellar graphite | 300–500 N/mm² | 0.6030 | Grade 300 | 0.6035 | Grade 350 | 0.6040 | Grade 400 |
| | 3.3 | Gray cast iron with spheroidal graphite | 300–500 N/mm² | 0.7040 | SG 400-12 | 0.7043 | SG 370-17 | 0.7050 | SG 500-7 |
| | 3.4 | Gray cast iron with spheroidal graphite | 500–900 N/mm² | 0.7060 | SG 600-3 | 0.7070 | SG 700-2 | 0.7080 | SG 800-2 |
| | 3.5 | White malleable cast iron | 270–450 N/mm² | 0.8035 | GTW-35 | 0.8045 | GTW-45 | | |
| | 3.6 | White malleable cast iron | 500–650 N/mm² | 0.8055 | GTW-55 | 0.8065 | GTW-65 | | |
| | 3.7 | Black malleable cast iron | 300–450 N/mm² | 0.8135 | GTS-35 | 0.8145 | GTS-45 | | |
| | 3.8 | Black malleable cast iron | 500–800 N/mm² | 0.8155 | GTS-55 | 0.8170 | GTS-70 | | |
| N | 4.1 | Aluminium (non alloyed, low alloyed) | < 350 N/mm² | 3.0255 | 1050 A | 3.0275 | 1070 A | 3.0285 | 1080 A (A8) |
| | 4.2 | Aluminium alloys < 0.5 % Si | < 500 N/mm² | 3.1325 | 2017 A (AU4G) | 3.4335 | 7005 (AZ5G) | 3.4365 | 7075 (AZ5GU) |
| | 4.3 | Aluminium alloy 0.5–10 % Si | < 400 N/mm² | 3.2315 | A- G S1 | 3.2373 | A-S9 G | 3.2151 | A-S 6 U4 |
| | 4.4 | Aluminium alloys 10–15 % Si | < 400 N/mm² | 3.2581 | A-S12 | 3.2583 | A-S12 U | | |
| | 4.5 | Aluminum alloys > 15 % Si | < 400 N/mm² | | A-S18 | A-S17 U4 | | | |
| | 4.6 | Copper (non alloyed, low alloyed) | < 350 N/mm² | 2.0040 | Cu-c1 | 2.0060 | Cu-a1 | 2.0090 | Cu-b1 |
| | 4.7 | Copper wrought alloys | < 700 N/mm² | 2.1247 | Cub2 (Berylium Copper) | 2.0855 | CuN2S (Nickel Copper) | 2.1310 | CU-Fe2P |
| | 4.8 | Special copper alloys | < 200 HB | 2.0916 | Cu-A5 | 2.1525 | Cu-S3 M | | Ampco 8 (Cu-A6Fe2) |
| | 4.9 | Special copper alloys | < 300 HB | 2.0978 | Cu-Al11 Fe5 Ni5) | | Ampco 18 (Cu- A10 Fe3) | | |
| | 4.10 | Special copper alloys | > 300 HB | 2.1247 | Cu Be2 | | Ampco M4 | | |
| | 4.11 | Short-chipping brass, bronze, red bronze | < 600 N/mm² | 2.0331 | Cu Zn36 Pb1,5 | 2.0380 | Cu Zn39 Pb2 (Ms 56) | 2.0410 | Cu Zn44 Pb2 |
| | 4.12 | Long-chipping brass | < 600 N/mm² | 2.0335 | Cu Zn 36 (Ms63) | 2.1293 | Cu Cr1 Zr | | |
| | 4.13 | Thermoplastics | | PE | PVC | PS | Polystyrene | | Plexiglas |
| | 4.14 | Duroplastics | | PF | Bakelite | | Pertinax | | |
| | 4.15 | Fibre-reinforced plastics | | | Carbon Fibre | | Fibreglass | | Aramid Fibre (Kevlar) |
| | 4.16 | Magnesium and magnesium alloys | < 850 N/mm² | 3.5812 | Mg A7 Z1 | 3.5662 | Mg A9 | 3.5105 | Mg Tr3 Z2 Zn 1 |
| | 4.17 | Graphite | | | R8500X | | R8650 | | Technograph 15 |
| | 4.18 | Tungsten and tungsten alloys | | | W-Ni Fe (Densimet) | | W- Ni Cu (Inermet) | | Denal |
| | 4.19 | Molybdenum and molybdenum alloys | | | TZM | | MHQ | | Mo W |
| S | 5.1 | Pure nickel | | 2.4066 | Ni99 (Nickel 200) | 2.4068 | Lc Ni99 (Nickel 201) | | |
| | 5.2 | Nickel alloys | | 1.3912 | Fe-Ni36 (Invar) | 1.3917 | Fe -Ni42 (N42) | 1.3922 | Fe-Ni48 (N48) |
| | 5.3 | Nickel alloys | < 850 N/mm² | 2.4375 | Ni Cu30 Al (Monel K500) | 2.4360 | Ni Cu30Fe (Monel 400) | 2.4668 | |
| | 5.4 | Nickel molybdenum alloys | | 2.4600 | Ni Mo30Cr2 (Hastelloy B4) | 2.4617 | Ni Mo28 (Hastelloy B2) | 2.4819 | Ni Mo16Cr16 Hastell. C276 |
| | 5.5 | Nickel-chromium alloys | < 1300 N/mm² | 2.4951 | Ni Cr20TiAl (Nimonic 80A) | 2.4858 | Ni Cr21Mo (Inconel 825) | 2.4856 | Ni Cr22Mo9Nb Inconel 625 |
| | 5.6 | Cobalt Chrome Alloys | < 1300 N/mm² | 2.4964 | Co Cr20 W15 Ni10 | | Co Cr20 Ni16 Mo7 | | Co Cr28 Mo 6 |
| | 5.7 | Heat resistant alloys | < 1300 N/mm² | 1.4718 | Z45 C S 9-3 | 1.4747 | Z80 CSN 20-02 | 1.4845 | Z12 CN 25-20 |
| | 5.8 | Nickel-cobalt-chromium alloys | < 1400 N/mm² | 2.4851 | Ni Cr23Fe (Inconel 601) | 2.4668 | Ni Cr19NbMo (Inconel 718) | 2.4602 | Ni Cr21Mo14 Hastelloy C22 |
| | 5.9 | Pure titanium | < 900 N/mm² | 3.7025 | T35 (Titanium Grade 1) | 3.7034 | T40 (Titanium Grade 2) | 3.7064 | T60 (Titanium Grade 4) |
| | 5.10 | Titanium alloys | < 700 N/mm² | | T-A6-Nb7 (367) | | T-A5-Sn2-Mo4-Cr4 (Ti17) | | T-A3-V2,5 (Gr18) |
| | 5.11 | Titanium alloys | < 1200 N/mm² | 3.7165 | T-A6-V4 (Ta6V) | | T-A4-3V-Mo2-Fe2 (SP700) | | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
| H | 6.1 | Tempered steel | < 45 HRC | | | | | | |
| | 6.2 | | 46–55 HRC | | | | | | |
| | 6.3 | | 56–60 HRC | | | | | | |
| | 6.4 | | 61–65 HRC | | | | | | |
| | 6.5 | | 65–70 HRC | | | | | | |

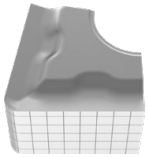
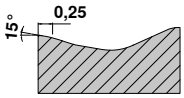
# Cutting data standard values for medium machining (M) (-M34) and aluminium chip breakers (-25P, -25Q, -27)

| | DRAGONSKIN | DRAGONSKIN | DRAGONSKIN |
|---|---|---|---|
| | CTPX710 -M34 | CTPX710 -25P / -25Q | CTPX715 -27 |
| **Index** | $v_c$ in m/min | | |
| **1.1** | **100–150** | **120–170** | **100–150** |
| **1.2** | **120–180** | **140–200** | **120–180** |
| **1.3** | **90–140** | **110–160** | **90–140** |
| **1.4** | **70–130** | **90–150** | **100–150** |
| **1.5** | **70–130** | **90–150** | **70–130** |
| **1.6** | **90–120** | **100–130** | **90–120** |
| **1.7** | **70–130** | **80–140** | **70–130** |
| **1.8** | **70–120** | **80–130** | **70–120** |
| **1.9** | **70–110** | **80–120** | **70–110** |
| **1.10** | **70–110** | **80–120** | **70–110** |
| **1.11** | **70–130** | **80–140** | **70–130** |
| **1.12** | **110–180** | **130–220** | **110–200** |
| **1.13** | **70–110** | **80–120** | **70–110** |
| **1.14** | **60–120** | **70–130** | **60–120** |
| **1.15** | **60–120** | **70–130** | **60–120** |
| **1.16** | **60–120** | **70–130** | **60–120** |
| **2.1** | **130–240** | **90–260** | **80–240** |
| **2.2** | **130–220** | **80–240** | **70–220** |
| **2.3** | **110–220** | **70–240** | **60–220** |
| **2.4** | **110–200** | **40–220** | **30–200** |
| **2.5** | **100–170** | **60–230** | **50–210** |
| **2.6** | **80–150** | **40–170** | **30–150** |
| **2.7** | **80–140** | **40–160** | **30–140** |
| **3.1** | 120-220 | 140-240 | 120-220 |
| **3.2** | 90-180 | 100-190 | 90-180 |
| **3.3** | 110-240 | 130-260 | 110-240 |
| **3.4** | 90-230 | 100-250 | 90-230 |
| **3.5** | 140-220 | 160-240 | 140-220 |
| **3.6** | 110-180 | 130-200 | 110-180 |
| **3.7** | 130-220 | 150-240 | 130-220 |
| **3.8** | 120-190 | 140-210 | 120-190 |
| **4.1** | | **300–3200** | **280–3000** |
| **4.2** | | **200–2800** | **180–2600** |
| **4.3** | 320-1500 | **400–2000** | **380–1900** |
| **4.4** | 400-1300 | **400–2000** | **350–1900** |
| **4.5** | 150-900 | **200–1200** | **180–1100** |
| **4.6** | 200-800 | **250–1000** | **230–950** |
| **4.7** | 160-750 | **200–1000** | **190–950** |
| **4.8** | 160-750 | **200–1000** | **190–950** |
| **4.9** | 160-700 | **200–1000** | **190–950** |
| **4.10** | 160-700 | **200–1000** | **190–950** |
| **4.11** | 150-600 | **150–800** | **140–750** |
| **4.12** | 120-370 | **150–500** | **140–450** |
| **4.13** | | **100–250** | **90–240** |
| **4.14** | | **80–200** | **70–190** |
| **4.15** | | **80–220** | **70–210** |
| **4.16** | | | |
| **4.17** | | | |
| **4.18** | 50-120 | **80–120** | **70–110** |
| **4.19** | 60-120 | **100–140** | **90–130** |
| **5.1** | **30–130** | **30–140** | **30–130** |
| **5.2** | **30–100** | **30–110** | **30–100** |
| **5.3** | **30–100** | **30–110** | **30–100** |
| **5.4** | **30–100** | **30–110** | **30–100** |
| **5.5** | **30–100** | **30–110** | **30–100** |
| **5.6** | **30–100** | **30–110** | **30–100** |
| **5.7** | **30–100** | **30–110** | **30–100** |
| **5.8** | **30–100** | **30–110** | **30–100** |
| **5.9** | **30–130** | **30–140** | **30–130** |
| **5.10** | **30–130** | 30-140 | 30-130 |
| **5.11** | **30–110** | 30-120 | 30-110 |
| **6.1** | | | |
| **6.2** | | | |
| **6.3** | | | |
| **6.4** | | | |
| **6.5** | | | |

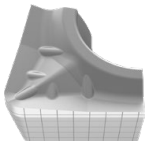
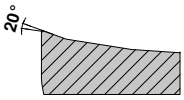
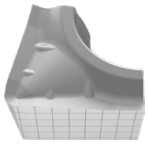
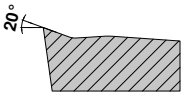
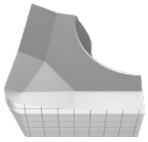
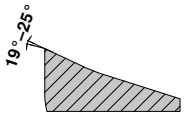
The cutting data depends extremely on the external conditions, e.g. stability of the tool and tool clamping, material and machine type. The indicated values are possible cutting data which have to be increased or reduced according to the application conditions.

# Standard chip breakers/application tips

## Negative

| | | Model | Smooth cut | Irregular cutting depth | Interrupted cut | Sectional illustration $a_p$ mm | Sectional illustration f mm | Geometry |
|---|---|---|---|---|---|---|---|---|
| **Main applications super alloys** | -M34 (-M34)<br>▲ First choice for superalloys<br>▲ Light cutting geometry<br>▲ Little built-up edge<br>▲ Low cutting forces |  <br>**M** | **CTPX710** | **CTPX710** | |  | | CN..<br>DN..<br>SN..<br>VN..<br>WN..<br>TN.. |
| | | | **CTPX710** | **CTPX710** | | | | |
| | | | CTPX710 | CTPX710 | | | | |
| | | | CTPX710 | CTPX710 | | 0,80–3,0 | 0,10–0,30 | |
| | | | **CTPX710** | **CTPX710** | | | | |

## Positive

| | | Model | Smooth cut | Irregular cutting depth | Interrupted cut | Sectional illustration $a_p$ mm | Sectional illustration f mm | Geometry |
|---|---|---|---|---|---|---|---|---|
| **Main application non-ferrous metals,** secondary application stainless steels, steels, super alloys, cast iron | -25P (-25P)<br>▲ Sharp cutting edge<br>▲ Good swarf control on soft aluminium alloys<br>▲ Low adhesion |  <br>**F**<br>**M** | **CTPX710** | **CTPX710** | |  | | CC..<br>DC..<br>SC..<br>VC.. |
| | | | **CTPX710** | **CTPX710** | | | | |
| | | | CTPX710 | CTPX710 | | | | |
| | | | **CTPX710** | **CTPX710** | **CTPX710** | 0,50–4,50 | 0,05–0,60 | |
| | | | **CTPX710** | **CTPX710** | | | | |
| | -25Q (-25Q)<br>▲ Wiper geometry<br>▲ High feed rates<br>▲ High surface quality<br>▲ Good swarf control on soft aluminium alloys<br>▲ Low adhesion |  <br>**M** | **CTPX710** | **CTPX710** | |  | | CC..<br>DC..<br>VC.. |
| | | | **CTPX710** | **CTPX710** | | | | |
| | | | CTPX710 | CTPX710 | | | | |
| | | | **CTPX710** | **CTPX710** | **CTPX710** | 0,05–6,50 | 0,05–0,60 | |
| | | | **CTPX710** | **CTPX710** | | | | |
| | -27 (-27)<br>▲ The universal Alu geometry<br>▲ Sharp cutting edge<br>▲ Extremely positive rake angle<br>▲ Low adhesion<br>▲ High feed rates |  <br>**M**<br>**R** | **CTPX715** | **CTPX715** | |  | | CC..<br>DC..<br>RC..<br>SC..<br>TC..<br>VC.. |
| | | | **CTPX715** | **CTPX715** | | | | |
| | | | CTPX715 | CTPX715 | | | | |
| | | | **CTPX715** | **CTPX715** | **CTPX715** | 1,00–10,00 | 0,10–0,75 | |
| | | | **CTPX715** | **CTPX715** | | | | |

# Grade description

**CTPX710**

- Carbide, AlTiN-coated
- ISO | **P10** | **M10** | K10 | **N10** | **S15**
- Universal multi-material grade from the X7 line for highest machining requirements

**CTPX715**

- Carbide, AlTiN-coated
- ISO | **P10** | **M10** | K10 | **N10** | **S15**
- Universal multi-material grade from the X7 line for highest machining requirements

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Product programme 45–60

Technical Information

Cutting Data 61–79

## WNT \ Performance

Premium quality tools for high performance.

The premium quality tools from the **WNT Performance** product line have been designed for specific applications and are distinguished by their outstanding performance. If you make high demands on the performance of your production and want to achieve the very best results, we recommend the Premium tools in this product line.

# Overview High Performance Milling Cutters

## SilverLine

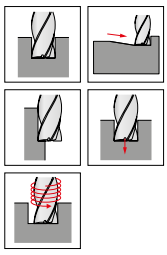
| Tool type | Number of flutes (ZEFP) | Diameter in mm Ø DC | Steel | Stainless steel | Cast iron | Non ferrous metals | Heat resistant | hardened materials | Sharp | Chamfer | Radius | Full Radius | Length | Tool design | coated | uncoated | Pages |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | 2 | 3–20 | ● | ● | ● | ○ | ● | HB | | ■ | | | ■ | HPC | ■ | | 45 |
| N | 3 | 3–20 | ● | ● | ● | ○ | ● | HB | ■ | ■ | ■ | | ■ | HPC | ■ | | 46–48 |
| N | 4 | 3–20 | ● | ● | ● | ○ | ● | HA HB | | ■ | | | ■ | HPC | ■ | | 49+50 |
| N | 4 | 3–20 | ● | ● | ● | ○ | | HA HB | | ■ | | | ■ | HPC | ■ | | 51 |
| N | 4 | 6–20 | ● | ● | ● | ○ | ● | HB | | ■ | | | ■ | HPC | ■ | ■ | 52 |
| N | 4 | 3–20 | ● | ● | ● | ○ | ● | HA HB | | | ■ | | ■ | HPC | ■ | | 53+54 |
| NF | 4 | 3–20 | ● | ● | ● | ○ | ● | HB | | ■ | | | ■ | HPC | ■ | | 55 |
| NR | 4 | 3–20 | ● | ● | ● | ○ | ● | HB | | ■ | | | ■ | HPC | ■ | | 56 |
| N | 6 | 6–25 | ● | ● | ○ | ○ | ● | HA | ■ | | | | ■ | | ■ | | 57 |
| N | 2 | 3–20 | ● | | ● | ○ | | ○ HA | | | | ■ | ■ | | ■ | | 58 |
| N | 4 | 4–20 | ● | ○ | ● | ○ | | HA | | | | ■ | ■ | | ■ | | 59 |
| N | 4 | 6–20 | ● | ○ | ● | ○ | | ○ HA | | | ■ | | ■ | HPC | ■ | | 60 |

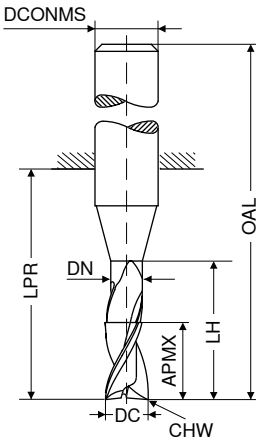
# SilverLine – End milling cutter

N | $\lambda_s$=30° $\gamma_s$=14° | ZEFP | HPC

DPB72S

DRAGONSKIN





≈DIN 6527

HB

NEW V0

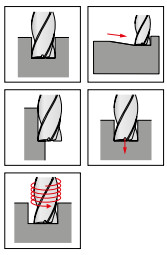
| DC e8 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | CHW mm | ZEFP | £ | Article no. 50 958 ... |
|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 8 | 2.8 | 15 | 21 | 57 | 6 | 0.1 | 2 | 49.52 | 03200 |
| 3.5 | 11 | 3.3 | 15 | 21 | 57 | 6 | 0.1 | 2 | 49.52 | 03700 |
| 4.0 | 11 | 3.8 | 15 | 21 | 57 | 6 | 0.1 | 2 | 49.52 | 04200 |
| 4.5 | 13 | 4.3 | 21 | 21 | 57 | 6 | 0.1 | 2 | 49.52 | 04700 |
| 5.0 | 13 | 4.8 | 21 | 21 | 57 | 6 | 0.1 | 2 | 49.52 | 05200 |
| 5.5 | 13 | 5.3 | 21 | 21 | 57 | 6 | 0.1 | 2 | 49.52 | 05700 |
| 6.0 | 13 | 5.8 | 21 | 21 | 57 | 6 | 0.1 | 2 | 49.52 | 06200 |
| 7.0 | 16 | 6.8 | 27 | 27 | 63 | 8 | 0.1 | 2 | 57.67 | 07200 |
| 8.0 | 19 | 7.8 | 27 | 27 | 63 | 8 | 0.1 | 2 | 57.67 | 08200 |
| 9.0 | 19 | 8.8 | 32 | 32 | 72 | 10 | 0.1 | 2 | 80.25 | 09200 |
| 10.0 | 22 | 9.8 | 32 | 32 | 72 | 10 | 0.1 | 2 | 80.25 | 10200 |
| 11.0 | 26 | 10.8 | 38 | 38 | 83 | 12 | 0.1 | 2 | 116.29 | 11200 |
| 12.0 | 26 | 11.8 | 38 | 38 | 83 | 12 | 0.1 | 2 | 116.29 | 12200 |
| 14.0 | 26 | 13.8 | 38 | 38 | 83 | 14 | 0.1 | 2 | 144.95 | 14200 |
| 15.0 | 32 | 14.7 | 44 | 44 | 92 | 16 | 0.1 | 2 | 187.98 | 15200 |
| 16.0 | 32 | 15.7 | 44 | 44 | 92 | 16 | 0.1 | 2 | 187.98 | 16200 |
| 17.0 | 32 | 16.7 | 44 | 44 | 92 | 18 | 0.1 | 2 | 228.28 | 17200 |
| 18.0 | 32 | 17.7 | 44 | 44 | 92 | 18 | 0.1 | 2 | 228.28 | 18200 |
| 19.0 | 38 | 18.7 | 54 | 54 | 104 | 20 | 0.1 | 2 | 282.49 | 19200 |
| 20.0 | 38 | 19.7 | 54 | 54 | 104 | 20 | 0.1 | 2 | 282.49 | 20200 |

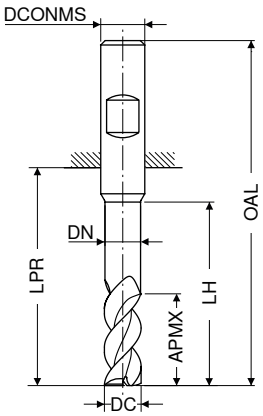
| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ● |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |
| Hardened materials | |

→ $v_c/f_z$ Page 62+63

# SilverLine – End milling cutter

N | $\lambda_s$=45° $\gamma_s$= 5° | ZEFP | HPC





Factory standard | Factory standard | Factory standard

HB | HB | HB

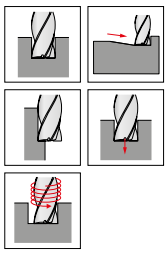
| DC f8 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | ZEFP | NEW V0 Article no. 50 992 ... £ | | NEW V0 Article no. 50 992 ... £ | | NEW V0 Article no. 50 992 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 8 | 2.9 | 15 | 21 | 57 | 6 | 3 | | | 60.03 | 03200 | | |
| 3.5 | 11 | 3.4 | 16 | 21 | 57 | 6 | 3 | | | 60.03 | 03700 | | |
| 4.0 | 8 | 3.9 | 15 | 18 | 54 | 6 | 3 | 57.88 | 04100 | | | | |
| 4.0 | 11 | 3.9 | 16 | 21 | 57 | 6 | 3 | | | 57.88 | 04200 | | |
| 4.0 | 16 | | | 26 | 62 | 6 | 3 | | | | | 61.02 | 04400 |
| 4.5 | 13 | 4.4 | 19 | 21 | 57 | 6 | 3 | | | 60.03 | 04700 | | |
| 5.0 | 9 | 4.9 | 16 | 18 | 54 | 6 | 3 | 57.88 | 05100 | | | | |
| 5.0 | 13 | 4.9 | 19 | 21 | 57 | 6 | 3 | | | 57.88 | 05200 | | |
| 5.0 | 17 | | | 26 | 62 | 6 | 3 | | | | | 61.02 | 05400 |
| 5.5 | 13 | 5.4 | 19 | 21 | 57 | 6 | 3 | | | 62.99 | 05700 | | |
| 6.0 | 10 | 5.9 | 17 | 18 | 54 | 6 | 3 | 60.19 | 06100 | | | | |
| 6.0 | 13 | 5.9 | 19 | 21 | 57 | 6 | 3 | | | 60.91 | 06200 | | |
| 6.0 | 18 | | | 26 | 62 | 6 | 3 | | | | | 67.68 | 06400 |
| 6.5 | 19 | 6.3 | 25 | 27 | 63 | 8 | 3 | | | 73.23 | 06700 | | |
| 7.0 | 19 | 6.8 | 25 | 27 | 63 | 8 | 3 | | | 73.23 | 07200 | | |
| 7.5 | 19 | 7.3 | 25 | 27 | 63 | 8 | 3 | | | 73.23 | 07700 | | |
| 8.0 | 12 | | 20 | 22 | 58 | 8 | 3 | 68.39 | 08100 | | | | |
| 8.0 | 19 | 7.8 | 25 | 27 | 63 | 8 | 3 | | | 71.11 | 08200 | | |
| 8.0 | 24 | | | 32 | 68 | 8 | 3 | | | | | 76.02 | 08400 |
| 8.5 | 22 | 8.2 | 30 | 32 | 72 | 10 | 3 | | | 122.04 | 08700 | | |
| 9.0 | 22 | 8.7 | 30 | 32 | 72 | 10 | 3 | | | 122.04 | 09200 | | |
| 9.5 | 22 | 9.2 | 30 | 32 | 72 | 10 | 3 | | | 122.04 | 09700 | | |
| 10.0 | 14 | 9.7 | 24 | 26 | 66 | 10 | 3 | 108.10 | 10100 | | | | |
| 10.0 | 22 | 9.7 | 30 | 32 | 72 | 10 | 3 | | | 119.80 | 10200 | | |
| 10.0 | 30 | | | 40 | 80 | 10 | 3 | | | | | 135.33 | 10400 |
| 12.0 | 16 | 11.7 | 26 | 28 | 73 | 12 | 3 | 151.58 | 12100 | | | | |
| 12.0 | 26 | 11.7 | 36 | 38 | 83 | 12 | 3 | | | 162.24 | 12200 | | |
| 12.0 | 36 | | | 48 | 93 | 12 | 3 | | | | | 183.69 | 12400 |
| 14.0 | 18 | 13.7 | 28 | 30 | 75 | 14 | 3 | 187.20 | 14100 | | | | |
| 14.0 | 26 | 13.7 | 36 | 38 | 83 | 14 | 3 | | | 213.98 | 14200 | | |
| 14.0 | 42 | | | 54 | 99 | 14 | 3 | | | | | 237.90 | 14400 |
| 16.0 | 22 | 15.5 | 32 | 34 | 82 | 16 | 3 | 226.59 | 16100 | | | | |
| 16.0 | 32 | 15.5 | 42 | 44 | 92 | 16 | 3 | | | 363.09 | 16200 | | |
| 16.0 | 48 | | | 60 | 108 | 16 | 3 | | | | | 367.12 | 16400 |
| 18.0 | 24 | 17.5 | 34 | 36 | 84 | 18 | 3 | 312.65 | 18100 | | | | |
| 18.0 | 32 | 17.5 | 42 | 44 | 92 | 18 | 3 | | | 374.27 | 18200 | | |
| 18.0 | 54 | | | 66 | 114 | 18 | 3 | | | | | 473.33 | 18400 |
| 20.0 | 26 | 19.5 | 40 | 42 | 92 | 20 | 3 | 383.11 | 20100 | | | | |
| 20.0 | 38 | 19.5 | 52 | 54 | 104 | 20 | 3 | | | 436.67 | 20200 | | |
| 20.0 | 60 | | | 76 | 126 | 20 | 3 | | | | | 546.52 | 20400 |

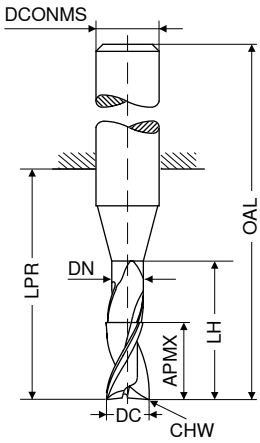
| | | | |
|---|---|---|---|
| Steel | ● | ● | ● |
| Stainless steel | ● | ● | ● |
| Cast iron | ● | ● | ● |
| Non ferrous metals | ○ | ○ | ○ |
| Heat resistant alloys | ● | ● | ● |
| Hardened materials | | | |

→ $v_c/f_z$ Page 64+65

# SilverLine – End milling cutter

N | $\lambda_s$=45° $\gamma_s$= 5° | ZEFP | HPC





| DPB72S | DPB72S | DPB72S |
|---|---|---|
| DRAGONSKIN | DRAGONSKIN | DRAGONSKIN |
| ≈DIN 6527 | ≈DIN 6527 | ≈DIN 6527 |
| HB | HB | HB |
| NEW V0 | NEW V0 | NEW V0 |

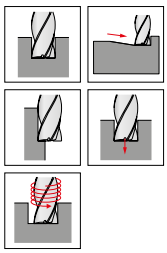
| DC f8 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | CHW mm | ZEFP | Article no. 50 966 ... £ | | Article no. 50 966 ... £ | | Article no. 50 966 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 8 | 2.9 | 15 | 21 | 57 | 6 | 0.1 | 3 | | | 60.03 | 03200 | | |
| 3.5 | 11 | 3.4 | 16 | 21 | 57 | 6 | 0.1 | 3 | | | 60.03 | 03700 | | |
| 4.0 | 8 | 3.9 | 15 | 18 | 54 | 6 | 0.1 | 3 | 57.88 | 04100 | | | | |
| 4.0 | 11 | 3.9 | 16 | 21 | 57 | 6 | 0.1 | 3 | | | 57.88 | 04200 | | |
| 4.0 | 16 | | | 26 | 62 | 6 | 0.1 | 3 | | | | | 61.02 | 04400 |
| 4.5 | 13 | 4.4 | 19 | 21 | 57 | 6 | 0.1 | 3 | | | 60.03 | 04700 | | |
| 5.0 | 9 | 4.9 | 16 | 18 | 54 | 6 | 0.1 | 3 | 57.88 | 05100 | | | | |
| 5.0 | 13 | 4.9 | 19 | 21 | 57 | 6 | 0.1 | 3 | | | 57.88 | 05200 | | |
| 5.0 | 17 | | | 26 | 62 | 6 | 0.1 | 3 | | | | | 61.02 | 05400 |
| 5.5 | 13 | 5.4 | 19 | 21 | 57 | 6 | 0.1 | 3 | | | 62.99 | 05700 | | |
| 6.0 | 10 | 5.9 | 17 | 18 | 54 | 6 | 0.2 | 3 | 60.19 | 06100 | | | | |
| 6.0 | 13 | 5.9 | 19 | 21 | 57 | 6 | 0.2 | 3 | | | 60.91 | 06200 | | |
| 6.0 | 18 | | | 26 | 62 | 6 | 0.2 | 3 | | | | | 67.68 | 06400 |
| 6.5 | 19 | 6.3 | 25 | 27 | 63 | 8 | 0.2 | 3 | | | 73.23 | 06700 | | |
| 7.0 | 19 | 6.8 | 25 | 27 | 63 | 8 | 0.2 | 3 | | | 73.23 | 07200 | | |
| 7.5 | 19 | 7.3 | 25 | 27 | 63 | 8 | 0.2 | 3 | | | 73.23 | 07700 | | |
| 8.0 | 12 | 7.8 | 20 | 22 | 58 | 8 | 0.2 | 3 | 68.39 | 08100 | | | | |
| 8.0 | 19 | 7.8 | 25 | 27 | 63 | 8 | 0.2 | 3 | | | 71.11 | 08200 | | |
| 8.0 | 24 | | | 32 | 68 | 8 | 0.2 | 3 | | | | | 76.02 | 08400 |
| 8.5 | 22 | 8.2 | 30 | 32 | 72 | 10 | 0.2 | 3 | | | 122.04 | 08700 | | |
| 9.0 | 22 | 8.7 | 30 | 32 | 72 | 10 | 0.2 | 3 | | | 122.04 | 09200 | | |
| 9.5 | 22 | 9.2 | 30 | 32 | 72 | 10 | 0.2 | 3 | | | 122.04 | 09700 | | |
| 10.0 | 14 | 9.7 | 24 | 26 | 66 | 10 | 0.2 | 3 | 108.10 | 10100 | | | | |
| 10.0 | 22 | 9.7 | 30 | 32 | 72 | 10 | 0.2 | 3 | | | 119.80 | 10200 | | |
| 10.0 | 30 | | | 40 | 80 | 10 | 0.2 | 3 | | | | | 135.33 | 10400 |
| 12.0 | 16 | 11.7 | 26 | 28 | 73 | 12 | 0.2 | 3 | 151.58 | 12100 | | | | |
| 12.0 | 26 | 11.7 | 36 | 38 | 83 | 12 | 0.2 | 3 | | | 162.24 | 12200 | | |
| 12.0 | 36 | | | 48 | 93 | 12 | 0.2 | 3 | | | | | 183.69 | 12400 |
| 14.0 | 18 | 13.7 | 28 | 30 | 75 | 14 | 0.2 | 3 | 187.20 | 14100 | | | | |
| 14.0 | 26 | 13.7 | 36 | 38 | 83 | 14 | 0.2 | 3 | | | 213.98 | 14200 | | |
| 14.0 | 42 | | | 54 | 99 | 14 | 0.2 | 3 | | | | | 237.90 | 14400 |
| 16.0 | 22 | 15.5 | 32 | 34 | 82 | 16 | 0.2 | 3 | 226.59 | 16100 | | | | |
| 16.0 | 32 | 15.5 | 42 | 44 | 92 | 16 | 0.2 | 3 | | | 363.09 | 16200 | | |
| 16.0 | 48 | | | 60 | 108 | 16 | 0.2 | 3 | | | | | 367.12 | 16400 |
| 18.0 | 24 | 17.5 | 34 | 36 | 84 | 18 | 0.2 | 3 | 312.65 | 18100 | | | | |
| 18.0 | 32 | 17.5 | 42 | 44 | 92 | 18 | 0.2 | 3 | | | 374.27 | 18200 | | |
| 18.0 | 54 | | | 66 | 114 | 18 | 0.2 | 3 | | | | | 473.33 | 18400 |
| 20.0 | 26 | 19.5 | 40 | 42 | 92 | 20 | 0.2 | 3 | 383.11 | 20100 | | | | |
| 20.0 | 38 | 19.5 | 52 | 54 | 104 | 20 | 0.2 | 3 | | | 436.67 | 20200 | | |
| 20.0 | 60 | | | 76 | 126 | 20 | 0.2 | 3 | | | | | 546.52 | 20400 |

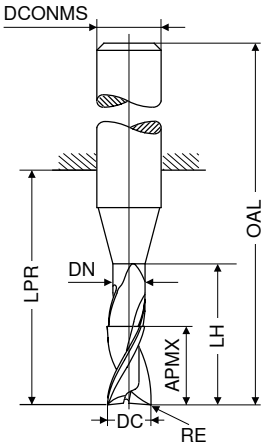
| | | | |
|---|---|---|---|
| Steel | ● | ● | ● |
| Stainless steel | ● | ● | ● |
| Cast iron | ● | ● | ● |
| Non ferrous metals | ○ | ○ | ○ |
| Heat resistant alloys | ● | ● | ● |
| Hardened materials | | | |

→ $v_c/f_z$ Page 64+65

# SilverLine – End milling cutter with corner radius

N | $\lambda_s$=45° $\gamma_s$= 5° | ZEFP | HPC






| DPB72S | DPB72S | DPB72S |
|---|---|---|
| DRAGONSKIN | DRAGONSKIN | DRAGONSKIN |

| ≈DIN 6527 | ≈DIN 6527 | ≈DIN 6527 |
|---|---|---|
| HB | HB | HB |

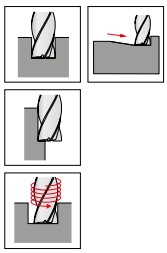
| DC f8 mm | RE mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | ZEFP | NEW V0 Article no. 50 967 ... £ | | NEW V0 Article no. 50 967 ... £ | | NEW V0 Article no. 50 967 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **4.0** | 0.5 | 8 | 3.9 | 15 | 18 | 54 | 6 | 3 | 70.59 | **04105** | | | | |
| **4.0** | 0.5 | 11 | 3.9 | 16 | 21 | 57 | 6 | 3 | | | 72.72 | **04205** | | |
| **4.0** | 0.5 | 16 | | | 26 | 62 | 6 | 3 | | | | | 77.21 | **04405** |
| **5.0** | 0.5 | 9 | 4.9 | 16 | 18 | 54 | 6 | 3 | 70.59 | **05105** | | | | |
| **5.0** | 0.5 | 13 | 4.9 | 19 | 21 | 57 | 6 | 3 | | | 72.72 | **05205** | | |
| **5.0** | 0.5 | 17 | | | 26 | 62 | 6 | 3 | | | | | 77.21 | **05405** |
| **6.0** | 0.5 | 10 | 5.9 | 17 | 18 | 54 | 6 | 3 | 72.49 | **06105** | | | | |
| **6.0** | 0.5 | 13 | 5.9 | 19 | 21 | 57 | 6 | 3 | | | 84.66 | **06205** | | |
| **6.0** | 0.5 | 18 | | | 26 | 62 | 6 | 3 | | | | | 85.64 | **06405** |
| **8.0** | 1.0 | 12 | 7.8 | 20 | 22 | 58 | 8 | 3 | 85.25 | **08110** | | | | |
| **8.0** | 1.0 | 19 | 7.8 | 25 | 27 | 63 | 8 | 3 | | | 97.27 | **08210** | | |
| **8.0** | 1.0 | 24 | | | 32 | 68 | 8 | 3 | | | | | 96.24 | **08410** |
| **10.0** | 1.0 | 14 | 9.7 | 24 | 26 | 66 | 10 | 3 | 153.66 | **10110** | | | | |
| **10.0** | 1.0 | 22 | 9.7 | 30 | 32 | 72 | 10 | 3 | | | 166.53 | **10210** | | |
| **10.0** | 1.0 | 30 | | | 40 | 80 | 10 | 3 | | | | | 171.21 | **10410** |
| **12.0** | 1.5 | 16 | 11.7 | 26 | 28 | 73 | 12 | 3 | 212.29 | **12115** | | | | |
| **12.0** | 1.5 | 26 | 11.7 | 36 | 38 | 83 | 12 | 3 | | | 226.33 | **12215** | | |
| **12.0** | 1.5 | 36 | | | 48 | 93 | 12 | 3 | | | | | 232.44 | **12415** |
| **16.0** | 2.0 | 22 | 15.5 | 32 | 34 | 82 | 16 | 3 | 430.30 | **16120** | | | | |
| **16.0** | 2.0 | 32 | 15.5 | 42 | 44 | 92 | 16 | 3 | | | 437.45 | **16220** | | |
| **16.0** | 2.0 | 48 | | | 60 | 108 | 16 | 3 | | | | | 464.49 | **16420** |
| **20.0** | 2.0 | 26 | 19.5 | 40 | 42 | 92 | 20 | 3 | 622.70 | **20120** | | | | |
| **20.0** | 2.0 | 38 | 19.5 | 52 | 54 | 104 | 20 | 3 | | | 637.65 | **20220** | | |
| **20.0** | 2.0 | 60 | | | 76 | 126 | 20 | 3 | | | | | 691.47 | **20420** |

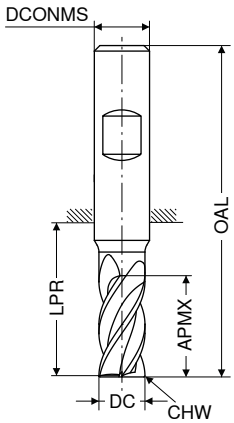
| | | | |
|---|---|---|---|
| Steel | ● | ● | ● |
| Stainless steel | ● | ● | ● |
| Cast iron | ● | ● | ● |
| Non ferrous metals | ○ | ○ | ○ |
| Heat resistant alloys | ● | ● | ● |
| Hardened materials | | | |

→ $v_c/f_z$ Page 64+65

# SilverLine – End milling cutter

N | $\lambda_s$=35° $\lambda_s$=38° $\gamma_s$= 9° | ZEFP | HPC





| | ≈DIN 6527 | ≈DIN 6527 | ≈DIN 6527 | ≈DIN 6527 |
|---|---|---|---|---|
| | HA | HB | HA | HB |
| | NEW V0 | NEW V0 | NEW V0 | NEW V0 |
| | Article no. 50 972 ... | Article no. 50 973 ... | Article no. 50 972 ... | Article no. 50 973 ... |

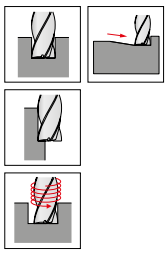
| DC f8 | APMX | LPR | OAL | DCONMS h6 | CHW | ZEFP | £ | | £ | | £ | | £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | mm | mm | mm | mm | mm | | | | | | | | | |
| 3.0 | 5 | 14 | 50 | 6 | 0.1 | 4 | 49.67 | 03100 | 49.67 | 03100 | | | | |
| 3.0 | 8 | 21 | 57 | 6 | 0.1 | 4 | | | | | 49.67 | 03200 | 49.67 | 03200 |
| 3.5 | 8 | 18 | 54 | 6 | 0.1 | 4 | 49.67 | 03600 | 49.67 | 03600 | | | | |
| 3.5 | 11 | 21 | 57 | 6 | 0.1 | 4 | | | | | 49.67 | 03700 | 49.67 | 03700 |
| 4.0 | 8 | 18 | 54 | 6 | 0.1 | 4 | 49.67 | 04100 | 49.67 | 04100 | | | | |
| 4.0 | 11 | 21 | 57 | 6 | 0.1 | 4 | | | | | 49.67 | 04200 | 49.67 | 04200 |
| 4.5 | 9 | 18 | 54 | 6 | 0.1 | 4 | 50.70 | 04600 | 50.70 | 04600 | | | | |
| 4.5 | 13 | 21 | 57 | 6 | 0.1 | 4 | | | | | 50.70 | 04700 | 50.70 | 04700 |
| 5.0 | 9 | 18 | 54 | 6 | 0.1 | 4 | 50.70 | 05100 | 50.70 | 05100 | | | | |
| 5.0 | 13 | 21 | 57 | 6 | 0.1 | 4 | | | | | 50.70 | 05200 | 50.70 | 05200 |
| 5.5 | 10 | 18 | 54 | 6 | 0.1 | 4 | 49.05 | 05600 | 49.05 | 05600 | | | | |
| 5.5 | 13 | 21 | 57 | 6 | 0.1 | 4 | | | | | 49.05 | 05700 | 49.05 | 05700 |
| 6.0 | 10 | 18 | 54 | 6 | 0.1 | 4 | 49.05 | 06100 | 49.05 | 06100 | | | | |
| 6.0 | 13 | 21 | 57 | 6 | 0.1 | 4 | | | | | 49.05 | 06200 | 49.05 | 06200 |
| 7.0 | 12 | 22 | 58 | 8 | 0.2 | 4 | 65.23 | 07100 | 65.23 | 07100 | | | | |
| 7.0 | 21 | 27 | 63 | 8 | 0.2 | 4 | | | | | 65.23 | 07200 | 65.23 | 07200 |
| 8.0 | 12 | 22 | 58 | 8 | 0.2 | 4 | 65.23 | 08100 | 65.23 | 08100 | | | | |
| 8.0 | 21 | 27 | 63 | 8 | 0.2 | 4 | | | | | 65.23 | 08200 | 65.23 | 08200 |
| 9.0 | 14 | 26 | 66 | 10 | 0.2 | 4 | 85.12 | 09100 | 85.12 | 09100 | | | | |
| 9.0 | 22 | 32 | 72 | 10 | 0.2 | 4 | | | | | 85.12 | 09200 | 85.12 | 09200 |
| 10.0 | 14 | 26 | 66 | 10 | 0.2 | 4 | 85.12 | 10100 | 85.12 | 10100 | | | | |
| 10.0 | 22 | 32 | 72 | 10 | 0.2 | 4 | | | | | 85.12 | 10200 | 85.12 | 10200 |
| 11.0 | 16 | 28 | 73 | 12 | 0.3 | 4 | 134.55 | 11100 | 134.55 | 11100 | | | | |
| 11.0 | 26 | 38 | 83 | 12 | 0.3 | 4 | | | | | 134.55 | 11200 | 134.55 | 11200 |
| 12.0 | 16 | 28 | 73 | 12 | 0.3 | 4 | 134.55 | 12100 | 134.55 | 12100 | | | | |
| 12.0 | 26 | 38 | 83 | 12 | 0.3 | 4 | | | | | 134.55 | 12200 | 134.55 | 12200 |
| 14.0 | 16 | 28 | 73 | 14 | 0.3 | 4 | 172.90 | 14100 | 172.90 | 14100 | | | | |
| 14.0 | 26 | 38 | 83 | 14 | 0.3 | 4 | | | | | 172.90 | 14200 | 172.90 | 14200 |
| 15.0 | 22 | 34 | 82 | 16 | 0.3 | 4 | 213.59 | 15100 | 213.59 | 15100 | | | | |
| 15.0 | 36 | 44 | 92 | 16 | 0.3 | 4 | | | | | 213.59 | 15200 | 213.59 | 15200 |
| 16.0 | 22 | 34 | 82 | 16 | 0.3 | 4 | 213.59 | 16100 | 213.59 | 16100 | | | | |
| 16.0 | 36 | 44 | 92 | 16 | 0.3 | 4 | | | | | 213.59 | 16200 | 213.59 | 16200 |
| 17.0 | 22 | 34 | 82 | 18 | 0.3 | 4 | 290.42 | 17100 | 290.42 | 17100 | | | | |
| 17.0 | 36 | 44 | 92 | 18 | 0.3 | 4 | | | | | 290.42 | 17200 | 290.42 | 17200 |
| 18.0 | 22 | 34 | 82 | 18 | 0.3 | 4 | 290.42 | 18100 | 290.42 | 18100 | | | | |
| 18.0 | 36 | 44 | 92 | 18 | 0.3 | 4 | | | | | 290.42 | 18200 | 290.42 | 18200 |
| 19.0 | 26 | 42 | 92 | 20 | 0.3 | 4 | 329.55 | 19100 | 329.55 | 19100 | | | | |
| 19.0 | 41 | 54 | 104 | 20 | 0.3 | 4 | | | | | 329.55 | 19200 | 329.55 | 19200 |
| 20.0 | 26 | 42 | 92 | 20 | 0.3 | 4 | 329.55 | 20100 | 329.55 | 20100 | | | | |
| 20.0 | 41 | 54 | 104 | 20 | 0.3 | 4 | | | | | 329.55 | 20200 | 329.55 | 20200 |

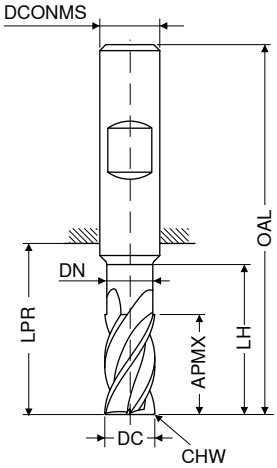
| | | | | |
|---|---|---|---|---|
| Steel | ● | ● | ● | ● |
| Stainless steel | ● | ● | ● | ● |
| Cast iron | ● | ● | ● | ● |
| Non ferrous metals | ○ | ○ | ○ | ○ |
| Heat resistant alloys | ● | ● | ● | ● |
| Hardened materials | | | | |

→ $v_c/f_z$ Page 68+69

# SilverLine – End milling cutter

N | $\lambda_s$=35° 38° $\gamma_s$= 9° | ZEFP | HPC






DPB72S DRAGONSKIN | DPB72S DRAGONSKIN | DPB72S DRAGONSKIN | DPB72S DRAGONSKIN

DIN 6527 | DIN 6527 | DIN 6527 | DIN 6527

HA | HB | HA | HB

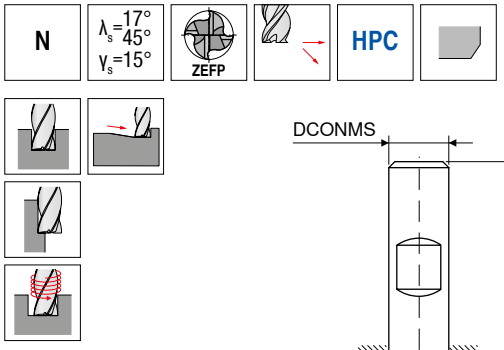
| DC f8 | APMX | DN | LH | LPR | OAL | DCONMS h6 | CHW | ZEFP | NEW V0 Article no. 50 974 ... | | NEW V0 Article no. 50 975 ... | | NEW V0 Article no. 50 974 ... | | NEW V0 Article no. 50 975 ... | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | mm | mm | mm | mm | mm | mm | mm | | £ | | £ | | £ | | £ | |
| 3.0 | 6.5 | 2.8 | 9 | 19 | 55 | 6 | 0.1 | 4 | 46.14 | 03200 | 46.14 | 03200 | | | | |
| 3.0 | 6.5 | 2.8 | 15 | 22 | 58 | 6 | 0.1 | 4 | | | | | 48.37 | 03400 | 48.37 | 03400 |
| 4.0 | 8.5 | 3.8 | 12 | 19 | 55 | 6 | 0.1 | 4 | 46.14 | 04200 | 46.14 | 04200 | | | | |
| 4.0 | 8.5 | 3.8 | 20 | 26 | 62 | 6 | 0.1 | 4 | | | | | 48.37 | 04400 | 48.37 | 04400 |
| 5.0 | 10.5 | 4.8 | 15 | 22 | 58 | 6 | 0.1 | 4 | 46.14 | 05200 | 46.14 | 05200 | | | | |
| 5.0 | 10.5 | 4.8 | 25 | 34 | 70 | 6 | 0.1 | 4 | | | | | 48.37 | 05400 | 48.37 | 05400 |
| 6.0 | 13.0 | 5.8 | 18 | 22 | 58 | 6 | 0.1 | 4 | 46.14 | 06200 | 46.14 | 06200 | | | | |
| 6.0 | 13.0 | 5.8 | 30 | 34 | 70 | 6 | 0.1 | 4 | | | | | 48.37 | 06400 | 48.37 | 06400 |
| 8.0 | 17.0 | 7.7 | 24 | 28 | 64 | 8 | 0.2 | 4 | 62.91 | 08200 | 62.91 | 08200 | | | | |
| 8.0 | 17.0 | 7.7 | 40 | 44 | 80 | 8 | 0.2 | 4 | | | | | 69.23 | 08400 | 69.23 | 08400 |
| 10.0 | 21.0 | 9.7 | 30 | 34 | 74 | 10 | 0.2 | 4 | 92.08 | 10200 | 92.08 | 10200 | | | | |
| 10.0 | 21.0 | 9.7 | 50 | 54 | 94 | 10 | 0.2 | 4 | | | | | 101.79 | 10400 | 101.79 | 10400 |
| 12.0 | 25.0 | 11.6 | 36 | 40 | 85 | 12 | 0.3 | 4 | 116.03 | 12200 | 116.03 | 12200 | | | | |
| 12.0 | 25.0 | 11.6 | 60 | 64 | 109 | 12 | 0.3 | 4 | | | | | 127.27 | 12400 | 127.27 | 12400 |
| 14.0 | 29.0 | 13.6 | 42 | 46 | 91 | 14 | 0.3 | 4 | 162.63 | 14200 | 162.63 | 14200 | | | | |
| 14.0 | 29.0 | 13.6 | 70 | 74 | 119 | 14 | 0.3 | 4 | | | | | 178.88 | 14400 | 178.88 | 14400 |
| 16.0 | 33.0 | 15.5 | 48 | 52 | 100 | 16 | 0.3 | 4 | 260.39 | 16200 | 260.39 | 16200 | | | | |
| 16.0 | 33.0 | 15.5 | 80 | 84 | 132 | 16 | 0.3 | 4 | | | | | 286.52 | 16400 | 286.52 | 16400 |
| 18.0 | 38.0 | 17.5 | 54 | 58 | 106 | 18 | 0.3 | 4 | 329.29 | 18200 | 329.29 | 18200 | | | | |
| 18.0 | 38.0 | 17.5 | 90 | 94 | 142 | 18 | 0.3 | 4 | | | | | 362.31 | 18400 | 362.31 | 18400 |
| 20.0 | 42.0 | 19.5 | 60 | 64 | 114 | 20 | 0.3 | 4 | 356.20 | 20200 | 356.20 | 20200 | | | | |
| 20.0 | 42.0 | 19.5 | 100 | 104 | 154 | 20 | 0.3 | 4 | | | | | 394.42 | 20400 | 394.42 | 20400 |

| | | | | |
|---|---|---|---|---|
| Steel | ● | ● | ● | ● |
| Stainless steel | ● | ● | ● | ● |
| Cast iron | ● | ● | ● | ● |
| Non ferrous metals | ○ | ○ | ○ | ○ |
| Heat resistant alloys | ● | ● | ● | ● |
| Hardened materials | | | | |

→ $v_c/f_z$ Page 68–71

# SilverLine – End milling cutter

▲ Specially for full slot milling

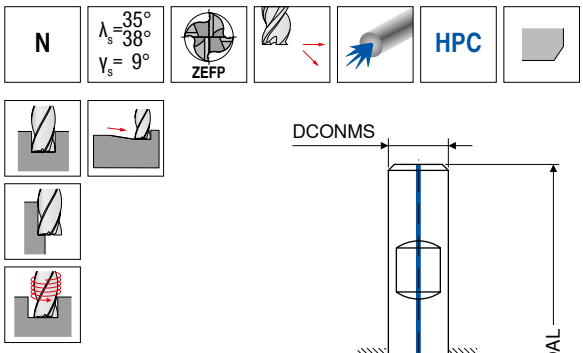


| DC f8 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | CHW mm | ZEFP | DIN 6527 HA NEW V0 Article no. 50 976 ... £ | | DIN 6527 HB NEW V0 Article no. 50 977 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 8 | 2.8 | 13 | 21 | 57 | 6 | 0.1 | 4 | 69.37 | 03200 | 69.37 | 03200 |
| 4.0 | 11 | 3.8 | 17 | 21 | 57 | 6 | 0.1 | 4 | 69.37 | 04200 | 69.37 | 04200 |
| 5.0 | 13 | 4.8 | 19 | 21 | 57 | 6 | 0.1 | 4 | 69.37 | 05200 | 69.37 | 05200 |
| 6.0 | 13 | 5.8 | 19 | 21 | 57 | 6 | 0.1 | 4 | 72.88 | 06200 | 72.88 | 06200 |
| 8.0 | 21 | 7.7 | 25 | 27 | 63 | 8 | 0.2 | 4 | 83.55 | 08200 | 83.55 | 08200 |
| 10.0 | 22 | 9.7 | 30 | 32 | 72 | 10 | 0.2 | 4 | 143.52 | 10200 | 143.52 | 10200 |
| 12.0 | 26 | 11.6 | 36 | 38 | 83 | 12 | 0.3 | 4 | 194.48 | 12200 | 194.48 | 12200 |
| 14.0 | 26 | 13.6 | 36 | 38 | 83 | 14 | 0.3 | 4 | 286.39 | 14200 | 286.39 | 14200 |
| 16.0 | 36 | 15.5 | 42 | 44 | 92 | 16 | 0.3 | 4 | 363.22 | 16200 | 363.22 | 16200 |
| 18.0 | 36 | 17.5 | 42 | 44 | 92 | 18 | 0.3 | 4 | 501.41 | 18200 | 501.41 | 18200 |
| 20.0 | 41 | 19.5 | 52 | 54 | 104 | 20 | 0.3 | 4 | 521.95 | 20200 | 521.95 | 20200 |

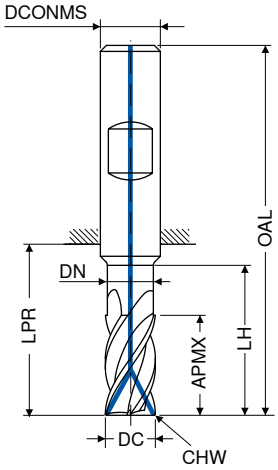
| | | |
|---|---|---|
| Steel | ● | ● |
| Stainless steel | ● | ● |
| Cast iron | ● | ● |
| Non ferrous metals | ○ | ○ |
| Heat resistant alloys | | |
| Hardened materials | | |

→ $v_c/f_z$ Page 66+67

# SilverLine – End milling cutter






DPB72S

DRAGONSKIN

DIN 6527

HB

NEW V0

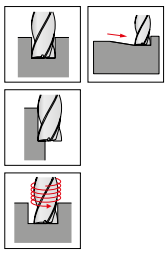
| DC f8 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | CHW mm | ZEFP | £ | Article no. 50 978 ... |
|---|---|---|---|---|---|---|---|---|---|---|
| 6.0 | 13 | 5.8 | 19 | 21 | 57 | 6 | 0.1 | 4 | 137.93 | 06200 |
| 8.0 | 21 | 7.7 | 25 | 27 | 63 | 8 | 0.2 | 4 | 160.81 | 08200 |
| 10.0 | 22 | 9.7 | 30 | 32 | 72 | 10 | 0.2 | 4 | 181.74 | 10200 |
| 12.0 | 26 | 11.6 | 36 | 38 | 83 | 12 | 0.3 | 4 | 254.15 | 12200 |
| 14.0 | 26 | 13.6 | 36 | 38 | 83 | 14 | 0.3 | 4 | 389.87 | 14200 |
| 16.0 | 36 | 15.5 | 42 | 44 | 92 | 16 | 0.3 | 4 | 389.87 | 16200 |
| 18.0 | 36 | 17.5 | 42 | 44 | 92 | 18 | 0.3 | 4 | 518.96 | 18200 |
| 20.0 | 41 | 19.5 | 52 | 54 | 104 | 20 | 0.3 | 4 | 518.96 | 20200 |

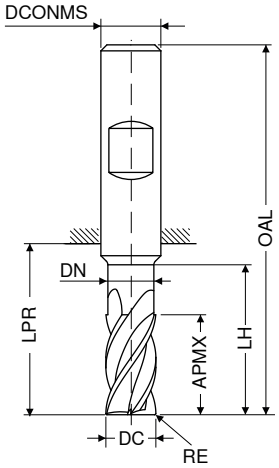
| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ● |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |
| Hardened materials | |

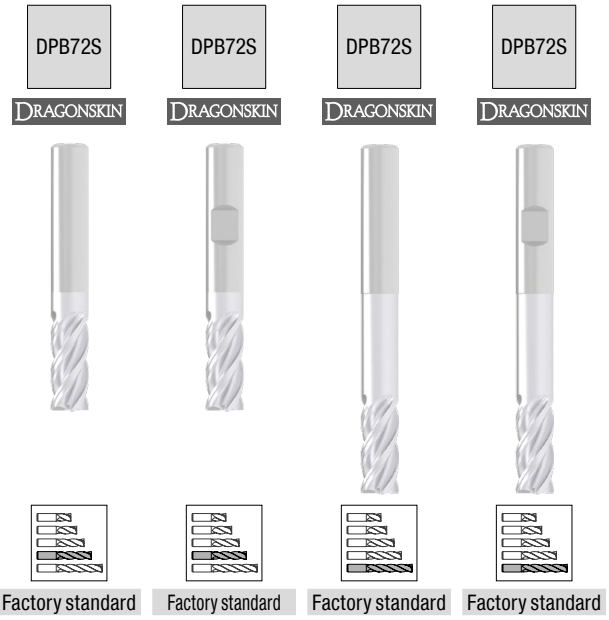
→ $v_c/f_z$ Page 68+69

# SilverLine – End milling cutter with corner radius

N | $\lambda_s$=35° 38° $\gamma_s$= 9° | ZEFP | HPC






| DC f8 | RE ±0,01 | APMX | DN | LH | LPR | OAL | DCONMS h6 | ZEFP | NEW V0 Article no. 50 970 ... | | NEW V0 Article no. 50 971 ... | | NEW V0 Article no. 50 970 ... | | NEW V0 Article no. 50 971 ... | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | mm | mm | mm | mm | mm | mm | mm | | £ | | £ | | £ | | £ | |
| 3.0 | 0.10 | 8.0 | 2.8 | 13 | 21 | 57 | 6 | 4 | 66.94 | 03201 | 66.94 | 03201 | | | | |
| 3.0 | 0.40 | 8.0 | 2.8 | 13 | 21 | 57 | 6 | 4 | 66.94 | 03204 | 66.94 | 03204 | | | | |
| 3.0 | 0.50 | 8.0 | 2.8 | 13 | 21 | 57 | 6 | 4 | 66.94 | 03205 | 66.94 | 03205 | | | | |
| 3.0 | 1.00 | 8.0 | 2.8 | 13 | 21 | 57 | 6 | 4 | 66.94 | 03210 | 66.94 | 03210 | | | | |
| 3.0 | 0.30 | 6.5 | 2.8 | 15 | 22 | 58 | 6 | 4 | | | | | 78.68 | 03403 | 78.68 | 03403 |
| 3.0 | 0.50 | 6.5 | 2.8 | 15 | 22 | 58 | 6 | 4 | | | | | 78.68 | 03405 | 78.68 | 03405 |
| 3.0 | 0.80 | 6.5 | 2.8 | 15 | 22 | 58 | 6 | 4 | | | | | 78.68 | 03408 | 78.68 | 03408 |
| 4.0 | 0.10 | 11.0 | 3.8 | 17 | 21 | 57 | 6 | 4 | 66.94 | 04201 | 66.94 | 04201 | | | | |
| 4.0 | 0.40 | 11.0 | 3.8 | 17 | 21 | 57 | 6 | 4 | 66.94 | 04204 | 66.94 | 04204 | | | | |
| 4.0 | 0.50 | 11.0 | 3.8 | 17 | 21 | 57 | 6 | 4 | 66.94 | 04205 | 66.94 | 04205 | | | | |
| 4.0 | 1.00 | 11.0 | 3.8 | 17 | 21 | 57 | 6 | 4 | 66.94 | 04210 | 66.94 | 04210 | | | | |
| 4.0 | 0.40 | 8.5 | 3.8 | 20 | 26 | 62 | 6 | 4 | | | | | 78.68 | 04404 | 78.68 | 04404 |
| 4.0 | 0.50 | 8.5 | 3.8 | 20 | 26 | 62 | 6 | 4 | | | | | 78.68 | 04405 | 78.68 | 04405 |
| 4.0 | 0.80 | 8.5 | 3.8 | 20 | 26 | 62 | 6 | 4 | | | | | 78.68 | 04408 | 78.68 | 04408 |
| 5.0 | 0.10 | 13.0 | 4.8 | 19 | 21 | 57 | 6 | 4 | 68.03 | 05201 | 68.03 | 05201 | | | | |
| 5.0 | 0.50 | 13.0 | 4.8 | 19 | 21 | 57 | 6 | 4 | 68.03 | 05205 | 68.03 | 05205 | | | | |
| 5.0 | 1.00 | 13.0 | 4.8 | 19 | 21 | 57 | 6 | 4 | 68.03 | 05210 | 68.03 | 05210 | | | | |
| 5.0 | 0.50 | 10.5 | 4.8 | 25 | 34 | 70 | 6 | 4 | | | | | 79.91 | 05405 | 79.91 | 05405 |
| 5.0 | 0.80 | 10.5 | 4.8 | 25 | 34 | 70 | 6 | 4 | | | | | 79.91 | 05408 | 79.91 | 05408 |
| 6.0 | 0.10 | 13.0 | 5.8 | 19 | 21 | 57 | 6 | 4 | 66.38 | 06201 | 66.38 | 06201 | | | | |
| 6.0 | 0.50 | 13.0 | 5.8 | 19 | 21 | 57 | 6 | 4 | 66.38 | 06205 | 66.38 | 06205 | | | | |
| 6.0 | 1.00 | 13.0 | 5.8 | 19 | 21 | 57 | 6 | 4 | 66.38 | 06210 | 66.38 | 06210 | | | | |
| 6.0 | 1.50 | 13.0 | 5.8 | 19 | 21 | 57 | 6 | 4 | 66.38 | 06215 | 66.38 | 06215 | | | | |
| 6.0 | 0.60 | 13.0 | 5.8 | 30 | 34 | 70 | 6 | 4 | | | | | 79.91 | 06406 | 79.91 | 06406 |
| 6.0 | 0.80 | 13.0 | 5.8 | 30 | 34 | 70 | 6 | 4 | | | | | 79.91 | 06408 | 79.91 | 06408 |
| 6.0 | 1.00 | 13.0 | 5.8 | 30 | 34 | 70 | 6 | 4 | | | | | 79.91 | 06410 | 79.91 | 06410 |
| 8.0 | 0.15 | 21.0 | 7.7 | 25 | 27 | 63 | 8 | 4 | 83.23 | 08202 | 83.23 | 08202 | | | | |
| 8.0 | 0.50 | 21.0 | 7.7 | 25 | 27 | 63 | 8 | 4 | 83.23 | 08205 | 83.23 | 08205 | | | | |
| 8.0 | 1.00 | 21.0 | 7.7 | 25 | 27 | 63 | 8 | 4 | 83.23 | 08210 | 83.23 | 08210 | | | | |
| 8.0 | 1.50 | 21.0 | 7.7 | 25 | 27 | 63 | 8 | 4 | 83.23 | 08215 | 83.23 | 08215 | | | | |
| 8.0 | 2.00 | 21.0 | 7.7 | 25 | 27 | 63 | 8 | 4 | 83.23 | 08220 | 83.23 | 08220 | | | | |
| 8.0 | 0.80 | 17.0 | 7.7 | 40 | 44 | 80 | 8 | 4 | | | | | 96.76 | 08408 | 96.76 | 08408 |
| 8.0 | 1.00 | 17.0 | 7.7 | 40 | 44 | 80 | 8 | 4 | | | | | 96.76 | 08410 | 96.76 | 08410 |
| 8.0 | 1.50 | 17.0 | 7.7 | 40 | 44 | 80 | 8 | 4 | | | | | 96.76 | 08415 | 96.76 | 08415 |
| 8.0 | 2.00 | 17.0 | 7.7 | 40 | 44 | 80 | 8 | 4 | | | | | 96.76 | 08420 | 96.76 | 08420 |
| 10.0 | 0.15 | 22.0 | 9.7 | 30 | 32 | 72 | 10 | 4 | 104.00 | 10202 | 104.00 | 10202 | | | | |
| 10.0 | 0.50 | 22.0 | 9.7 | 30 | 32 | 72 | 10 | 4 | 104.00 | 10205 | 104.00 | 10205 | | | | |
| 10.0 | 1.00 | 22.0 | 9.7 | 30 | 32 | 72 | 10 | 4 | 104.00 | 10210 | 104.00 | 10210 | | | | |
| 10.0 | 1.50 | 22.0 | 9.7 | 30 | 32 | 72 | 10 | 4 | 104.00 | 10215 | 104.00 | 10215 | | | | |
| 10.0 | 2.00 | 22.0 | 9.7 | 30 | 32 | 72 | 10 | 4 | 104.00 | 10220 | 104.00 | 10220 | | | | |
| 10.0 | 0.50 | 21.0 | 9.7 | 50 | 54 | 94 | 10 | 4 | | | | | 119.69 | 10405 | 119.69 | 10405 |
| 10.0 | 1.00 | 21.0 | 9.7 | 50 | 54 | 94 | 10 | 4 | | | | | 119.69 | 10410 | 119.69 | 10410 |
| 10.0 | 1.50 | 21.0 | 9.7 | 50 | 54 | 94 | 10 | 4 | | | | | 119.69 | 10415 | 119.69 | 10415 |
| 10.0 | 2.00 | 21.0 | 9.7 | 50 | 54 | 94 | 10 | 4 | | | | | 119.69 | 10420 | 119.69 | 10420 |
| 12.0 | 0.20 | 26.0 | 11.6 | 36 | 38 | 83 | 12 | 4 | 160.55 | 12202 | 160.55 | 12202 | | | | |
| 12.0 | 0.50 | 26.0 | 11.6 | 36 | 38 | 83 | 12 | 4 | 160.55 | 12205 | 160.55 | 12205 | | | | |
| 12.0 | 1.00 | 26.0 | 11.6 | 36 | 38 | 83 | 12 | 4 | 160.55 | 12210 | 160.55 | 12210 | | | | |
| 12.0 | 1.50 | 26.0 | 11.6 | 36 | 38 | 83 | 12 | 4 | 160.55 | 12215 | 160.55 | 12215 | | | | |

| | | | | |
|---|---|---|---|---|
| Steel | ● | ● | ● | ● |
| Stainless steel | ● | ● | ● | ● |
| Cast iron | ● | ● | ● | ● |
| Non ferrous metals | ○ | ○ | ○ | ○ |
| Heat resistant alloys | ● | ● | ● | ● |
| Hardened materials | | | | |

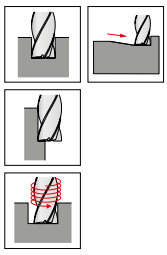
→ $v_c/f_z$ Page 68–71

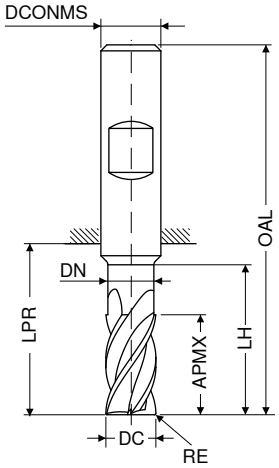


Continued on next page

# SilverLine – End milling cutter with corner radius

N | $\lambda_s$=35° $\lambda_s$=38° $\gamma_s$= 9° | ZEFP | HPC





| DC f8 | RE ±0,01 | APMX | DN | LH | LPR | OAL | DCONMS h6 | ZEFP | NEW V0 Article no. 50 970 ... £ | | NEW V0 Article no. 50 971 ... £ | | NEW V0 Article no. 50 970 ... £ | | NEW V0 Article no. 50 971 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | mm | mm | mm | mm | mm | mm | mm | | | | | | | | | |
| 12.0 | 2.00 | 26.0 | 11.6 | 36 | 38 | 83 | 12 | 4 | 160.55 | 12220 | 160.55 | 12220 | | | | |
| 12.0 | 3.00 | 26.0 | 11.6 | 36 | 38 | 83 | 12 | 4 | 160.55 | 12230 | 160.55 | 12230 | | | | |
| 12.0 | 4.00 | 26.0 | 11.6 | 36 | 38 | 83 | 12 | 4 | 160.55 | 12240 | 160.55 | 12240 | | | | |
| 12.0 | 0.50 | 25.0 | 11.6 | 60 | 64 | 109 | 12 | 4 | | | | | 181.74 | 12405 | 181.74 | 12405 |
| 12.0 | 1.00 | 25.0 | 11.6 | 60 | 64 | 109 | 12 | 4 | | | | | 181.74 | 12410 | 181.74 | 12410 |
| 12.0 | 1.50 | 25.0 | 11.6 | 60 | 64 | 109 | 12 | 4 | | | | | 181.74 | 12415 | 181.74 | 12415 |
| 12.0 | 2.00 | 25.0 | 11.6 | 60 | 64 | 109 | 12 | 4 | | | | | 181.74 | 12420 | 181.74 | 12420 |
| 12.0 | 3.00 | 25.0 | 11.6 | 60 | 64 | 109 | 12 | 4 | | | | | 181.74 | 12430 | 181.74 | 12430 |
| 12.0 | 4.00 | 25.0 | 11.6 | 60 | 64 | 109 | 12 | 4 | | | | | 181.74 | 12440 | 181.74 | 12440 |
| 14.0 | 0.30 | 26.0 | 13.6 | 36 | 38 | 83 | 14 | 4 | 242.84 | 14203 | 242.84 | 14203 | | | | |
| 14.0 | 1.00 | 26.0 | 13.6 | 36 | 38 | 83 | 14 | 4 | 242.84 | 14210 | 242.84 | 14210 | | | | |
| 14.0 | 2.00 | 26.0 | 13.6 | 36 | 38 | 83 | 14 | 4 | 242.84 | 14220 | 242.84 | 14220 | | | | |
| 14.0 | 3.00 | 26.0 | 13.6 | 36 | 38 | 83 | 14 | 4 | 242.84 | 14230 | 242.84 | 14230 | | | | |
| 14.0 | 4.00 | 26.0 | 13.6 | 36 | 38 | 83 | 14 | 4 | 242.84 | 14240 | 242.84 | 14240 | | | | |
| 14.0 | 1.00 | 29.0 | 13.6 | 70 | 74 | 119 | 14 | 4 | | | | | 272.35 | 14410 | 272.35 | 14410 |
| 14.0 | 2.00 | 29.0 | 13.6 | 70 | 74 | 119 | 14 | 4 | | | | | 272.35 | 14420 | 272.35 | 14420 |
| 14.0 | 3.00 | 29.0 | 13.6 | 70 | 74 | 119 | 14 | 4 | | | | | 272.35 | 14430 | 272.35 | 14430 |
| 14.0 | 4.00 | 29.0 | 13.6 | 70 | 74 | 119 | 14 | 4 | | | | | 272.35 | 14440 | 272.35 | 14440 |
| 16.0 | 0.30 | 36.0 | 15.5 | 42 | 44 | 92 | 16 | 4 | 242.84 | 16203 | 242.84 | 16203 | | | | |
| 16.0 | 1.00 | 36.0 | 15.5 | 42 | 44 | 92 | 16 | 4 | 242.84 | 16210 | 242.84 | 16210 | | | | |
| 16.0 | 2.00 | 36.0 | 15.5 | 42 | 44 | 92 | 16 | 4 | 242.84 | 16220 | 242.84 | 16220 | | | | |
| 16.0 | 3.00 | 36.0 | 15.5 | 42 | 44 | 92 | 16 | 4 | 242.84 | 16230 | 242.84 | 16230 | | | | |
| 16.0 | 4.00 | 36.0 | 15.5 | 42 | 44 | 92 | 16 | 4 | 242.84 | 16240 | 242.84 | 16240 | | | | |
| 16.0 | 1.00 | 33.0 | 15.5 | 80 | 84 | 132 | 16 | 4 | | | | | 298.74 | 16410 | 298.74 | 16410 |
| 16.0 | 2.00 | 33.0 | 15.5 | 80 | 84 | 132 | 16 | 4 | | | | | 298.74 | 16420 | 298.74 | 16420 |
| 16.0 | 3.00 | 33.0 | 15.5 | 80 | 84 | 132 | 16 | 4 | | | | | 298.74 | 16430 | 298.74 | 16430 |
| 16.0 | 4.00 | 33.0 | 15.5 | 80 | 84 | 132 | 16 | 4 | | | | | 298.74 | 16440 | 298.74 | 16440 |
| 18.0 | 1.00 | 36.0 | 17.5 | 42 | 44 | 92 | 18 | 4 | 323.05 | 18210 | 323.05 | 18210 | | | | |
| 18.0 | 2.00 | 36.0 | 17.5 | 42 | 44 | 92 | 18 | 4 | 323.05 | 18220 | 323.05 | 18220 | | | | |
| 18.0 | 3.00 | 36.0 | 17.5 | 42 | 44 | 92 | 18 | 4 | 323.05 | 18230 | 323.05 | 18230 | | | | |
| 18.0 | 4.00 | 36.0 | 17.5 | 42 | 44 | 92 | 18 | 4 | 323.05 | 18240 | 323.05 | 18240 | | | | |
| 18.0 | 1.00 | 38.0 | 17.5 | 90 | 94 | 142 | 18 | 4 | | | | | 360.36 | 18410 | 360.36 | 18410 |
| 18.0 | 2.00 | 38.0 | 17.5 | 90 | 94 | 142 | 18 | 4 | | | | | 360.36 | 18420 | 360.36 | 18420 |
| 18.0 | 3.00 | 38.0 | 17.5 | 90 | 94 | 142 | 18 | 4 | | | | | 360.36 | 18430 | 360.36 | 18430 |
| 18.0 | 4.00 | 38.0 | 17.5 | 90 | 94 | 142 | 18 | 4 | | | | | 360.36 | 18440 | 360.36 | 18440 |
| 20.0 | 0.30 | 41.0 | 19.5 | 52 | 54 | 104 | 20 | 4 | 363.74 | 20203 | 363.74 | 20203 | | | | |
| 20.0 | 1.00 | 41.0 | 19.5 | 52 | 54 | 104 | 20 | 4 | 363.74 | 20210 | 363.74 | 20210 | | | | |
| 20.0 | 2.00 | 41.0 | 19.5 | 52 | 54 | 104 | 20 | 4 | 363.74 | 20220 | 363.74 | 20220 | | | | |
| 20.0 | 3.00 | 41.0 | 19.5 | 52 | 54 | 104 | 20 | 4 | 363.74 | 20230 | 363.74 | 20230 | | | | |
| 20.0 | 4.00 | 41.0 | 19.5 | 52 | 54 | 104 | 20 | 4 | 363.74 | 20240 | 363.74 | 20240 | | | | |
| 20.0 | 1.00 | 42.0 | 19.5 | 100 | 104 | 154 | 20 | 4 | | | | | 405.08 | 20410 | 405.08 | 20410 |
| 20.0 | 2.00 | 42.0 | 19.5 | 100 | 104 | 154 | 20 | 4 | | | | | 405.08 | 20420 | 405.08 | 20420 |
| 20.0 | 3.00 | 42.0 | 19.5 | 100 | 104 | 154 | 20 | 4 | | | | | 405.08 | 20430 | 405.08 | 20430 |
| 20.0 | 4.00 | 42.0 | 19.5 | 100 | 104 | 154 | 20 | 4 | | | | | 405.08 | 20440 | 405.08 | 20440 |

| | | | | |
|---|---|---|---|---|
| Steel | ● | ● | ● | ● |
| Stainless steel | ● | ● | ● | ● |
| Cast iron | ● | ● | ● | ● |
| Non ferrous metals | ○ | ○ | ○ | ○ |
| Heat resistant alloys | ● | ● | ● | ● |
| Hardened materials | | | | |

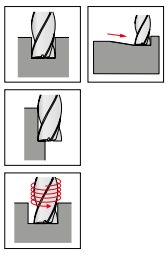
→ $v_c/f_z$ Page 68–71

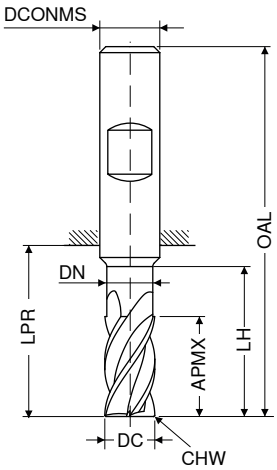
# SilverLine – End milling cutter

NF | $\lambda_s$=35° 38° $\gamma_s$= 9° | ZEFP | HPC

DPB72S

DRAGONSKIN





DIN 6527

HB

NEW V0

| DC f8 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | CHW mm | ZEFP | Article no. 50 969 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 8 | 2.8 | 13 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 03200 |
| 3.5 | 11 | 3.3 | 17 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 03700 |
| 4.0 | 11 | 3.8 | 17 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 04200 |
| 4.5 | 13 | 4.3 | 19 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 04700 |
| 5.0 | 13 | 4.8 | 19 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 05200 |
| 5.5 | 13 | 5.3 | 19 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 05700 |
| 6.0 | 13 | 5.8 | 19 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 06200 |
| 7.0 | 21 | 6.7 | 25 | 27 | 63 | 8 | 0.2 | 4 | 154.05 | 07200 |
| 8.0 | 21 | 7.7 | 25 | 27 | 63 | 8 | 0.2 | 4 | 154.05 | 08200 |
| 9.0 | 22 | 8.7 | 30 | 32 | 72 | 10 | 0.2 | 4 | 161.85 | 09200 |
| 10.0 | 22 | 9.7 | 30 | 32 | 72 | 10 | 0.2 | 4 | 161.85 | 10200 |
| 11.0 | 26 | 10.6 | 36 | 38 | 83 | 12 | 0.3 | 4 | 225.94 | 11200 |
| 12.0 | 26 | 11.6 | 36 | 38 | 83 | 12 | 0.3 | 4 | 225.94 | 12200 |
| 14.0 | 26 | 13.6 | 36 | 38 | 83 | 14 | 0.3 | 4 | 323.44 | 14200 |
| 15.0 | 36 | 14.5 | 42 | 44 | 92 | 16 | 0.3 | 4 | 323.44 | 15200 |
| 16.0 | 36 | 15.5 | 42 | 44 | 92 | 16 | 0.3 | 4 | 323.44 | 16200 |
| 17.0 | 36 | 16.5 | 42 | 44 | 92 | 18 | 0.3 | 4 | 378.56 | 17200 |
| 18.0 | 36 | 17.5 | 42 | 44 | 92 | 18 | 0.3 | 4 | 378.56 | 18200 |
| 19.0 | 41 | 18.5 | 52 | 54 | 104 | 20 | 0.3 | 4 | 509.47 | 19200 |
| 20.0 | 41 | 19.5 | 52 | 54 | 104 | 20 | 0.3 | 4 | 509.47 | 20200 |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ● |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |
| Hardened materials | |

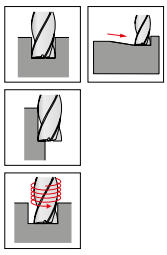
→ $v_c/f_z$ Page 68+69

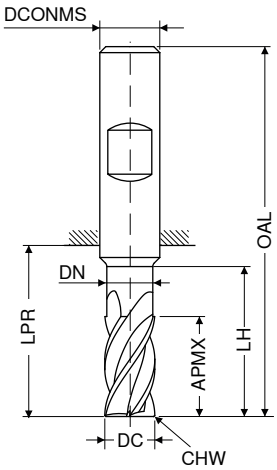
# SilverLine – End milling cutter

NR | $\lambda_s$=35° 38° $\gamma_s$= 9° | ZEFP | HPC

DPB72S

DRAGONSKIN





DIN 6527

HB

NEW V0

| DC f8 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | CHW mm | ZEFP | Article no. 50 979 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 8 | 2.8 | 13 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 03200 |
| 3.5 | 11 | 3.3 | 17 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 03700 |
| 4.0 | 11 | 3.8 | 17 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 04200 |
| 4.5 | 13 | 4.3 | 19 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 04700 |
| 5.0 | 13 | 4.8 | 19 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 05200 |
| 5.5 | 13 | 5.3 | 19 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 05700 |
| 6.0 | 13 | 5.8 | 19 | 21 | 57 | 6 | 0.1 | 4 | 143.00 | 06200 |
| 7.0 | 21 | 6.7 | 25 | 27 | 63 | 8 | 0.2 | 4 | 154.05 | 07200 |
| 8.0 | 21 | 7.7 | 25 | 27 | 63 | 8 | 0.2 | 4 | 154.05 | 08200 |
| 9.0 | 22 | 8.7 | 30 | 32 | 72 | 10 | 0.2 | 4 | 161.85 | 09200 |
| 10.0 | 22 | 9.7 | 30 | 32 | 72 | 10 | 0.2 | 4 | 161.85 | 10200 |
| 11.0 | 26 | 10.6 | 36 | 38 | 83 | 12 | 0.3 | 4 | 225.94 | 11200 |
| 12.0 | 26 | 11.6 | 36 | 38 | 83 | 12 | 0.3 | 4 | 225.94 | 12200 |
| 14.0 | 26 | 13.6 | 36 | 38 | 83 | 14 | 0.3 | 4 | 323.44 | 14200 |
| 15.0 | 36 | 14.5 | 42 | 44 | 92 | 16 | 0.3 | 4 | 323.44 | 15200 |
| 16.0 | 36 | 15.5 | 42 | 44 | 92 | 16 | 0.3 | 4 | 323.44 | 16200 |
| 17.0 | 36 | 16.5 | 42 | 44 | 92 | 18 | 0.3 | 4 | 378.56 | 17200 |
| 18.0 | 36 | 18.0 | 42 | 44 | 92 | 18 | 0.3 | 4 | 378.56 | 18200 |
| 19.0 | 41 | 19.0 | 52 | 54 | 104 | 20 | 0.3 | 4 | 509.47 | 19200 |
| 20.0 | 41 | 20.0 | 52 | 54 | 104 | 20 | 0.3 | 4 | 509.47 | 20200 |

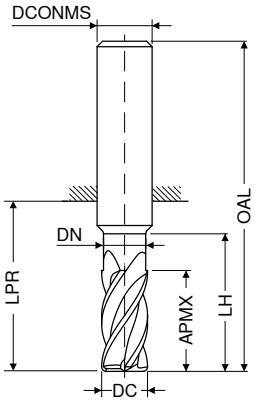
| | |
|---|---|
| Steel | ● |
| Stainless steel | ● |
| Cast iron | ● |
| Non ferrous metals | ○ |
| Heat resistant alloys | ● |
| Hardened materials | |

→ $v_c/f_z$ Page 68+69

# SilverLine – High Accuracy Finish Milling Cutter

▲ max. taper of 0.005 mm for high precision and parallelism of vertical walls
▲ Tool with cutting edge correction

N | $\lambda_s$=48° $\lambda_s$=50° $\gamma_s$=13° | ZEFP



| | DPB72S DRAGONSKIN | DPB72S DRAGONSKIN |
|---|---|---|
| | ≈DIN 6527 | Factory standard |
| | HA | HA |
| | NEW V0 Article no. 50 991 ... £ | NEW V0 Article no. 50 991 ... £ |

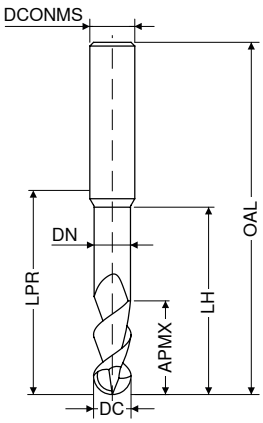
| DC f8 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h5 mm | ZEFP | ≈DIN 6527 £ | Article no. | Factory standard £ | Article no. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.0 | 10 | 5.8 | 18 | 22 | 58 | 6 | 6 | 73.91 | 06200 | | |
| 6.0 | 13 | 5.6 | 19 | 21 | 57 | 6 | 6 | 73.87 | 06700 | | |
| 6.0 | 13 | 5.8 | 27 | 31 | 67 | 6 | 6 | | | 100.22 | 06400 |
| 6.0 | 13 | 5.8 | 36 | 40 | 76 | 6 | 6 | | | 125.19 | 06900 |
| 6.0 | 15 | 5.6 | 42 | 44 | 80 | 6 | 6 | | | 100.18 | 90000 |
| 8.0 | 13 | 7.7 | 24 | 28 | 64 | 8 | 6 | 84.54 | 08200 | | |
| 8.0 | 17 | 7.7 | 36 | 40 | 76 | 8 | 6 | | | 123.97 | 08400 |
| 8.0 | 17 | 7.7 | 48 | 53 | 89 | 8 | 6 | | | 154.96 | 08900 |
| 8.0 | 19 | 7.6 | 25 | 27 | 63 | 8 | 6 | 84.85 | 08700 | | |
| 8.0 | 20 | 7.6 | 62 | 64 | 100 | 8 | 6 | | | 123.81 | 90100 |
| 10.0 | 16 | 9.7 | 30 | 34 | 74 | 10 | 6 | 145.73 | 10200 | | |
| 10.0 | 21 | 9.7 | 45 | 49 | 89 | 10 | 6 | | | 185.77 | 10400 |
| 10.0 | 21 | 9.7 | 60 | 64 | 104 | 10 | 6 | | | 232.18 | 90200 |
| 10.0 | 22 | 9.6 | 30 | 32 | 72 | 10 | 6 | 145.34 | 10700 | | |
| 10.0 | 25 | 9.6 | 58 | 60 | 100 | 10 | 6 | | | 185.25 | 10900 |
| 12.0 | 19 | 11.6 | 36 | 40 | 85 | 12 | 6 | 197.47 | 12200 | | |
| 12.0 | 25 | 11.6 | 54 | 58 | 103 | 12 | 6 | | | 287.56 | 12400 |
| 12.0 | 25 | 11.6 | 72 | 76 | 121 | 12 | 6 | | | 359.32 | 90300 |
| 12.0 | 26 | 11.5 | 36 | 38 | 83 | 12 | 6 | 196.95 | 12700 | | |
| 12.0 | 30 | 11.5 | 73 | 75 | 120 | 12 | 6 | | | 287.17 | 12900 |
| 16.0 | 25 | 15.5 | 48 | 52 | 100 | 16 | 6 | 367.38 | 16200 | | |
| 16.0 | 32 | 15.0 | 42 | 44 | 92 | 16 | 6 | 367.25 | 16700 | | |
| 16.0 | 33 | 15.5 | 72 | 76 | 124 | 16 | 6 | | | 506.09 | 16400 |
| 16.0 | 33 | 15.5 | 96 | 100 | 148 | 16 | 6 | | | 632.58 | 16900 |
| 16.0 | 40 | 15.0 | 100 | 102 | 150 | 16 | 6 | | | 505.57 | 90400 |
| 20.0 | 32 | 19.5 | 60 | 64 | 114 | 20 | 6 | 529.36 | 20200 | | |
| 20.0 | 38 | 19.0 | 52 | 54 | 104 | 20 | 6 | 529.10 | 20700 | | |
| 20.0 | 42 | 19.5 | 90 | 94 | 144 | 20 | 6 | | | 696.93 | 20400 |
| 20.0 | 42 | 19.5 | 120 | 124 | 174 | 20 | 6 | | | 871.13 | 90500 |
| 20.0 | 50 | 19.0 | 98 | 100 | 150 | 20 | 6 | | | 696.67 | 20900 |
| 25.0 | 40 | 24.5 | 75 | 80 | 136 | 25 | 6 | 663.00 | 25200 | | |
| 25.0 | 52 | 24.5 | 113 | 118 | 174 | 25 | 6 | | | 872.04 | 25400 |
| 25.0 | 52 | 24.5 | 150 | 154 | 210 | 25 | 6 | | | 1,090.05 | 25900 |

| | ≈DIN 6527 | Factory standard |
|---|---|---|
| Steel | ● | ● |
| Stainless steel | ● | ● |
| Cast iron | ○ | ○ |
| Non ferrous metals | ○ | ○ |
| Heat resistant alloys | ● | ● |
| Hardened materials | | |

→ $v_c/f_z$ Page 74

# SilverLine – Ball Nosed Cutter

N | $\lambda_s$=30° $\gamma_s$= 6° | ZEFP




DPB72S DRAGONSKIN

DPB72S DRAGONSKIN

Factory standard HA

Factory standard HA

| DC f8 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | ZEFP | NEW V0 Article no. 50 963 ... £ | | NEW V0 Article no. 50 963 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 4 | 2.8 | 10.0 | 14 | 50 | 6 | 2 | 63.08 | 03115 | | |
| 3.0 | 7 | 3.0 | 8.8 | 24 | 60 | 6 | 2 | | | 84.62 | 03415 |
| 4.0 | 8 | 3.8 | 12.0 | 18 | 54 | 6 | 2 | 63.08 | 04120 | | |
| 4.0 | 10 | 4.0 | 12.5 | 39 | 75 | 6 | 2 | | | 84.62 | 04420 |
| 5.0 | 9 | 4.8 | 16.0 | 18 | 54 | 6 | 2 | 63.08 | 05125 | | |
| 5.0 | 12 | 5.0 | 15.0 | 39 | 75 | 6 | 2 | | | 88.01 | 05425 |
| 6.0 | 10 | 5.7 | 16.0 | 18 | 54 | 6 | 2 | 63.08 | 06130 | | |
| 6.0 | 12 | 6.0 | 15.0 | 64 | 100 | 6 | 2 | | | 101.91 | 06430 |
| 7.0 | 11 | 6.6 | 20.0 | 22 | 58 | 8 | 2 | 76.78 | 07135 | | |
| 8.0 | 12 | 7.6 | 20.0 | 22 | 58 | 8 | 2 | 76.78 | 08140 | | |
| 8.0 | 14 | 8.0 | 17.5 | 64 | 100 | 8 | 2 | | | 119.13 | 08440 |
| 10.0 | 14 | 9.6 | 24.0 | 26 | 66 | 10 | 2 | 96.01 | 10150 | | |
| 10.0 | 18 | 10.0 | 22.5 | 60 | 100 | 10 | 2 | | | 161.98 | 10450 |
| 12.0 | 16 | 11.5 | 26.0 | 28 | 73 | 12 | 2 | 139.49 | 12160 | | |
| 12.0 | 22 | 12.0 | 27.5 | 55 | 100 | 12 | 2 | | | 208.91 | 12460 |
| 14.0 | 18 | 13.3 | 28.0 | 30 | 75 | 14 | 2 | 161.98 | 14170 | | |
| 14.0 | 26 | 14.0 | 32.5 | 75 | 120 | 14 | 2 | | | 333.19 | 14470 |
| 16.0 | 22 | 15.2 | 32.0 | 34 | 82 | 16 | 2 | 205.53 | 16180 | | |
| 16.0 | 30 | 16.0 | 37.5 | 102 | 150 | 16 | 2 | | | 448.89 | 16480 |
| 18.0 | 24 | 17.1 | 34.0 | 36 | 84 | 18 | 2 | 338.65 | 18190 | | |
| 20.0 | 26 | 19.0 | 40.0 | 42 | 92 | 20 | 2 | 338.65 | 20110 | | |
| 20.0 | 38 | 20.0 | 47.5 | 100 | 150 | 20 | 2 | | | 594.88 | 20410 |

| | | |
|---|---|---|
| Steel | ● | ● |
| Stainless steel | | |
| Cast iron | ● | ● |
| Non ferrous metals | ○ | ○ |
| Heat resistant alloys | | |
| Hardened materials | ○ | ○ |

→ $v_c/f_z$ Page 72

# SilverLine – Ball Nosed Cutter

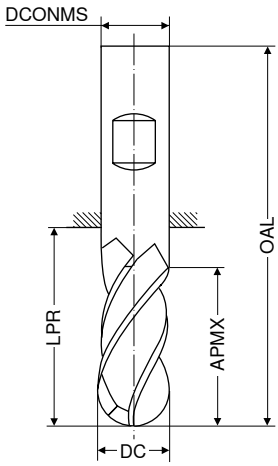
N

$\lambda_s$=35° 38°
$\gamma_s$= 7°

ZEFP

DPB72S

DRAGONSKIN



Factory standard

HA

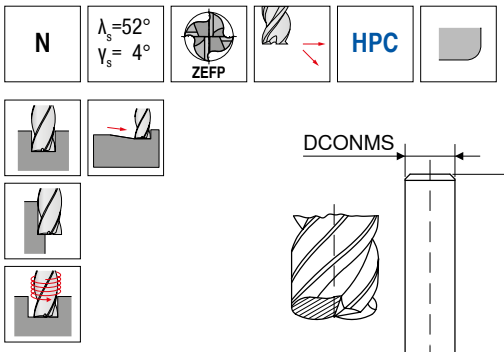
| DC f8 mm | APMX mm | LPR mm | OAL mm | DCONMS h6 mm | ZEFP | NEW V0 Article no. 50 990 ... £ | |
|---|---|---|---|---|---|---|---|
| 4.0 | 11 | 21 | 57 | 6 | 4 | 61.41 | 04220 |
| 5.0 | 13 | 21 | 57 | 6 | 4 | 61.41 | 05225 |
| 6.0 | 13 | 21 | 57 | 6 | 4 | 71.85 | 06230 |
| 8.0 | 19 | 36 | 72 | 8 | 4 | 89.02 | 08280 |
| 10.0 | 22 | 32 | 72 | 10 | 4 | 112.39 | 10250 |
| 12.0 | 26 | 38 | 83 | 12 | 4 | 177.84 | 12260 |
| 16.0 | 32 | 44 | 92 | 16 | 4 | 262.47 | 16280 |
| 20.0 | 38 | 54 | 104 | 20 | 4 | 380.38 | 20210 |

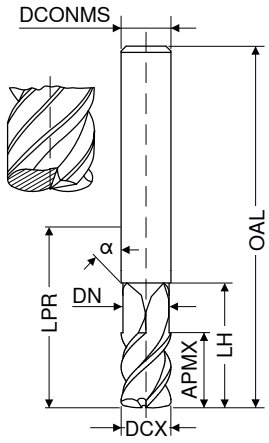
| | |
|---|---|
| Steel | ● |
| Stainless steel | ○ |
| Cast iron | ● |
| Non ferrous metals | ○ |
| Heat resistant alloys | |
| Hardened materials | |

→ $v_c/f_z$ Page 75–77

# SilverLine – Torus Face Milling Cutter

▲ APMX does not correspond to the maximum cutting depth
▲ $r_{3D}$ = corner radius to be programmed



Factory standard | Factory standard

HA | HA

| DCX f8 mm | $r_{3D}$ mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | α° | DCONMS h6 mm | ZEFP | NEW V0 Article no. 50 989 ... £ | | NEW V0 Article no. 50 989 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.00 | 1.12 | 6 | 5.5 | 21 | 21 | 57 | 45 | 6 | 4 | 88.83 | 06110 | | |
| 6.00 | 1.12 | 6 | 5.5 | 64 | 64 | 100 | 45 | 6 | 4 | | | 117.39 | 06410 |
| 8.00 | 1.23 | 8 | 7.4 | 27 | 27 | 63 | 45 | 8 | 4 | 100.65 | 08110 | | |
| 8.00 | 1.23 | 8 | 7.4 | 64 | 64 | 100 | 45 | 8 | 4 | | | 153.14 | 08410 |
| 10.00 | 1.17 | 10 | 9.2 | 32 | 32 | 72 | 45 | 10 | 4 | 172.12 | 10115 | | |
| 10.00 | 1.17 | 10 | 9.2 | 60 | 60 | 100 | 45 | 10 | 4 | | | 251.81 | 10415 |
| 12.00 | 1.86 | 12 | 11.0 | 32 | 38 | 83 | 45 | 12 | 4 | 225.55 | 12115 | | |
| 12.00 | 1.86 | 12 | 11.0 | 65 | 65 | 110 | 45 | 12 | 4 | | | 277.81 | 12415 |
| 16.00 | 2.47 | 16 | 15.0 | 38 | 44 | 92 | 45 | 16 | 4 | 423.80 | 16120 | | |
| 16.00 | 2.47 | 16 | 15.0 | 65 | 102 | 150 | 45 | 16 | 4 | | | 619.58 | 16420 |
| 20.00 | 2.61 | 20 | 18.5 | 40 | 42 | 92 | 45 | 20 | 4 | 609.70 | 20120 | | |
| 20.00 | 2.61 | 20 | 18.5 | 65 | 100 | 150 | 45 | 20 | 4 | | | 916.63 | 20420 |

| | | |
|---|---|---|
| Steel | ● | ● |
| Stainless steel | ○ | ○ |
| Cast iron | ● | ● |
| Non ferrous metals | ○ | ○ |
| Heat resistant alloys | | |
| Hardened materials | ○ | ○ |

→ $v_c/f_z$ Page 78+79

# Material examples referring to the cutting data tables

| | Index | Material | Strength N/mm² / HB / HRC | Material number | Material designation | Material number | Material designation | Material number | Material designation |
|---|---|---|---|---|---|---|---|---|---|
| P | 1.1 | General construction steel | < 800 N/mm² | 1.0402 | EN3B | | | | |
| | 1.2 | Free cutting steel | < 800 N/mm² | 1.0711 | EN1A | | | | |
| | 1.3 | Hardened steel, non alloyed | < 800 N/mm² | 1.0401 | EN32C | | | | |
| | 1.4 | Alloyed hardened steel | < 1000 N/mm² | 1.7325 | 25 CD4 | | | | |
| | 1.5 | Tempering steel, unalloyed | < 850 N/mm² | 1.5752 | EN36 | 1.0535 | EN9 | | |
| | 1.6 | Tempering steel, unalloyed | < 1000 N/mm² | 1.6582 | EN24 | | | | |
| | 1.7 | Tempering steel, alloyed | < 800 N/mm² | 1.7225 | EN19 | | | | |
| | 1.8 | Tempering steel, alloyed | < 1300 N/mm² | 1.8515 | EN40B | | | | |
| | 1.9 | Steel castings | < 850 N/mm² | 0.9650 | G-X 260 Cr 27 | 1.6750 | GS-20 NiCrMo 3.7 | 1.6582 | GS-34 CrNiMo 6 |
| | 1.10 | Nitriding steel | < 1000 N/mm² | 1.8509 | EN41B | | | | |
| | 1.11 | Nitriding steel | < 1200 N/mm² | 1.1186 | EN8 | 1.1160 | EN14A | | |
| | 1.12 | Roller bearing steel | < 1200 N/mm² | 1.3505 | 534A99 | | | | |
| | 1.13 | Spring steel | < 1200 N/mm² | | EN45 | | EN47 | | EN43 |
| | 1.14 | High-speed steel | < 1300 N/mm² | 1.3343 | M2 | 1.3249 | M34 | | |
| | 1.15 | Cold working tool steel | < 1300 N/mm² | 1.2379 | D2 | 1.2311 | P20 | | |
| | 1.16 | Hot working tool steel | < 1300 N/mm² | 1.2344 | H13 | | | | |
| M | 2.1 | Cast steel and sulphured stainless steel | < 850 N/mm² | 1.4581 | 318 | | | | |
| | 2.2 | Stainless steel, ferritic | < 750 N/mm² | 1.4000 | 403 | | | | |
| | 2.3 | Stainless steel, martensitic | < 900 N/mm² | 1.4057 | EN57 | | | | |
| | 2.4 | Stainless steel, ferritic / martensitic | <1100 N/mm² | 1.4028 | EN56B | | | | |
| | 2.5 | Stainless steel, austenitic / ferritic | < 850 N/mm² | 1.4542 | 17-4PH | | | | |
| | 2.6 | Stainless steel, austenitic | < 750 N/mm² | 1.4305 | 303 | 1.4401 | 316 | 1.4301 | 304 |
| | 2.7 | Heat resistant steel | < 1100 N/mm² | 1.4876 | Incoloy 800 | | | | |
| K | 3.1 | Grey cast iron with lamellar graphite | 100–350 N/mm² | 0.6015 | Grade 150 | 0.6020 | Grade 220 | 0.6025 | Grade 260 |
| | 3.2 | Grey cast iron with lamellar graphite | 300–500 N/mm² | 0.6030 | Grade 300 | 0.6035 | Grade 350 | 0.6040 | Grade 400 |
| | 3.3 | Gray cast iron with spheroidal graphite | 300–500 N/mm² | 0.7040 | SG 400-12 | 0.7043 | SG 370-17 | 0.7050 | SG 500-7 |
| | 3.4 | Gray cast iron with spheroidal graphite | 500–900 N/mm² | 0.7060 | SG 600-3 | 0.7070 | SG 700-2 | 0.7080 | SG 800-2 |
| | 3.5 | White malleable cast iron | 270–450 N/mm² | 0.8035 | GTW-35 | 0.8045 | GTW-45 | | |
| | 3.6 | White malleable cast iron | 500–650 N/mm² | 0.8055 | GTW-55 | 0.8065 | GTW-65 | | |
| | 3.7 | Black malleable cast iron | 300–450 N/mm² | 0.8135 | GTS-35 | 0.8145 | GTS-45 | | |
| | 3.8 | Black malleable cast iron | 500–800 N/mm² | 0.8155 | GTS-55 | 0.8170 | GTS-70 | | |
| N | 4.1 | Aluminium (non alloyed, low alloyed) | < 350 N/mm² | 3.0255 | 1050 A | 3.0275 | 1070 A | 3.0285 | 1080 A (A8) |
| | 4.2 | Aluminium alloys < 0.5 % Si | < 500 N/mm² | 3.1325 | 2017 A (AU4G) | 3.4335 | 7005 (AZ5G) | 3.4365 | 7075 (AZ5GU) |
| | 4.3 | Aluminium alloy 0.5–10 % Si | < 400 N/mm² | 3.2315 | A- G S1 | 3.2373 | A-S9 G | 3.2151 | A-S 6 U4 |
| | 4.4 | Aluminium alloys 10–15 % Si | < 400 N/mm² | 3.2581 | A-S12 | 3.2583 | A-S12 U | | |
| | 4.5 | Aluminum alloys > 15 % Si | < 400 N/mm² | | A-S18 | A-S17 U4 | | | |
| | 4.6 | Copper (non alloyed, low alloyed) | < 350 N/mm² | 2.0040 | Cu-c1 | 2.0060 | Cu-a1 | 2.0090 | Cu-b1 |
| | 4.7 | Copper wrought alloys | < 700 N/mm² | 2.1247 | Cub2 (Berylium Copper) | 2.0855 | CuN2S (Nickel Copper) | 2.1310 | CU-Fe2P |
| | 4.8 | Special copper alloys | < 200 HB | 2.0916 | Cu-A5 | 2.1525 | Cu-S3 M | | Ampco 8 (Cu-A6Fe2) |
| | 4.9 | Special copper alloys | < 300 HB | 2.0978 | Cu-Al11 Fe5 Ni5) | | Ampco 18 (Cu- A10 Fe3) | | |
| | 4.10 | Special copper alloys | > 300 HB | 2.1247 | Cu Be2 | | Ampco M4 | | |
| | 4.11 | Short-chipping brass, bronze, red bronze | < 600 N/mm² | 2.0331 | Cu Zn36 Pb1,5 | 2.0380 | Cu Zn39 Pb2 (Ms 56) | 2.0410 | Cu Zn44 Pb2 |
| | 4.12 | Long-chipping brass | < 600 N/mm² | 2.0335 | Cu Zn 36 (Ms63) | 2.1293 | Cu Cr1 Zr | | |
| | 4.13 | Thermoplastics | | PE | PVC | PS | Polystyrene | | Plexiglas |
| | 4.14 | Duroplastics | | PF | Bakelite | | Pertinax | | |
| | 4.15 | Fibre-reinforced plastics | | | Carbon Fibre | | Fibreglass | | Aramid Fibre (Kevlar) |
| | 4.16 | Magnesium and magnesium alloys | < 850 N/mm² | 3.5812 | Mg A7 Z1 | 3.5662 | Mg A9 | 3.5105 | Mg Tr3 Z2 Zn 1 |
| | 4.17 | Graphite | | | R8500X | | R8650 | | Technograph 15 |
| | 4.18 | Tungsten and tungsten alloys | | | W-Ni Fe (Densimet) | | W- Ni Cu (Inermet) | | Denal |
| | 4.19 | Molybdenum and molybdenum alloys | | | TZM | | MHQ | | Mo W |
| S | 5.1 | Pure nickel | | 2.4066 | Ni99 (Nickel 200) | 2.4068 | Lc Ni99 (Nickel 201) | | |
| | 5.2 | Nickel alloys | | 1.3912 | Fe-Ni36 (Invar) | 1.3917 | Fe -Ni42 (N42) | 1.3922 | Fe-Ni48 (N48) |
| | 5.3 | Nickel alloys | < 850 N/mm² | 2.4375 | Ni Cu30 Al (Monel K500) | 2.4360 | Ni Cu30Fe (Monel 400) | 2.4668 | |
| | 5.4 | Nickel molybdenum alloys | | 2.4600 | Ni Mo30Cr2 (Hastelloy B4) | 2.4617 | Ni Mo28 (Hastelloy B2) | 2.4819 | Ni Mo16Cr16 Hastell. C276 |
| | 5.5 | Nickel-chromium alloys | < 1300 N/mm² | 2.4951 | Ni Cr20TiAl (Nimonic 80A) | 2.4858 | Ni Cr21Mo (Inconel 825) | 2.4856 | Ni Cr22Mo9Nb Inconel 625 |
| | 5.6 | Cobalt Chrome Alloys | < 1300 N/mm² | 2.4964 | Co Cr20 W15 Ni10 | | Co Cr20 Ni16 Mo7 | | Co Cr28 Mo 6 |
| | 5.7 | Heat resistant alloys | < 1300 N/mm² | 1.4718 | Z45 C S 9-3 | 1.4747 | Z80 CSN 20-02 | 1.4845 | Z12 CN 25-20 |
| | 5.8 | Nickel-cobalt-chromium alloys | < 1400 N/mm² | 2.4851 | Ni Cr23Fe (Inconel 601) | 2.4668 | Ni Cr19NbMo (Inconel 718) | 2.4602 | Ni Cr21Mo14 Hastelloy C22 |
| | 5.9 | Pure titanium | < 900 N/mm² | 3.7025 | T35 (Titanium Grade 1) | 3.7034 | T40 (Titanium Grade 2) | 3.7064 | T60 (Titanium Grade 4) |
| | 5.10 | Titanium alloys | < 700 N/mm² | | T-A6-Nb7 (367) | | T-A5-Sn2-Mo4-Cr4 (Ti17) | | T-A3-V2,5 (Gr18) |
| | 5.11 | Titanium alloys | < 1200 N/mm² | 3.7165 | T-A6-V4 (Ta6V) | | T-A4-3V-Mo2-Fe2 (SP700) | | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
| H | 6.1 | Tempered steel | < 45 HRC | | | | | | |
| | 6.2 | | 46–55 HRC | | | | | | |
| | 6.3 | | 56–60 HRC | | | | | | |
| | 6.4 | | 61–65 HRC | | | | | | |
| | 6.5 | | 65–70 HRC | | | | | | |

# Cutting data standard values – SilverLine – End mills – 50 958 ...

| | long | | Ø DC = 3,0–3,5 mm | | | Ø DC = 4,0–4,5 mm | | | Ø DC = 5,0–5,5 mm | | | Ø DC = 6,0–7,0 mm | | | Ø DC = 8,0–9,0 mm | | | Ø DC = 10,0–11,0 mm | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | |
| | | | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC |
| **Index** | $v_c$ m/min | $a_{p\,max}$ x DC | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | |
| **1.1** | **100** | 1,0* | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,094 | 0,075 | 0,047 |
| **1.2** | **100** | 1,0* | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 |
| **1.3** | **110** | 1,0* | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 |
| **1.4** | **70** | 1,0* | 0,022 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 |
| **1.5** | **90** | 1,0* | 0,022 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 |
| **1.6** | **80** | 1,0* | 0,022 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 |
| **1.7** | **80** | 1,0* | 0,022 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 |
| **1.8** | **55** | 1,0* | 0,022 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 |
| **1.9** | **90** | 1,0* | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,094 | 0,075 | 0,047 |
| **1.10** | **80** | 1,0* | 0,022 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 |
| **1.11** | **55** | 1,0* | 0,022 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 |
| **1.12** | **55** | 1,0* | 0,022 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 |
| **1.13** | | | | | | | | | | | | | | | | | | | | |
| **1.14** | | | | | | | | | | | | | | | | | | | | |
| **1.15** | | | | | | | | | | | | | | | | | | | | |
| **1.16** | | | | | | | | | | | | | | | | | | | | |
| **2.1** | **60** | 1,0* | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 |
| **2.2** | **50** | 1,0* | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 |
| **2.3** | **40** | 1,0* | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 |
| **2.4** | **40** | 1,0* | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 |
| **2.5** | **50** | 1,0* | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 |
| **2.6** | **40** | 1,0* | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 |
| **2.7** | **30** | 1,0* | 0,007 | | | 0,010 | | | 0,012 | | | 0,015 | | | 0,020 | | | 0,025 | | |
| **3.1** | **130** | 1,0* | 0,054 | 0,043 | 0,027 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 |
| **3.2** | **120** | 1,0* | 0,054 | 0,043 | 0,027 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 |
| **3.3** | **130** | 1,0* | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,094 | 0,075 | 0,047 |
| **3.4** | **120** | 1,0* | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,094 | 0,075 | 0,047 |
| **3.5** | **130** | 1,0* | 0,054 | 0,043 | 0,027 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 |
| **3.6** | **120** | 1,0* | 0,054 | 0,043 | 0,027 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 |
| **3.7** | **130** | 1,0* | 0,054 | 0,043 | 0,027 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 |
| **3.8** | **120** | 1,0* | 0,054 | 0,043 | 0,027 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 |
| **4.1** | | | | | | | | | | | | | | | | | | | | |
| **4.2** | | | | | | | | | | | | | | | | | | | | |
| **4.3** | | | | | | | | | | | | | | | | | | | | |
| **4.4** | | | | | | | | | | | | | | | | | | | | |
| **4.5** | | | | | | | | | | | | | | | | | | | | |
| **4.6** | 140 | 1,0* | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 |
| **4.7** | 120 | 1,0* | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 |
| **4.8** | 140 | 1,0* | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 |
| **4.9** | 120 | 1,0* | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 |
| **4.10** | 120 | 1,0* | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 |
| **4.11** | 200 | 1,0* | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 |
| **4.12** | 150 | 1,0* | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 |
| **4.13** | | | | | | | | | | | | | | | | | | | | |
| **4.14** | | | | | | | | | | | | | | | | | | | | |
| **4.15** | | | | | | | | | | | | | | | | | | | | |
| **4.16** | | | | | | | | | | | | | | | | | | | | |
| **4.17** | | | | | | | | | | | | | | | | | | | | |
| **4.18** | | | | | | | | | | | | | | | | | | | | |
| **4.19** | | | | | | | | | | | | | | | | | | | | |
| **5.1** | **30** | 1,0* | 0,007 | | | 0,010 | | | 0,012 | | | 0,015 | | | 0,020 | | | 0,025 | | |
| **5.2** | **30** | 1,0* | 0,007 | | | 0,010 | | | 0,012 | | | 0,015 | | | 0,020 | | | 0,025 | | |
| **5.3** | **30** | 1,0* | 0,007 | | | 0,010 | | | 0,012 | | | 0,015 | | | 0,020 | | | 0,025 | | |
| **5.4** | **30** | 1,0* | 0,007 | | | 0,010 | | | 0,012 | | | 0,015 | | | 0,020 | | | 0,025 | | |
| **5.5** | **30** | 1,0* | 0,007 | | | 0,010 | | | 0,012 | | | 0,015 | | | 0,020 | | | 0,025 | | |
| **5.6** | **30** | 1,0* | 0,007 | | | 0,010 | | | 0,012 | | | 0,015 | | | 0,020 | | | 0,025 | | |
| **5.7** | **30** | 1,0* | 0,007 | | | 0,010 | | | 0,012 | | | 0,015 | | | 0,020 | | | 0,025 | | |
| **5.8** | **30** | 1,0* | 0,007 | | | 0,010 | | | 0,012 | | | 0,015 | | | 0,020 | | | 0,025 | | |
| **5.9** | **50** | 1,0* | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 |
| **5.10** | **35** | 1,0* | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 |
| **5.11** | **20** | 1,0* | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 |
| **6.1** | | | | | | | | | | | | | | | | | | | | |
| **6.2** | | | | | | | | | | | | | | | | | | | | |
| **6.3** | | | | | | | | | | | | | | | | | | | | |
| **6.4** | | | | | | | | | | | | | | | | | | | | |
| **6.5** | | | | | | | | | | | | | | | | | | | | |

* = long version: $a_{p\,max.}$ = 1.5 x DC at $f_z$ x 0.75

| Index | Ø DC = 12,0 mm | | | Ø DC = 14,0–15,0 mm | | | Ø DC = 16,0–17,0 mm | | | Ø DC = 18,0–19,0 mm | | | Ø DC = 20,0 mm | | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | | | |
| | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | | | |
| | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | Emulsion | Compressed air | MMS |
| 1.1 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,152 | 0,122 | 0,076 | 0,160 | 0,128 | 0,080 | ● | ○ | ○ |
| 1.2 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 | ● | ○ | ○ |
| 1.3 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 | ● | ○ | ○ |
| 1.4 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.5 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.6 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.7 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.8 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.9 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,152 | 0,122 | 0,076 | 0,160 | 0,128 | 0,080 | ● | ○ | ○ |
| 1.10 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.11 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.12 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.13 | | | | | | | | | | | | | | | | | | |
| 1.14 | | | | | | | | | | | | | | | | | | |
| 1.15 | | | | | | | | | | | | | | | | | | |
| 1.16 | | | | | | | | | | | | | | | | | | |
| 2.1 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.2 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.3 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.4 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.5 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.6 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.7 | 0,030 | | | 0,035 | | | 0,040 | | | 0,045 | | | 0,050 | | | ● | | |
| 3.1 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.2 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.3 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,152 | 0,122 | 0,076 | 0,160 | 0,128 | 0,080 | ● | ○ | ○ |
| 3.4 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,152 | 0,122 | 0,076 | 0,160 | 0,128 | 0,080 | ● | ○ | ○ |
| 3.5 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.6 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.7 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.8 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 4.1 | | | | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | | | | | | |
| 4.6 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.7 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.8 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.9 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.10 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.11 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.12 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.13 | | | | | | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | | | | | | |
| 5.1 | 0,030 | | | 0,035 | | | 0,040 | | | 0,045 | | | 0,050 | | | ● | | |
| 5.2 | 0,030 | | | 0,035 | | | 0,040 | | | 0,045 | | | 0,050 | | | ● | | |
| 5.3 | 0,030 | | | 0,035 | | | 0,040 | | | 0,045 | | | 0,050 | | | ● | | |
| 5.4 | 0,030 | | | 0,035 | | | 0,040 | | | 0,045 | | | 0,050 | | | ● | | |
| 5.5 | 0,030 | | | 0,035 | | | 0,040 | | | 0,045 | | | 0,050 | | | ● | | |
| 5.6 | 0,030 | | | 0,035 | | | 0,040 | | | 0,045 | | | 0,050 | | | ● | | |
| 5.7 | 0,030 | | | 0,035 | | | 0,040 | | | 0,045 | | | 0,050 | | | ● | | |
| 5.8 | 0,030 | | | 0,035 | | | 0,040 | | | 0,045 | | | 0,050 | | | ● | | |
| 5.9 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 5.10 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 5.11 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 6.1 | | | | | | | | | | | | | | | | | | |
| 6.2 | | | | | | | | | | | | | | | | | | |
| 6.3 | | | | | | | | | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | | | | | | |

Plunging angle for ramping and helical milling: 3°

# Cutting data standard values – SilverLine – End mills – 50 966 ... / 50 967 ... / 50 992 ...

| | | | | | | Ø DC = 3,0–3,5 mm | | | Ø DC = 4,0–4,5 mm | | | Ø DC = 5,0–5,5 mm | | | Ø DC = 6,0–7,5 mm | | | Ø DC = 8,0–9,5 mm | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | |
| | short | long | extra long | short/long | extra long | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC |
| **Index** | $v_c$ m/min | | | $a_{p\,max}$ x DC | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | |
| **1.1** | **276** | **230** | **110** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.2** | **288** | **240** | **120** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.3** | **252** | **210** | **105** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.4** | **228** | **190** | **95** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.5** | **240** | **200** | **100** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.6** | **228** | **190** | **95** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.7** | **228** | **190** | **95** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.8** | **204** | **170** | **85** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.9** | **192** | **160** | **80** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.10** | **228** | **190** | **95** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.11** | **204** | **170** | **85** | 1,0* | 0,8 | 0,022 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 |
| **1.12** | **204** | **170** | **85** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **1.13** | | | | | | | | | | | | | | | | | | | | |
| **1.14** | | | | | | | | | | | | | | | | | | | | |
| **1.15** | | | | | | | | | | | | | | | | | | | | |
| **1.16** | | | | | | | | | | | | | | | | | | | | |
| **2.1** | **132** | **110** | **65** | 1,0* | 0,8 | 0,018 | 0,014 | 0,009 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 |
| **2.2** | **120** | **100** | **60** | 1,0* | 0,8 | 0,018 | 0,014 | 0,009 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 |
| **2.3** | **96** | **80** | **50** | 1,0* | 0,8 | 0,018 | 0,014 | 0,009 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 |
| **2.4** | **96** | **80** | **50** | 1,0* | 0,8 | 0,018 | 0,014 | 0,009 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 |
| **2.5** | **120** | **100** | **60** | 1,0* | 0,8 | 0,018 | 0,014 | 0,009 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 |
| **2.6** | **120** | **100** | **60** | 1,0* | 0,8 | 0,018 | 0,014 | 0,009 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 |
| **2.7** | **30** | **25** | **15** | 0,5 | 0,4 | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 |
| **3.1** | **240** | **200** | **100** | 1,0* | 0,8 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,090 | 0,072 | 0,045 |
| **3.2** | **216** | **180** | **90** | 1,0* | 0,8 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,090 | 0,072 | 0,045 |
| **3.3** | **228** | **190** | **60** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **3.4** | **204** | **170** | **85** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **3.5** | **216** | **180** | **90** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **3.6** | **192** | **160** | **80** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **3.7** | **216** | **180** | **90** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **3.8** | **192** | **160** | **80** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **4.1** | | | | | | | | | | | | | | | | | | | | |
| **4.2** | | | | | | | | | | | | | | | | | | | | |
| **4.3** | | | | | | | | | | | | | | | | | | | | |
| **4.4** | | | | | | | | | | | | | | | | | | | | |
| **4.5** | | | | | | | | | | | | | | | | | | | | |
| **4.6** | 336 | 280 | 140 | 1,0* | 0,8 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,090 | 0,072 | 0,045 |
| **4.7** | 288 | 240 | 120 | 1,0* | 0,8 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,090 | 0,072 | 0,045 |
| **4.8** | 192 | 160 | 80 | 1,0* | 0,8 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,090 | 0,072 | 0,045 |
| **4.9** | 168 | 140 | 120 | 1,0* | 0,8 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,090 | 0,072 | 0,045 |
| **4.10** | 168 | 140 | 120 | 1,0* | 0,8 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,090 | 0,072 | 0,045 |
| **4.11** | 420 | 350 | 175 | 1,0* | 0,8 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,090 | 0,072 | 0,045 |
| **4.12** | 360 | 300 | 150 | 1,0* | 0,8 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,090 | 0,072 | 0,045 |
| **4.13** | | | | | | | | | | | | | | | | | | | | |
| **4.14** | | | | | | | | | | | | | | | | | | | | |
| **4.15** | | | | | | | | | | | | | | | | | | | | |
| **4.16** | | | | | | | | | | | | | | | | | | | | |
| **4.17** | | | | | | | | | | | | | | | | | | | | |
| **4.18** | | | | | | | | | | | | | | | | | | | | |
| **4.19** | | | | | | | | | | | | | | | | | | | | |
| **5.1** | **30** | **25** | **15** | 0,5 | 0,4 | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 |
| **5.2** | **30** | **25** | **15** | 0,5 | 0,4 | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 |
| **5.3** | **30** | **25** | **15** | 0,5 | 0,4 | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 |
| **5.4** | **30** | **25** | **15** | 0,5 | 0,4 | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 |
| **5.5** | **30** | **25** | **15** | 0,5 | 0,4 | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 |
| **5.6** | **30** | **25** | **15** | 0,5 | 0,4 | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 |
| **5.7** | **30** | **25** | **15** | 0,5 | 0,4 | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 |
| **5.8** | **30** | **25** | **15** | 0,5 | 0,4 | 0,014 | 0,011 | 0,007 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 |
| **5.9** | **108** | **90** | **45** | 1,0* | 0,8 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 |
| **5.10** | **96** | **80** | **40** | 1,0* | 0,8 | 0,024 | 0,018 | 0,011 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 |
| **5.11** | **60** | **50** | **25** | 1,0* | 0,8 | 0,018 | 0,014 | 0,009 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,038 | 0,030 | 0,019 | 0,050 | 0,040 | 0,025 |
| **6.1** | | | | | | | | | | | | | | | | | | | | |
| **6.2** | | | | | | | | | | | | | | | | | | | | |
| **6.3** | | | | | | | | | | | | | | | | | | | | |
| **6.4** | | | | | | | | | | | | | | | | | | | | |
| **6.5** | | | | | | | | | | | | | | | | | | | | |

* = long version: $a_{p\,max.}$ = 1.5 x DC at $f_z$ x 0.75

"Extra-long" version: when profiling with an $a_e$ of 0.1–0.4 x DC an $a_p$ of 1.0 x DC should be used.

| | Ø DC = 10,0mm | | | Ø DC = 12,0 mm | | | Ø DC = 14,0mm | | | Ø DC = 16,0 mm | | | Ø DC = 18,0 mm | | | Ø DC = 20,0 mm | | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | | | |
| | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | | | |
| Index | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | Emulsion | Compressed air | MMS |
| 1.1 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.2 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.3 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.4 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.5 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.6 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.7 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.8 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.9 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.10 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.11 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | ● | ○ | ○ |
| 1.12 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ○ | ○ |
| 1.13 | | | | | | | | | | | | | | | | | | | | | |
| 1.14 | | | | | | | | | | | | | | | | | | | | | |
| 1.15 | | | | | | | | | | | | | | | | | | | | | |
| 1.16 | | | | | | | | | | | | | | | | | | | | | |
| 2.1 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | ● | | |
| 2.2 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | ● | | |
| 2.3 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | ● | | |
| 2.4 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | ● | | |
| 2.5 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | ● | | |
| 2.6 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | ● | | |
| 2.7 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | ● | | |
| 3.1 | 0,114 | 0,091 | 0,057 | 0,140 | 0,112 | 0,070 | 0,170 | 0,136 | 0,085 | 0,200 | 0,160 | 0,100 | 0,220 | 0,176 | 0,110 | 0,240 | 0,192 | 0,120 | ● | ● | ● |
| 3.2 | 0,114 | 0,091 | 0,057 | 0,140 | 0,112 | 0,070 | 0,170 | 0,136 | 0,085 | 0,200 | 0,160 | 0,100 | 0,220 | 0,176 | 0,110 | 0,240 | 0,192 | 0,120 | ● | ● | ● |
| 3.3 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ● | ● |
| 3.4 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ● | ● |
| 3.5 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ● | ● |
| 3.6 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ● | ● |
| 3.7 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ● | ● |
| 3.8 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | ● | ● |
| 4.1 | | | | | | | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | | | | | | | | | |
| 4.6 | 0,114 | 0,091 | 0,057 | 0,140 | 0,112 | 0,070 | 0,170 | 0,136 | 0,085 | 0,200 | 0,160 | 0,100 | 0,220 | 0,176 | 0,110 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.7 | 0,114 | 0,091 | 0,057 | 0,140 | 0,112 | 0,070 | 0,170 | 0,136 | 0,085 | 0,200 | 0,160 | 0,100 | 0,220 | 0,176 | 0,110 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.8 | 0,114 | 0,091 | 0,057 | 0,140 | 0,112 | 0,070 | 0,170 | 0,136 | 0,085 | 0,200 | 0,160 | 0,100 | 0,220 | 0,176 | 0,110 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.9 | 0,114 | 0,091 | 0,057 | 0,140 | 0,112 | 0,070 | 0,170 | 0,136 | 0,085 | 0,200 | 0,160 | 0,100 | 0,220 | 0,176 | 0,110 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.10 | 0,114 | 0,091 | 0,057 | 0,140 | 0,112 | 0,070 | 0,170 | 0,136 | 0,085 | 0,200 | 0,160 | 0,100 | 0,220 | 0,176 | 0,110 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.11 | 0,114 | 0,091 | 0,057 | 0,140 | 0,112 | 0,070 | 0,170 | 0,136 | 0,085 | 0,200 | 0,160 | 0,100 | 0,220 | 0,176 | 0,110 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.12 | 0,114 | 0,091 | 0,057 | 0,140 | 0,112 | 0,070 | 0,170 | 0,136 | 0,085 | 0,200 | 0,160 | 0,100 | 0,220 | 0,176 | 0,110 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.13 | | | | | | | | | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | | | | | | | | | |
| 5.1 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,05 | ● | | |
| 5.2 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,05 | ● | | |
| 5.3 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,05 | ● | | |
| 5.4 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,05 | ● | | |
| 5.5 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,05 | ● | | |
| 5.6 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,05 | ● | | |
| 5.7 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,05 | ● | | |
| 5.8 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,05 | ● | | |
| 5.9 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,200 | 0,160 | 0,100 | ● | | |
| 5.10 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | ● | | |
| 5.11 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | ● | | |
| 6.1 | | | | | | | | | | | | | | | | | | | | | |
| 6.2 | | | | | | | | | | | | | | | | | | | | | |
| 6.3 | | | | | | | | | | | | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | | | | | | | | | |

Plunging angle for ramping and helical milling: 3°

# Cutting data standard values – SilverLine – End mills – 50 976 ... / 50 977 ...

| | long | | Ø DC = 3,0 mm | | Ø DC = 4,0 mm | | Ø DC = 5,0 mm | | Ø DC = 6,0 mm | | Ø DC = 8,0 mm | | Ø DC = 10,0 mm | | Ø DC = 12,0 mm | | Ø DC = 14,0 mm | | Ø DC = 16,0 mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $a_e$ | | $a_e$ | | $a_e$ | | $a_e$ | | $a_e$ | | $a_e$ | | $a_e$ | | $a_e$ | | $a_e$ | |
| | | | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC |
| **Index** | $v_c$ m/min | $a_{p\,max}$ x DC | $f_z$ mm | | $f_z$ mm | | $f_z$ mm | | $f_z$ mm | | $f_z$ mm | | $f_z$ mm | | $f_z$ mm | | $f_z$ mm | | $f_z$ mm | |
| **1.1** | **230** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **1.2** | **240** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **1.3** | **210** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **1.4** | **190** | 2,0 | 0,021 | 0,015 | 0,028 | 0,020 | 0,035 | 0,025 | 0,042 | 0,030 | 0,056 | 0,040 | 0,070 | 0,050 | 0,084 | 0,060 | 0,098 | 0,070 | 0,112 | 0,080 |
| **1.5** | **200** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **1.6** | **190** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **1.7** | **190** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **1.8** | **170** | 2,0 | 0,021 | 0,015 | 0,028 | 0,020 | 0,035 | 0,025 | 0,042 | 0,030 | 0,056 | 0,040 | 0,070 | 0,050 | 0,084 | 0,060 | 0,098 | 0,070 | 0,112 | 0,080 |
| **1.9** | **160** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **1.10** | **190** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **1.11** | **170** | 2,0 | 0,021 | 0,015 | 0,028 | 0,020 | 0,035 | 0,025 | 0,042 | 0,030 | 0,056 | 0,040 | 0,070 | 0,050 | 0,084 | 0,060 | 0,098 | 0,070 | 0,112 | 0,080 |
| **1.12** | **170** | 2,0 | 0,021 | 0,015 | 0,028 | 0,020 | 0,035 | 0,025 | 0,042 | 0,030 | 0,056 | 0,040 | 0,070 | 0,050 | 0,084 | 0,060 | 0,098 | 0,070 | 0,112 | 0,080 |
| **1.13** | | | | | | | | | | | | | | | | | | | | |
| **1.14** | | | | | | | | | | | | | | | | | | | | |
| **1.15** | **140** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **1.16** | **140** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **2.1** | **130** | 2,0 | 0,013 | 0,009 | 0,017 | 0,012 | 0,021 | 0,015 | 0,027 | 0,019 | 0,035 | 0,025 | 0,045 | 0,032 | 0,056 | 0,040 | 0,063 | 0,045 | 0,070 | 0,050 |
| **2.2** | **120** | 2,0 | 0,013 | 0,009 | 0,017 | 0,012 | 0,021 | 0,015 | 0,027 | 0,019 | 0,035 | 0,025 | 0,045 | 0,032 | 0,056 | 0,040 | 0,063 | 0,045 | 0,070 | 0,050 |
| **2.3** | **100** | 2,0 | 0,013 | 0,009 | 0,017 | 0,012 | 0,021 | 0,015 | 0,027 | 0,019 | 0,035 | 0,025 | 0,045 | 0,032 | 0,056 | 0,040 | 0,063 | 0,045 | 0,070 | 0,050 |
| **2.4** | **100** | 2,0 | 0,013 | 0,009 | 0,017 | 0,012 | 0,021 | 0,015 | 0,027 | 0,019 | 0,035 | 0,025 | 0,045 | 0,032 | 0,056 | 0,040 | 0,063 | 0,045 | 0,070 | 0,050 |
| **2.5** | **120** | 2,0 | 0,013 | 0,009 | 0,017 | 0,012 | 0,021 | 0,015 | 0,027 | 0,019 | 0,035 | 0,025 | 0,045 | 0,032 | 0,056 | 0,040 | 0,063 | 0,045 | 0,070 | 0,050 |
| **2.6** | **120** | 2,0 | 0,013 | 0,009 | 0,017 | 0,012 | 0,021 | 0,015 | 0,027 | 0,019 | 0,035 | 0,025 | 0,045 | 0,032 | 0,056 | 0,040 | 0,063 | 0,045 | 0,070 | 0,050 |
| **2.7** | | | | | | | | | | | | | | | | | | | | |
| **3.1** | **200** | 2,0 | 0,028 | 0,020 | 0,039 | 0,028 | 0,049 | 0,035 | 0,056 | 0,040 | 0,070 | 0,050 | 0,091 | 0,065 | 0,112 | 0,080 | 0,140 | 0,100 | 0,168 | 0,120 |
| **3.2** | **180** | 2,0 | 0,028 | 0,020 | 0,039 | 0,028 | 0,049 | 0,035 | 0,056 | 0,040 | 0,070 | 0,050 | 0,091 | 0,065 | 0,112 | 0,080 | 0,140 | 0,100 | 0,168 | 0,120 |
| **3.3** | **190** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **3.4** | **170** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **3.5** | **180** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **3.6** | **160** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **3.7** | **180** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **3.8** | **160** | 2,0 | 0,027 | 0,019 | 0,035 | 0,025 | 0,042 | 0,030 | 0,049 | 0,035 | 0,063 | 0,045 | 0,080 | 0,057 | 0,098 | 0,070 | 0,119 | 0,085 | 0,140 | 0,100 |
| **4.1** | | | | | | | | | | | | | | | | | | | | |
| **4.2** | | | | | | | | | | | | | | | | | | | | |
| **4.3** | | | | | | | | | | | | | | | | | | | | |
| **4.4** | | | | | | | | | | | | | | | | | | | | |
| **4.5** | | | | | | | | | | | | | | | | | | | | |
| **4.6** | 280 | 2,0 | 0,028 | 0,020 | 0,039 | 0,028 | 0,049 | 0,035 | 0,056 | 0,040 | 0,070 | 0,050 | 0,091 | 0,065 | 0,112 | 0,080 | 0,140 | 0,100 | 0,168 | 0,120 |
| **4.7** | 240 | 2,0 | 0,028 | 0,020 | 0,039 | 0,028 | 0,049 | 0,035 | 0,056 | 0,040 | 0,070 | 0,050 | 0,091 | 0,065 | 0,112 | 0,080 | 0,140 | 0,100 | 0,168 | 0,120 |
| **4.8** | 160 | 2,0 | 0,028 | 0,020 | 0,039 | 0,028 | 0,049 | 0,035 | 0,056 | 0,040 | 0,070 | 0,050 | 0,091 | 0,065 | 0,112 | 0,080 | 0,140 | 0,100 | 0,168 | 0,120 |
| **4.9** | 140 | 2,0 | 0,028 | 0,020 | 0,039 | 0,028 | 0,049 | 0,035 | 0,056 | 0,040 | 0,070 | 0,050 | 0,091 | 0,065 | 0,112 | 0,080 | 0,140 | 0,100 | 0,168 | 0,120 |
| **4.10** | 140 | 2,0 | 0,028 | 0,020 | 0,039 | 0,028 | 0,049 | 0,035 | 0,056 | 0,040 | 0,070 | 0,050 | 0,091 | 0,065 | 0,112 | 0,080 | 0,140 | 0,100 | 0,168 | 0,120 |
| **4.11** | 350 | 2,0 | 0,028 | 0,020 | 0,039 | 0,028 | 0,049 | 0,035 | 0,056 | 0,040 | 0,070 | 0,050 | 0,091 | 0,065 | 0,112 | 0,080 | 0,140 | 0,100 | 0,168 | 0,120 |
| **4.12** | 300 | 2,0 | 0,028 | 0,020 | 0,039 | 0,028 | 0,049 | 0,035 | 0,056 | 0,040 | 0,070 | 0,050 | 0,091 | 0,065 | 0,112 | 0,080 | 0,140 | 0,100 | 0,168 | 0,120 |
| **4.13** | | | | | | | | | | | | | | | | | | | | |
| **4.14** | | | | | | | | | | | | | | | | | | | | |
| **4.15** | | | | | | | | | | | | | | | | | | | | |
| **4.16** | | | | | | | | | | | | | | | | | | | | |
| **4.17** | | | | | | | | | | | | | | | | | | | | |
| **4.18** | | | | | | | | | | | | | | | | | | | | |
| **4.19** | | | | | | | | | | | | | | | | | | | | |
| **5.1** | | | | | | | | | | | | | | | | | | | | |
| **5.2** | | | | | | | | | | | | | | | | | | | | |
| **5.3** | | | | | | | | | | | | | | | | | | | | |
| **5.4** | | | | | | | | | | | | | | | | | | | | |
| **5.5** | | | | | | | | | | | | | | | | | | | | |
| **5.6** | | | | | | | | | | | | | | | | | | | | |
| **5.7** | | | | | | | | | | | | | | | | | | | | |
| **5.8** | | | | | | | | | | | | | | | | | | | | |
| **5.9** | | | | | | | | | | | | | | | | | | | | |
| **5.10** | | | | | | | | | | | | | | | | | | | | |
| **5.11** | | | | | | | | | | | | | | | | | | | | |
| **6.1** | | | | | | | | | | | | | | | | | | | | |
| **6.2** | | | | | | | | | | | | | | | | | | | | |
| **6.3** | | | | | | | | | | | | | | | | | | | | |
| **6.4** | | | | | | | | | | | | | | | | | | | | |
| **6.5** | | | | | | | | | | | | | | | | | | | | |

Profiling with an $a_e$ < 0.3xDC only possible under certain conditions!

| Index | Ø DC = 18,0 mm | | Ø DC = 20,0 mm | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|
| | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | Emulsion | Compressed air | MMS |
| | $f_z$ mm | | $f_z$ mm | | | | |
| 1.1 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 1.2 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 1.3 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 1.4 | 0,126 | 0,090 | 0,140 | 0,100 | ● | ○ | ○ |
| 1.5 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 1.6 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 1.7 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 1.8 | 0,126 | 0,090 | 0,140 | 0,100 | ● | ○ | ○ |
| 1.9 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 1.10 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 1.11 | 0,126 | 0,090 | 0,140 | 0,100 | ● | ○ | ○ |
| 1.12 | 0,126 | 0,090 | 0,140 | 0,100 | ● | ○ | ○ |
| 1.13 | | | | | | | |
| 1.14 | | | | | | | |
| 1.15 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 1.16 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ○ | ○ |
| 2.1 | 0,084 | 0,060 | 0,098 | 0,070 | ● | | |
| 2.2 | 0,084 | 0,060 | 0,098 | 0,070 | ● | | |
| 2.3 | 0,084 | 0,060 | 0,098 | 0,070 | ● | | |
| 2.4 | 0,084 | 0,060 | 0,098 | 0,070 | ● | | |
| 2.5 | 0,084 | 0,060 | 0,098 | 0,070 | ● | | |
| 2.6 | 0,084 | 0,060 | 0,098 | 0,070 | ● | | |
| 2.7 | | | | | | | |
| 3.1 | 0,182 | 0,130 | 0,196 | 0,140 | ● | ● | ● |
| 3.2 | 0,182 | 0,130 | 0,196 | 0,140 | ● | ● | ● |
| 3.3 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ● | ● |
| 3.4 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ● | ● |
| 3.5 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ● | ● |
| 3.6 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ● | ● |
| 3.7 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ● | ● |
| 3.8 | 0,154 | 0,110 | 0,168 | 0,120 | ● | ● | ● |
| 4.1 | | | | | | | |
| 4.2 | | | | | | | |
| 4.3 | | | | | | | |
| 4.4 | | | | | | | |
| 4.5 | | | | | | | |
| 4.6 | 0,182 | 0,130 | 0,196 | 0,140 | ● | ○ | ○ |
| 4.7 | 0,182 | 0,130 | 0,196 | 0,140 | ● | ○ | ○ |
| 4.8 | 0,182 | 0,130 | 0,196 | 0,140 | ● | ○ | ○ |
| 4.9 | 0,182 | 0,130 | 0,196 | 0,140 | ● | ○ | ○ |
| 4.10 | 0,182 | 0,130 | 0,196 | 0,140 | ● | ○ | ○ |
| 4.11 | 0,182 | 0,130 | 0,196 | 0,140 | ● | ○ | ○ |
| 4.12 | 0,182 | 0,130 | 0,196 | 0,140 | ● | ○ | ○ |
| 4.13 | | | | | | | |
| 4.14 | | | | | | | |
| 4.15 | | | | | | | |
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| 4.19 | | | | | | | |
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| 5.9 | | | | | | | |
| 5.10 | | | | | | | |
| 5.11 | | | | | | | |
| 6.1 | | | | | | | |
| 6.2 | | | | | | | |
| 6.3 | | | | | | | |
| 6.4 | | | | | | | |
| 6.5 | | | | | | | |

Plunging angle for ramping and helical milling: 3°

# Cutting data standard values – SilverLine – End mills – 50 969 ... – 50 975 ... / 50 978 ...

| | | | | Ø DC = 3,0–3,5 mm | | | Ø DC = 4,0–4,5 mm | | | Ø DC = 5,0–5,5 mm | | | Ø DC = 6,0–7,0 mm | | | Ø DC = 8,0–9,0 mm | | | Ø DC = 10,0–11,0 mm | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | |
| | short | long | | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC |
| **Index** | $v_c$ m/min | | $a_{p\,max}$ x DC | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | |
| **1.1** | **253** | **230** | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **1.2** | **264** | **240** | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **1.3** | **253** | **230** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **1.4** | **231** | **210** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.5** | **242** | **220** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **1.6** | **231** | **210** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **1.7** | **231** | **210** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **1.8** | **209** | **190** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.9** | **198** | **180** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **1.10** | **231** | **210** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **1.11** | **209** | **190** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.12** | **209** | **190** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.13** | | | | | | | | | | | | | | | | | | | | | |
| **1.14** | | | | | | | | | | | | | | | | | | | | | |
| **1.15** | **176** | **160** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **1.16** | **176** | **160** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **2.1** | **130** | **120** | 1,0* | 0,020 | 0,015 | 0,011 | 0,027 | 0,021 | 0,015 | 0,036 | 0,027 | 0,018 | 0,044 | 0,033 | 0,022 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 |
| **2.2** | **120** | **110** | 1,0* | 0,020 | 0,015 | 0,011 | 0,027 | 0,021 | 0,015 | 0,036 | 0,027 | 0,018 | 0,044 | 0,033 | 0,022 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 |
| **2.3** | **100** | **90** | 1,0* | 0,020 | 0,015 | 0,011 | 0,027 | 0,021 | 0,015 | 0,036 | 0,027 | 0,018 | 0,044 | 0,033 | 0,022 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 |
| **2.4** | **100** | **90** | 1,0* | 0,020 | 0,015 | 0,011 | 0,027 | 0,021 | 0,015 | 0,036 | 0,027 | 0,018 | 0,044 | 0,033 | 0,022 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 |
| **2.5** | **120** | **110** | 1,0* | 0,020 | 0,015 | 0,011 | 0,027 | 0,021 | 0,015 | 0,036 | 0,027 | 0,018 | 0,044 | 0,033 | 0,022 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 |
| **2.6** | **120** | **110** | 1,0* | 0,020 | 0,015 | 0,011 | 0,027 | 0,021 | 0,015 | 0,036 | 0,027 | 0,018 | 0,044 | 0,033 | 0,022 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 |
| **2.7** | **35** | **30** | 0,5* | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,024 | 0,018 | 0,012 | 0,030 | 0,022 | 0,015 | 0,040 | 0,030 | 0,020 | 0,050 | 0,037 | 0,025 |
| **3.1** | **242** | **220** | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **3.2** | **220** | **200** | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **3.3** | **231** | **210** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **3.4** | **209** | **190** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **3.5** | **220** | **200** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **3.6** | **198** | **180** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **3.7** | **220** | **200** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **3.8** | **198** | **180** | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,060 | 0,045 | 0,030 | 0,070 | 0,052 | 0,035 | 0,090 | 0,067 | 0,045 | 0,114 | 0,085 | 0,057 |
| **4.1** | | | | | | | | | | | | | | | | | | | | | |
| **4.2** | | | | | | | | | | | | | | | | | | | | | |
| **4.3** | | | | | | | | | | | | | | | | | | | | | |
| **4.4** | | | | | | | | | | | | | | | | | | | | | |
| **4.5** | | | | | | | | | | | | | | | | | | | | | |
| **4.6** | 308 | 280 | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **4.7** | 264 | 240 | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **4.8** | 176 | 160 | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **4.9** | 154 | 140 | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **4.10** | 154 | 140 | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **4.11** | 385 | 350 | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **4.12** | 330 | 300 | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,120 | 0,089 | 0,060 |
| **4.13** | | | | | | | | | | | | | | | | | | | | | |
| **4.14** | | | | | | | | | | | | | | | | | | | | | |
| **4.15** | | | | | | | | | | | | | | | | | | | | | |
| **4.16** | | | | | | | | | | | | | | | | | | | | | |
| **4.17** | | | | | | | | | | | | | | | | | | | | | |
| **4.18** | | | | | | | | | | | | | | | | | | | | | |
| **4.19** | | | | | | | | | | | | | | | | | | | | | |
| **5.1** | | | | | | | | | | | | | | | | | | | | | |
| **5.2** | | | | | | | | | | | | | | | | | | | | | |
| **5.3** | **35** | **30** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,024 | 0,018 | 0,012 | 0,030 | 0,022 | 0,015 | 0,040 | 0,030 | 0,020 | 0,050 | 0,037 | 0,025 |
| **5.4** | **35** | **30** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,024 | 0,018 | 0,012 | 0,030 | 0,022 | 0,015 | 0,040 | 0,030 | 0,020 | 0,050 | 0,037 | 0,025 |
| **5.5** | **35** | **30** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,024 | 0,018 | 0,012 | 0,030 | 0,022 | 0,015 | 0,040 | 0,030 | 0,020 | 0,050 | 0,037 | 0,025 |
| **5.6** | **35** | **30** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,024 | 0,018 | 0,012 | 0,030 | 0,022 | 0,015 | 0,040 | 0,030 | 0,020 | 0,050 | 0,037 | 0,025 |
| **5.7** | **35** | **30** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,024 | 0,018 | 0,012 | 0,030 | 0,022 | 0,015 | 0,040 | 0,030 | 0,020 | 0,050 | 0,037 | 0,025 |
| **5.8** | **35** | **30** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,024 | 0,018 | 0,012 | 0,030 | 0,022 | 0,015 | 0,040 | 0,030 | 0,020 | 0,050 | 0,037 | 0,025 |
| **5.9** | **110** | **90** | 0,5 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **5.10** | **90** | **80** | 0,5 | 0,020 | 0,015 | 0,011 | 0,027 | 0,021 | 0,015 | 0,036 | 0,027 | 0,018 | 0,044 | 0,033 | 0,022 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 |
| **5.11** | **70** | **50** | 0,5 | 0,016 | 0,012 | 0,009 | 0,022 | 0,017 | 0,012 | 0,030 | 0,022 | 0,015 | 0,038 | 0,028 | 0,019 | 0,050 | 0,037 | 0,025 | 0,064 | 0,048 | 0,032 |
| **6.1** | | | | | | | | | | | | | | | | | | | | | |
| **6.2** | | | | | | | | | | | | | | | | | | | | | |
| **6.3** | | | | | | | | | | | | | | | | | | | | | |
| **6.4** | | | | | | | | | | | | | | | | | | | | | |
| **6.5** | | | | | | | | | | | | | | | | | | | | | |

* = long version: $a_{p\,max.}$ = 1.5 x DC at $f_z$ x 0.75

Plunging angle for ramping and helical milling: 3°

# / 50 979 ...

| Index | Ø DC = 12,0mm | | | Ø DC = 14,0 mm | | | Ø DC = 16,0–17,0 mm | | | Ø DC = 18,0–19,0 mm | | | Ø DC = 20,0 mm | | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | Emulsion | Compressed air | MMS |
| | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | | | |
| 1.1 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | ○ | ○ |
| 1.2 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | ○ | ○ |
| 1.3 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ○ | ○ |
| 1.4 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.5 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ○ | ○ |
| 1.6 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ○ | ○ |
| 1.7 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ○ | ○ |
| 1.8 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.9 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ○ | ○ |
| 1.10 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ○ | ○ |
| 1.11 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.12 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.13 | | | | | | | | | | | | | | | | | | |
| 1.14 | | | | | | | | | | | | | | | | | | |
| 1.15 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ○ | ○ |
| 1.16 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ○ | ○ |
| 2.1 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | 0,126 | 0,103 | 0,080 | ● | | |
| 2.2 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | 0,126 | 0,103 | 0,080 | ● | | |
| 2.3 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | 0,126 | 0,103 | 0,080 | ● | | |
| 2.4 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | 0,126 | 0,103 | 0,080 | ● | | |
| 2.5 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | 0,126 | 0,103 | 0,080 | ● | | |
| 2.6 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | 0,126 | 0,103 | 0,080 | ● | | |
| 2.7 | 0,060 | 0,045 | 0,030 | 0,064 | 0,049 | 0,035 | 0,068 | 0,052 | 0,040 | 0,071 | 0,058 | 0,045 | 0,079 | 0,065 | 0,050 | ● | | |
| 3.1 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | ● | ● |
| 3.2 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | ● | ● |
| 3.3 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ● | ● |
| 3.4 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ● | ● |
| 3.5 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ● | ● |
| 3.6 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ● | ● |
| 3.7 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ● | ● |
| 3.8 | 0,140 | 0,104 | 0,070 | 0,155 | 0,120 | 0,085 | 0,169 | 0,129 | 0,100 | 0,174 | 0,142 | 0,110 | 0,190 | 0,155 | 0,120 | ● | ● | ● |
| 4.1 | | | | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | | | | | | |
| 4.6 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | | |
| 4.7 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | | |
| 4.8 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | | |
| 4.9 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | | |
| 4.10 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | | |
| 4.11 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | | |
| 4.12 | 0,140 | 0,104 | 0,070 | 0,164 | 0,127 | 0,090 | 0,203 | 0,155 | 0,120 | 0,237 | 0,194 | 0,150 | 0,269 | 0,219 | 0,170 | ● | | |
| 4.13 | | | | | | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | | | | | | |
| 5.1 | | | | | | | | | | | | | | | | | | |
| 5.2 | | | | | | | | | | | | | | | | | | |
| 5.3 | 0,060 | 0,045 | 0,030 | 0,064 | 0,049 | 0,035 | 0,068 | 0,052 | 0,040 | 0,071 | 0,058 | 0,045 | 0,079 | 0,065 | 0,050 | ● | | |
| 5.4 | 0,060 | 0,045 | 0,030 | 0,064 | 0,049 | 0,035 | 0,068 | 0,052 | 0,040 | 0,071 | 0,058 | 0,045 | 0,079 | 0,065 | 0,050 | ● | | |
| 5.5 | 0,060 | 0,025 | 0,030 | 0,064 | 0,049 | 0,035 | 0,068 | 0,052 | 0,040 | 0,071 | 0,058 | 0,045 | 0,079 | 0,065 | 0,050 | ● | | |
| 5.6 | 0,060 | 0,045 | 0,030 | 0,064 | 0,049 | 0,035 | 0,068 | 0,052 | 0,040 | 0,071 | 0,058 | 0,045 | 0,079 | 0,065 | 0,050 | ● | | |
| 5.7 | 0,060 | 0,045 | 0,030 | 0,064 | 0,049 | 0,035 | 0,068 | 0,052 | 0,040 | 0,071 | 0,058 | 0,045 | 0,079 | 0,065 | 0,050 | ● | | |
| 5.8 | 0,060 | 0,045 | 0,030 | 0,064 | 0,049 | 0,035 | 0,068 | 0,052 | 0,040 | 0,071 | 0,058 | 0,045 | 0,079 | 0,065 | 0,050 | ● | | |
| 5.9 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | | |
| 5.10 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | 0,126 | 0,103 | 0,080 | ● | | |
| 5.11 | 0,080 | 0,060 | 0,040 | 0,082 | 0,064 | 0,045 | 0,085 | 0,065 | 0,050 | 0,095 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | ● | | |
| 6.1 | | | | | | | | | | | | | | | | | | |
| 6.2 | | | | | | | | | | | | | | | | | | |
| 6.3 | | | | | | | | | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | | | | | | |

# Cutting data standard values – SilverLine – End mills – 50 970 ... / 50 971 ... / 50 974 ...

| | extra long | | Ø DC = 3,0 mm | | | Ø DC = 4,0 mm | | | Ø DC = 5,0 mm | | | Ø DC = 6,0 mm | | | Ø DC = 8,0 mm | | | Ø DC = 10,0 mm | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | |
| | | | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC |
| **Index** | $v_c$ m/min | $a_{p\,max}$ x DC | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | |
| **1.1** | **150** | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,110 | 0,082 | 0,055 |
| **1.2** | **150** | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,110 | 0,082 | 0,055 |
| **1.3** | **160** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.4** | **140** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.5** | **140** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.6** | **140** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.7** | **140** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.8** | **120** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.9** | **100** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.10** | **140** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.11** | **130** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.12** | **120** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.13** | | | | | | | | | | | | | | | | | | | | |
| **1.14** | | | | | | | | | | | | | | | | | | | | |
| **1.15** | **80** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **1.16** | **80** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 |
| **2.1** | **90** | 0,5 | 0,016 | 0,012 | 0,009 | 0,022 | 0,017 | 0,012 | 0,030 | 0,022 | 0,015 | 0,038 | 0,028 | 0,019 | 0,050 | 0,037 | 0,025 | 0,064 | 0,048 | 0,032 |
| **2.2** | **80** | 0,5 | 0,016 | 0,012 | 0,009 | 0,022 | 0,017 | 0,012 | 0,030 | 0,022 | 0,015 | 0,038 | 0,028 | 0,019 | 0,050 | 0,037 | 0,025 | 0,064 | 0,048 | 0,032 |
| **2.3** | **70** | 0,5 | 0,016 | 0,012 | 0,009 | 0,022 | 0,017 | 0,012 | 0,030 | 0,022 | 0,015 | 0,038 | 0,028 | 0,019 | 0,050 | 0,037 | 0,025 | 0,064 | 0,048 | 0,032 |
| **2.4** | **70** | 0,5 | 0,016 | 0,012 | 0,009 | 0,022 | 0,017 | 0,012 | 0,030 | 0,022 | 0,015 | 0,038 | 0,028 | 0,019 | 0,050 | 0,037 | 0,025 | 0,064 | 0,048 | 0,032 |
| **2.5** | **80** | 0,5 | 0,016 | 0,012 | 0,009 | 0,022 | 0,017 | 0,012 | 0,030 | 0,022 | 0,015 | 0,038 | 0,028 | 0,019 | 0,050 | 0,037 | 0,025 | 0,064 | 0,048 | 0,032 |
| **2.6** | **80** | 0,5 | 0,016 | 0,012 | 0,009 | 0,022 | 0,017 | 0,012 | 0,030 | 0,022 | 0,015 | 0,038 | 0,028 | 0,019 | 0,050 | 0,037 | 0,025 | 0,064 | 0,048 | 0,032 |
| **2.7** | **25** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 |
| **3.1** | **150** | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,110 | 0,082 | 0,055 |
| **3.2** | **140** | 1,0* | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,070 | 0,052 | 0,035 | 0,080 | 0,060 | 0,040 | 0,100 | 0,075 | 0,050 | 0,110 | 0,082 | 0,055 |
| **3.3** | **150** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,090 | 0,067 | 0,045 |
| **3.4** | **140** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,090 | 0,067 | 0,045 |
| **3.5** | **150** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,090 | 0,067 | 0,045 |
| **3.6** | **140** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,090 | 0,067 | 0,045 |
| **3.7** | **150** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,090 | 0,067 | 0,045 |
| **3.8** | **140** | 1,0* | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,050 | 0,037 | 0,025 | 0,060 | 0,045 | 0,030 | 0,080 | 0,060 | 0,040 | 0,090 | 0,067 | 0,045 |
| **4.1** | | | | | | | | | | | | | | | | | | | | |
| **4.2** | | | | | | | | | | | | | | | | | | | | |
| **4.3** | | | | | | | | | | | | | | | | | | | | |
| **4.4** | | | | | | | | | | | | | | | | | | | | |
| **4.5** | | | | | | | | | | | | | | | | | | | | |
| **4.6** | 180 | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,081 | 0,062 | 0,045 | 0,102 | 0,079 | 0,057 |
| **4.7** | 160 | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,081 | 0,062 | 0,045 | 0,102 | 0,079 | 0,057 |
| **4.8** | 130 | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,081 | 0,062 | 0,045 | 0,102 | 0,079 | 0,057 |
| **4.9** | 110 | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,081 | 0,062 | 0,045 | 0,102 | 0,079 | 0,057 |
| **4.10** | 110 | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,081 | 0,062 | 0,045 | 0,102 | 0,079 | 0,057 |
| **4.11** | 220 | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,081 | 0,062 | 0,045 | 0,102 | 0,079 | 0,057 |
| **4.12** | 200 | 1,0* | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,081 | 0,062 | 0,045 | 0,102 | 0,079 | 0,057 |
| **4.13** | | | | | | | | | | | | | | | | | | | | |
| **4.14** | | | | | | | | | | | | | | | | | | | | |
| **4.15** | | | | | | | | | | | | | | | | | | | | |
| **4.16** | | | | | | | | | | | | | | | | | | | | |
| **4.17** | | | | | | | | | | | | | | | | | | | | |
| **4.18** | | | | | | | | | | | | | | | | | | | | |
| **4.19** | | | | | | | | | | | | | | | | | | | | |
| **5.1** | **25** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 |
| **5.2** | **25** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 |
| **5.3** | **25** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 |
| **5.4** | **25** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 |
| **5.5** | **25** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 |
| **5.6** | **25** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 |
| **5.7** | **25** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 |
| **5.8** | **25** | 0,5 | 0,013 | 0,010 | 0,007 | 0,018 | 0,014 | 0,010 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 |
| **5.9** | **80** | 0,5 | 0,027 | 0,021 | 0,015 | 0,036 | 0,028 | 0,020 | 0,045 | 0,035 | 0,025 | 0,054 | 0,042 | 0,030 | 0,072 | 0,055 | 0,040 | 0,090 | 0,069 | 0,050 |
| **5.10** | **70** | 0,5 | 0,020 | 0,015 | 0,011 | 0,027 | 0,021 | 0,015 | 0,032 | 0,025 | 0,018 | 0,040 | 0,031 | 0,022 | 0,054 | 0,042 | 0,030 | 0,072 | 0,055 | 0,040 |
| **5.11** | **40** | 0,5 | 0,016 | 0,012 | 0,009 | 0,022 | 0,017 | 0,012 | 0,027 | 0,021 | 0,015 | 0,034 | 0,026 | 0,019 | 0,045 | 0,035 | 0,025 | 0,057 | 0,044 | 0,032 |
| **6.1** | | | | | | | | | | | | | | | | | | | | |
| **6.2** | | | | | | | | | | | | | | | | | | | | |
| **6.3** | | | | | | | | | | | | | | | | | | | | |
| **6.4** | | | | | | | | | | | | | | | | | | | | |
| **6.5** | | | | | | | | | | | | | | | | | | | | |

* = long version: $a_{p\,max.}$ = 1.5 x DC at $f_z$ x 0.75

Plunging angle for ramping and helical milling: 3°

# / 50 975 ...

| | Ø DC = 12,0 mm | | | Ø DC = 14,0 mm | | | Ø DC = 16,0 mm | | | Ø DC = 18,0 mm | | | Ø DC = 20,0 mm | | | ● 1st choice | ○ suitable | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | | | |
| | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | | | |
| Index | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | Emulsion | Compressed air | MMS |
| 1.1 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.2 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.3 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.4 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.5 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.6 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.7 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.8 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.9 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.10 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.11 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.12 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.13 | | | | | | | | | | | | | | | | | | |
| 1.14 | | | | | | | | | | | | | | | | | | |
| 1.15 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 1.16 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ○ | ○ |
| 2.1 | 0,080 | 0,060 | 0,040 | 0,082 | 0,064 | 0,045 | 0,085 | 0,065 | 0,050 | 0,095 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | ● | | |
| 2.2 | 0,080 | 0,060 | 0,040 | 0,082 | 0,064 | 0,045 | 0,085 | 0,065 | 0,050 | 0,095 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | ● | | |
| 2.3 | 0,080 | 0,060 | 0,040 | 0,082 | 0,064 | 0,045 | 0,085 | 0,065 | 0,050 | 0,095 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | ● | | |
| 2.4 | 0,080 | 0,060 | 0,040 | 0,082 | 0,064 | 0,045 | 0,085 | 0,065 | 0,050 | 0,095 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | ● | | |
| 2.5 | 0,080 | 0,060 | 0,040 | 0,082 | 0,064 | 0,045 | 0,085 | 0,065 | 0,050 | 0,095 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | ● | | |
| 2.6 | 0,080 | 0,060 | 0,040 | 0,082 | 0,064 | 0,045 | 0,085 | 0,065 | 0,050 | 0,095 | 0,077 | 0,060 | 0,111 | 0,090 | 0,070 | ● | | |
| 2.7 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | ● | | |
| 3.1 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ● | ● |
| 3.2 | 0,120 | 0,089 | 0,060 | 0,128 | 0,099 | 0,070 | 0,135 | 0,103 | 0,080 | 0,142 | 0,116 | 0,090 | 0,158 | 0,129 | 0,100 | ● | ● | ● |
| 3.3 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,103 | 0,084 | 0,065 | 0,111 | 0,090 | 0,070 | ● | ● | ● |
| 3.4 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,103 | 0,084 | 0,065 | 0,111 | 0,090 | 0,070 | ● | ● | ● |
| 3.5 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,103 | 0,084 | 0,065 | 0,111 | 0,090 | 0,070 | ● | ● | ● |
| 3.6 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,103 | 0,084 | 0,065 | 0,111 | 0,090 | 0,070 | ● | ● | ● |
| 3.7 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,103 | 0,084 | 0,065 | 0,111 | 0,090 | 0,070 | ● | ● | ● |
| 3.8 | 0,100 | 0,075 | 0,050 | 0,100 | 0,078 | 0,055 | 0,101 | 0,077 | 0,060 | 0,103 | 0,084 | 0,065 | 0,111 | 0,090 | 0,070 | ● | ● | ● |
| 4.1 | | | | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | | | | | | |
| 4.6 | 0,126 | 0,097 | 0,070 | 0,153 | 0,118 | 0,085 | 0,180 | 0,139 | 0,100 | 0,198 | 0,153 | 0,110 | 0,216 | 0,166 | 0,120 | ● | | |
| 4.7 | 0,126 | 0,097 | 0,070 | 0,153 | 0,118 | 0,085 | 0,180 | 0,139 | 0,100 | 0,198 | 0,153 | 0,110 | 0,216 | 0,166 | 0,120 | ● | | |
| 4.8 | 0,126 | 0,097 | 0,070 | 0,153 | 0,118 | 0,085 | 0,180 | 0,139 | 0,100 | 0,198 | 0,153 | 0,110 | 0,216 | 0,166 | 0,120 | ● | | |
| 4.9 | 0,126 | 0,097 | 0,070 | 0,153 | 0,118 | 0,085 | 0,180 | 0,139 | 0,100 | 0,198 | 0,153 | 0,110 | 0,216 | 0,166 | 0,120 | ● | | |
| 4.10 | 0,126 | 0,097 | 0,070 | 0,153 | 0,118 | 0,085 | 0,180 | 0,139 | 0,100 | 0,198 | 0,153 | 0,110 | 0,216 | 0,166 | 0,120 | ● | | |
| 4.11 | 0,126 | 0,097 | 0,070 | 0,153 | 0,118 | 0,085 | 0,180 | 0,139 | 0,100 | 0,198 | 0,153 | 0,110 | 0,216 | 0,166 | 0,120 | ● | | |
| 4.12 | 0,126 | 0,097 | 0,070 | 0,153 | 0,118 | 0,085 | 0,180 | 0,139 | 0,100 | 0,198 | 0,153 | 0,110 | 0,216 | 0,166 | 0,120 | ● | | |
| 4.13 | | | | | | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | | | | | | |
| 5.1 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | | | |
| 5.2 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | | | |
| 5.3 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | ● | | |
| 5.4 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | ● | | |
| 5.5 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | ● | | |
| 5.6 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | ● | | |
| 5.7 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | ● | | |
| 5.8 | 0,054 | 0,042 | 0,030 | 0,063 | 0,049 | 0,035 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | ● | | |
| 5.9 | 0,108 | 0,083 | 0,060 | 0,126 | 0,097 | 0,070 | 0,144 | 0,111 | 0,080 | 0,162 | 0,125 | 0,090 | 0,180 | 0,139 | 0,100 | ● | | |
| 5.10 | 0,090 | 0,069 | 0,050 | 0,099 | 0,076 | 0,055 | 0,108 | 0,083 | 0,060 | 0,126 | 0,097 | 0,070 | 0,144 | 0,111 | 0,080 | ● | | |
| 5.11 | 0,072 | 0,055 | 0,040 | 0,081 | 0,062 | 0,045 | 0,090 | 0,069 | 0,050 | 0,108 | 0,083 | 0,060 | 0,126 | 0,097 | 0,070 | ● | | |
| 6.1 | | | | | | | | | | | | | | | | | | |
| 6.2 | | | | | | | | | | | | | | | | | | |
| 6.3 | | | | | | | | | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | | | | | | |

# Cutting data standard values – SilverLine – Radius milling cutters – 50 963 ...

| | | | | Ø DC = 3,0 mm | | | Ø DC = 4,0 mm | | | Ø DC = 5,0 mm | | | Ø DC = 6,0 mm | | | Ø DC = 7,0 mm | | | Ø DC = 8,0 mm | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | short | long | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | |
| | | | | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC |
| **Index** | $v_c$ m/min | $v_c$ m/min | $a_{p\,max}$ x DC | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | |
| **1.1** | **420** | **350** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **1.2** | **420** | **350** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **1.3** | **516** | **430** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **1.4** | **372** | **310** | 0,08 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 |
| **1.5** | **480** | **400** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **1.6** | **384** | **320** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **1.7** | **324** | **270** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **1.8** | **324** | **270** | 0,08 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 |
| **1.9** | | | | | | | | | | | | | | | | | | | | | |
| **1.10** | **432** | **360** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **1.11** | **324** | **270** | 0,08 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 |
| **1.12** | **324** | **270** | 0,08 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 |
| **1.13** | **288** | **240** | 0,05 | 0,052 | 0,042 | 0,026 | 0,070 | 0,056 | 0,035 | 0,082 | 0,066 | 0,041 | 0,094 | 0,075 | 0,047 | 0,107 | 0,086 | 0,054 | 0,120 | 0,096 | 0,060 |
| **1.14** | | | | | | | | | | | | | | | | | | | | | |
| **1.15** | **216** | **180** | 0,05 | 0,052 | 0,042 | 0,026 | 0,070 | 0,056 | 0,035 | 0,082 | 0,066 | 0,041 | 0,094 | 0,075 | 0,047 | 0,107 | 0,086 | 0,054 | 0,120 | 0,096 | 0,060 |
| **1.16** | **216** | **180** | 0,05 | 0,052 | 0,042 | 0,026 | 0,070 | 0,056 | 0,035 | 0,082 | 0,066 | 0,041 | 0,094 | 0,075 | 0,047 | 0,107 | 0,086 | 0,054 | 0,120 | 0,096 | 0,060 |
| **2.1** | | | | | | | | | | | | | | | | | | | | | |
| **2.2** | | | | | | | | | | | | | | | | | | | | | |
| **2.3** | | | | | | | | | | | | | | | | | | | | | |
| **2.4** | | | | | | | | | | | | | | | | | | | | | |
| **2.5** | | | | | | | | | | | | | | | | | | | | | |
| **2.6** | | | | | | | | | | | | | | | | | | | | | |
| **2.7** | | | | | | | | | | | | | | | | | | | | | |
| **3.1** | **564** | **470** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **3.2** | **480** | **400** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **3.3** | **564** | **470** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **3.4** | **480** | **400** | 0,08 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 |
| **3.5** | **564** | **470** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **3.6** | **480** | **400** | 0,08 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 |
| **3.7** | **564** | **470** | 0,08 | 0,064 | 0,051 | 0,032 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 |
| **3.8** | **480** | **400** | 0,08 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 | 0,110 | 0,088 | 0,055 | 0,120 | 0,096 | 0,060 |
| **4.1** | | | | | | | | | | | | | | | | | | | | | |
| **4.2** | | | | | | | | | | | | | | | | | | | | | |
| **4.3** | | | | | | | | | | | | | | | | | | | | | |
| **4.4** | | | | | | | | | | | | | | | | | | | | | |
| **4.5** | | | | | | | | | | | | | | | | | | | | | |
| **4.6** | 780 | 650 | 0,15 | 0,052 | 0,042 | 0,026 | 0,070 | 0,056 | 0,035 | 0,082 | 0,066 | 0,041 | 0,094 | 0,075 | 0,047 | 0,107 | 0,086 | 0,054 | 0,120 | 0,096 | 0,060 |
| **4.7** | 660 | 550 | 0,15 | 0,052 | 0,042 | 0,026 | 0,070 | 0,056 | 0,035 | 0,082 | 0,066 | 0,041 | 0,094 | 0,075 | 0,047 | 0,107 | 0,086 | 0,054 | 0,120 | 0,096 | 0,060 |
| **4.8** | | | | | | | | | | | | | | | | | | | | | |
| **4.9** | | | | | | | | | | | | | | | | | | | | | |
| **4.10** | | | | | | | | | | | | | | | | | | | | | |
| **4.11** | | | | | | | | | | | | | | | | | | | | | |
| **4.12** | | | | | | | | | | | | | | | | | | | | | |
| **4.13** | | | | | | | | | | | | | | | | | | | | | |
| **4.14** | | | | | | | | | | | | | | | | | | | | | |
| **4.15** | | | | | | | | | | | | | | | | | | | | | |
| **4.16** | | | | | | | | | | | | | | | | | | | | | |
| **4.17** | | | | | | | | | | | | | | | | | | | | | |
| **4.18** | | | | | | | | | | | | | | | | | | | | | |
| **4.19** | | | | | | | | | | | | | | | | | | | | | |
| **5.1** | | | | | | | | | | | | | | | | | | | | | |
| **5.2** | | | | | | | | | | | | | | | | | | | | | |
| **5.3** | | | | | | | | | | | | | | | | | | | | | |
| **5.4** | | | | | | | | | | | | | | | | | | | | | |
| **5.5** | | | | | | | | | | | | | | | | | | | | | |
| **5.6** | | | | | | | | | | | | | | | | | | | | | |
| **5.7** | | | | | | | | | | | | | | | | | | | | | |
| **5.8** | | | | | | | | | | | | | | | | | | | | | |
| **5.9** | | | | | | | | | | | | | | | | | | | | | |
| **5.10** | | | | | | | | | | | | | | | | | | | | | |
| **5.11** | | | | | | | | | | | | | | | | | | | | | |
| **6.1** | 168 | 140 | 0,05 | 0,036 | 0,026 | | 0,049 | 0,035 | | 0,057 | 0,041 | | 0,066 | 0,047 | | 0,075 | 0,054 | | 0,084 | 0,060 | |
| **6.2** | 120 | 100 | 0,05 | 0,036 | 0,026 | | 0,049 | 0,035 | | 0,057 | 0,041 | | 0,066 | 0,047 | | 0,075 | 0,054 | | 0,084 | 0,060 | |
| **6.3** | 108 | 90 | 0,03 | 0,026 | | | 0,035 | | | 0,041 | | | 0,047 | | | 0,054 | | | 0,060 | | |
| **6.4** | 96 | 80 | 0,02 | 0,026 | | | 0,035 | | | 0,041 | | | 0,047 | | | 0,054 | | | 0,060 | | |
| **6.5** | | | | | | | | | | | | | | | | | | | | | |

Plunging angle for ramping and helical milling: 3°

| | Ø DC = 10,0 mm | | | Ø DC = 12,0 mm | | | Ø DC = 14,0 mm | | | Ø DC = 16,0 mm | | | Ø DC = 18,0 mm | | | Ø DC = 20,0 mm | | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | | | |
| | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | 0,01–0,02 x DC | 0,03–0,04 x DC | 0,05 x DC | | | |
| Index | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | Emulsion | Compressed air | MMS |
| 1.1 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 1.2 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 1.3 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 1.4 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | 0,300 | 0,240 | 0,150 | 0,350 | 0,280 | 0,175 | 0,400 | 0,320 | 0,200 | ● | ○ | ○ |
| 1.5 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 1.6 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 1.7 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 1.8 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | 0,300 | 0,240 | 0,150 | 0,350 | 0,280 | 0,175 | 0,400 | 0,320 | 0,200 | ● | ○ | ○ |
| 1.9 | | | | | | | | | | | | | | | | | | | | | |
| 1.10 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 1.11 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | 0,300 | 0,240 | 0,150 | 0,350 | 0,280 | 0,175 | 0,400 | 0,320 | 0,200 | ● | ○ | ○ |
| 1.12 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | 0,300 | 0,240 | 0,150 | 0,350 | 0,280 | 0,175 | 0,400 | 0,320 | 0,200 | ● | ○ | ○ |
| 1.13 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 1.14 | | | | | | | | | | | | | | | | | | | | | |
| 1.15 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 1.16 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 2.1 | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | | | | | | | | | | | | | | | | | | | | | |
| 2.3 | | | | | | | | | | | | | | | | | | | | | |
| 2.4 | | | | | | | | | | | | | | | | | | | | | |
| 2.5 | | | | | | | | | | | | | | | | | | | | | |
| 2.6 | | | | | | | | | | | | | | | | | | | | | |
| 2.7 | | | | | | | | | | | | | | | | | | | | | |
| 3.1 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 3.2 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 3.3 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 3.4 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | 0,300 | 0,240 | 0,150 | 0,350 | 0,280 | 0,175 | 0,400 | 0,320 | 0,200 | ● | ○ | ○ |
| 3.5 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 3.6 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | 0,300 | 0,240 | 0,150 | 0,350 | 0,280 | 0,175 | 0,400 | 0,320 | 0,200 | ● | ○ | ○ |
| 3.7 | 0,200 | 0,160 | 0,100 | 0,240 | 0,192 | 0,120 | 0,320 | 0,256 | 0,160 | 0,400 | 0,320 | 0,200 | 0,450 | 0,360 | 0,225 | 0,500 | 0,400 | 0,250 | ● | ○ | ○ |
| 3.8 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | 0,300 | 0,240 | 0,150 | 0,350 | 0,280 | 0,175 | 0,400 | 0,320 | 0,200 | ● | ○ | ○ |
| 4.1 | | | | | | | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | | | | | | | | | |
| 4.6 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.7 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | 0,180 | 0,144 | 0,090 | 0,210 | 0,168 | 0,105 | 0,240 | 0,192 | 0,120 | ● | | |
| 4.8 | | | | | | | | | | | | | | | | | | | | | |
| 4.9 | | | | | | | | | | | | | | | | | | | | | |
| 4.10 | | | | | | | | | | | | | | | | | | | | | |
| 4.11 | | | | | | | | | | | | | | | | | | | | | |
| 4.12 | | | | | | | | | | | | | | | | | | | | | |
| 4.13 | | | | | | | | | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | | | | | | | | | |
| 5.1 | | | | | | | | | | | | | | | | | | | | | |
| 5.2 | | | | | | | | | | | | | | | | | | | | | |
| 5.3 | | | | | | | | | | | | | | | | | | | | | |
| 5.4 | | | | | | | | | | | | | | | | | | | | | |
| 5.5 | | | | | | | | | | | | | | | | | | | | | |
| 5.6 | | | | | | | | | | | | | | | | | | | | | |
| 5.7 | | | | | | | | | | | | | | | | | | | | | |
| 5.8 | | | | | | | | | | | | | | | | | | | | | |
| 5.9 | | | | | | | | | | | | | | | | | | | | | |
| 5.10 | | | | | | | | | | | | | | | | | | | | | |
| 5.11 | | | | | | | | | | | | | | | | | | | | | |
| 6.1 | 0,091 | 0,065 | | 0,098 | 0,070 | | 0,112 | 0,080 | | 0,126 | 0,090 | | 0,147 | 0,105 | | 0,168 | 0,120 | | | ● | |
| 6.2 | 0,091 | 0,065 | | 0,098 | 0,070 | | 0,112 | 0,080 | | 0,126 | 0,090 | | 0,147 | 0,105 | | 0,168 | 0,120 | | | ● | |
| 6.3 | 0,065 | | | 0,070 | | | 0,080 | | | 0,090 | | | 0,105 | | | 0,120 | | | | ● | |
| 6.4 | 0,065 | | | 0,070 | | | 0,080 | | | 0,090 | | | 0,105 | | | 0,120 | | | | ● | |
| 6.5 | | | | | | | | | | | | | | | | | | | | | |

# Cutting data standard values – SilverLine – High-precision finish milling cutter – 50 991 ...

| | | | | Ø DC = 6,0 mm | Ø DC = 8,0 mm | Ø DC = 10,0 mm | Ø DC = 12,0 mm | Ø DC = 16,0 mm | Ø DC = 20,0 mm | Ø DC = 25,0 mm | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | short | long | | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | | | |
| Index | $v_c$ m/min | $v_c$ m/min | $a_{p\,max}$ x DC | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | Emulsion | Compressed air | MMS |
| 1.1 | 290 | 205 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 1.2 | 300 | 210 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 1.3 | 260 | 180 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 1.4 | 230 | 160 | 2,0 | 0,022 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | ● | ○ | ○ |
| 1.5 | 250 | 175 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 1.6 | 230 | 160 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 1.7 | 230 | 160 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 1.8 | 210 | 145 | 2,0 | 0,022 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | ● | ○ | ○ |
| 1.9 | 200 | 140 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 1.10 | 230 | 160 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 1.11 | 210 | 145 | 2,0 | 0,022 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | ● | ○ | ○ |
| 1.12 | 210 | 145 | 2,0 | 0,022 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | ● | ○ | ○ |
| 1.13 | 140 | 100 | 2,0 | 0,019 | 0,025 | 0,032 | 0,040 | 0,050 | 0,070 | 0,090 | ● | ○ | ○ |
| 1.14 | | | | | | | | | | | | | |
| 1.15 | 175 | 120 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 1.16 | 175 | 120 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ○ | ○ |
| 2.1 | 130 | 90 | 2,0 | 0,019 | 0,025 | 0,032 | 0,040 | 0,050 | 0,070 | 0,090 | ● | | |
| 2.2 | 120 | 80 | 2,0 | 0,019 | 0,025 | 0,032 | 0,040 | 0,050 | 0,070 | 0,090 | ● | | |
| 2.3 | 100 | 70 | 2,0 | 0,019 | 0,025 | 0,032 | 0,040 | 0,050 | 0,070 | 0,090 | ● | | |
| 2.4 | 100 | 70 | 2,0 | 0,019 | 0,025 | 0,032 | 0,040 | 0,050 | 0,070 | 0,090 | ● | | |
| 2.5 | 120 | 80 | 2,0 | 0,019 | 0,025 | 0,032 | 0,040 | 0,050 | 0,070 | 0,090 | ● | | |
| 2.6 | 120 | 80 | 2,0 | 0,019 | 0,025 | 0,032 | 0,040 | 0,050 | 0,070 | 0,090 | ● | | |
| 2.7 | 40 | 30 | 2,0 | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | ● | | |
| 3.1 | 250 | 175 | 2,0 | 0,035 | 0,045 | 0,057 | 0,070 | 0,100 | 0,120 | 0,140 | ● | ● | ● |
| 3.2 | 220 | 155 | 2,0 | 0,035 | 0,045 | 0,057 | 0,070 | 0,100 | 0,120 | 0,140 | ● | ● | ● |
| 3.3 | 230 | 160 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ● | ● |
| 3.4 | 210 | 145 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ● | ● |
| 3.5 | 220 | 155 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ● | ● |
| 3.6 | 200 | 140 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ● | ● |
| 3.7 | 220 | 155 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ● | ● |
| 3.8 | 200 | 140 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | ● | ● |
| 4.1 | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | |
| 4.6 | 350 | 245 | 2,0 | 0,035 | 0,045 | 0,057 | 0,070 | 0,100 | 0,120 | 0,140 | ● | ○ | ○ |
| 4.7 | 300 | 210 | 2,0 | 0,035 | 0,045 | 0,057 | 0,070 | 0,100 | 0,120 | 0,140 | ● | ○ | ○ |
| 4.8 | 200 | 140 | 2,0 | 0,035 | 0,045 | 0,057 | 0,070 | 0,100 | 0,120 | 0,140 | ● | ○ | ○ |
| 4.9 | 175 | 120 | 2,0 | 0,035 | 0,045 | 0,057 | 0,070 | 0,100 | 0,120 | 0,140 | ● | ○ | ○ |
| 4.10 | 175 | 120 | 2,0 | 0,035 | 0,045 | 0,057 | 0,070 | 0,100 | 0,120 | 0,140 | ● | ○ | ○ |
| 4.11 | 430 | 300 | 2,0 | 0,035 | 0,045 | 0,057 | 0,070 | 0,100 | 0,120 | 0,140 | ● | ○ | ○ |
| 4.12 | 370 | 260 | 2,0 | 0,035 | 0,045 | 0,057 | 0,070 | 0,100 | 0,120 | 0,140 | ● | ○ | ○ |
| 4.13 | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | |
| 5.1 | 40 | 30 | 2,0 | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | ● | | |
| 5.2 | 40 | 30 | 2,0 | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | ● | | |
| 5.3 | 40 | 30 | 2,0 | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | ● | | |
| 5.4 | 40 | 30 | 2,0 | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | ● | | |
| 5.5 | 40 | 30 | 2,0 | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | ● | | |
| 5.6 | 40 | 30 | 2,0 | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | ● | | |
| 5.7 | 40 | 30 | 2,0 | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | ● | | |
| 5.8 | 40 | 30 | 2,0 | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | ● | | |
| 5.9 | 200 | 140 | 2,0 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | ● | | |
| 5.10 | 175 | 120 | 2,0 | 0,022 | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | ● | | |
| 5.11 | 125 | 85 | 2,0 | 0,019 | 0,025 | 0,032 | 0,040 | 0,050 | 0,070 | 0,090 | ● | | |
| 6.1 | | | | | | | | | | | | | |
| 6.2 | | | | | | | | | | | | | |
| 6.3 | | | | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | |

Plunging angle for ramping and helical milling = 1°

# Cutting data standard values – SilverLine – Radius milling cutters – 50 990 ... – Finish machining

| | long | | Ø DC = 4,0 mm | Ø DC = 5,0 mm | Ø DC = 6,0 mm | Ø DC = 8,0 mm | Ø DC = 10,0 mm | Ø DC = 12,0 mm | Ø DC = 16,0 mm | Ø DC = 20,0 mm | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | $a_e$ 0,05 x DC | | | |
| **Index** | $v_c$ m/min | $a_{p\,max}$ x DC | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | Emulsion | Compressed air | MMS |
| **1.1** | **180** | 0,08 | 0,035 | 0,044 | 0,050 | 0,060 | 0,065 | 0,070 | 0,090 | 0,120 | ● | ○ | ○ |
| **1.2** | **180** | 0,08 | 0,040 | 0,041 | 0,043 | 0,045 | 0,052 | 0,060 | 0,070 | 0,100 | ● | ○ | ○ |
| **1.3** | **195** | 0,08 | 0,040 | 0,041 | 0,043 | 0,045 | 0,052 | 0,060 | 0,070 | 0,100 | ● | ○ | ○ |
| **1.4** | **130** | 0,08 | 0,030 | 0,035 | 0,040 | 0,045 | 0,047 | 0,050 | 0,070 | 0,080 | ● | ○ | ○ |
| **1.5** | **165** | 0,08 | 0,030 | 0,035 | 0,040 | 0,045 | 0,047 | 0,050 | 0,070 | 0,080 | ● | ○ | ○ |
| **1.6** | **145** | 0,08 | 0,030 | 0,035 | 0,040 | 0,045 | 0,047 | 0,050 | 0,070 | 0,080 | ● | ○ | ○ |
| **1.7** | **145** | 0,08 | 0,030 | 0,035 | 0,040 | 0,045 | 0,047 | 0,050 | 0,070 | 0,080 | ● | ○ | ○ |
| **1.8** | **100** | 0,08 | 0,030 | 0,035 | 0,040 | 0,045 | 0,047 | 0,050 | 0,070 | 0,080 | ● | ○ | ○ |
| **1.9** | **165** | 0,08 | 0,035 | 0,044 | 0,050 | 0,060 | 0,065 | 0,070 | 0,090 | 0,120 | ● | ○ | ○ |
| **1.10** | **145** | 0,08 | 0,030 | 0,035 | 0,040 | 0,045 | 0,047 | 0,050 | 0,070 | 0,080 | ● | ○ | ○ |
| **1.11** | **100** | 0,08 | 0,030 | 0,035 | 0,040 | 0,045 | 0,047 | 0,050 | 0,070 | 0,080 | ● | ○ | ○ |
| **1.12** | **100** | 0,08 | 0,030 | 0,035 | 0,040 | 0,045 | 0,047 | 0,050 | 0,070 | 0,080 | ● | ○ | ○ |
| **1.13** | | | | | | | | | | | | | |
| **1.14** | | | | | | | | | | | | | |
| **1.15** | | | | | | | | | | | | | |
| **1.16** | | | | | | | | | | | | | |
| **2.1** | 105 | 0,08 | 0,010 | 0,015 | 0,020 | 0,030 | 0,035 | 0,040 | 0,050 | 0,060 | ● | | |
| **2.2** | 90 | 0,08 | 0,010 | 0,015 | 0,020 | 0,030 | 0,035 | 0,040 | 0,050 | 0,060 | ● | | |
| **2.3** | 75 | 0,08 | 0,010 | 0,015 | 0,020 | 0,030 | 0,035 | 0,040 | 0,050 | 0,060 | ● | | |
| **2.4** | 75 | 0,08 | 0,010 | 0,015 | 0,020 | 0,030 | 0,035 | 0,040 | 0,050 | 0,060 | ● | | |
| **2.5** | 90 | 0,08 | 0,010 | 0,015 | 0,020 | 0,030 | 0,035 | 0,040 | 0,050 | 0,060 | ● | | |
| **2.6** | 75 | 0,08 | 0,010 | 0,015 | 0,020 | 0,030 | 0,035 | 0,040 | 0,050 | 0,060 | ● | | |
| **2.7** | | | | | | | | | | | | | |
| **3.1** | **235** | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ● | ● |
| **3.2** | **220** | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ● | ● |
| **3.3** | **235** | 0,08 | 0,035 | 0,044 | 0,050 | 0,060 | 0,065 | 0,070 | 0,090 | 0,120 | ● | ● | ● |
| **3.4** | **220** | 0,08 | 0,035 | 0,044 | 0,050 | 0,060 | 0,065 | 0,070 | 0,090 | 0,120 | ● | ● | ● |
| **3.5** | **235** | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ● | ● |
| **3.6** | **220** | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ● | ● |
| **3.7** | **235** | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ● | ● |
| **3.8** | **220** | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ● | ● |
| **4.1** | | | | | | | | | | | | | |
| **4.2** | | | | | | | | | | | | | |
| **4.3** | | | | | | | | | | | | | |
| **4.4** | | | | | | | | | | | | | |
| **4.5** | | | | | | | | | | | | | |
| **4.6** | 255 | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ○ | ○ |
| **4.7** | 220 | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ○ | ○ |
| **4.8** | 255 | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ○ | ○ |
| **4.9** | 220 | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ○ | ○ |
| **4.10** | 220 | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ○ | ○ |
| **4.11** | 360 | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ○ | ○ |
| **4.12** | 270 | 0,08 | 0,028 | 0,035 | 0,040 | 0,050 | 0,065 | 0,080 | 0,120 | 0,140 | ● | ○ | ○ |
| **4.13** | | | | | | | | | | | | | |
| **4.14** | | | | | | | | | | | | | |
| **4.15** | | | | | | | | | | | | | |
| **4.16** | | | | | | | | | | | | | |
| **4.17** | | | | | | | | | | | | | |
| **4.18** | | | | | | | | | | | | | |
| **4.19** | | | | | | | | | | | | | |
| **5.1** | | | | | | | | | | | | | |
| **5.2** | | | | | | | | | | | | | |
| **5.3** | | | | | | | | | | | | | |
| **5.4** | | | | | | | | | | | | | |
| **5.5** | | | | | | | | | | | | | |
| **5.6** | | | | | | | | | | | | | |
| **5.7** | | | | | | | | | | | | | |
| **5.8** | | | | | | | | | | | | | |
| **5.9** | | | | | | | | | | | | | |
| **5.10** | | | | | | | | | | | | | |
| **5.11** | | | | | | | | | | | | | |
| **6.1** | | | | | | | | | | | | | |
| **6.2** | | | | | | | | | | | | | |
| **6.3** | | | | | | | | | | | | | |
| **6.4** | | | | | | | | | | | | | |
| **6.5** | | | | | | | | | | | | | |

Plunging angle for ramping and helical milling: 3°

# Cutting data standard values – SilverLine – Radius milling cutters – 50 990 ...

| | long | | Ø DC = 4,0 mm | | | Ø DC = 5,0 mm | | | Ø DC = 6,0 mm | | | Ø DC = 8,0 mm | | | Ø DC = 10,0 mm | | | Ø DC = 12,0 mm | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | |
| | | | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC |
| **Index** | $v_c$ m/min | $a_{p\,max}$ x DC | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | |
| **1.1** | **120** | 1,0 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,094 | 0,075 | 0,047 | 0,100 | 0,080 | 0,050 |
| **1.2** | **120** | 1,0 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 |
| **1.3** | **130** | 1,0 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,100 | 0,080 | 0,050 |
| **1.4** | **85** | 1,0 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 |
| **1.5** | **110** | 1,0 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 |
| **1.6** | **95** | 1,0 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 |
| **1.7** | **95** | 1,0 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 |
| **1.8** | **65** | 1,0 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 |
| **1.9** | **110** | 1,0 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,094 | 0,075 | 0,047 | 0,100 | 0,080 | 0,050 |
| **1.10** | **95** | 1,0 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 |
| **1.11** | **65** | 1,0 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 |
| **1.12** | **65** | 1,0 | 0,030 | 0,024 | 0,015 | 0,036 | 0,029 | 0,018 | 0,044 | 0,035 | 0,022 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 |
| **1.13** | | | | | | | | | | | | | | | | | | | | |
| **1.14** | | | | | | | | | | | | | | | | | | | | |
| **1.15** | | | | | | | | | | | | | | | | | | | | |
| **1.16** | | | | | | | | | | | | | | | | | | | | |
| **2.1** | 70 | 1,0 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 |
| **2.2** | 60 | 1,0 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 |
| **2.3** | 50 | 1,0 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 |
| **2.4** | 50 | 1,0 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 |
| **2.5** | 60 | 1,0 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 |
| **2.6** | 50 | 1,0 | 0,020 | 0,016 | 0,010 | 0,024 | 0,019 | 0,012 | 0,030 | 0,024 | 0,015 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 |
| **2.7** | | | | | | | | | | | | | | | | | | | | |
| **3.1** | **155** | 1,0 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 |
| **3.2** | **145** | 1,0 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 |
| **3.3** | **155** | 1,0 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,094 | 0,075 | 0,047 | 0,100 | 0,080 | 0,050 |
| **3.4** | **145** | 1,0 | 0,060 | 0,048 | 0,030 | 0,070 | 0,056 | 0,035 | 0,080 | 0,064 | 0,040 | 0,090 | 0,072 | 0,045 | 0,094 | 0,075 | 0,047 | 0,100 | 0,080 | 0,050 |
| **3.5** | **155** | 1,0 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 |
| **3.6** | **145** | 1,0 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 |
| **3.7** | **155** | 1,0 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 |
| **3.8** | **145** | 1,0 | 0,070 | 0,056 | 0,035 | 0,088 | 0,070 | 0,044 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | 0,130 | 0,104 | 0,065 | 0,140 | 0,112 | 0,070 |
| **4.1** | | | | | | | | | | | | | | | | | | | | |
| **4.2** | | | | | | | | | | | | | | | | | | | | |
| **4.3** | | | | | | | | | | | | | | | | | | | | |
| **4.4** | | | | | | | | | | | | | | | | | | | | |
| **4.5** | | | | | | | | | | | | | | | | | | | | |
| **4.6** | 170 | 1,0 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 |
| **4.7** | 145 | 1,0 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 |
| **4.8** | 170 | 1,0 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 |
| **4.9** | 145 | 1,0 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 |
| **4.10** | 145 | 1,0 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 |
| **4.11** | 240 | 1,0 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 |
| **4.12** | 180 | 1,0 | 0,040 | 0,032 | 0,020 | 0,050 | 0,040 | 0,025 | 0,060 | 0,048 | 0,030 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 |
| **4.13** | | | | | | | | | | | | | | | | | | | | |
| **4.14** | | | | | | | | | | | | | | | | | | | | |
| **4.15** | | | | | | | | | | | | | | | | | | | | |
| **4.16** | | | | | | | | | | | | | | | | | | | | |
| **4.17** | | | | | | | | | | | | | | | | | | | | |
| **4.18** | | | | | | | | | | | | | | | | | | | | |
| **4.19** | | | | | | | | | | | | | | | | | | | | |
| **5.1** | | | | | | | | | | | | | | | | | | | | |
| **5.2** | | | | | | | | | | | | | | | | | | | | |
| **5.3** | | | | | | | | | | | | | | | | | | | | |
| **5.4** | | | | | | | | | | | | | | | | | | | | |
| **5.5** | | | | | | | | | | | | | | | | | | | | |
| **5.6** | | | | | | | | | | | | | | | | | | | | |
| **5.7** | | | | | | | | | | | | | | | | | | | | |
| **5.8** | | | | | | | | | | | | | | | | | | | | |
| **5.9** | | | | | | | | | | | | | | | | | | | | |
| **5.10** | | | | | | | | | | | | | | | | | | | | |
| **5.11** | | | | | | | | | | | | | | | | | | | | |
| **6.1** | | | | | | | | | | | | | | | | | | | | |
| **6.2** | | | | | | | | | | | | | | | | | | | | |
| **6.3** | | | | | | | | | | | | | | | | | | | | |
| **6.4** | | | | | | | | | | | | | | | | | | | | |
| **6.5** | | | | | | | | | | | | | | | | | | | | |

Plunging angle for ramping and helical milling: 3°

# – Rough machining

| | Ø DC = 16,0 mm | | | Ø DC = 20,0 mm | | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|
| | $a_e$ | | | $a_e$ | | | | | |
| | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,6–1,0 x DC | | | |
| Index | $f_z$ mm | | | $f_z$ mm | | | Emulsion | Compressed air | MMS |
| 1.1 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | ● | ○ | ○ |
| 1.2 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | ● | ○ | ○ |
| 1.3 | 0,120 | 0,096 | 0,060 | 0,140 | 0,112 | 0,070 | ● | ○ | ○ |
| 1.4 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.5 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.6 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.7 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.8 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.9 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | ● | ○ | ○ |
| 1.10 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.11 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.12 | 0,100 | 0,080 | 0,050 | 0,120 | 0,096 | 0,060 | ● | ○ | ○ |
| 1.13 | | | | | | | | | |
| 1.14 | | | | | | | | | |
| 1.15 | | | | | | | | | |
| 1.16 | | | | | | | | | |
| 2.1 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.2 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.3 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.4 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.5 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.6 | 0,080 | 0,064 | 0,040 | 0,100 | 0,080 | 0,050 | ● | | |
| 2.7 | | | | | | | | | |
| 3.1 | 0,180 | 0,144 | 0,090 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.2 | 0,180 | 0,144 | 0,090 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.3 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | ● | ○ | ○ |
| 3.4 | 0,140 | 0,112 | 0,070 | 0,160 | 0,128 | 0,080 | ● | ○ | ○ |
| 3.5 | 0,180 | 0,144 | 0,090 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.6 | 0,180 | 0,144 | 0,090 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.7 | 0,180 | 0,144 | 0,090 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 3.8 | 0,180 | 0,144 | 0,090 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 4.1 | | | | | | | | | |
| 4.2 | | | | | | | | | |
| 4.3 | | | | | | | | | |
| 4.4 | | | | | | | | | |
| 4.5 | | | | | | | | | |
| 4.6 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 4.7 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 4.8 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 4.9 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 4.10 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 4.11 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 4.12 | 0,160 | 0,128 | 0,080 | 0,240 | 0,192 | 0,120 | ● | ○ | ○ |
| 4.13 | | | | | | | | | |
| 4.14 | | | | | | | | | |
| 4.15 | | | | | | | | | |
| 4.16 | | | | | | | | | |
| 4.17 | | | | | | | | | |
| 4.18 | | | | | | | | | |
| 4.19 | | | | | | | | | |
| 5.1 | | | | | | | | | |
| 5.2 | | | | | | | | | |
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| 5.4 | | | | | | | | | |
| 5.5 | | | | | | | | | |
| 5.6 | | | | | | | | | |
| 5.7 | | | | | | | | | |
| 5.8 | | | | | | | | | |
| 5.9 | | | | | | | | | |
| 5.10 | | | | | | | | | |
| 5.11 | | | | | | | | | |
| 6.1 | | | | | | | | | |
| 6.2 | | | | | | | | | |
| 6.3 | | | | | | | | | |
| 6.4 | | | | | | | | | |
| 6.5 | | | | | | | | | |

# Cutting data standard values – SilverLine – Torus face cutter – 50 989 ...

| | | | | Ø DC = 6,0 mm | | | Ø DC = 8,0 mm | | | Ø DC = 10,0 mm | | | Ø DC = 12,0 mm | | | Ø DC = 16,0 mm | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | | $a_e$ | | |
| | long | extra long | | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,5 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,5 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,5 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,5 x DC | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,5 x DC |
| Index | $v_c$ m/min | | $a_{p\,max}$ x DC | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | |
| 1.1 | 220 | 175 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.2 | 230 | 185 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.3 | 240 | 190 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.4 | 200 | 160 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.5 | 210 | 170 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.6 | 190 | 150 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.7 | 200 | 160 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.8 | 170 | 135 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.9 | | | | | | | | | | | | | | | | | | |
| 1.10 | 180 | 145 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.11 | 170 | 135 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.12 | 170 | 135 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.13 | 130 | 105 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.14 | | | | | | | | | | | | | | | | | | |
| 1.15 | 120 | 95 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 1.16 | 120 | 95 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 2.1 | 100 | 80 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 2.2 | 90 | 70 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 2.3 | 70 | 55 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 2.4 | 70 | 55 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 2.5 | 90 | 70 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 2.6 | 90 | 70 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 2.7 | | | | | | | | | | | | | | | | | | |
| 3.1 | 250 | 200 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 3.2 | 230 | 185 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 3.3 | 200 | 160 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 3.4 | 180 | 145 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 3.5 | 220 | 175 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 3.6 | 210 | 170 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 3.7 | 220 | 175 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 3.8 | 210 | 170 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 4.1 | | | | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | | | | | | |
| 4.6 | 250 | 200 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 4.7 | 250 | 200 | 0,03 | 0,380 | 0,304 | 0,190 | 0,500 | 0,400 | 0,250 | 0,600 | 0,480 | 0,300 | 0,700 | 0,560 | 0,350 | 0,900 | 0,720 | 0,450 |
| 4.8 | | | | | | | | | | | | | | | | | | |
| 4.9 | | | | | | | | | | | | | | | | | | |
| 4.10 | | | | | | | | | | | | | | | | | | |
| 4.11 | | | | | | | | | | | | | | | | | | |
| 4.12 | | | | | | | | | | | | | | | | | | |
| 4.13 | | | | | | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | | | | | | |
| 5.1 | | | | | | | | | | | | | | | | | | |
| 5.2 | | | | | | | | | | | | | | | | | | |
| 5.3 | | | | | | | | | | | | | | | | | | |
| 5.4 | | | | | | | | | | | | | | | | | | |
| 5.5 | | | | | | | | | | | | | | | | | | |
| 5.6 | | | | | | | | | | | | | | | | | | |
| 5.7 | | | | | | | | | | | | | | | | | | |
| 5.8 | | | | | | | | | | | | | | | | | | |
| 5.9 | | | | | | | | | | | | | | | | | | |
| 5.10 | | | | | | | | | | | | | | | | | | |
| 5.11 | | | | | | | | | | | | | | | | | | |
| 6.1 | 120 | 95 | 0,03 | 0,220 | 0,176 | 0,110 | 0,300 | 0,240 | 0,150 | 0,400 | 0,320 | 0,200 | 0,500 | 0,400 | 0,250 | 0,700 | 0,560 | 0,350 |
| 6.2 | 95 | 75 | 0,03 | 0,220 | 0,176 | 0,110 | 0,300 | 0,240 | 0,150 | 0,400 | 0,320 | 0,200 | 0,500 | 0,400 | 0,250 | 0,700 | 0,560 | 0,350 |
| 6.3 | 80 | 65 | 0,03 | 0,220 | 0,176 | 0,110 | 0,300 | 0,240 | 0,150 | 0,400 | 0,320 | 0,200 | 0,500 | 0,400 | 0,250 | 0,700 | 0,560 | 0,350 |
| 6.4 | | | | | | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | | | | | | |

Plunging angle for ramping and helical milling: 3°

| | Ø DC = 20,0 mm | | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|
| | $a_e$ | | | | | |
| | 0,1–0,2 x DC | 0,3–0,4 x DC | 0,5 x DC | | | |
| Index | $f_z$ mm | | | Emulsion | Compressed air | MMS |
| 1.1 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.2 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.3 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.4 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.5 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.6 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.7 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.8 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.9 | | | | | | |
| 1.10 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.11 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.12 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.13 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.14 | | | | | | |
| 1.15 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 1.16 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 2.1 | 1,100 | 0,880 | 0,550 | ● | | |
| 2.2 | 1,100 | 0,880 | 0,550 | ● | | |
| 2.3 | 1,100 | 0,880 | 0,550 | ● | | |
| 2.4 | 1,100 | 0,880 | 0,550 | ● | | |
| 2.5 | 1,100 | 0,880 | 0,550 | ● | | |
| 2.6 | 1,100 | 0,880 | 0,550 | ● | | |
| 2.7 | | | | | | |
| 3.1 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 3.2 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 3.3 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 3.4 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 3.5 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 3.6 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 3.7 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 3.8 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 4.1 | | | | | | |
| 4.2 | | | | | | |
| 4.3 | | | | | | |
| 4.4 | | | | | | |
| 4.5 | | | | | | |
| 4.6 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 4.7 | 1,100 | 0,880 | 0,550 | ● | ○ | ○ |
| 4.8 | | | | | | |
| 4.9 | | | | | | |
| 4.10 | | | | | | |
| 4.11 | | | | | | |
| 4.12 | | | | | | |
| 4.13 | | | | | | |
| 4.14 | | | | | | |
| 4.15 | | | | | | |
| 4.16 | | | | | | |
| 4.17 | | | | | | |
| 4.18 | | | | | | |
| 4.19 | | | | | | |
| 5.1 | | | | | | |
| 5.2 | | | | | | |
| 5.3 | | | | | | |
| 5.4 | | | | | | |
| 5.5 | | | | | | |
| 5.6 | | | | | | |
| 5.7 | | | | | | |
| 5.8 | | | | | | |
| 5.9 | | | | | | |
| 5.10 | | | | | | |
| 5.11 | | | | | | |
| 6.1 | 0,900 | 0,720 | 0,450 | | ● | ● |
| 6.2 | 0,900 | 0,720 | 0,450 | | ● | ● |
| 6.3 | 0,900 | 0,720 | 0,450 | | ● | ● |
| 6.4 | | | | | | |
| 6.5 | | | | | | |

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| Cutting Data | 85–89 |
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## WNT \ Performance

Premium quality tools for high performance.

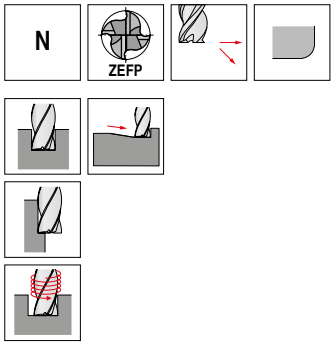
The premium quality tools from the **WNT Performance** product line have been designed for specific applications and are distinguished by their outstanding performance. If you make high demands on the performance of your production and want to achieve the very best results, we recommend the Premium tools in this product line.

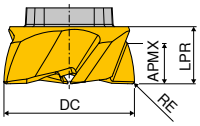
# Overview

| | Solid carbide high-feed cutters | Solid carbide torus bull nose milling cutters | Solid carbide ball-nosed end mills | Solid carbide deburring cutters |
|---|---|---|---|---|
| | | | | |
| CTPX225 | 81 | 81 | 82 | 82 |
| CTC5240 | 81 | 81 | 82 | |
| Cylindrical shank HA/HB | 83 | | | |
| Screw-in adapter, shape A | 84 | | | |
| Screw-in adapter, shape B | | | 84 | |

# MultiLock – Torus Cutter

▲ KLG = Coupling Size




CTC5240 DRAGONSKIN

CTPX225 DRAGONSKIN

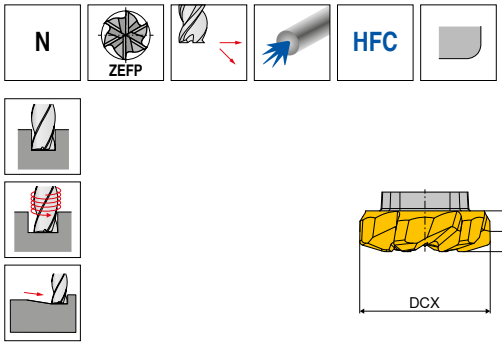
| DC mm | RE mm | KLG | APMX mm | LPR mm | ZEFP | Factory standard NEW W2 Article no. 53 805 ... £ | | Factory standard NEW W2 Article no. 53 806 ... £ | |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 0.2 | EL12 | 3.0 | 5 | 4 | 40.82 | 01205 | 36.27 | 01205 |
| 16 | 0.3 | EL16 | 4.5 | 7 | 4 | 54.45 | 01607 | 49.91 | 01607 |
| 20 | 0.3 | EL20 | 6.0 | 8 | 5 | 68.09 | 02008 | 63.55 | 02008 |
| 25 | 0.5 | EL25 | 8.0 | 10 | 6 | 77.18 | 02510 | 72.64 | 02510 |

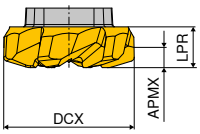
| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | | ○ |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | ● | |
| Hardened materials | | |

# MultiLock – High Feed Cutter

▲ KLG = Coupling Size

▲ $r_{3d}$ = corner radius to be programmed




CTC5240 DRAGONSKIN

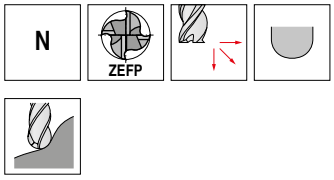
CTPX225 DRAGONSKIN

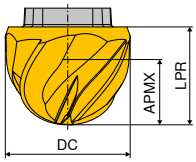
| DCX mm | KLG | $r_{3D}$ mm | APMX mm | LPR mm | ZEFP | Factory standard NEW W2 Article no. 53 801 ... £ | | Factory standard NEW W2 Article no. 53 802 ... £ | |
|---|---|---|---|---|---|---|---|---|---|
| 12 | EL12 | 0.7 | 0.5 | 4 | 5 | 45.36 | 01202 | 40.82 | 01202 |
| 16 | EL16 | 1.2 | 0.8 | 5 | 6 | 59.00 | 01605 | 54.45 | 01605 |
| 20 | EL20 | 1.2 | 0.8 | 6 | 6 | 68.09 | 02005 | 63.55 | 02005 |
| 25 | EL25 | 1.2 | 0.8 | 7 | 6 | 81.73 | 02505 | 77.18 | 02505 |

| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | | ○ |
| Cast iron | | ● |
| Non ferrous metals | | |
| Heat resistant alloys | ● | |
| Hardened materials | | |

# MultiLock – Ball Nosed Cutter

▲ KLG = Coupling Size




CTC5240 DRAGONSKIN

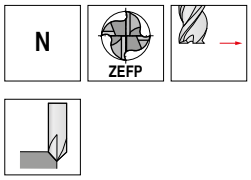
CTPX225 DRAGONSKIN

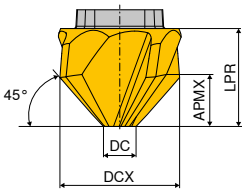
| DC mm | KLG | APMX mm | LPR mm | ZEFP | Factory standard NEW W2 Article no. 53 803 ... £ | | Factory standard NEW W2 Article no. 53 804 ... £ | |
|---|---|---|---|---|---|---|---|---|
| 12 | EL12 | 7.0 | 9 | 4 | 45.36 | 01200 | 40.82 | 01200 |
| 16 | EL16 | 9.5 | 12 | 4 | 59.00 | 01600 | 54.45 | 01600 |
| 20 | EL20 | 12.0 | 15 | 4 | 72.64 | 02000 | 68.09 | 02000 |
| 25 | EL25 | 16.0 | 19 | 4 | 81.73 | 02500 | 77.18 | 02500 |

| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | | ○ |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | ● | |
| Hardened materials | | |

# MultiLock – Deburring Cutter

▲ KLG = Coupling Size



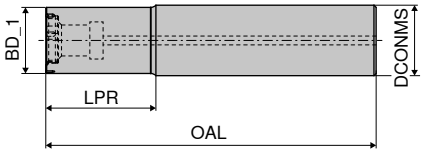

CTPX225 DRAGONSKIN

| DCX mm | KLG | APMX mm | DC mm | LPR mm | ZEFP | Factory standard NEW W2 Article no. 53 800 ... £ | |
|---|---|---|---|---|---|---|---|
| 12 | EL12 | 4 | 4 | 8 | 4 | 41.73 | 01200 |
| 16 | EL16 | 6 | 4 | 12 | 4 | 55.36 | 01600 |

| | | |
|---|---|---|
| Steel | | ● |
| Stainless steel | | ○ |
| Cast iron | | ● |
| Non ferrous metals | | ○ |
| Heat resistant alloys | | |
| Hardened materials | | |

# MultiLock – Holders

▲ KLG = Coupling Size

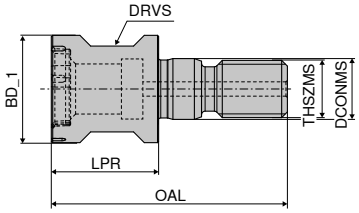


| KLG | BD_1 | DCONMS | OAL | LPR | Steel A NEW W1 Article no. 84 050 ... | | Steel B NEW W1 Article no. 84 051 ... | |
|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | £ | | £ | |
| **EL12** | 11 | 12 | 66 | 20 | 89.09 | **01200** | 89.09 | **01200** |
| **EL16** | 15 | 16 | 75 | 25 | 97.27 | **01600** | 97.27 | **01600** |
| **EL20** | 19 | 20 | 77 | 25 | 106.36 | **02000** | 106.36 | **02000** |
| **EL25** | 24 | 25 | 87 | 30 | 117.27 | **02500** | 117.27 | **02500** |

| Spare parts | Y7 Bit | | 2A/28 Threaded bush | | 2A/28 Cylindrical screw | | Y7 TORX® blade | | Y7 Key D | | 2A/28 Molykote | | 2A/28 Clamping screw | | Y7 Torque screw-driver | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Article no. 80 398 ... | | Article no. 70 950 ... | | Article no. 70 950 ... | | Article no. 80 950 ... | | Article no. 80 950 ... | | Article no. 70 950 ... | | Article no. 70 950 ... | | Article no. 80 950 ... | |
| **for Article no.** | £ | | £ | | £ | | £ | | £ | | £ | | £ | | £ | |
| 84 051 01200 / 84 050 01200 | 6.18 | **03500** | 5.15 | **42100** | 1.01 | **42000** | 6.69 | **054** | 12.05 | **120** | 3.98 | **303** | 3.46 | **41900** | 183.22 | **193** |
| 84 051 01600 / 84 050 01600 | 6.18 | **04500** | 6.17 | **42400** | 1.22 | **42300** | 6.69 | **055** | 12.90 | **121** | 3.98 | **303** | 4.12 | **42200** | 183.22 | **193** |
| 84 051 02000 / 84 050 02000 | 6.18 | **04500** | 6.17 | **42400** | 1.22 | **42300** | 6.69 | **055** | 12.90 | **121** | 3.98 | **303** | 4.12 | **42200** | 183.22 | **193** |
| 84 051 02500 / 84 050 02500 | 4.56 | **06000** | 5.71 | **42700** | 1.50 | **42600** | 6.69 | **055** | 12.90 | **121** | 3.98 | **303** | 7.85 | **42500** | 183.22 | **193** |

# Screw-in adapter, type A

▲ KLG = Coupling size
▲ For high-feed and torus cutters

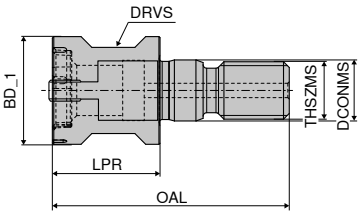


| KLG | BD_1 | THSZMS | OAL | LPR | DCONMS | DRVS | NEW W1 Article no. 84 052 ... | |
|---|---|---|---|---|---|---|---|---|
| | mm | | mm | mm | mm | mm | £ | |
| EL12 | 11 | M6 | 28 | 13 | 6.5 | 9 | 93.64 | 01200 |
| EL16 | 15 | M8 | 33 | 14 | 8.5 | 12 | 101.82 | 01600 |
| EL20 | 19 | M10 | 37 | 18 | 10.5 | 15 | 110.91 | 02000 |
| EL25 | 24 | M12 | 42 | 20 | 12.5 | 17 | 130.00 | 02500 |

| Spare parts | Y7 Bit | | 2A/28 Threaded bush | | Y7 TORX® blade | | Y7 Key D | | 2A/28 Molykote | | 2A/28 Clamping screw | | Y7 Torque screw-driver | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Article no. 80 398 ... | | Article no. 70 950 ... | | Article no. 80 950 ... | | Article no. 80 950 ... | | Article no. 70 950 ... | | Article no. 70 950 ... | | Article no. 80 950 ... | |
| for Article no. | £ | | £ | | £ | | £ | | £ | | £ | | £ | |
| 84 052 01200 | 6.18 | 03500 | 5.15 | 42100 | 6.69 | 054 | 12.05 | 120 | 3.98 | 303 | 3.46 | 41900 | 183.22 | 193 |
| 84 052 01600 | 6.18 | 04500 | 6.17 | 42400 | 6.69 | 055 | 12.90 | 121 | 3.98 | 303 | 4.12 | 42200 | 183.22 | 193 |
| 84 052 02000 | 6.18 | 04500 | 6.17 | 42400 | 6.69 | 055 | 12.90 | 121 | 3.98 | 303 | 4.12 | 42200 | 183.22 | 193 |
| 84 052 02500 | 4.56 | 06000 | 5.71 | 42700 | 6.69 | 055 | 12.90 | 121 | 3.98 | 303 | 7.85 | 42500 | 183.22 | 193 |

# Screw-in adapter, type B

▲ KLG = Coupling size
▲ For radius milling and deburring cutters



| KLG | BD_1 | THSZMS | OAL | LPR | DCONMS | DRVS | NEW W1 Article no. 84 053 ... | |
|---|---|---|---|---|---|---|---|---|
| | mm | | mm | mm | mm | mm | £ | |
| EL12 | 11 | M6 | 28 | 13 | 6.5 | 9 | 104.55 | 01200 |
| EL16 | 15 | M8 | 33 | 14 | 8.5 | 12 | 113.64 | 01600 |
| EL20 | 20 | M10 | 37 | 18 | 10.5 | 15 | 122.73 | 02000 |
| EL25 | 25 | M12 | 42 | 20 | 12.5 | 17 | 144.55 | 02500 |

| Spare parts | W1 Clamping screw | | W1 Mounting bush | | Y7 TORX® blade | | Y7 Key D | | 2A/28 Molykote | | Y7 Torque screw-driver | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Article no. 84 950 ... | | Article no. 84 950 ... | | Article no. 80 950 ... | | Article no. 80 950 ... | | Article no. 70 950 ... | | Article no. 80 950 ... | |
| for Article no. | £ | | £ | | £ | | £ | | £ | | £ | |
| 84 053 01200 | 36.36 | 18600 | 78.18 | 18000 | 6.69 | 054 | 12.05 | 120 | 3.98 | 303 | 183.22 | 193 |
| 84 053 01600 | 39.55 | 18800 | 85.00 | 18100 | 6.69 | 055 | 12.90 | 121 | 3.98 | 303 | 183.22 | 193 |
| 84 053 02000 | 42.73 | 18700 | 91.82 | 18200 | 6.69 | 055 | 12.90 | 121 | 3.98 | 303 | 183.22 | 193 |
| 84 053 02500 | 50.00 | 18900 | 108.18 | 18300 | 6.69 | 055 | 12.90 | 121 | 3.98 | 303 | 183.22 | 193 |

# Material examples referring to the cutting data tables

| | Index | Material | Strength N/mm² / HB / HRC | Material number | Material designation | Material number | Material designation | Material number | Material designation |
|---|---|---|---|---|---|---|---|---|---|
| P | 1.1 | General construction steel | < 800 N/mm² | 1.0402 | EN3B | | | | |
| | 1.2 | Free cutting steel | < 800 N/mm² | 1.0711 | EN1A | | | | |
| | 1.3 | Hardened steel, non alloyed | < 800 N/mm² | 1.0401 | EN32C | | | | |
| | 1.4 | Alloyed hardened steel | < 1000 N/mm² | 1.7325 | 25 CD4 | | | | |
| | 1.5 | Tempering steel, unalloyed | < 850 N/mm² | 1.5752 | EN36 | 1.0535 | EN9 | | |
| | 1.6 | Tempering steel, unalloyed | < 1000 N/mm² | 1.6582 | EN24 | | | | |
| | 1.7 | Tempering steel, alloyed | < 800 N/mm² | 1.7225 | EN19 | | | | |
| | 1.8 | Tempering steel, alloyed | < 1300 N/mm² | 1.8515 | EN40B | | | | |
| | 1.9 | Steel castings | < 850 N/mm² | 0.9650 | G-X 260 Cr 27 | 1.6750 | GS-20 NiCrMo 3.7 | 1.6582 | GS-34 CrNiMo 6 |
| | 1.10 | Nitriding steel | < 1000 N/mm² | 1.8509 | EN41B | | | | |
| | 1.11 | Nitriding steel | < 1200 N/mm² | 1.1186 | EN8 | 1.1160 | EN14A | | |
| | 1.12 | Roller bearing steel | < 1200 N/mm² | 1.3505 | 534A99 | | | | |
| | 1.13 | Spring steel | < 1200 N/mm² | | EN45 | | EN47 | | EN43 |
| | 1.14 | High-speed steel | < 1300 N/mm² | 1.3343 | M2 | 1.3249 | M34 | | |
| | 1.15 | Cold working tool steel | < 1300 N/mm² | 1.2379 | D2 | 1.2311 | P20 | | |
| | 1.16 | Hot working tool steel | < 1300 N/mm² | 1.2344 | H13 | | | | |
| M | 2.1 | Cast steel and sulphured stainless steel | < 850 N/mm² | 1.4581 | 318 | | | | |
| | 2.2 | Stainless steel, ferritic | < 750 N/mm² | 1.4000 | 403 | | | | |
| | 2.3 | Stainless steel, martensitic | < 900 N/mm² | 1.4057 | EN57 | | | | |
| | 2.4 | Stainless steel, ferritic / martensitic | <1100 N/mm² | 1.4028 | EN56B | | | | |
| | 2.5 | Stainless steel, austenitic / ferritic | < 850 N/mm² | 1.4542 | 17-4PH | | | | |
| | 2.6 | Stainless steel, austenitic | < 750 N/mm² | 1.4305 | 303 | 1.4401 | 316 | 1.4301 | 304 |
| | 2.7 | Heat resistant steel | < 1100 N/mm² | 1.4876 | Incoloy 800 | | | | |
| K | 3.1 | Grey cast iron with lamellar graphite | 100–350 N/mm² | 0.6015 | Grade 150 | 0.6020 | Grade 220 | 0.6025 | Grade 260 |
| | 3.2 | Grey cast iron with lamellar graphite | 300–500 N/mm² | 0.6030 | Grade 300 | 0.6035 | Grade 350 | 0.6040 | Grade 400 |
| | 3.3 | Gray cast iron with spheroidal graphite | 300–500 N/mm² | 0.7040 | SG 400-12 | 0.7043 | SG 370-17 | 0.7050 | SG 500-7 |
| | 3.4 | Gray cast iron with spheroidal graphite | 500–900 N/mm² | 0.7060 | SG 600-3 | 0.7070 | SG 700-2 | 0.7080 | SG 800-2 |
| | 3.5 | White malleable cast iron | 270–450 N/mm² | 0.8035 | GTW-35 | 0.8045 | GTW-45 | | |
| | 3.6 | White malleable cast iron | 500–650 N/mm² | 0.8055 | GTW-55 | 0.8065 | GTW-65 | | |
| | 3.7 | Black malleable cast iron | 300–450 N/mm² | 0.8135 | GTS-35 | 0.8145 | GTS-45 | | |
| | 3.8 | Black malleable cast iron | 500–800 N/mm² | 0.8155 | GTS-55 | 0.8170 | GTS-70 | | |
| N | 4.1 | Aluminium (non alloyed, low alloyed) | < 350 N/mm² | 3.0255 | 1050 A | 3.0275 | 1070 A | 3.0285 | 1080 A (A8) |
| | 4.2 | Aluminium alloys < 0.5 % Si | < 500 N/mm² | 3.1325 | 2017 A (AU4G) | 3.4335 | 7005 (AZ5G) | 3.4365 | 7075 (AZ5GU) |
| | 4.3 | Aluminium alloy 0.5–10 % Si | < 400 N/mm² | 3.2315 | A- G S1 | 3.2373 | A-S9 G | 3.2151 | A-S 6 U4 |
| | 4.4 | Aluminium alloys 10–15 % Si | < 400 N/mm² | 3.2581 | A-S12 | 3.2583 | A-S12 U | | |
| | 4.5 | Aluminum alloys > 15 % Si | < 400 N/mm² | | A-S18 | A-S17 U4 | | | |
| | 4.6 | Copper (non alloyed, low alloyed) | < 350 N/mm² | 2.0040 | Cu-c1 | 2.0060 | Cu-a1 | 2.0090 | Cu-b1 |
| | 4.7 | Copper wrought alloys | < 700 N/mm² | 2.1247 | Cub2 (Berylium Copper) | 2.0855 | CuN2S (Nickel Copper) | 2.1310 | CU-Fe2P |
| | 4.8 | Special copper alloys | < 200 HB | 2.0916 | Cu-A5 | 2.1525 | Cu-S3 M | | Ampco 8 (Cu-A6Fe2) |
| | 4.9 | Special copper alloys | < 300 HB | 2.0978 | Cu-Al11 Fe5 Ni5) | | Ampco 18 (Cu- A10 Fe3) | | |
| | 4.10 | Special copper alloys | > 300 HB | 2.1247 | Cu Be2 | | Ampco M4 | | |
| | 4.11 | Short-chipping brass, bronze, red bronze | < 600 N/mm² | 2.0331 | Cu Zn36 Pb1,5 | 2.0380 | Cu Zn39 Pb2 (Ms 56) | 2.0410 | Cu Zn44 Pb2 |
| | 4.12 | Long-chipping brass | < 600 N/mm² | 2.0335 | Cu Zn 36 (Ms63) | 2.1293 | Cu Cr1 Zr | | |
| | 4.13 | Thermoplastics | | PE | PVC | PS | Polystyrene | | Plexiglas |
| | 4.14 | Duroplastics | | PF | Bakelite | | Pertinax | | |
| | 4.15 | Fibre-reinforced plastics | | | Carbon Fibre | | Fibreglass | | Aramid Fibre (Kevlar) |
| | 4.16 | Magnesium and magnesium alloys | < 850 N/mm² | 3.5812 | Mg A7 Z1 | 3.5662 | Mg A9 | 3.5105 | Mg Tr3 Z2 Zn 1 |
| | 4.17 | Graphite | | | R8500X | | R8650 | | Technograph 15 |
| | 4.18 | Tungsten and tungsten alloys | | | W-Ni Fe (Densimet) | | W- Ni Cu (Inermet) | | Denal |
| | 4.19 | Molybdenum and molybdenum alloys | | | TZM | | MHQ | | Mo W |
| S | 5.1 | Pure nickel | | 2.4066 | Ni99 (Nickel 200) | 2.4068 | Lc Ni99 (Nickel 201) | | |
| | 5.2 | Nickel alloys | | 1.3912 | Fe-Ni36 (Invar) | 1.3917 | Fe -Ni42 (N42) | 1.3922 | Fe-Ni48 (N48) |
| | 5.3 | Nickel alloys | < 850 N/mm² | 2.4375 | Ni Cu30 Al (Monel K500) | 2.4360 | Ni Cu30Fe (Monel 400) | 2.4668 | |
| | 5.4 | Nickel molybdenum alloys | | 2.4600 | Ni Mo30Cr2 (Hastelloy B4) | 2.4617 | Ni Mo28 (Hastelloy B2) | 2.4819 | Ni Mo16Cr16 Hastell. C276 |
| | 5.5 | Nickel-chromium alloys | < 1300 N/mm² | 2.4951 | Ni Cr20TiAl (Nimonic 80A) | 2.4858 | Ni Cr21Mo (Inconel 825) | 2.4856 | Ni Cr22Mo9Nb Inconel 625 |
| | 5.6 | Cobalt Chrome Alloys | < 1300 N/mm² | 2.4964 | Co Cr20 W15 Ni10 | | Co Cr20 Ni16 Mo7 | | Co Cr28 Mo 6 |
| | 5.7 | Heat resistant alloys | < 1300 N/mm² | 1.4718 | Z45 C S 9-3 | 1.4747 | Z80 CSN 20-02 | 1.4845 | Z12 CN 25-20 |
| | 5.8 | Nickel-cobalt-chromium alloys | < 1400 N/mm² | 2.4851 | Ni Cr23Fe (Inconel 601) | 2.4668 | Ni Cr19NbMo (Inconel 718) | 2.4602 | Ni Cr21Mo14 Hastelloy C22 |
| | 5.9 | Pure titanium | < 900 N/mm² | 3.7025 | T35 (Titanium Grade 1) | 3.7034 | T40 (Titanium Grade 2) | 3.7064 | T60 (Titanium Grade 4) |
| | 5.10 | Titanium alloys | < 700 N/mm² | | T-A6-Nb7 (367) | | T-A5-Sn2-Mo4-Cr4 (Ti17) | | T-A3-V2,5 (Gr18) |
| | 5.11 | Titanium alloys | < 1200 N/mm² | 3.7165 | T-A6-V4 (Ta6V) | | T-A4-3V-Mo2-Fe2 (SP700) | | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
| H | 6.1 | Tempered steel | < 45 HRC | | | | | | |
| | 6.2 | | 46–55 HRC | | | | | | |
| | 6.3 | | 56–60 HRC | | | | | | |
| | 6.4 | | 61–65 HRC | | | | | | |
| | 6.5 | | 65–70 HRC | | | | | | |

# Cutting data standard values – MultiLock – Torus cutter

| | | | Ø DC = 12 mm | | Ø DC = 16 mm | | Ø DC = 20 mm | | Ø DC = 25 mm | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CTC5240 | CTPX225 | $a_e$ = 0,1–0,3 x DC | $a_e$ = 0,3–0,6 x DC | $a_e$ = 0,1–0,3 x DC | $a_e$ = 0,3–0,6 x DC | $a_e$ = 0,1–0,3 x DC | $a_e$ = 0,3–0,6 x DC | $a_e$ = 0,1–0,3 x DC | $a_e$ = 0,3–0,6 x DC | | | |
| | | | $a_p$ max. = 3 mm | | $a_p$ max. = 4,5 mm | | $a_p$ max. = 6 mm | | $a_p$ max. = 8 mm | | | | |
| Index | $v_c$ m/min | $v_c$ m/min | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | Emulsion | Compressed air | MMS |
| 1.1 | | 180 | 0,08 | 0,05 | 0,11 | 0,07 | 0,14 | 0,08 | 0,15 | 0,08 | ● | ○ | ○ |
| 1.2 | | 200 | 0,09 | 0,06 | 0,13 | 0,08 | 0,16 | 0,10 | 0,18 | 0,10 | ● | ○ | ○ |
| 1.3 | | 180 | 0,08 | 0,05 | 0,11 | 0,07 | 0,14 | 0,08 | 0,15 | 0,08 | ● | ○ | ○ |
| 1.4 | | 150 | 0,07 | 0,04 | 0,10 | 0,06 | 0,13 | 0,08 | 0,14 | 0,08 | ● | ○ | ○ |
| 1.5 | | 160 | 0,09 | 0,05 | 0,12 | 0,07 | 0,15 | 0,09 | 0,17 | 0,09 | ● | ○ | ○ |
| 1.6 | | 140 | 0,07 | 0,04 | 0,10 | 0,06 | 0,13 | 0,08 | 0,14 | 0,08 | ● | ○ | ○ |
| 1.7 | | 140 | 0,09 | 0,05 | 0,12 | 0,07 | 0,15 | 0,09 | 0,17 | 0,09 | ● | ○ | ○ |
| 1.8 | | 100 | 0,06 | 0,03 | 0,08 | 0,05 | 0,10 | 0,06 | 0,11 | 0,06 | ● | ○ | ○ |
| 1.9 | | 140 | 0,08 | 0,05 | 0,11 | 0,07 | 0,14 | 0,08 | 0,15 | 0,08 | ● | ○ | ○ |
| 1.10 | | 120 | 0,06 | 0,03 | 0,08 | 0,05 | 0,10 | 0,06 | 0,11 | 0,06 | ● | ○ | ○ |
| 1.11 | | 100 | 0,05 | 0,03 | 0,07 | 0,04 | 0,09 | 0,06 | 0,10 | 0,06 | ● | ○ | ○ |
| 1.12 | | 90 | 0,06 | 0,03 | 0,08 | 0,05 | 0,10 | 0,06 | 0,11 | 0,06 | ● | ○ | ○ |
| 1.13 | | 70 | 0,06 | 0,03 | 0,08 | 0,05 | 0,10 | 0,06 | 0,11 | 0,06 | ● | ○ | ○ |
| 1.14 | | | | | | | | | | | | | |
| 1.15 | | 80 | 0,05 | 0,03 | 0,07 | 0,04 | 0,09 | 0,06 | 0,10 | 0,06 | ● | ○ | ○ |
| 1.16 | | 80 | 0,05 | 0,03 | 0,07 | 0,04 | 0,09 | 0,06 | 0,10 | 0,06 | ● | ○ | ○ |
| 2.1 | | 60 | 0,07 | 0,06 | 0,09 | 0,08 | 0,12 | 0,10 | 0,13 | 0,10 | ● | | ○ |
| 2.2 | | 60 | 0,06 | 0,05 | 0,08 | 0,07 | 0,10 | 0,09 | 0,11 | 0,09 | ● | | ○ |
| 2.3 | | 50 | 0,06 | 0,05 | 0,08 | 0,07 | 0,10 | 0,09 | 0,11 | 0,09 | ● | | ○ |
| 2.4 | | 40 | 0,04 | 0,03 | 0,06 | 0,05 | 0,08 | 0,07 | 0,09 | 0,07 | ● | | ○ |
| 2.5 | | 50 | 0,05 | 0,04 | 0,07 | 0,06 | 0,09 | 0,08 | 0,10 | 0,08 | ● | | ○ |
| 2.6 | | 50 | 0,05 | 0,04 | 0,07 | 0,06 | 0,09 | 0,08 | 0,10 | 0,08 | ● | | ○ |
| 2.7 | | 40 | 0,04 | 0,03 | 0,06 | 0,05 | 0,08 | 0,07 | 0,09 | 0,07 | ● | | ○ |
| 3.1 | | 150 | 0,09 | 0,06 | 0,13 | 0,08 | 0,16 | 0,10 | 0,18 | 0,10 | ● | ○ | ○ |
| 3.2 | | 120 | 0,08 | 0,05 | 0,11 | 0,07 | 0,14 | 0,08 | 0,15 | 0,08 | ● | ○ | ○ |
| 3.3 | | 140 | 0,09 | 0,05 | 0,12 | 0,07 | 0,15 | 0,09 | 0,17 | 0,09 | ● | ○ | ○ |
| 3.4 | | 120 | 0,07 | 0,04 | 0,10 | 0,06 | 0,13 | 0,08 | 0,14 | 0,08 | ● | ○ | ○ |
| 3.5 | | 120 | 0,09 | 0,05 | 0,12 | 0,07 | 0,15 | 0,09 | 0,17 | 0,09 | ● | ○ | ○ |
| 3.6 | | 100 | 0,08 | 0,05 | 0,11 | 0,07 | 0,14 | 0,08 | 0,15 | 0,08 | ● | ○ | ○ |
| 3.7 | | 120 | 0,09 | 0,05 | 0,12 | 0,07 | 0,15 | 0,09 | 0,17 | 0,09 | ● | ○ | ○ |
| 3.8 | | 100 | 0,07 | 0,04 | 0,10 | 0,06 | 0,13 | 0,08 | 0,14 | 0,08 | ● | ○ | ○ |
| 4.1 | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | |
| 4.6 | | | | | | | | | | | | | |
| 4.7 | | | | | | | | | | | | | |
| 4.8 | | | | | | | | | | | | | |
| 4.9 | | | | | | | | | | | | | |
| 4.10 | | 160 | 0,05 | 0,03 | 0,07 | 0,04 | 0,09 | 0,06 | 0,10 | 0,06 | ● | | ○ |
| 4.11 | | 220 | 0,09 | 0,06 | 0,13 | 0,08 | 0,16 | 0,10 | 0,18 | 0,10 | ● | | ○ |
| 4.12 | | | | | | | | | | | | | |
| 4.13 | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | |
| 5.1 | 120 | | 0,07 | 0,04 | 0,10 | 0,06 | 0,15 | 0,08 | 0,17 | 0,10 | ● | | |
| 5.2 | 80 | | 0,07 | 0,04 | 0,10 | 0,06 | 0,15 | 0,08 | 0,17 | 0,10 | ● | | |
| 5.3 | 80 | | 0,07 | 0,04 | 0,10 | 0,06 | 0,15 | 0,08 | 0,17 | 0,10 | ● | | |
| 5.4 | 60 | | 0,07 | 0,04 | 0,10 | 0,06 | 0,15 | 0,08 | 0,17 | 0,10 | ● | | |
| 5.5 | 60 | | 0,07 | 0,04 | 0,10 | 0,06 | 0,15 | 0,08 | 0,17 | 0,10 | ● | | |
| 5.6 | 60 | | 0,07 | 0,04 | 0,10 | 0,06 | 0,15 | 0,08 | 0,17 | 0,10 | ● | | |
| 5.7 | 60 | | 0,07 | 0,04 | 0,10 | 0,06 | 0,15 | 0,08 | 0,17 | 0,10 | ● | | |
| 5.8 | 60 | | 0,07 | 0,04 | 0,10 | 0,06 | 0,15 | 0,08 | 0,17 | 0,10 | ● | | |
| 5.9 | 140 | | 0,10 | 0,05 | 0,15 | 0,08 | 0,20 | 0,11 | 0,22 | 0,13 | ● | | |
| 5.10 | 120 | | 0,10 | 0,05 | 0,15 | 0,08 | 0,20 | 0,11 | 0,22 | 0,13 | ● | | |
| 5.11 | 100 | | 0,07 | 0,04 | 0,10 | 0,06 | 0,15 | 0,08 | 0,17 | 0,10 | ● | | |
| 6.1 | | | | | | | | | | | | | |
| 6.2 | | | | | | | | | | | | | |
| 6.3 | | | | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | |

# Cutting data standard values – MultiLock – HFC milling cutter

| | | | Ø DC = 12 mm | | | Ø DC = 16 mm | | | Ø DC = 20 mm | | | Ø DC = 25 mm | | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CTC5240 | CTPX225 | $a_e$ = 0,1–0,2 x DC | $a_e$ = 0,3–0,4 x DC | $a_e$ = 0,6–1,0 x DC | $a_e$ = 0,1–0,2 x DC | $a_e$ = 0,3–0,4 x DC | $a_e$ = 0,6–1,0 x DC | $a_e$ = 0,1–0,2 x DC | $a_e$ = 0,3–0,4 x DC | $a_e$ = 0,6–1,0 x DC | $a_e$ = 0,1–0,2 x DC | $a_e$ = 0,3–0,4 x DC | $a_e$ = 0,6–1,0 x DC | | | |
| | | | $a_p$ max. = 0,5 mm | | | $a_p$ max. = 0,8 mm | | | $a_p$ max. = 0,8 mm | | | $a_p$ max. = 0,8 mm | | | | | |
| Index | $v_c$ m/min | $v_c$ m/min | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | Emulsion | Compressed air | MMS |
| 1.1 | | 200 | 0,60 | 0,48 | 0,35 | 0,84 | 0,62 | 0,40 | 1,08 | 0,79 | 0,50 | 1,19 | 0,85 | 0,50 | ● | ○ | ○ |
| 1.2 | | 220 | 0,71 | 0,57 | 0,42 | 0,99 | 0,73 | 0,47 | 1,28 | 0,94 | 0,60 | 1,41 | 1,01 | 0,60 | ● | ○ | ○ |
| 1.3 | | 200 | 0,60 | 0,48 | 0,35 | 0,84 | 0,62 | 0,40 | 1,08 | 0,79 | 0,50 | 1,19 | 0,85 | 0,50 | ● | ○ | ○ |
| 1.4 | | 170 | 0,55 | 0,44 | 0,32 | 0,76 | 0,56 | 0,36 | 0,99 | 0,73 | 0,46 | 1,09 | 0,78 | 0,46 | ● | ○ | ○ |
| 1.5 | | 180 | 0,66 | 0,52 | 0,38 | 0,92 | 0,68 | 0,44 | 1,18 | 0,87 | 0,55 | 1,30 | 0,93 | 0,55 | ● | ○ | ○ |
| 1.6 | | 150 | 0,55 | 0,44 | 0,32 | 0,76 | 0,56 | 0,36 | 0,99 | 0,73 | 0,46 | 1,09 | 0,78 | 0,46 | ● | ○ | ○ |
| 1.7 | | 150 | 0,66 | 0,52 | 0,38 | 0,92 | 0,68 | 0,44 | 1,18 | 0,87 | 0,55 | 1,30 | 0,93 | 0,55 | ● | ○ | ○ |
| 1.8 | | 110 | 0,44 | 0,35 | 0,26 | 0,61 | 0,45 | 0,29 | 0,79 | 0,58 | 0,37 | 0,87 | 0,62 | 0,37 | ● | ○ | ○ |
| 1.9 | | 150 | 0,60 | 0,48 | 0,35 | 0,84 | 0,62 | 0,4 | 1,08 | 0,79 | 0,50 | 1,19 | 0,85 | 0,50 | ● | ○ | ○ |
| 1.10 | | 130 | 0,44 | 0,35 | 0,26 | 0,61 | 0,45 | 0,29 | 0,79 | 0,58 | 0,37 | 0,87 | 0,62 | 0,37 | ● | ○ | ○ |
| 1.11 | | 110 | 0,39 | 0,31 | 0,23 | 0,54 | 0,40 | 0,25 | 0,69 | 0,51 | 0,33 | 0,76 | 0,55 | 0,33 | ● | ○ | ○ |
| 1.12 | | 100 | 0,44 | 0,35 | 0,26 | 0,61 | 0,45 | 0,29 | 0,79 | 0,58 | 0,37 | 0,87 | 0,62 | 0,37 | ● | ○ | ○ |
| 1.13 | | 80 | 0,44 | 0,35 | 0,26 | 0,61 | 0,45 | 0,29 | 0,79 | 0,58 | 0,37 | 0,87 | 0,62 | 0,37 | ● | ○ | ○ |
| 1.14 | | | | | | | | | | | | | | | | | |
| 1.15 | | 90 | 0,39 | 0,31 | 0,23 | 0,54 | 0,40 | 0,25 | 0,69 | 0,51 | 0,33 | 0,76 | 0,55 | 0,33 | ● | ○ | ○ |
| 1.16 | | 90 | 0,39 | 0,31 | 0,23 | 0,54 | 0,40 | 0,25 | 0,69 | 0,51 | 0,33 | 0,76 | 0,55 | 0,33 | ● | ○ | ○ |
| 2.1 | | 70 | 0,74 | 0,59 | 0,43 | 1,03 | 0,76 | 0,48 | 1,33 | 0,98 | 0,62 | 1,46 | 1,04 | 0,62 | ● | | ○ |
| 2.2 | | 70 | 0,66 | 0,52 | 0,38 | 0,92 | 0,68 | 0,44 | 1,18 | 0,87 | 0,55 | 1,30 | 0,93 | 0,55 | ● | | ○ |
| 2.3 | | 60 | 0,66 | 0,52 | 0,38 | 0,92 | 0,68 | 0,44 | 1,18 | 0,87 | 0,55 | 1,30 | 0,93 | 0,55 | ● | | ○ |
| 2.4 | | 40 | 0,49 | 0,39 | 0,29 | 0,69 | 0,51 | 0,33 | 0,88 | 0,65 | 0,42 | 0,97 | 0,70 | 0,42 | ● | | ○ |
| 2.5 | | 60 | 0,57 | 0,46 | 0,34 | 0,81 | 0,60 | 0,38 | 1,03 | 0,76 | 0,48 | 1,13 | 0,81 | 0,48 | ● | | ○ |
| 2.6 | | 55 | 0,57 | 0,46 | 0,34 | 0,81 | 0,60 | 0,38 | 1,03 | 0,76 | 0,48 | 1,13 | 0,81 | 0,48 | ● | | ○ |
| 2.7 | | 40 | 0,49 | 0,39 | 0,29 | 0,69 | 0,51 | 0,33 | 0,88 | 0,65 | 0,42 | 0,97 | 0,70 | 0,42 | ● | | ○ |
| 3.1 | | 170 | 0,71 | 0,57 | 0,42 | 0,99 | 0,73 | 0,47 | 1,28 | 0,94 | 0,60 | 1,41 | 1,01 | 0,60 | ● | ○ | ○ |
| 3.2 | | 130 | 0,60 | 0,48 | 0,35 | 0,84 | 0,62 | 0,4 | 1,08 | 0,79 | 0,50 | 1,19 | 0,85 | 0,50 | ● | ○ | ○ |
| 3.3 | | 150 | 0,66 | 0,52 | 0,38 | 0,92 | 0,68 | 0,44 | 1,18 | 0,87 | 0,55 | 1,30 | 0,93 | 0,55 | ● | ○ | ○ |
| 3.4 | | 130 | 0,55 | 0,44 | 0,32 | 0,76 | 0,56 | 0,36 | 0,99 | 0,73 | 0,46 | 1,09 | 0,78 | 0,46 | ● | ○ | ○ |
| 3.5 | | 130 | 0,66 | 0,52 | 0,38 | 0,92 | 0,68 | 0,44 | 1,18 | 0,87 | 0,55 | 1,30 | 0,93 | 0,55 | ● | ○ | ○ |
| 3.6 | | 110 | 0,60 | 0,48 | 0,35 | 0,84 | 0,62 | 0,4 | 1,08 | 0,79 | 0,50 | 1,19 | 0,85 | 0,50 | ● | ○ | ○ |
| 3.7 | | 130 | 0,66 | 0,52 | 0,38 | 0,92 | 0,68 | 0,44 | 1,18 | 0,87 | 0,55 | 1,30 | 0,93 | 0,55 | ● | ○ | ○ |
| 3.8 | | 110 | 0,55 | 0,44 | 0,32 | 0,76 | 0,56 | 0,36 | 0,99 | 0,73 | 0,46 | 1,09 | 0,78 | 0,46 | ● | ○ | ○ |
| 4.1 | | | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | | | | | |
| 4.6 | | | | | | | | | | | | | | | | | |
| 4.7 | | | | | | | | | | | | | | | | | |
| 4.8 | | | | | | | | | | | | | | | | | |
| 4.9 | | | | | | | | | | | | | | | | | |
| 4.10 | | | | | | | | | | | | | | | | | |
| 4.11 | | | | | | | | | | | | | | | | | |
| 4.12 | | | | | | | | | | | | | | | | | |
| 4.13 | | | | | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | | | | | |
| 5.1 | 120 | | 0,24 | 0,20 | 0,15 | 0,26 | 0,20 | 0,14 | 0,28 | 0,24 | 0,19 | 0,30 | 0,26 | 0,21 | ● | | |
| 5.2 | 80 | | 0,24 | 0,20 | 0,15 | 0,26 | 0,20 | 0,14 | 0,28 | 0,24 | 0,19 | 0,30 | 0,26 | 0,21 | ● | | |
| 5.3 | 80 | | 0,24 | 0,20 | 0,15 | 0,26 | 0,20 | 0,14 | 0,28 | 0,24 | 0,19 | 0,30 | 0,26 | 0,21 | ● | | |
| 5.4 | 60 | | 0,24 | 0,20 | 0,15 | 0,26 | 0,20 | 0,14 | 0,28 | 0,24 | 0,19 | 0,30 | 0,26 | 0,21 | ● | | |
| 5.5 | 60 | | 0,24 | 0,20 | 0,15 | 0,26 | 0,20 | 0,14 | 0,28 | 0,24 | 0,19 | 0,30 | 0,26 | 0,21 | ● | | |
| 5.6 | 60 | | 0,24 | 0,20 | 0,15 | 0,26 | 0,20 | 0,14 | 0,28 | 0,24 | 0,19 | 0,30 | 0,26 | 0,21 | ● | | |
| 5.7 | 60 | | 0,24 | 0,20 | 0,15 | 0,26 | 0,20 | 0,14 | 0,28 | 0,24 | 0,19 | 0,30 | 0,26 | 0,21 | ● | | |
| 5.8 | 60 | | 0,24 | 0,20 | 0,15 | 0,26 | 0,20 | 0,14 | 0,28 | 0,24 | 0,19 | 0,30 | 0,26 | 0,21 | ● | | |
| 5.9 | 140 | | 0,33 | 0,26 | 0,18 | 0,35 | 0,26 | 0,16 | 0,37 | 0,30 | 0,22 | 0,39 | 0,32 | 0,24 | ● | | |
| 5.10 | 120 | | 0,33 | 0,26 | 0,18 | 0,35 | 0,26 | 0,16 | 0,37 | 0,30 | 0,22 | 0,39 | 0,32 | 0,24 | ● | | |
| 5.11 | 100 | | 0,24 | 0,20 | 0,15 | 0,26 | 0,20 | 0,14 | 0,29 | 0,24 | 0,19 | 0,31 | 0,26 | 0,21 | ● | | |
| 6.1 | | | | | | | | | | | | | | | | | |
| 6.2 | | | | | | | | | | | | | | | | | |
| 6.3 | | | | | | | | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | | | | | |

# Cutting data standard values – MultiLock – Radius milling cutter

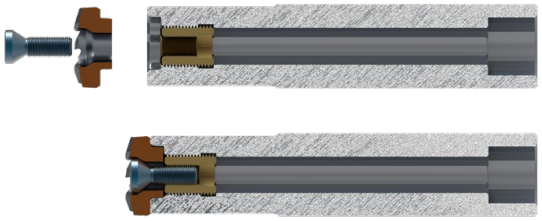
| | | | Ø DC = 12 mm | Ø DC = 16 mm | Ø DC = 20 mm | Ø DC = 25 mm | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|
| | CTC5240 | CTPX225 | $a_e / a_p$ = 0,05 x DC | $a_e / a_p$ = 0,05 x DC | $a_e / a_p$ = 0,05 x DC | $a_e / a_p$ = 0,05 x DC | | | |
| Index | $v_c$ m/min | $v_c$ m/min | $f_z$ mm | $f_z$ mm | $f_z$ mm | $f_z$ mm | Emulsion | Compressed air | MMS |
| 1.1 | | 180 | 0,12 | 0,15 | 0,18 | 0,20 | ● | ○ | ○ |
| 1.2 | | 200 | 0,13 | 0,17 | 0,21 | 0,23 | ● | ○ | ○ |
| 1.3 | | 180 | 0,12 | 0,15 | 0,18 | 0,20 | ● | ○ | ○ |
| 1.4 | | 150 | 0,10 | 0,13 | 0,16 | 0,18 | ● | ○ | ○ |
| 1.5 | | 160 | 0,13 | 0,16 | 0,19 | 0,21 | ● | ○ | ○ |
| 1.6 | | 140 | 0,10 | 0,13 | 0,16 | 0,18 | ● | ○ | ○ |
| 1.7 | | 140 | 0,13 | 0,16 | 0,19 | 0,21 | ● | ○ | ○ |
| 1.8 | | 100 | 0,09 | 0,10 | 0,13 | 0,14 | ● | ○ | ○ |
| 1.9 | | 140 | 0,12 | 0,15 | 0,18 | 0,20 | ● | ○ | ○ |
| 1.10 | | 120 | 0,09 | 0,10 | 0,13 | 0,14 | ● | ○ | ○ |
| 1.11 | | 100 | 0,07 | 0,09 | 0,11 | 0,12 | ● | ○ | ○ |
| 1.12 | | 90 | 0,09 | 0,10 | 0,13 | 0,14 | ● | ○ | ○ |
| 1.13 | | 70 | 0,09 | 0,10 | 0,13 | 0,14 | ● | ○ | ○ |
| 1.14 | | | | | | | | | |
| 1.15 | | 80 | 0,07 | 0,09 | 0,11 | 0,12 | ● | ○ | ○ |
| 1.16 | | 80 | 0,07 | 0,09 | 0,11 | 0,12 | ● | ○ | ○ |
| 2.1 | | 60 | 0,10 | 0,12 | 0,15 | 0,17 | ● | | ○ |
| 2.2 | | 60 | 0,09 | 0,10 | 0,13 | 0,14 | ● | | ○ |
| 2.3 | | 50 | 0,09 | 0,10 | 0,13 | 0,14 | ● | | ○ |
| 2.4 | | 40 | 0,06 | 0,08 | 0,10 | 0,11 | ● | | ○ |
| 2.5 | | 50 | 0,07 | 0,09 | 0,11 | 0,12 | ● | | ○ |
| 2.6 | | 50 | 0,07 | 0,09 | 0,11 | 0,12 | ● | | ○ |
| 2.7 | | 40 | 0,06 | 0,08 | 0,10 | 0,11 | ● | | ○ |
| 3.1 | | 150 | 0,13 | 0,17 | 0,21 | 0,23 | ● | ○ | ○ |
| 3.2 | | 120 | 0,12 | 0,15 | 0,18 | 0,20 | ● | ○ | ○ |
| 3.3 | | 140 | 0,13 | 0,16 | 0,19 | 0,21 | ● | ○ | ○ |
| 3.4 | | 120 | 0,10 | 0,13 | 0,16 | 0,18 | ● | ○ | ○ |
| 3.5 | | 120 | 0,13 | 0,16 | 0,19 | 0,21 | ● | ○ | ○ |
| 3.6 | | 100 | 0,12 | 0,15 | 0,18 | 0,20 | ● | ○ | ○ |
| 3.7 | | 120 | 0,13 | 0,16 | 0,19 | 0,21 | ● | ○ | ○ |
| 3.8 | | 100 | 0,10 | 0,13 | 0,16 | 0,18 | ● | ○ | ○ |
| 4.1 | | 500 | 0,20 | 0,25 | 0,30 | 0,33 | ● | | ○ |
| 4.2 | | 450 | 0,20 | 0,25 | 0,30 | 0,33 | ● | | ○ |
| 4.3 | | 380 | 0,19 | 0,24 | 0,28 | 0,31 | ● | | ○ |
| 4.4 | | 300 | 0,18 | 0,22 | 0,27 | 0,30 | ● | | ○ |
| 4.5 | | 150 | 0,16 | 0,20 | 0,24 | 0,26 | ● | | ○ |
| 4.6 | | 250 | 0,13 | 0,16 | 0,19 | 0,21 | ● | | ○ |
| 4.7 | | 200 | 0,12 | 0,15 | 0,18 | 0,20 | ● | | ○ |
| 4.8 | | 220 | 0,10 | 0,12 | 0,15 | 0,17 | ● | | ○ |
| 4.9 | | 200 | 0,07 | 0,09 | 0,11 | 0,12 | ● | | ○ |
| 4.10 | | 160 | 0,07 | 0,09 | 0,11 | 0,12 | ● | | ○ |
| 4.11 | | 220 | 0,13 | 0,17 | 0,21 | 0,23 | ● | | ○ |
| 4.12 | | 190 | 0,13 | 0,17 | 0,21 | 0,23 | ● | | ○ |
| 4.13 | | | | | | | | | |
| 4.14 | | | | | | | | | |
| 4.15 | | | | | | | | | |
| 4.16 | | | | | | | | | |
| 4.17 | | | | | | | | | |
| 4.18 | | | | | | | | | |
| 4.19 | | | | | | | | | |
| 5.1 | 120 | | 0,08 | 0,11 | 0,16 | 0,17 | ● | | |
| 5.2 | 80 | | 0,08 | 0,11 | 0,16 | 0,17 | ● | | |
| 5.3 | 80 | | 0,08 | 0,11 | 0,16 | 0,17 | ● | | |
| 5.4 | 60 | | 0,08 | 0,11 | 0,16 | 0,17 | ● | | |
| 5.5 | 60 | | 0,08 | 0,11 | 0,16 | 0,17 | ● | | |
| 5.6 | 60 | | 0,08 | 0,11 | 0,16 | 0,17 | ● | | |
| 5.7 | 60 | | 0,08 | 0,11 | 0,16 | 0,17 | ● | | |
| 5.8 | 60 | | 0,08 | 0,11 | 0,16 | 0,17 | ● | | |
| 5.9 | 140 | | 0,11 | 0,16 | 0,21 | 0,22 | ● | | |
| 5.10 | 120 | | 0,11 | 0,16 | 0,21 | 0,22 | ● | | |
| 5.11 | 100 | | 0,08 | 0,11 | 0,16 | 0,17 | ● | | |
| 6.1 | | | | | | | | | |
| 6.2 | | | | | | | | | |
| 6.3 | | | | | | | | | |
| 6.4 | | | | | | | | | |
| 6.5 | | | | | | | | | |

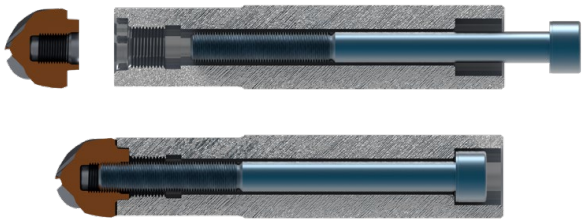
# Cutting data standard values – MultiLock – Deburring cutter

| | | Ø DC = 12 mm | Ø DC = 16 mm | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|
| | CTPX225 | $a_e$ = 0,1–0,2 x DC<br>$a_p$ max. = 4 mm | $a_e$ = 0,1–0,2 x DC<br>$a_p$ max. = 6 mm | | | |
| Index | $v_c$ m/min | $f_z$ mm | $f_z$ mm | Emulsion | Compressed air | MMS |
| 1.1 | 200 | 0,09 | 0,12 | ● | ○ | ○ |
| 1.2 | 220 | 0,11 | 0,14 | ● | ○ | ○ |
| 1.3 | 200 | 0,09 | 0,12 | ● | ○ | ○ |
| 1.4 | 170 | 0,08 | 0,11 | ● | ○ | ○ |
| 1.5 | 180 | 0,10 | 0,13 | ● | ○ | ○ |
| 1.6 | 150 | 0,08 | 0,11 | ● | ○ | ○ |
| 1.7 | 150 | 0,10 | 0,13 | ● | ○ | ○ |
| 1.8 | 110 | 0,07 | 0,09 | ● | ○ | ○ |
| 1.9 | 150 | 0,09 | 0,12 | ● | ○ | ○ |
| 1.10 | 130 | 0,07 | 0,09 | ● | ○ | ○ |
| 1.11 | 110 | 0,06 | 0,08 | ● | ○ | ○ |
| 1.12 | 100 | 0,07 | 0,09 | ● | ○ | ○ |
| 1.13 | 80 | 0,07 | 0,09 | ● | ○ | ○ |
| 1.14 | | | | | | |
| 1.15 | 90 | 0,06 | 0,08 | ● | ○ | ○ |
| 1.16 | 90 | 0,06 | 0,08 | ● | ○ | ○ |
| 2.1 | 70 | 0,08 | 0,10 | ● | | ○ |
| 2.2 | 70 | 0,07 | 0,09 | ● | | ○ |
| 2.3 | 60 | 0,07 | 0,09 | ● | | ○ |
| 2.4 | 40 | 0,05 | 0,07 | ● | | ○ |
| 2.5 | 60 | 0,06 | 0,08 | ● | | ○ |
| 2.6 | 60 | 0,06 | 0,08 | ● | | ○ |
| 2.7 | 40 | 0,05 | 0,07 | ● | | ○ |
| 3.1 | 170 | 0,11 | 0,14 | ● | ○ | ○ |
| 3.2 | 130 | 0,09 | 0,12 | ● | ○ | ○ |
| 3.3 | 150 | 0,10 | 0,13 | ● | ○ | ○ |
| 3.4 | 130 | 0,08 | 0,11 | ● | ○ | ○ |
| 3.5 | 130 | 0,10 | 0,13 | ● | ○ | ○ |
| 3.6 | 110 | 0,09 | 0,12 | ● | ○ | ○ |
| 3.7 | 130 | 0,10 | 0,13 | ● | ○ | ○ |
| 3.8 | 110 | 0,08 | 0,11 | ● | ○ | ○ |
| 4.1 | 550 | 0,16 | 0,21 | ● | | |
| 4.2 | 500 | 0,16 | 0,21 | ● | | |
| 4.3 | 420 | 0,15 | 0,20 | ● | | |
| 4.4 | 330 | 0,14 | 0,19 | ● | | |
| 4.5 | 170 | 0,13 | 0,17 | ● | | |
| 4.6 | 280 | 0,10 | 0,13 | ● | | |
| 4.7 | 220 | 0,09 | 0,12 | ● | | |
| 4.8 | 240 | 0,08 | 0,10 | ● | | |
| 4.9 | 220 | 0,06 | 0,08 | ● | | |
| 4.10 | 180 | 0,06 | 0,08 | ● | | |
| 4.11 | 240 | 0,11 | 0,14 | ● | | |
| 4.12 | 210 | 0,11 | 0,14 | ● | | |
| 4.13 | | | | | | |
| 4.14 | | | | | | |
| 4.15 | | | | | | |
| 4.16 | | | | | | |
| 4.17 | | | | | | |
| 4.18 | | | | | | |
| 4.19 | | | | | | |
| 5.1 | | | | | | |
| 5.2 | | | | | | |
| 5.3 | | | | | | |
| 5.4 | | | | | | |
| 5.5 | | | | | | |
| 5.6 | | | | | | |
| 5.7 | | | | | | |
| 5.8 | | | | | | |
| 5.9 | | | | | | |
| 5.10 | | | | | | |
| 5.11 | | | | | | |
| 6.1 | | | | | | |
| 6.2 | | | | | | |
| 6.3 | | | | | | |
| 6.4 | | | | | | |
| 6.5 | | | | | | |

# Assembly instructions

## Image of MultiLock cylindrical shank adapter assembly

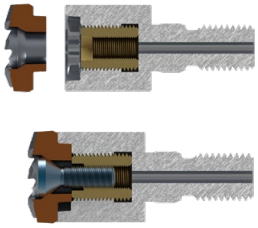




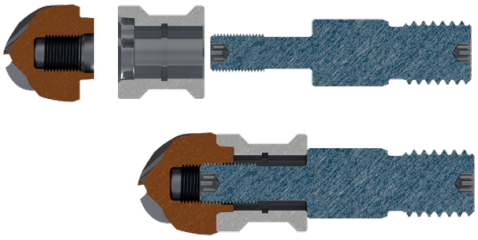
- The cylindrical shank adapter can be used universally. In this case, the MultiLock high-feed and torus cutters are clamped from the front using a threaded bush and clamping screw. The MultiLock radius milling and deburring cutters are clamped via the shank using a cylindrical screw.

## Image of MultiLock screw-in adapter assembly

**Type A**



**Type B**



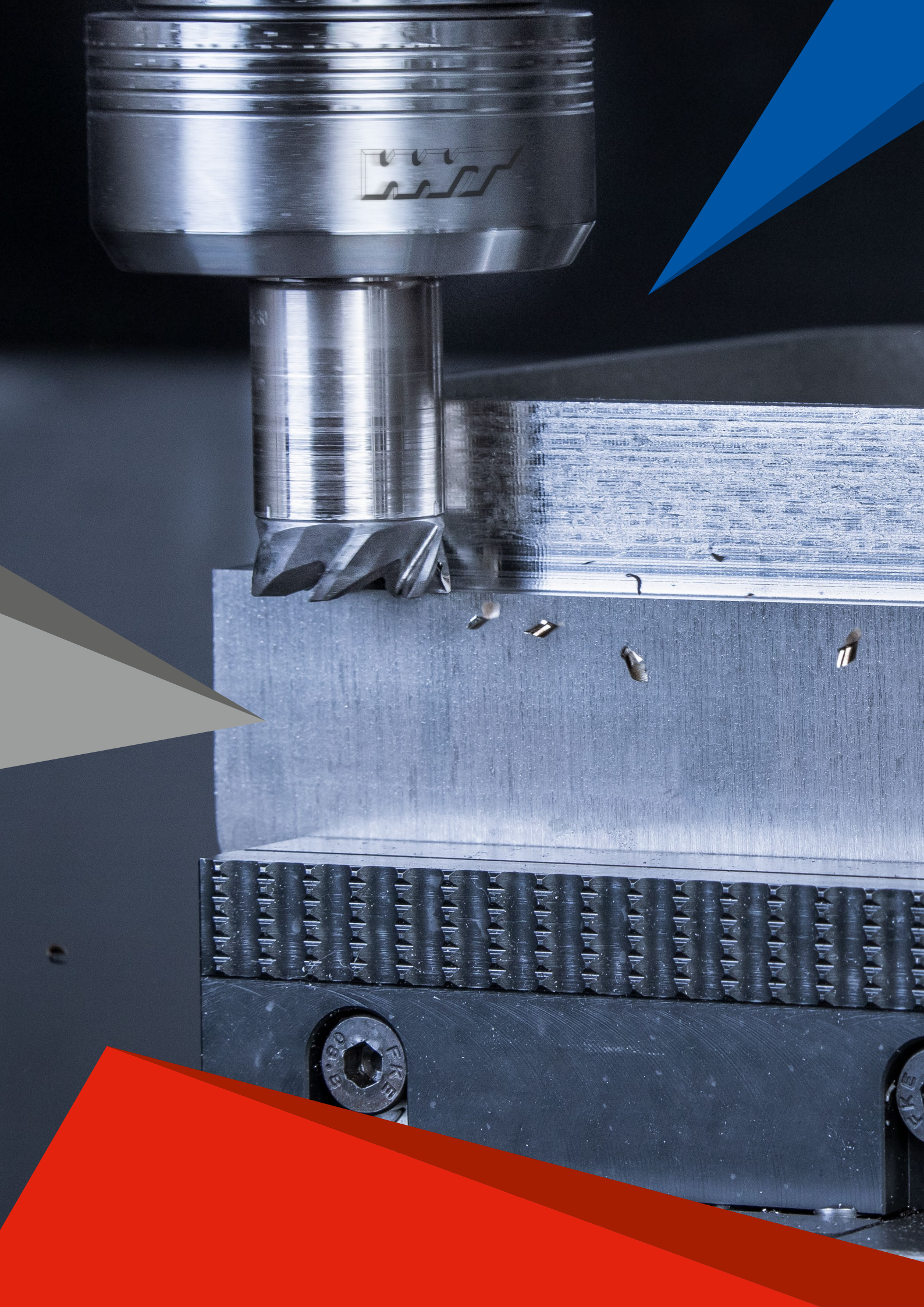
- The type A screw-in adapter must be used for MultiLock high-feed and torus cutters. These are clamped from the front using a threaded bush and clamping screw.

- The type B screw-in adapter has two parts and must be used for MultiLock radius milling and deburring cutters. These are tensioned from the rear using a clamping screw. The clamping screw is simultaneously used for screwing in the adapter.

Detailed assembly instructions are enclosed with the respective holders.

# Coatings

| | |
|---|---|
| CTC5240 | ▲ TiB2-based coating<br>▲ HIT 43 GPa ~ 4300 HV0.05<br>▲ Friction value against steel 0.3<br>▲ Maximum application temperature 1000 °C |
| CTPX225 | ▲ AlTiN-based coating<br>▲ HIT 35 GPa ~ 3500 HV0.05<br>▲ Friction value against steel 0.5<br>▲ Maximum application temperature 1000 °C |



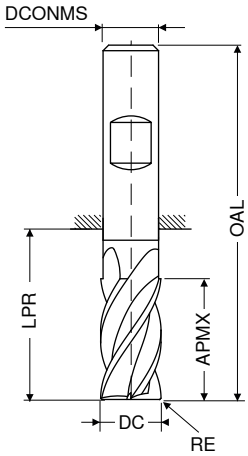
# CircularLine – End milling cutter

▲ Chip breaker 0.9 x DC

CCR UNI | $\lambda_s$=35° 36° $\gamma_s$= 9° | ZEFP | HPC

DPX72S

DRAGONSKIN



Factory standard

HB

NEW V1

| DC e8 mm | RE ±0,05 mm | APMX mm | LPR mm | OAL mm | DCONMS h6 mm | ZEFP | Article no. 53 593 ... £ | |
|---|---|---|---|---|---|---|---|---|
| 6.0 | 0.2 | 31 | 39 | 75 | 6 | 5 | 79.69 | 06402 |
| 6.0 | 1.0 | 31 | 39 | 75 | 6 | 5 | 79.69 | 06410 |
| 6.0 | 1.5 | 31 | 39 | 75 | 6 | 5 | 79.69 | 06415 |
| 8.0 | 0.2 | 41 | 49 | 85 | 8 | 5 | 91.86 | 08402 |
| 8.0 | 1.0 | 41 | 49 | 85 | 8 | 5 | 91.86 | 08410 |
| 8.0 | 1.5 | 41 | 49 | 85 | 8 | 5 | 91.86 | 08415 |
| 8.0 | 2.0 | 41 | 49 | 85 | 8 | 5 | 91.86 | 08420 |
| 10.0 | 0.2 | 51 | 60 | 100 | 10 | 5 | 126.83 | 10402 |
| 10.0 | 1.0 | 51 | 60 | 100 | 10 | 5 | 126.83 | 10410 |
| 10.0 | 1.5 | 51 | 60 | 100 | 10 | 5 | 126.83 | 10415 |
| 10.0 | 1.6 | 51 | 60 | 100 | 10 | 5 | 126.83 | 10416 |
| 10.0 | 2.0 | 51 | 60 | 100 | 10 | 5 | 126.83 | 10420 |
| 12.0 | 0.2 | 61 | 70 | 115 | 12 | 5 | 157.21 | 12402 |
| 12.0 | 1.0 | 61 | 70 | 115 | 12 | 5 | 157.21 | 12410 |
| 12.0 | 1.5 | 61 | 70 | 115 | 12 | 5 | 157.21 | 12415 |
| 12.0 | 1.6 | 61 | 70 | 115 | 12 | 5 | 157.21 | 12416 |
| 12.0 | 2.0 | 61 | 70 | 115 | 12 | 5 | 157.21 | 12420 |
| 12.0 | 3.0 | 61 | 70 | 115 | 12 | 5 | 157.21 | 12430 |
| 14.0 | 0.2 | 71 | 81 | 126 | 14 | 5 | 157.21 | 14402 |
| 14.0 | 1.0 | 71 | 81 | 126 | 14 | 5 | 322.92 | 14410 |
| 14.0 | 1.5 | 71 | 81 | 126 | 14 | 5 | 322.92 | 14415 |
| 14.0 | 1.6 | 71 | 81 | 126 | 14 | 5 | 322.92 | 14416 |
| 14.0 | 2.0 | 71 | 81 | 126 | 14 | 5 | 322.92 | 14420 |
| 14.0 | 3.0 | 71 | 81 | 126 | 14 | 5 | 322.92 | 14430 |
| 16.0 | 0.2 | 81 | 92 | 140 | 16 | 5 | 319.47 | 16402 |
| 16.0 | 1.0 | 81 | 92 | 140 | 16 | 5 | 319.47 | 16410 |
| 16.0 | 1.5 | 81 | 92 | 140 | 16 | 5 | 319.47 | 16415 |
| 16.0 | 1.6 | 81 | 92 | 140 | 16 | 5 | 319.47 | 16416 |
| 16.0 | 2.0 | 81 | 92 | 140 | 16 | 5 | 319.47 | 16420 |
| 16.0 | 3.0 | 81 | 92 | 140 | 16 | 5 | 319.47 | 16430 |
| 16.0 | 4.0 | 81 | 92 | 140 | 16 | 5 | 319.47 | 16440 |
| 18.0 | 0.2 | 91 | 102 | 150 | 18 | 5 | 365.35 | 18402 |
| 18.0 | 1.0 | 91 | 102 | 150 | 18 | 5 | 365.35 | 18410 |
| 18.0 | 1.5 | 91 | 102 | 150 | 18 | 5 | 365.35 | 18415 |
| 18.0 | 1.6 | 91 | 102 | 150 | 18 | 5 | 365.35 | 18416 |
| 18.0 | 2.0 | 91 | 102 | 150 | 18 | 5 | 365.35 | 18420 |
| 18.0 | 3.0 | 91 | 102 | 150 | 18 | 5 | 365.35 | 18430 |
| 18.0 | 4.0 | 91 | 102 | 150 | 18 | 5 | 365.35 | 18440 |
| 20.0 | 0.2 | 102 | 113 | 163 | 20 | 5 | 441.16 | 20402 |
| 20.0 | 1.0 | 102 | 113 | 163 | 20 | 5 | 441.16 | 20410 |
| 20.0 | 1.5 | 102 | 113 | 163 | 20 | 5 | 441.16 | 20415 |
| 20.0 | 1.6 | 102 | 113 | 163 | 20 | 5 | 441.16 | 20416 |
| 20.0 | 2.0 | 102 | 113 | 163 | 20 | 5 | 441.16 | 20420 |
| 20.0 | 3.0 | 102 | 113 | 163 | 20 | 5 | 441.16 | 20430 |
| 20.0 | 4.0 | 102 | 113 | 163 | 20 | 5 | 441.16 | 20440 |

| | |
|---|---|
| Steel | ● |
| Stainless steel | ○ |
| Cast iron | ● |
| Non ferrous metals | |
| Heat resistant alloys | ○ |
| Hardened materials | |

→ $v_c/f_z$ Page 93–95

# Material examples referring to the cutting data tables

| | Index | Material | Strength N/mm² / HB / HRC | Material number | Material designation | Material number | Material designation | Material number | Material designation |
|---|---|---|---|---|---|---|---|---|---|
| P | 1.1 | General construction steel | < 800 N/mm² | 1.0402 | EN3B | | | | |
| | 1.2 | Free cutting steel | < 800 N/mm² | 1.0711 | EN1A | | | | |
| | 1.3 | Hardened steel, non alloyed | < 800 N/mm² | 1.0401 | EN32C | | | | |
| | 1.4 | Alloyed hardened steel | < 1000 N/mm² | 1.7325 | 25 CD4 | | | | |
| | 1.5 | Tempering steel, unalloyed | < 850 N/mm² | 1.5752 | EN36 | 1.0535 | EN9 | | |
| | 1.6 | Tempering steel, unalloyed | < 1000 N/mm² | 1.6582 | EN24 | | | | |
| | 1.7 | Tempering steel, alloyed | < 800 N/mm² | 1.7225 | EN19 | | | | |
| | 1.8 | Tempering steel, alloyed | < 1300 N/mm² | 1.8515 | EN40B | | | | |
| | 1.9 | Steel castings | < 850 N/mm² | 0.9650 | G-X 260 Cr 27 | 1.6750 | GS-20 NiCrMo 3.7 | 1.6582 | GS-34 CrNiMo 6 |
| | 1.10 | Nitriding steel | < 1000 N/mm² | 1.8509 | EN41B | | | | |
| | 1.11 | Nitriding steel | < 1200 N/mm² | 1.1186 | EN8 | 1.1160 | EN14A | | |
| | 1.12 | Roller bearing steel | < 1200 N/mm² | 1.3505 | 534A99 | | | | |
| | 1.13 | Spring steel | < 1200 N/mm² | | EN45 | | EN47 | | EN43 |
| | 1.14 | High-speed steel | < 1300 N/mm² | 1.3343 | M2 | 1.3249 | M34 | | |
| | 1.15 | Cold working tool steel | < 1300 N/mm² | 1.2379 | D2 | 1.2311 | P20 | | |
| | 1.16 | Hot working tool steel | < 1300 N/mm² | 1.2344 | H13 | | | | |
| M | 2.1 | Cast steel and sulphured stainless steel | < 850 N/mm² | 1.4581 | 318 | | | | |
| | 2.2 | Stainless steel, ferritic | < 750 N/mm² | 1.4000 | 403 | | | | |
| | 2.3 | Stainless steel, martensitic | < 900 N/mm² | 1.4057 | EN57 | | | | |
| | 2.4 | Stainless steel, ferritic / martensitic | <1100 N/mm² | 1.4028 | EN56B | | | | |
| | 2.5 | Stainless steel, austenitic / ferritic | < 850 N/mm² | 1.4542 | 17-4PH | | | | |
| | 2.6 | Stainless steel, austenitic | < 750 N/mm² | 1.4305 | 303 | 1.4401 | 316 | 1.4301 | 304 |
| | 2.7 | Heat resistant steel | < 1100 N/mm² | 1.4876 | Incoloy 800 | | | | |
| K | 3.1 | Grey cast iron with lamellar graphite | 100–350 N/mm² | 0.6015 | Grade 150 | 0.6020 | Grade 220 | 0.6025 | Grade 260 |
| | 3.2 | Grey cast iron with lamellar graphite | 300–500 N/mm² | 0.6030 | Grade 300 | 0.6035 | Grade 350 | 0.6040 | Grade 400 |
| | 3.3 | Gray cast iron with spheroidal graphite | 300–500 N/mm² | 0.7040 | SG 400-12 | 0.7043 | SG 370-17 | 0.7050 | SG 500-7 |
| | 3.4 | Gray cast iron with spheroidal graphite | 500–900 N/mm² | 0.7060 | SG 600-3 | 0.7070 | SG 700-2 | 0.7080 | SG 800-2 |
| | 3.5 | White malleable cast iron | 270–450 N/mm² | 0.8035 | GTW-35 | 0.8045 | GTW-45 | | |
| | 3.6 | White malleable cast iron | 500–650 N/mm² | 0.8055 | GTW-55 | 0.8065 | GTW-65 | | |
| | 3.7 | Black malleable cast iron | 300–450 N/mm² | 0.8135 | GTS-35 | 0.8145 | GTS-45 | | |
| | 3.8 | Black malleable cast iron | 500–800 N/mm² | 0.8155 | GTS-55 | 0.8170 | GTS-70 | | |
| N | 4.1 | Aluminium (non alloyed, low alloyed) | < 350 N/mm² | 3.0255 | 1050 A | 3.0275 | 1070 A | 3.0285 | 1080 A (A8) |
| | 4.2 | Aluminium alloys < 0.5 % Si | < 500 N/mm² | 3.1325 | 2017 A (AU4G) | 3.4335 | 7005 (AZ5G) | 3.4365 | 7075 (AZ5GU) |
| | 4.3 | Aluminium alloy 0.5–10 % Si | < 400 N/mm² | 3.2315 | A- G S1 | 3.2373 | A-S9 G | 3.2151 | A-S 6 U4 |
| | 4.4 | Aluminium alloys 10–15 % Si | < 400 N/mm² | 3.2581 | A-S12 | 3.2583 | A-S12 U | | |
| | 4.5 | Aluminum alloys > 15 % Si | < 400 N/mm² | | A-S18 | A-S17 U4 | | | |
| | 4.6 | Copper (non alloyed, low alloyed) | < 350 N/mm² | 2.0040 | Cu-c1 | 2.0060 | Cu-a1 | 2.0090 | Cu-b1 |
| | 4.7 | Copper wrought alloys | < 700 N/mm² | 2.1247 | Cub2 (Berylium Copper) | 2.0855 | CuN2S (Nickel Copper) | 2.1310 | CU-Fe2P |
| | 4.8 | Special copper alloys | < 200 HB | 2.0916 | Cu-A5 | 2.1525 | Cu-S3 M | | Ampco 8 (Cu-A6Fe2) |
| | 4.9 | Special copper alloys | < 300 HB | 2.0978 | Cu-Al11 Fe5 Ni5) | | Ampco 18 (Cu- A10 Fe3) | | |
| | 4.10 | Special copper alloys | > 300 HB | 2.1247 | Cu Be2 | | Ampco M4 | | |
| | 4.11 | Short-chipping brass, bronze, red bronze | < 600 N/mm² | 2.0331 | Cu Zn36 Pb1,5 | 2.0380 | Cu Zn39 Pb2 (Ms 56) | 2.0410 | Cu Zn44 Pb2 |
| | 4.12 | Long-chipping brass | < 600 N/mm² | 2.0335 | Cu Zn 36 (Ms63) | 2.1293 | Cu Cr1 Zr | | |
| | 4.13 | Thermoplastics | | PE | PVC | PS | Polystyrene | | Plexiglas |
| | 4.14 | Duroplastics | | PF | Bakelite | | Pertinax | | |
| | 4.15 | Fibre-reinforced plastics | | | Carbon Fibre | | Fibreglass | | Aramid Fibre (Kevlar) |
| | 4.16 | Magnesium and magnesium alloys | < 850 N/mm² | 3.5812 | Mg A7 Z1 | 3.5662 | Mg A9 | 3.5105 | Mg Tr3 Z2 Zn 1 |
| | 4.17 | Graphite | | | R8500X | | R8650 | | Technograph 15 |
| | 4.18 | Tungsten and tungsten alloys | | | W-Ni Fe (Densimet) | | W- Ni Cu (Inermet) | | Denal |
| | 4.19 | Molybdenum and molybdenum alloys | | | TZM | | MHQ | | Mo W |
| S | 5.1 | Pure nickel | | 2.4066 | Ni99 (Nickel 200) | 2.4068 | Lc Ni99 (Nickel 201) | | |
| | 5.2 | Nickel alloys | | 1.3912 | Fe-Ni36 (Invar) | 1.3917 | Fe -Ni42 (N42) | 1.3922 | Fe-Ni48 (N48) |
| | 5.3 | Nickel alloys | < 850 N/mm² | 2.4375 | Ni Cu30 Al (Monel K500) | 2.4360 | Ni Cu30Fe (Monel 400) | 2.4668 | |
| | 5.4 | Nickel molybdenum alloys | | 2.4600 | Ni Mo30Cr2 (Hastelloy B4) | 2.4617 | Ni Mo28 (Hastelloy B2) | 2.4819 | Ni Mo16Cr16 Hastell. C276 |
| | 5.5 | Nickel-chromium alloys | < 1300 N/mm² | 2.4951 | Ni Cr20TiAl (Nimonic 80A) | 2.4858 | Ni Cr21Mo (Inconel 825) | 2.4856 | Ni Cr22Mo9Nb Inconel 625 |
| | 5.6 | Cobalt Chrome Alloys | < 1300 N/mm² | 2.4964 | Co Cr20 W15 Ni10 | | Co Cr20 Ni16 Mo7 | | Co Cr28 Mo 6 |
| | 5.7 | Heat resistant alloys | < 1300 N/mm² | 1.4718 | Z45 C S 9-3 | 1.4747 | Z80 CSN 20-02 | 1.4845 | Z12 CN 25-20 |
| | 5.8 | Nickel-cobalt-chromium alloys | < 1400 N/mm² | 2.4851 | Ni Cr23Fe (Inconel 601) | 2.4668 | Ni Cr19NbMo (Inconel 718) | 2.4602 | Ni Cr21Mo14 Hastelloy C22 |
| | 5.9 | Pure titanium | < 900 N/mm² | 3.7025 | T35 (Titanium Grade 1) | 3.7034 | T40 (Titanium Grade 2) | 3.7064 | T60 (Titanium Grade 4) |
| | 5.10 | Titanium alloys | < 700 N/mm² | | T-A6-Nb7 (367) | | T-A5-Sn2-Mo4-Cr4 (Ti17) | | T-A3-V2,5 (Gr18) |
| | 5.11 | Titanium alloys | < 1200 N/mm² | 3.7165 | T-A6-V4 (Ta6V) | | T-A4-3V-Mo2-Fe2 (SP700) | | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
| H | 6.1 | Tempered steel | < 45 HRC | | | | | | |
| | 6.2 | | 46–55 HRC | | | | | | |
| | 6.3 | | 56–60 HRC | | | | | | |
| | 6.4 | | 61–65 HRC | | | | | | |
| | 6.5 | | 65–70 HRC | | | | | | |

# Cutting data – CircularLine – End Mills – CCR-UNI, extra long

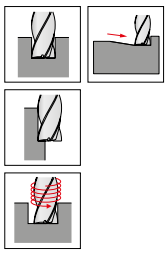
| Index | extra long $v_c$ m/min | max. angle of engagement | Ø DC = 6,0 mm $a_e$ 0,05 x DC $f_z$ mm | $a_e$ 0,1 x DC $f_z$ mm | $h_m$ | Ø DC = 8,0 mm $a_e$ 0,05 x DC $f_z$ mm | $a_e$ 0,1 x DC $f_z$ mm | $h_m$ | Ø DC = 10,0 mm $a_e$ 0,05 x DC $f_z$ mm | $a_e$ 0,1 x DC $f_z$ mm | $h_m$ | Ø DC = 12,0 mm $a_e$ 0,05 x DC $f_z$ mm | $a_e$ 0,1 x DC $f_z$ mm | $h_m$ | Ø DC = 14,0 mm $a_e$ 0,05 x DC $f_z$ mm | $a_e$ 0,1 x DC $f_z$ mm | $h_m$ | Ø DC = 16,0 mm $a_e$ 0,05 x DC $f_z$ mm | $a_e$ 0,1 x DC $f_z$ mm | $h_m$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.1 | 230 | 50° | 0,07 | 0,05 | 0,015 | 0,08 | 0,06 | 0,018 | 0,10 | 0,07 | 0,022 | 0,12 | 0,09 | 0,027 | 0,13 | 0,09 | 0,030 | 0,14 | 0,10 | 0,032 |
| 1.2 | 230 | 50° | 0,07 | 0,05 | 0,015 | 0,08 | 0,06 | 0,018 | 0,10 | 0,07 | 0,022 | 0,12 | 0,09 | 0,027 | 0,13 | 0,09 | 0,030 | 0,14 | 0,10 | 0,032 |
| 1.3 | 220 | 50° | 0,07 | 0,05 | 0,015 | 0,08 | 0,06 | 0,018 | 0,10 | 0,07 | 0,022 | 0,12 | 0,09 | 0,027 | 0,13 | 0,09 | 0,030 | 0,14 | 0,10 | 0,032 |
| 1.4 | 220 | 50° | 0,07 | 0,05 | 0,015 | 0,08 | 0,06 | 0,018 | 0,10 | 0,07 | 0,022 | 0,12 | 0,09 | 0,027 | 0,13 | 0,09 | 0,030 | 0,14 | 0,10 | 0,032 |
| 1.5 | 220 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.6 | 210 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.7 | 220 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.8 | 210 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.9 | 210 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.10 | 190 | 50° | 6,00 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.11 | 190 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.12 | 190 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.13 | 190 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.14 | | | | | | | | | | | | | | | | | | | | |
| 1.15 | 180 | 45° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 1.16 | 180 | 45° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 2.1 | 140 | 45° | 0,04 | 0,03 | 0,009 | 0,05 | 0,03 | 0,011 | 0,06 | 0,04 | 0,014 | 0,08 | 0,06 | 0,018 | 0,09 | 0,06 | 0,020 | 0,09 | 0,07 | 0,021 |
| 2.2 | 130 | 45° | 0,04 | 0,03 | 0,009 | 0,05 | 0,03 | 0,011 | 0,06 | 0,04 | 0,014 | 0,08 | 0,06 | 0,018 | 0,09 | 0,06 | 0,020 | 0,09 | 0,07 | 0,021 |
| 2.3 | 110 | 45° | 0,04 | 0,03 | 0,009 | 0,05 | 0,03 | 0,011 | 0,06 | 0,04 | 0,014 | 0,08 | 0,06 | 0,018 | 0,09 | 0,06 | 0,020 | 0,09 | 0,07 | 0,021 |
| 2.4 | 110 | 45° | 0,04 | 0,03 | 0,009 | 0,05 | 0,03 | 0,011 | 0,06 | 0,04 | 0,014 | 0,08 | 0,06 | 0,018 | 0,09 | 0,06 | 0,020 | 0,09 | 0,07 | 0,021 |
| 2.5 | 90 | 45° | 0,04 | 0,03 | 0,009 | 0,05 | 0,03 | 0,011 | 0,06 | 0,04 | 0,014 | 0,08 | 0,06 | 0,018 | 0,09 | 0,06 | 0,020 | 0,09 | 0,07 | 0,021 |
| 2.6 | 90 | 45° | 0,04 | 0,03 | 0,009 | 0,05 | 0,03 | 0,011 | 0,06 | 0,04 | 0,014 | 0,08 | 0,06 | 0,018 | 0,09 | 0,06 | 0,020 | 0,09 | 0,07 | 0,021 |
| 2.7 | | | | | | | | | | | | | | | | | | | | |
| 3.1 | 230 | 50° | 0,07 | 0,05 | 0,015 | 0,08 | 0,06 | 0,018 | 0,10 | 0,07 | 0,022 | 0,12 | 0,09 | 0,027 | 0,13 | 0,09 | 0,030 | 0,14 | 0,10 | 0,032 |
| 3.2 | 230 | 50° | 0,07 | 0,05 | 0,015 | 0,08 | 0,06 | 0,018 | 0,10 | 0,07 | 0,022 | 0,12 | 0,09 | 0,027 | 0,13 | 0,09 | 0,030 | 0,14 | 0,10 | 0,032 |
| 3.3 | 230 | 50° | 0,07 | 0,05 | 0,015 | 0,08 | 0,06 | 0,018 | 0,10 | 0,07 | 0,022 | 0,12 | 0,09 | 0,027 | 0,13 | 0,09 | 0,030 | 0,14 | 0,10 | 0,032 |
| 3.4 | 210 | 50° | 0,07 | 0,05 | 0,015 | 0,08 | 0,06 | 0,018 | 0,10 | 0,07 | 0,022 | 0,12 | 0,09 | 0,027 | 0,13 | 0,09 | 0,030 | 0,14 | 0,10 | 0,032 |
| 3.5 | 210 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 3.6 | 190 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 3.7 | 190 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 3.8 | 170 | 50° | 0,05 | 0,04 | 0,012 | 0,07 | 0,05 | 0,016 | 0,09 | 0,06 | 0,020 | 0,11 | 0,08 | 0,025 | 0,13 | 0,08 | 0,028 | 0,13 | 0,09 | 0,030 |
| 4.1 | | | | | | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | | | | | | | | |
| 4.6 | | | | | | | | | | | | | | | | | | | | |
| 4.7 | | | | | | | | | | | | | | | | | | | | |
| 4.8 | | | | | | | | | | | | | | | | | | | | |
| 4.9 | | | | | | | | | | | | | | | | | | | | |
| 4.10 | | | | | | | | | | | | | | | | | | | | |
| 4.11 | | | | | | | | | | | | | | | | | | | | |
| 4.12 | | | | | | | | | | | | | | | | | | | | |
| 4.13 | | | | | | | | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | | | | | | | | |
| 5.1 | 80 | 40° | 0,02 | 0,02 | 0,005 | 0,03 | 0,02 | 0,006 | 0,04 | 0,03 | 0,008 | 0,04 | 0,03 | 0,010 | 0,05 | 0,04 | 0,012 | 0,06 | 0,04 | 0,013 |
| 5.2 | 60 | 40° | 0,02 | 0,02 | 0,005 | 0,03 | 0,02 | 0,006 | 0,04 | 0,03 | 0,008 | 0,04 | 0,03 | 0,010 | 0,05 | 0,04 | 0,012 | 0,06 | 0,04 | 0,013 |
| 5.3 | 60 | 40° | 0,02 | 0,02 | 0,005 | 0,03 | 0,02 | 0,006 | 0,04 | 0,03 | 0,008 | 0,04 | 0,03 | 0,010 | 0,05 | 0,04 | 0,012 | 0,06 | 0,04 | 0,013 |
| 5.4 | | | | | | | | | | | | | | | | | | | | |
| 5.5 | | | | | | | | | | | | | | | | | | | | |
| 5.6 | | | | | | | | | | | | | | | | | | | | |
| 5.7 | | | | | | | | | | | | | | | | | | | | |
| 5.8 | | | | | | | | | | | | | | | | | | | | |
| 5.9 | 100 | 40° | 0,03 | 0,02 | 0,007 | 0,04 | 0,03 | 0,008 | 0,04 | 0,03 | 0,010 | 0,05 | 0,04 | 0,012 | 0,07 | 0,04 | 0,015 | 0,08 | 0,05 | 0,017 |
| 5.10 | 90 | 40° | 0,03 | 0,02 | 0,007 | 0,04 | 0,03 | 0,008 | 0,04 | 0,03 | 0,010 | 0,05 | 0,04 | 0,012 | 0,07 | 0,04 | 0,015 | 0,08 | 0,05 | 0,017 |
| 5.11 | 80 | 40° | 0,02 | 0,02 | 0,005 | 0,03 | 0,02 | 0,006 | 0,04 | 0,03 | 0,008 | 0,04 | 0,03 | 0,010 | 0,05 | 0,04 | 0,012 | 0,06 | 0,04 | 0,013 |
| 6.1 | | | | | | | | | | | | | | | | | | | | |
| 6.2 | | | | | | | | | | | | | | | | | | | | |
| 6.3 | | | | | | | | | | | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | | | | | | | | |

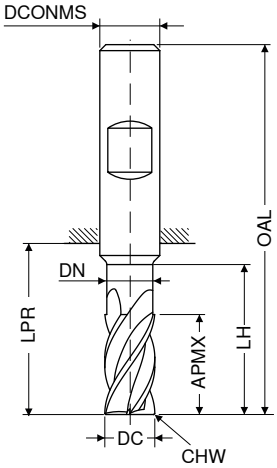
Depth of cut corresponds to the flute length

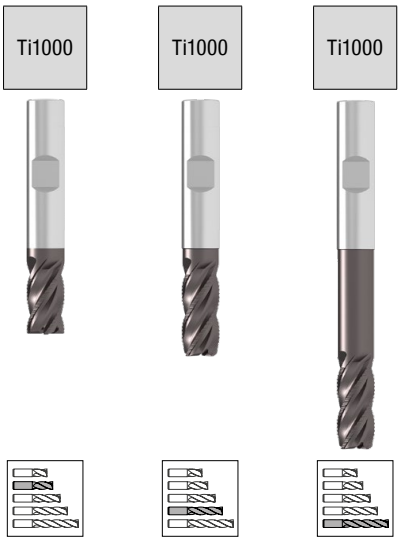
| Index | Ø DC = 18,0 mm | | | Ø DC = 20,0 mm | | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|
| | $a_e$ 0,05 x DC | $a_e$ 0,1 x DC | $h_m$ | $a_e$ 0,05 x DC | $a_e$ 0,1 x DC | $h_m$ | Emulsion | Compressed air | MMS |
| | $f_z$ mm | | | $f_z$ mm | | | | | |
| 1.1 | 0,16 | 0,11 | 0,035 | 0,17 | 0,12 | 0,037 | ○ | ● | ○ |
| 1.2 | 0,16 | 0,11 | 0,035 | 0,17 | 0,12 | 0,037 | ○ | ● | ○ |
| 1.3 | 0,16 | 0,11 | 0,035 | 0,17 | 0,12 | 0,037 | ○ | ● | ○ |
| 1.4 | 0,16 | 0,11 | 0,035 | 0,17 | 0,12 | 0,037 | ○ | ● | ○ |
| 1.5 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.6 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.7 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.8 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.9 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.10 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.11 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.12 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.13 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.14 | | | | | | | | | |
| 1.15 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 1.16 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 2.1 | 0,12 | 0,08 | 0,026 | 0,13 | 0,09 | 0,03 | ● | | |
| 2.2 | 0,12 | 0,08 | 0,026 | 0,13 | 0,09 | 0,03 | ● | | |
| 2.3 | 0,12 | 0,08 | 0,026 | 0,13 | 0,09 | 0,03 | ● | | |
| 2.4 | 0,12 | 0,08 | 0,026 | 0,13 | 0,09 | 0,03 | ● | | |
| 2.5 | 0,12 | 0,08 | 0,026 | 0,13 | 0,09 | 0,03 | ● | | |
| 2.6 | 0,12 | 0,08 | 0,026 | 0,13 | 0,09 | 0,03 | ● | | |
| 2.7 | | | | | | | | | |
| 3.1 | 0,16 | 0,11 | 0,035 | 0,17 | 0,12 | 0,037 | ○ | ● | ○ |
| 3.2 | 0,16 | 0,11 | 0,035 | 0,17 | 0,12 | 0,037 | ○ | ● | ○ |
| 3.3 | 0,16 | 0,11 | 0,035 | 0,17 | 0,12 | 0,037 | ○ | ● | ○ |
| 3.4 | 0,16 | 0,11 | 0,035 | 0,17 | 0,12 | 0,037 | ○ | ● | ○ |
| 3.5 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 3.6 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 3.7 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 3.8 | 0,14 | 0,10 | 0,031 | 0,14 | 0,10 | 0,032 | ○ | ● | ○ |
| 4.1 | | | | | | | | | |
| 4.2 | | | | | | | | | |
| 4.3 | | | | | | | | | |
| 4.4 | | | | | | | | | |
| 4.5 | | | | | | | | | |
| 4.6 | | | | | | | | | |
| 4.7 | | | | | | | | | |
| 4.8 | | | | | | | | | |
| 4.9 | | | | | | | | | |
| 4.10 | | | | | | | | | |
| 4.11 | | | | | | | | | |
| 4.12 | | | | | | | | | |
| 4.13 | | | | | | | | | |
| 4.14 | | | | | | | | | |
| 4.15 | | | | | | | | | |
| 4.16 | | | | | | | | | |
| 4.17 | | | | | | | | | |
| 4.18 | | | | | | | | | |
| 4.19 | | | | | | | | | |
| 5.1 | 0,07 | 0,05 | 0,016 | 0,08 | 0,06 | 0,018 | ● | | |
| 5.2 | 0,07 | 0,05 | 0,016 | 0,08 | 0,06 | 0,018 | ● | | |
| 5.3 | 0,07 | 0,05 | 0,016 | 0,08 | 0,06 | 0,018 | ● | | |
| 5.4 | | | | | | | | | |
| 5.5 | | | | | | | | | |
| 5.6 | | | | | | | | | |
| 5.7 | | | | | | | | | |
| 5.8 | | | | | | | | | |
| 5.9 | 0,09 | 0,07 | 0,021 | 0,11 | 0,08 | 0,024 | ● | | |
| 5.10 | 0,09 | 0,07 | 0,021 | 0,11 | 0,08 | 0,024 | ● | | |
| 5.11 | 0,07 | 0,05 | 0,016 | 0,08 | 0,06 | 0,018 | ● | | |
| 6.1 | | | | | | | | | |
| 6.2 | | | | | | | | | |
| 6.3 | | | | | | | | | |
| 6.4 | | | | | | | | | |
| 6.5 | | | | | | | | | |

# Rough milling cutter

NR | $\lambda_s$=35° $\lambda_s$=38° $\gamma_s$=10° | ZEFP | HPC






| DC h10 mm | APMX mm | DN mm | LH mm | LPR mm | OAL mm | DCONMS h6 mm | CHW mm | ZEFP | NEW V3 Article no. 54 000 ... £ | | NEW V3 Article no. 54 015 ... £ | | NEW V3 Article no. 54 015 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 5 | | | 14 | 50 | 6 | 0.15 | 4 | 20.28 | 03100 | | | | |
| 3 | 8 | 2.8 | 12 | 21 | 57 | 6 | 0.15 | 4 | | | 20.32 | 03200 | | |
| 3 | 8 | 2.8 | 15 | 34 | 70 | 6 | 0.15 | 4 | | | | | 29.62 | 03400 |
| 4 | 8 | | | 18 | 54 | 6 | 0.15 | 4 | 20.26 | 04100 | | | | |
| 4 | 11 | 3.8 | 15 | 21 | 57 | 6 | 0.15 | 4 | | | 20.32 | 04200 | | |
| 4 | 11 | 3.8 | 20 | 34 | 70 | 6 | 0.15 | 4 | | | | | 29.62 | 04400 |
| 5 | 9 | | | 18 | 54 | 6 | 0.15 | 4 | 20.26 | 05100 | | | | |
| 5 | 13 | 4.8 | 17 | 21 | 57 | 6 | 0.15 | 4 | | | 20.32 | 05200 | | |
| 5 | 13 | 4.8 | 25 | 34 | 70 | 6 | 0.15 | 4 | | | | | 33.88 | 05400 |
| 6 | 10 | | | 18 | 54 | 6 | 0.15 | 4 | 20.26 | 06100 | | | | |
| 6 | 13 | 5.8 | 21 | 21 | 57 | 6 | 0.15 | 4 | | | 24.38 | 06200 | | |
| 6 | 13 | 5.8 | 30 | 34 | 70 | 6 | 0.15 | 4 | | | | | 38.36 | 06400 |
| 8 | 12 | | | 22 | 58 | 8 | 0.25 | 4 | 27.98 | 08100 | | | | |
| 8 | 19 | 7.7 | 27 | 27 | 63 | 8 | 0.25 | 4 | | | 30.42 | 08200 | | |
| 8 | 19 | 7.7 | 40 | 44 | 80 | 8 | 0.25 | 4 | | | | | 46.90 | 08400 |
| 10 | 14 | | | 26 | 66 | 10 | 0.25 | 4 | 34.80 | 10100 | | | | |
| 10 | 22 | 9.7 | 32 | 32 | 72 | 10 | 0.25 | 4 | | | 38.78 | 10200 | | |
| 10 | 22 | 9.7 | 50 | 54 | 94 | 10 | 0.25 | 4 | | | | | 64.06 | 10400 |
| 12 | 16 | | | 28 | 73 | 12 | 0.35 | 4 | 51.50 | 12100 | | | | |
| 12 | 26 | 11.6 | 38 | 38 | 83 | 12 | 0.35 | 4 | | | 62.92 | 12200 | | |
| 12 | 26 | 11.6 | 64 | 65 | 109 | 12 | 0.35 | 4 | | | | | 76.56 | 12400 |
| 16 | 22 | | | 34 | 82 | 16 | 0.35 | 4 | 88.34 | 16100 | | | | |
| 16 | 32 | 15.5 | 44 | 44 | 92 | 16 | 0.35 | 4 | | | 94.72 | 16200 | | |
| 16 | 32 | 15.5 | 80 | 84 | 132 | 16 | 0.35 | 4 | | | | | 144.36 | 16400 |
| 20 | 26 | | | 42 | 92 | 20 | 0.35 | 4 | 129.10 | 20100 | | | | |
| 20 | 38 | 19.5 | 54 | 54 | 104 | 20 | 0.35 | 4 | | | 140.42 | 20200 | | |
| 20 | 38 | 19.5 | 100 | 104 | 154 | 20 | 0.35 | 4 | | | | | 188.60 | 20400 |

| | | | |
|---|---|---|---|
| Steel | ● | ● | ● |
| Stainless steel | ● | ● | ● |
| Cast iron | ○ | ○ | ○ |
| Non ferrous metals | ○ | ○ | ○ |
| Heat resistant alloys | ● | ● | ● |
| Hardened materials | | | |

→ $v_c/f_z$ Page 97–99

# Material examples referring to the cutting data tables

| | Index | Material | Strength N/mm² / HB / HRC | Material number | Material designation | Material number | Material designation | Material number | Material designation |
|---|---|---|---|---|---|---|---|---|---|
| P | 1.1 | General construction steel | < 800 N/mm² | 1.0402 | EN3B | | | | |
| | 1.2 | Free cutting steel | < 800 N/mm² | 1.0711 | EN1A | | | | |
| | 1.3 | Hardened steel, non alloyed | < 800 N/mm² | 1.0401 | EN32C | | | | |
| | 1.4 | Alloyed hardened steel | < 1000 N/mm² | 1.7325 | 25 CD4 | | | | |
| | 1.5 | Tempering steel, unalloyed | < 850 N/mm² | 1.5752 | EN36 | 1.0535 | EN9 | | |
| | 1.6 | Tempering steel, unalloyed | < 1000 N/mm² | 1.6582 | EN24 | | | | |
| | 1.7 | Tempering steel, alloyed | < 800 N/mm² | 1.7225 | EN19 | | | | |
| | 1.8 | Tempering steel, alloyed | < 1300 N/mm² | 1.8515 | EN40B | | | | |
| | 1.9 | Steel castings | < 850 N/mm² | 0.9650 | G-X 260 Cr 27 | 1.6750 | GS-20 NiCrMo 3.7 | 1.6582 | GS-34 CrNiMo 6 |
| | 1.10 | Nitriding steel | < 1000 N/mm² | 1.8509 | EN41B | | | | |
| | 1.11 | Nitriding steel | < 1200 N/mm² | 1.1186 | EN8 | 1.1160 | EN14A | | |
| | 1.12 | Roller bearing steel | < 1200 N/mm² | 1.3505 | 534A99 | | | | |
| | 1.13 | Spring steel | < 1200 N/mm² | | EN45 | | EN47 | | EN43 |
| | 1.14 | High-speed steel | < 1300 N/mm² | 1.3343 | M2 | 1.3249 | M34 | | |
| | 1.15 | Cold working tool steel | < 1300 N/mm² | 1.2379 | D2 | 1.2311 | P20 | | |
| | 1.16 | Hot working tool steel | < 1300 N/mm² | 1.2344 | H13 | | | | |
| M | 2.1 | Cast steel and sulphured stainless steel | < 850 N/mm² | 1.4581 | 318 | | | | |
| | 2.2 | Stainless steel, ferritic | < 750 N/mm² | 1.4000 | 403 | | | | |
| | 2.3 | Stainless steel, martensitic | < 900 N/mm² | 1.4057 | EN57 | | | | |
| | 2.4 | Stainless steel, ferritic / martensitic | <1100 N/mm² | 1.4028 | EN56B | | | | |
| | 2.5 | Stainless steel, austenitic / ferritic | < 850 N/mm² | 1.4542 | 17-4PH | | | | |
| | 2.6 | Stainless steel, austenitic | < 750 N/mm² | 1.4305 | 303 | 1.4401 | 316 | 1.4301 | 304 |
| | 2.7 | Heat resistant steel | < 1100 N/mm² | 1.4876 | Incoloy 800 | | | | |
| K | 3.1 | Grey cast iron with lamellar graphite | 100–350 N/mm² | 0.6015 | Grade 150 | 0.6020 | Grade 220 | 0.6025 | Grade 260 |
| | 3.2 | Grey cast iron with lamellar graphite | 300–500 N/mm² | 0.6030 | Grade 300 | 0.6035 | Grade 350 | 0.6040 | Grade 400 |
| | 3.3 | Gray cast iron with spheroidal graphite | 300–500 N/mm² | 0.7040 | SG 400-12 | 0.7043 | SG 370-17 | 0.7050 | SG 500-7 |
| | 3.4 | Gray cast iron with spheroidal graphite | 500–900 N/mm² | 0.7060 | SG 600-3 | 0.7070 | SG 700-2 | 0.7080 | SG 800-2 |
| | 3.5 | White malleable cast iron | 270–450 N/mm² | 0.8035 | GTW-35 | 0.8045 | GTW-45 | | |
| | 3.6 | White malleable cast iron | 500–650 N/mm² | 0.8055 | GTW-55 | 0.8065 | GTW-65 | | |
| | 3.7 | Black malleable cast iron | 300–450 N/mm² | 0.8135 | GTS-35 | 0.8145 | GTS-45 | | |
| | 3.8 | Black malleable cast iron | 500–800 N/mm² | 0.8155 | GTS-55 | 0.8170 | GTS-70 | | |
| N | 4.1 | Aluminium (non alloyed, low alloyed) | < 350 N/mm² | 3.0255 | 1050 A | 3.0275 | 1070 A | 3.0285 | 1080 A (A8) |
| | 4.2 | Aluminium alloys < 0.5 % Si | < 500 N/mm² | 3.1325 | 2017 A (AU4G) | 3.4335 | 7005 (AZ5G) | 3.4365 | 7075 (AZ5GU) |
| | 4.3 | Aluminium alloy 0.5–10 % Si | < 400 N/mm² | 3.2315 | A- G S1 | 3.2373 | A-S9 G | 3.2151 | A-S 6 U4 |
| | 4.4 | Aluminium alloys 10–15 % Si | < 400 N/mm² | 3.2581 | A-S12 | 3.2583 | A-S12 U | | |
| | 4.5 | Aluminum alloys > 15 % Si | < 400 N/mm² | | A-S18 | A-S17 U4 | | | |
| | 4.6 | Copper (non alloyed, low alloyed) | < 350 N/mm² | 2.0040 | Cu-c1 | 2.0060 | Cu-a1 | 2.0090 | Cu-b1 |
| | 4.7 | Copper wrought alloys | < 700 N/mm² | 2.1247 | Cub2 (Berylium Copper) | 2.0855 | CuN2S (Nickel Copper) | 2.1310 | CU-Fe2P |
| | 4.8 | Special copper alloys | < 200 HB | 2.0916 | Cu-A5 | 2.1525 | Cu-S3 M | | Ampco 8 (Cu-A6Fe2) |
| | 4.9 | Special copper alloys | < 300 HB | 2.0978 | Cu-Al11 Fe5 Ni5) | | Ampco 18 (Cu- A10 Fe3) | | |
| | 4.10 | Special copper alloys | > 300 HB | 2.1247 | Cu Be2 | | Ampco M4 | | |
| | 4.11 | Short-chipping brass, bronze, red bronze | < 600 N/mm² | 2.0331 | Cu Zn36 Pb1,5 | 2.0380 | Cu Zn39 Pb2 (Ms 56) | 2.0410 | Cu Zn44 Pb2 |
| | 4.12 | Long-chipping brass | < 600 N/mm² | 2.0335 | Cu Zn 36 (Ms63) | 2.1293 | Cu Cr1 Zr | | |
| | 4.13 | Thermoplastics | | PE | PVC | PS | Polystyrene | | Plexiglas |
| | 4.14 | Duroplastics | | PF | Bakelite | | Pertinax | | |
| | 4.15 | Fibre-reinforced plastics | | | Carbon Fibre | | Fibreglass | | Aramid Fibre (Kevlar) |
| | 4.16 | Magnesium and magnesium alloys | < 850 N/mm² | 3.5812 | Mg A7 Z1 | 3.5662 | Mg A9 | 3.5105 | Mg Tr3 Z2 Zn 1 |
| | 4.17 | Graphite | | | R8500X | | R8650 | | Technograph 15 |
| | 4.18 | Tungsten and tungsten alloys | | | W-Ni Fe (Densimet) | | W- Ni Cu (Inermet) | | Denal |
| | 4.19 | Molybdenum and molybdenum alloys | | | TZM | | MHQ | | Mo W |
| S | 5.1 | Pure nickel | | 2.4066 | Ni99 (Nickel 200) | 2.4068 | Lc Ni99 (Nickel 201) | | |
| | 5.2 | Nickel alloys | | 1.3912 | Fe-Ni36 (Invar) | 1.3917 | Fe -Ni42 (N42) | 1.3922 | Fe-Ni48 (N48) |
| | 5.3 | Nickel alloys | < 850 N/mm² | 2.4375 | Ni Cu30 Al (Monel K500) | 2.4360 | Ni Cu30Fe (Monel 400) | 2.4668 | |
| | 5.4 | Nickel molybdenum alloys | | 2.4600 | Ni Mo30Cr2 (Hastelloy B4) | 2.4617 | Ni Mo28 (Hastelloy B2) | 2.4819 | Ni Mo16Cr16 Hastell. C276 |
| | 5.5 | Nickel-chromium alloys | < 1300 N/mm² | 2.4951 | Ni Cr20TiAl (Nimonic 80A) | 2.4858 | Ni Cr21Mo (Inconel 825) | 2.4856 | Ni Cr22Mo9Nb Inconel 625 |
| | 5.6 | Cobalt Chrome Alloys | < 1300 N/mm² | 2.4964 | Co Cr20 W15 Ni10 | | Co Cr20 Ni16 Mo7 | | Co Cr28 Mo 6 |
| | 5.7 | Heat resistant alloys | < 1300 N/mm² | 1.4718 | Z45 C S 9-3 | 1.4747 | Z80 CSN 20-02 | 1.4845 | Z12 CN 25-20 |
| | 5.8 | Nickel-cobalt-chromium alloys | < 1400 N/mm² | 2.4851 | Ni Cr23Fe (Inconel 601) | 2.4668 | Ni Cr19NbMo (Inconel 718) | 2.4602 | Ni Cr21Mo14 Hastelloy C22 |
| | 5.9 | Pure titanium | < 900 N/mm² | 3.7025 | T35 (Titanium Grade 1) | 3.7034 | T40 (Titanium Grade 2) | 3.7064 | T60 (Titanium Grade 4) |
| | 5.10 | Titanium alloys | < 700 N/mm² | | T-A6-Nb7 (367) | | T-A5-Sn2-Mo4-Cr4 (Ti17) | | T-A3-V2,5 (Gr18) |
| | 5.11 | Titanium alloys | < 1200 N/mm² | 3.7165 | T-A6-V4 (Ta6V) | | T-A4-3V-Mo2-Fe2 (SP700) | | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
| H | 6.1 | Tempered steel | < 45 HRC | | | | | | |
| | 6.2 | | 46–55 HRC | | | | | | |
| | 6.3 | | 56–60 HRC | | | | | | |
| | 6.4 | | 61–65 HRC | | | | | | |
| | 6.5 | | 65–70 HRC | | | | | | |

# Cutting data standard values – End mills – 54 000 ... / 54 015 ...

| | short | Long/extra-long | short/long | extra long | Ø DC = 3,0 mm | | | Ø DC = 4,0 mm | | | Ø DC = 5,0 mm | | | Ø DC = 6,0 mm | | | Ø DC = 8,0 mm | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC |
| **Index** | $v_c$ m/min | | $a_{p\,max.}$ x DC | $a_{p\,max.}$ x DC | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | |
| **1.1** | **200** | **160** | 1,0 | 0,5 | 0,024 | 0,019 | 0,014 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.2** | **210** | **170** | 1,0 | 0,5 | 0,024 | 0,019 | 0,014 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.3** | **180** | **140** | 1,0 | 0,5 | 0,017 | 0,013 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.4** | **160** | **130** | 1,0 | 0,5 | 0,012 | 0,009 | 0,007 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.5** | **170** | **135** | 1,0 | 0,5 | 0,017 | 0,013 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.6** | **160** | **130** | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.7** | **160** | **130** | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.8** | **140** | **115** | 1,0 | 0,5 | 0,012 | 0,009 | 0,007 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.9** | **140** | **110** | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.10** | **160** | **130** | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.11** | **140** | **115** | 1,0 | 0,5 | 0,012 | 0,009 | 0,007 | 0,022 | 0,017 | 0,012 | 0,032 | 0,024 | 0,016 | 0,04 | 0,03 | 0,02 | 0,05 | 0,04 | 0,02 |
| **1.12** | **160** | **130** | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.13** | | | | | | | | | | | | | | | | | | | |
| **1.14** | | | | | | | | | | | | | | | | | | | |
| **1.15** | **150** | **120** | 1,0 | 0,5 | 0,017 | 0,013 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **1.16** | **130** | **100** | 1,0 | 0,5 | 0,017 | 0,013 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **2.1** | **110** | **90** | 1,0 | 0,5 | 0,012 | 0,009 | 0,007 | 0,018 | 0,014 | 0,01 | 0,027 | 0,02 | 0,014 | 0,036 | 0,027 | 0,018 | 0,04 | 0,03 | 0,02 |
| **2.2** | **100** | **80** | 1,0 | 0,5 | 0,012 | 0,009 | 0,007 | 0,018 | 0,014 | 0,01 | 0,027 | 0,02 | 0,014 | 0,036 | 0,027 | 0,018 | 0,04 | 0,03 | 0,02 |
| **2.3** | **85** | **70** | 1,0 | 0,5 | 0,012 | 0,009 | 0,007 | 0,018 | 0,014 | 0,01 | 0,027 | 0,02 | 0,014 | 0,036 | 0,027 | 0,018 | 0,04 | 0,03 | 0,02 |
| **2.4** | **85** | **70** | 1,0 | 0,5 | 0,012 | 0,009 | 0,007 | 0,018 | 0,014 | 0,01 | 0,027 | 0,02 | 0,014 | 0,036 | 0,027 | 0,018 | 0,04 | 0,03 | 0,02 |
| **2.5** | **100** | **80** | 1,0 | 0,5 | 0,012 | 0,009 | 0,007 | 0,018 | 0,014 | 0,01 | 0,027 | 0,02 | 0,014 | 0,036 | 0,027 | 0,018 | 0,04 | 0,03 | 0,02 |
| **2.6** | **100** | **80** | 1,0 | 0,5 | 0,012 | 0,009 | 0,007 | 0,018 | 0,014 | 0,01 | 0,027 | 0,02 | 0,014 | 0,036 | 0,027 | 0,018 | 0,04 | 0,03 | 0,02 |
| **2.7** | **25** | **20** | 1,0 | 0,5 | 0,009 | 0,007 | 0,005 | 0,015 | 0,012 | 0,009 | 0,022 | 0,016 | 0,011 | 0,029 | 0,022 | 0,014 | 0,03 | 0,03 | 0,02 |
| **3.1** | 170 | 135 | 1,0 | 0,5 | 0,024 | 0,019 | 0,014 | 0,036 | 0,028 | 0,02 | 0,051 | 0,038 | 0,026 | 0,061 | 0,045 | 0,03 | 0,07 | 0,05 | 0,04 |
| **3.2** | 140 | 110 | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,036 | 0,028 | 0,02 | 0,051 | 0,038 | 0,026 | 0,061 | 0,045 | 0,03 | 0,07 | 0,05 | 0,04 |
| **3.3** | 160 | 130 | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **3.4** | 130 | 100 | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **3.5** | 150 | 120 | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **3.6** | 140 | 110 | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **3.7** | 150 | 120 | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **3.8** | 135 | 110 | 1,0 | 0,5 | 0,018 | 0,014 | 0,01 | 0,029 | 0,022 | 0,016 | 0,043 | 0,032 | 0,022 | 0,053 | 0,039 | 0,026 | 0,06 | 0,05 | 0,03 |
| **4.1** | | | | | | | | | | | | | | | | | | | |
| **4.2** | | | | | | | | | | | | | | | | | | | |
| **4.3** | | | | | | | | | | | | | | | | | | | |
| **4.4** | | | | | | | | | | | | | | | | | | | |
| **4.5** | | | | | | | | | | | | | | | | | | | |
| **4.6** | 240 | 190 | 1,0 | 0,5 | 0,029 | 0,022 | 0,016 | 0,038 | 0,029 | 0,021 | 0,054 | 0,041 | 0,027 | 0,065 | 0,048 | 0,032 | 0,08 | 0,06 | 0,04 |
| **4.7** | 260 | 200 | 1,0 | 0,5 | 0,029 | 0,022 | 0,016 | 0,038 | 0,029 | 0,021 | 0,054 | 0,041 | 0,027 | 0,065 | 0,048 | 0,032 | 0,08 | 0,06 | 0,04 |
| **4.8** | 140 | 110 | 1,0 | 0,5 | 0,029 | 0,022 | 0,016 | 0,038 | 0,029 | 0,021 | 0,054 | 0,041 | 0,027 | 0,065 | 0,048 | 0,032 | 0,08 | 0,06 | 0,04 |
| **4.9** | 120 | 95 | 1,0 | 0,5 | 0,029 | 0,022 | 0,016 | 0,038 | 0,029 | 0,021 | 0,054 | 0,041 | 0,027 | 0,065 | 0,048 | 0,032 | 0,08 | 0,06 | 0,04 |
| **4.10** | 100 | 80 | 1,0 | 0,5 | 0,029 | 0,022 | 0,016 | 0,038 | 0,029 | 0,021 | 0,054 | 0,041 | 0,027 | 0,065 | 0,048 | 0,032 | 0,08 | 0,06 | 0,04 |
| **4.11** | 300 | 240 | 1,0 | 0,5 | 0,029 | 0,022 | 0,016 | 0,038 | 0,029 | 0,021 | 0,054 | 0,041 | 0,027 | 0,065 | 0,048 | 0,032 | 0,08 | 0,06 | 0,04 |
| **4.12** | 260 | 200 | 1,0 | 0,5 | 0,029 | 0,022 | 0,016 | 0,038 | 0,029 | 0,021 | 0,054 | 0,041 | 0,027 | 0,065 | 0,048 | 0,032 | 0,08 | 0,06 | 0,04 |
| **4.13** | | | | | | | | | | | | | | | | | | | |
| **4.14** | | | | | | | | | | | | | | | | | | | |
| **4.15** | | | | | | | | | | | | | | | | | | | |
| **4.16** | | | | | | | | | | | | | | | | | | | |
| **4.17** | | | | | | | | | | | | | | | | | | | |
| **4.18** | | | | | | | | | | | | | | | | | | | |
| **4.19** | | | | | | | | | | | | | | | | | | | |
| **5.1** | | | | | | | | | | | | | | | | | | | |
| **5.2** | | | | | | | | | | | | | | | | | | | |
| **5.3** | **25** | **20** | 0,5 | 0,25 | 0,011 | 0,008 | 0,006 | 0,015 | 0,012 | 0,009 | 0,022 | 0,016 | 0,011 | 0,029 | 0,022 | 0,014 | 0,03 | 0,03 | 0,02 |
| **5.4** | **25** | **20** | 0,5 | 0,25 | 0,011 | 0,008 | 0,006 | 0,015 | 0,012 | 0,009 | 0,022 | 0,016 | 0,011 | 0,029 | 0,022 | 0,014 | 0,03 | 0,03 | 0,02 |
| **5.5** | **25** | **20** | 0,5 | 0,25 | 0,011 | 0,008 | 0,006 | 0,015 | 0,012 | 0,009 | 0,022 | 0,016 | 0,011 | 0,029 | 0,022 | 0,014 | 0,03 | 0,03 | 0,02 |
| **5.6** | **25** | **20** | 0,5 | 0,25 | 0,011 | 0,008 | 0,006 | 0,015 | 0,012 | 0,009 | 0,022 | 0,016 | 0,011 | 0,029 | 0,022 | 0,014 | 0,03 | 0,03 | 0,02 |
| **5.7** | **25** | **20** | 0,5 | 0,25 | 0,011 | 0,008 | 0,006 | 0,015 | 0,012 | 0,009 | 0,022 | 0,016 | 0,011 | 0,029 | 0,022 | 0,014 | 0,03 | 0,03 | 0,02 |
| **5.8** | **25** | **20** | 0,5 | 0,25 | 0,011 | 0,008 | 0,006 | 0,015 | 0,012 | 0,009 | 0,022 | 0,016 | 0,011 | 0,029 | 0,022 | 0,014 | 0,03 | 0,03 | 0,02 |
| **5.9** | **100** | **70** | 0,5 | 0,25 | 0,021 | 0,017 | 0,012 | 0,031 | 0,024 | 0,017 | 0,046 | 0,034 | 0,023 | 0,056 | 0,042 | 0,028 | 0,07 | 0,05 | 0,03 |
| **5.10** | **80** | **60** | 0,5 | 0,25 | 0,015 | 0,012 | 0,009 | 0,023 | 0,018 | 0,013 | 0,034 | 0,025 | 0,017 | 0,043 | 0,032 | 0,021 | 0,05 | 0,04 | 0,03 |
| **5.11** | **60** | **50** | 0,5 | 0,25 | 0,012 | 0,009 | 0,007 | 0,018 | 0,014 | 0,01 | 0,027 | 0,02 | 0,014 | 0,036 | 0,027 | 0,018 | 0,04 | 0,03 | 0,02 |
| **6.1** | | | | | | | | | | | | | | | | | | | |
| **6.2** | | | | | | | | | | | | | | | | | | | |
| **6.3** | | | | | | | | | | | | | | | | | | | |
| **6.4** | | | | | | | | | | | | | | | | | | | |
| **6.5** | | | | | | | | | | | | | | | | | | | |

"Extra-long" version: when profiling with an $a_e$ of 0.1–0.4 x DC an $a_p$ of 1.0 x DC should be used.

Plunging angle for ramping and helical milling: 3°

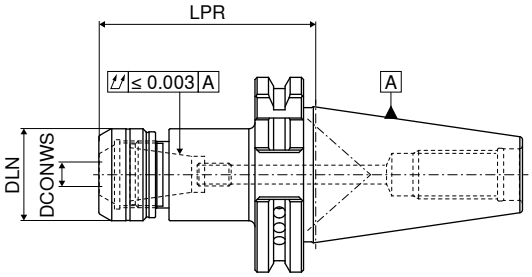
| Index | Ø DC = 10,0 mm | | | Ø DC = 12,0 mm | | | Ø DC = 16,0 mm | | | Ø DC = 20,0 mm | | | ● 1st choice | | ○ suitable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | $a_e$ 0,1–0,2 x DC | $a_e$ 0,3–0,4 x DC | $a_e$ 0,6–1,0 x DC | Emulsion | Compressed air | MMS |
| | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | $f_z$ mm | | | | | |
| 1.1 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.2 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.3 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.4 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.5 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.6 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.7 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.8 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.9 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | | | |
| 1.10 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.11 | 0,06 | 0,05 | 0,03 | 0,08 | 0,06 | 0,04 | 0,08 | 0,06 | 0,05 | 0,1 | 0,08 | 0,06 | ● | ○ | ○ |
| 1.12 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.13 | | | | | | | | | | | | | ● | ○ | ○ |
| 1.14 | | | | | | | | | | | | | | | |
| 1.15 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 1.16 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ○ | ○ |
| 2.1 | 0,05 | 0,04 | 0,03 | 0,07 | 0,05 | 0,03 | 0,07 | 0,05 | 0,04 | 0,09 | 0,08 | 0,06 | ● | | |
| 2.2 | 0,05 | 0,04 | 0,03 | 0,07 | 0,05 | 0,03 | 0,07 | 0,05 | 0,04 | 0,09 | 0,08 | 0,06 | ● | | |
| 2.3 | 0,05 | 0,04 | 0,03 | 0,07 | 0,05 | 0,03 | 0,07 | 0,05 | 0,04 | 0,09 | 0,08 | 0,06 | ● | | |
| 2.4 | 0,05 | 0,04 | 0,03 | 0,07 | 0,05 | 0,03 | 0,07 | 0,05 | 0,04 | 0,09 | 0,08 | 0,06 | ● | | |
| 2.5 | 0,05 | 0,04 | 0,03 | 0,07 | 0,05 | 0,03 | 0,07 | 0,05 | 0,04 | 0,09 | 0,08 | 0,06 | ● | | |
| 2.6 | 0,05 | 0,04 | 0,03 | 0,07 | 0,05 | 0,03 | 0,07 | 0,05 | 0,04 | 0,09 | 0,08 | 0,06 | ● | | |
| 2.7 | 0,04 | 0,03 | 0,02 | 0,05 | 0,04 | 0,03 | 0,06 | 0,04 | 0,03 | 0,07 | 0,05 | 0,04 | ● | | |
| 3.1 | 0,09 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,14 | 0,1 | 0,08 | 0,15 | 0,12 | 0,1 | ● | ● | ● |
| 3.2 | 0,09 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,14 | 0,1 | 0,08 | 0,15 | 0,12 | 0,1 | ● | ● | ● |
| 3.3 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ● | ● |
| 3.4 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ● | ● |
| 3.5 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ● | ● |
| 3.6 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ● | ● |
| 3.7 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ● | ● |
| 3.8 | 0,08 | 0,06 | 0,04 | 0,1 | 0,07 | 0,05 | 0,11 | 0,08 | 0,06 | 0,13 | 0,1 | 0,08 | ● | ● | ● |
| 4.1 | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | |
| 4.4 | | | | | | | | | | | | | | | |
| 4.5 | | | | | | | | | | | | | | | |
| 4.6 | 0,1 | 0,07 | 0,05 | 0,14 | 0,11 | 0,07 | 0,16 | 0,12 | 0,09 | 0,19 | 0,15 | 0,12 | ● | | |
| 4.7 | 0,1 | 0,07 | 0,05 | 0,14 | 0,11 | 0,07 | 0,16 | 0,12 | 0,09 | 0,19 | 0,15 | 0,12 | ● | | |
| 4.8 | 0,1 | 0,07 | 0,05 | 0,14 | 0,11 | 0,07 | 0,16 | 0,12 | 0,09 | 0,19 | 0,15 | 0,12 | ● | | |
| 4.9 | 0,1 | 0,07 | 0,05 | 0,14 | 0,11 | 0,07 | 0,16 | 0,12 | 0,09 | 0,19 | 0,15 | 0,12 | ● | | |
| 4.10 | 0,1 | 0,07 | 0,05 | 0,14 | 0,11 | 0,07 | 0,16 | 0,12 | 0,09 | 0,19 | 0,15 | 0,12 | ● | | |
| 4.11 | 0,1 | 0,07 | 0,05 | 0,14 | 0,11 | 0,07 | 0,16 | 0,12 | 0,09 | 0,16 | 0,13 | 0,1 | ● | | |
| 4.12 | 0,1 | 0,07 | 0,05 | 0,14 | 0,11 | 0,07 | 0,16 | 0,12 | 0,09 | 0,16 | 0,13 | 0,1 | ● | | |
| 4.13 | | | | | | | | | | | | | | | |
| 4.14 | | | | | | | | | | | | | | | |
| 4.15 | | | | | | | | | | | | | | | |
| 4.16 | | | | | | | | | | | | | | | |
| 4.17 | | | | | | | | | | | | | | | |
| 4.18 | | | | | | | | | | | | | | | |
| 4.19 | | | | | | | | | | | | | | | |
| 5.1 | | | | | | | | | | | | | | | |
| 5.2 | | | | | | | | | | | | | | | |
| 5.3 | 0,04 | 0,03 | 0,02 | 0,06 | 0,04 | 0,03 | 0,06 | 0,05 | 0,04 | 0,07 | 0,06 | 0,05 | ● | | |
| 5.4 | 0,04 | 0,03 | 0,02 | 0,06 | 0,04 | 0,03 | 0,06 | 0,05 | 0,04 | 0,07 | 0,06 | 0,05 | ● | | |
| 5.5 | 0,04 | 0,03 | 0,02 | 0,06 | 0,02 | 0,03 | 0,06 | 0,05 | 0,04 | 0,07 | 0,06 | 0,05 | ● | | |
| 5.6 | 0,04 | 0,03 | 0,02 | 0,06 | 0,04 | 0,03 | 0,06 | 0,05 | 0,04 | 0,07 | 0,06 | 0,05 | ● | | |
| 5.7 | 0,04 | 0,03 | 0,02 | 0,06 | 0,04 | 0,03 | 0,06 | 0,05 | 0,04 | 0,07 | 0,06 | 0,05 | ● | | |
| 5.8 | 0,04 | 0,03 | 0,02 | 0,06 | 0,04 | 0,03 | 0,06 | 0,05 | 0,04 | 0,07 | 0,06 | 0,05 | ● | | |
| 5.9 | 0,09 | 0,06 | 0,04 | 0,12 | 0,09 | 0,06 | 0,13 | 0,1 | 0,08 | 0,15 | 0,12 | 0,09 | ● | | |
| 5.10 | 0,07 | 0,05 | 0,03 | 0,09 | 0,07 | 0,05 | 0,1 | 0,08 | 0,06 | 0,12 | 0,1 | 0,08 | ● | | |
| 5.11 | 0,05 | 0,04 | 0,03 | 0,08 | 0,06 | 0,04 | 0,09 | 0,07 | 0,05 | 0,11 | 0,09 | 0,07 | ● | | |
| 6.1 | | | | | | | | | | | | | | | |
| 6.2 | | | | | | | | | | | | | | | |
| 6.3 | | | | | | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | | | |
| 6.5 | | | | | | | | | | | | | | | |

# ER Precision Collet chuck – PCC

- For standard or sealing disc lock nuts
- Maximum clamping range covered according to ISO tolerance field H10
- Roll key required for clamping
- $p_{max}$ = 100 bar

**Scope of supply:**
Base body with lock nut and backstop screw

PCC



AD/B
G 2,5 $n_{max}$ 25000

| Adapter | DCONWS mm | LPR mm | DLN mm | for collet | Torque moment / Clamping force Nm | NEW Y8 Article no. 82 700 ... £ | |
|---|---|---|---|---|---|---|---|
| SK 40 | 1 - 10 | 70 | 30 | 426E (ER16) | 40 / 2-70 | 170.54 | 11079 |
| SK 40 | 1 - 10 | 100 | 30 | 426E (ER16) | 40 / 2-70 | 245.67 | 21079 |
| SK 40 | 2 - 16 | 70 | 40 | 430E (ER25) | 80 / 10-160 | 170.54 | 11679 |
| SK 40 | 2 - 16 | 100 | 40 | 430E (ER25) | 80 / 10-160 | 245.67 | 21679 |
| SK 40 | 2 - 20 | 70 | 50 | 470E (ER32) | 125 / 15-250 | 170.54 | 12079 |
| SK 40 | 2 - 20 | 100 | 50 | 470E (ER32) | 125 / 15-250 | 245.67 | 22079 |
| SK 50 | 2 - 16 | 70 | 40 | 430E (ER25) | 80 / 10-160 | 321.29 | 11678 |
| SK 50 | 2 - 16 | 100 | 40 | 430E (ER25) | 80 / 10-160 | 399.00 | 21678 |
| SK 50 | 2 - 20 | 70 | 50 | 470E (ER32) | 125 / 15-250 | 321.29 | 12078 |
| SK 50 | 2 - 20 | 100 | 50 | 470E (ER32) | 125 / 15-250 | 399.00 | 22078 |

Dimension LPR is 4.5 mm longer for ER16 and ER32 and 5.0 mm longer for ER25 when using lock nut IK

| Spare parts for collet | | Y8 Backstop screw PCC 2 Article no. 82 950 ... £ | | | Y8 Backstop screw PCC 1 Article no. 82 950 ... £ | | Y8 Lock nut IK Article no. 82 950 ... £ | | Y8 Lock nut Article no. 82 950 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|
| 426E (ER16) | | | | M8X3,0 | 6.10 | 00100 | 64.83 | 11000 | 61.09 | 01000 |
| 430E (ER25) | M18x1,5 | 8.30 | 00200 | M8x8 | 6.10 | 00300 | 64.83 | 11600 | 61.09 | 01600 |
| 470E (ER32) | M18x1,5 | 8.30 | 00200 | M8x8 | 6.10 | 00300 | 64.83 | 12000 | 61.09 | 02000 |

*Accessories*

ER collet
→ Chapter 16 in main catalogue

Sealing ring
→ 103

Roll key
→ Chapter 16 in main catalogue

Roll key head
→ Chapter 16 in main catalogue

Pull stud
→ Chapter 16 in main catalogue

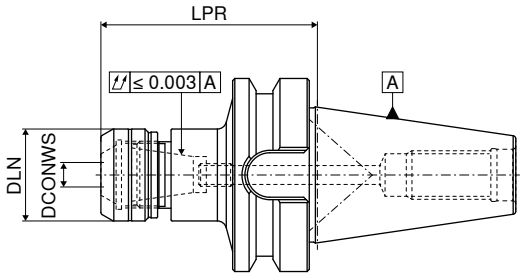
Others
→ Chapter 16 in main catalogue

# ER Precision Collet chuck – PCC

- For standard or sealing disc lock nuts
- Maximum clamping range covered according to ISO tolerance field H10
- Roll key required for clamping
- $p_{max}$ = 100 bar

**Scope of supply:**
Base body with lock nut and backstop screw

PCC



AD/B
G 2,5 $n_{max}$ 25000
NEW Y8

| Adapter | DCONWS mm | LPR mm | DLN mm | for collet | Torque moment / Clamping force Nm | Article no. 82 700 ... £ | |
|---|---|---|---|---|---|---|---|
| BT 40 | 1 - 10 | 70 | 30 | 426E (ER16) | 40 / 2-70 | 170.54 | 11069 |
| BT 40 | 1 - 10 | 100 | 30 | 426E (ER16) | 40 / 2-70 | 245.67 | 21069 |
| BT 40 | 2 - 16 | 70 | 40 | 430E (ER25) | 80 / 10-160 | 170.54 | 11669 |
| BT 40 | 2 - 16 | 100 | 40 | 430E (ER25) | 80 / 10-160 | 245.67 | 21669 |
| BT 40 | 2 - 20 | 70 | 50 | 470E (ER32) | 125 / 15-250 | 170.54 | 12069 |
| BT 40 | 2 - 20 | 100 | 50 | 470E (ER32) | 125 / 15-250 | 245.67 | 22069 |
| BT 50 | 2 - 16 | 80 | 40 | 430E (ER25) | 80 / 10-160 | 321.29 | 11668 |
| BT 50 | 2 - 16 | 100 | 40 | 430E (ER25) | 80 / 10-160 | 399.00 | 21668 |
| BT 50 | 2 - 20 | 80 | 50 | 470E (ER32) | 125 / 15-250 | 321.29 | 12068 |
| BT 50 | 2 - 20 | 100 | 50 | 470E (ER32) | 125 / 15-250 | 399.00 | 22068 |

Dimension LPR is 4.5 mm longer for ER16 and ER32 and 5.0 mm longer for ER25 when using lock nut IK

| Spare parts for collet | | Y8 Backstop screw PCC 2 Article no. 82 950 ... £ | | | Y8 Backstop screw PCC 1 Article no. 82 950 ... £ | | Y8 Lock nut IK Article no. 82 950 ... £ | | Y8 Lock nut Article no. 82 950 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|
| 426E (ER16) | | | | M8X3,0 | 6.10 | 00100 | 64.83 | 11000 | 61.09 | 01000 |
| 430E (ER25) | M18x1,5 | 8.30 | 00200 | M8x8 | 6.10 | 00300 | 64.83 | 11600 | 61.09 | 01600 |
| 470E (ER32) | M18x1,5 | 8.30 | 00200 | M8x8 | 6.10 | 00300 | 64.83 | 12000 | 61.09 | 02000 |

*Accessories*

ER collet
→ Chapter 16 in main catalogue

Sealing ring
→ 103

Roll key
→ Chapter 16 in main catalogue

Roll key head
→ Chapter 16 in main catalogue

Pull stud
→ Chapter 16 in main catalogue

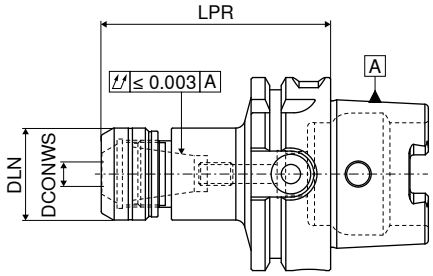
Others
→ Chapter 16 in main catalogue

# ER Precision Collet chuck – PCC

- For standard or sealing disc lock nuts
- Maximum clamping range covered according to ISO tolerance field H10
- Roll key required for clamping
- $p_{max}$ = 100 bar

**Scope of supply:**
Base body with lock nut and backstop screw

PCC



| Adapter | DCONWS | LPR | DLN | for collet | Torque moment / Clamping force | AD G 2,5 $n_{max}$ 25000 NEW Y8 Article no. 82 700 ... | |
|---|---|---|---|---|---|---|---|
| | mm | mm | mm | | Nm | £ | |
| **HSK-A 63** | 1 - 10 | 75 | 30 | 426E (ER16) | 40 / 2-70 | 222.68 | **11057** |
| **HSK-A 63** | 1 - 10 | 100 | 30 | 426E (ER16) | 40 / 2-70 | 233.89 | **21057** |
| **HSK-A 63** | 2 - 16 | 75 | 40 | 430E (ER25) | 80 / 10-160 | 222.68 | **11657** |
| **HSK-A 63** | 2 - 16 | 100 | 40 | 430E (ER25) | 80 / 10-160 | 233.89 | **21657** |
| **HSK-A 63** | 2 - 20 | 75 | 50 | 470E (ER32) | 125 / 15-250 | 222.68 | **12057** |
| **HSK-A 63** | 2 - 20 | 100 | 50 | 470E (ER32) | 125 / 15-250 | 233.89 | **22057** |
| **HSK-A 100** | 2 - 16 | 100 | 40 | 430E (ER25) | 80 / 10-160 | 387.41 | **21655** |
| **HSK-A 100** | 2 - 16 | 160 | 40 | 430E (ER25) | 80 / 10-160 | 519.27 | **41655** |
| **HSK-A 100** | 2 - 20 | 100 | 50 | 470E (ER32) | 125 / 15-250 | 387.41 | **22055** |
| **HSK-A 100** | 2 - 20 | 160 | 50 | 470E (ER32) | 125 / 15-250 | 519.27 | **42055** |

Dimension LPR is 4.5 mm longer for ER16 and ER32 and 5.0 mm longer for ER25 when using lock nut IK

| Spare parts | | Y8 Backstop screw PCC 2 | | | Y8 Backstop screw PCC 1 | | Y8 Lock nut IK | | Y8 Lock nut | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Article no. 82 950 ... | | | Article no. 82 950 ... | | Article no. 82 950 ... | | Article no. 82 950 ... | |
| **for collet** | | £ | | | £ | | £ | | £ | |
| 426E (ER16) | | | | M8X3,0 | 6.10 | **00100** | 64.83 | **11000** | 61.09 | **01000** |
| 430E (ER25) | M18x1,5 | 8.30 | **00200** | M8x8 | 6.10 | **00300** | 64.83 | **11600** | 61.09 | **01600** |
| 470E (ER32) | M18x1,5 | 8.30 | **00200** | M8x8 | 6.10 | **00300** | 64.83 | **12000** | 61.09 | **02000** |

*Accessories*

ER collet
→ Chapter 16 in main catalogue

Sealing ring
→ 103

Roll key
→ Chapter 16 in main catalogue

Roll key head
→ Chapter 16 in main catalogue

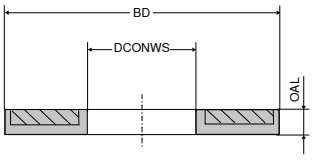
Pull stud
→ Chapter 16 in main catalogue

Others
→ Chapter 16 in main catalogue

# Sealing rings for precision collet chucks – PCC

- For sealing when using tools with internal cooling
- Sealing range: nominal diameter –0,1 mm / +0,4 mm
- Can be applied up to 100 bar

PCC



| DCONWS | BD = 13<br>OAL = 4<br>426E (ER16) | | BD = 21<br>OAL = 4<br>430E (ER25) | | BD = 27<br>OAL = 4<br>470E (ER32) | |
|---|---|---|---|---|---|---|
| | NEW Y8 | | NEW Y8 | | NEW Y8 | |
| | Article no. 82 630 ... | | Article no. 82 631 ... | | Article no. 82 632 ... | |
| mm | £ | | £ | | £ | |
| 3.0 | 32.19 | 03000 | 32.19 | 03000 | 32.19 | 03000 |
| 3.5 | 32.19 | 03500 | 32.19 | 03500 | 32.19 | 03500 |
| 4.0 | 32.19 | 04000 | 32.19 | 04000 | 32.19 | 04000 |
| 4.5 | 32.19 | 04500 | 32.19 | 04500 | 32.19 | 04500 |
| 5.0 | 32.19 | 05000 | 32.19 | 05000 | 32.19 | 05000 |
| 5.5 | 32.19 | 05500 | 32.19 | 05500 | 32.19 | 05500 |
| 6.0 | 32.19 | 06000 | 32.19 | 06000 | 32.19 | 06000 |
| 6.5 | 32.19 | 06500 | 32.19 | 06500 | 32.19 | 06500 |
| 7.0 | 32.19 | 07000 | 32.19 | 07000 | 32.19 | 07000 |
| 7.5 | 32.19 | 07500 | 32.19 | 07500 | 32.19 | 07500 |
| 8.0 | 32.19 | 08000 | 32.19 | 08000 | 32.19 | 08000 |
| 8.5 | 32.19 | 08500 | 32.19 | 08500 | 32.19 | 08500 |
| 9.0 | 32.19 | 09000 | 32.19 | 09000 | 32.19 | 09000 |
| 9.5 | 32.19 | 09500 | 32.19 | 09500 | 32.19 | 09500 |
| 10.0 | 32.19 | 10000 | 32.19 | 10000 | 32.19 | 10000 |
| 10.5 | | | 32.19 | 10500 | 32.19 | 10500 |
| 11.0 | | | 32.19 | 11000 | 32.19 | 11000 |
| 11.5 | | | 32.19 | 11500 | 32.19 | 11500 |
| 12.0 | | | 32.19 | 12000 | 32.19 | 12000 |
| 12.5 | | | 32.19 | 12500 | 32.19 | 12500 |
| 13.0 | | | 32.19 | 13000 | 32.19 | 13000 |
| 13.5 | | | 32.19 | 13500 | 32.19 | 13500 |
| 14.0 | | | 32.19 | 14000 | 32.19 | 14000 |
| 14.5 | | | 32.19 | 14500 | 32.19 | 14500 |
| 15.0 | | | 32.19 | 15000 | 32.19 | 15000 |
| 15.5 | | | 32.19 | 15500 | 32.19 | 15500 |
| 16.0 | | | 32.19 | 16000 | 32.19 | 16000 |
| 16.5 | | | | | 32.19 | 16500 |
| 17.0 | | | | | 32.19 | 17000 |
| 17.5 | | | | | 32.19 | 17500 |
| 18.0 | | | | | 32.19 | 18000 |
| 18.5 | | | | | 32.19 | 18500 |
| 19.0 | | | | | 32.19 | 19000 |
| 19.5 | | | | | 32.19 | 19500 |
| 20.0 | | | | | 32.19 | 20000 |

# Table of contents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| Clamping systems overview | 104 |
| Product programme | 105–112 |
| General top jaws overview | 113 |
| MNG Zero Point System Overview | 114–116 |


## WNT \ Performance

Premium quality tools for high performance.

The premium quality tools from the **WNT Performance** product line have been designed for specific applications and are distinguished by their outstanding performance. If you make high demands on the performance of your production and want to achieve the very best results, we recommend the Premium tools in this product line.

# Clamping systems overview

NCG
H5G -Z
H5G -Z-S
ESG 5

## Single clamping vice

- Force amplified systems NCG, H5G-Z and H5G-Z-S
- Fixed jaws as reference
- High repeatability

High precision and force amplification

ZSG 4

## Centric vice

- symmetrical clamping
- very good accessibility for 5-sided machining
- part datum always centered
- high repeatability

High process security with encapsulated system

MNG

## Clamping variants

- Zero point clamping system

Reduction in setup times

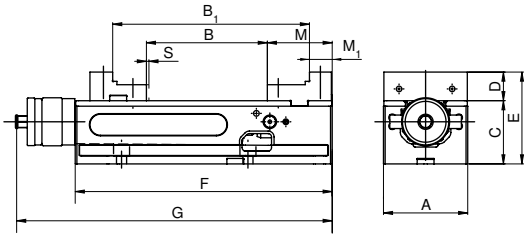
# NC-quick clamping vice with combi reversible jaw plus

▲ Through additional holes, top jaws with a height of 18 mm or 40 mm can be used.

**Scope of supply:**

NC-quick vice, including 4 clamping claws, 2 x combi reversible jaw plus (one side serrated, one side smooth), clamping levers including operating accessories, without clamping screws.

NCG

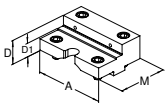


| A mm | B mm | $B_1$ mm | $C_{-0.02}$ mm | D mm | E mm | F mm | G mm | M mm | $M_1$ mm | S mm | Clamping force kN | kg | NEW Y4 Article no. 80 890 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **125** | 0 - 212 | 96 - 307 | 100 | 39 | 139 | 390 | 457 | 89 | 39 | 3 | 4 - 40 | 34 | 2,641.90 | **12500** |

Other dimensional drawings can be found in our current workpiece clamping catalogue 2019 on → **pages 10–11**.

# System jaws overview

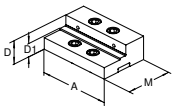
## Combi reversible jaw plus, fixed




- ▲ For the extension of the clamping range
- ▲ Jaws hardened
- ▲ includes fixing bolts
- ▲ price per piece

| Description | A | D | $D_1$ | M | price £ | NEW Article no. Y4 | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **125** | **39,8** | **22** | **88** | 314.29 | **80 890 35100** | ● | | | | | | | | | |

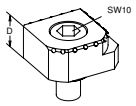
## Combi reversible jaw plus, movable




- ▲ For the extension of the clamping range
- ▲ Jaws hardened
- ▲ includes fixing bolts
- ▲ price per piece

| Description | A | D | $D_1$ | M | price £ | NEW Article no. Y4 | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **125** | **39,8** | **22** | **82** | 314.29 | **80 890 35200** | ● | | | | | | | | | |

## 6x indexable jaw, carbide, grip




- ▲ 1 = Smooth
- ▲ 2 = Carbide grip
- ▲ 3 = Carbide grip with 3 mm step
- ▲ 4 = Carbide grip with 8 mm step
- ▲ 5 = Round carbide grip with 8 mm step
- ▲ 6 = Round carbide grip
- ▲ Incl. fixing screws

| Description | A | D | $D_1$ | M | price £ | NEW Article no. Y4 | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **18** | | | 93.33 | **80 890 35300** | ● | ● | ● | | ● | | ● | | ● | |

The matching pendulum jaw and adapter plate with item numbers 80 890 338/80 890 337 can be found in the workpiece clamping catalogue 2019 on → **page 13**.

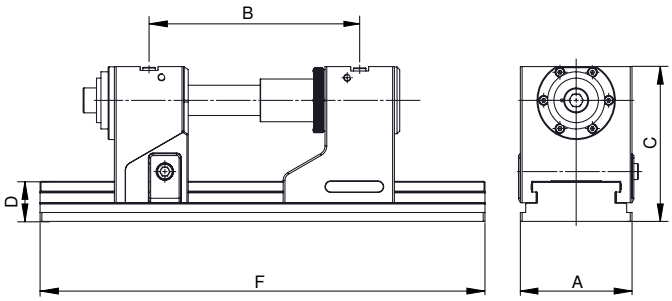
# 5-Axis vice with movable fixed jaw, 174 mm height

- Crank handle quick clamping
- Vice with quick span adjustment
- 100 % encapsulated
- Clamping on the machine table is possible with MNG/PNG, directly through the base body or with T-nuts using an alignment set

**Scope of supply:**

Incl. clamping key with hexagonal pin insert, without clamping claws and drawbar extension

**H5G -Z**



| A mm | B ±0,015 mm | C mm | D mm | F mm | SW mm | Clamping force kN | kg | NEW Y4 Article no. 80 907 ... £ | |
|---|---|---|---|---|---|---|---|---|---|
| 125 | 131 - 246 | 174 | 45 | 330 | 14 | 40 | 32.5 | 2,993.33 | 12800 |

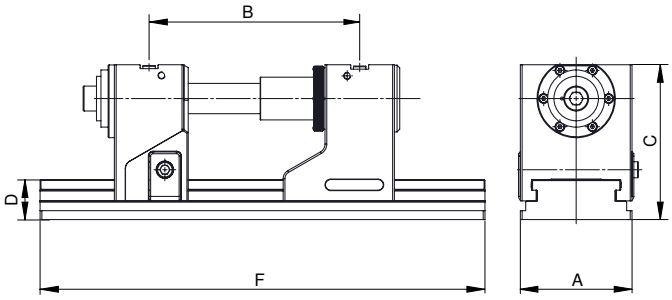
# 5-axis vice with movable fixed jaw, 125 mm height

- Crank handle quick clamping
- Vice with quick span adjustment
- 100 % encapsulated
- Clamping on the machine table is possible with MNG/PNG, directly through the base body or with T-nuts using an alignment set

**Scope of supply:**

Incl. clamping key with hexagonal pin insert, without clamping claws and drawbar extension

**H5G -Z-S**

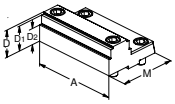


| A mm | B ±0,015 mm | C mm | D mm | F mm | SW mm | Clamping force kN | kg | NEW Y4 Article no. 80 907 ... £ | |
|---|---|---|---|---|---|---|---|---|---|
| 125 | 131 - 246 | 125 | 45 | 330 | 14 | 40 | 24.5 | 2,817.14 | 22500 |
| 125 | 131 - 352 | 125 | 45 | 430 | 14 | 40 | 28.5 | 2,864.76 | 22600 |
| 125 | 131 - 422 | 125 | 45 | 500 | 14 | 40 | 30.5 | 3,008.57 | 22700 |
| 125 | 131 - 552 | 125 | 45 | 630 | 14 | 40 | 35.5 | 3,276.19 | 22800 |

Other dimensional drawings can be found in our current workpiece clamping catalogue 2019 on → **page 22**.
For the 5-axis "vice with movable fixed jaw, 125 mm height – H5G-Z-S", please reduce dimension C by 49 mm.

# System jaws overview

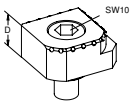
## Indexable jaw, grip 3 mm, 16 mm smooth step, on both sides




▲ Price per piece

| Description | A | D | $D_1$ | $D_2$ | M | price | Article no. | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | £ | NEW Y4 | | | | | | | | | | |
| | 125 | 40 | 37 | 24 | 82,5 | 333.33 | 80 898 35000 | | ● | | | | | | | | |

## 6x indexable jaw, carbide, grip



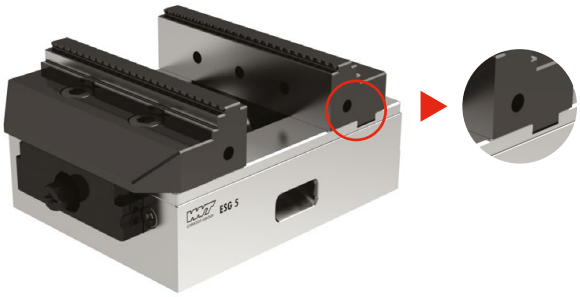

- ▲ 1 = Smooth
- ▲ 2 = Carbide grip
- ▲ 3 = Carbide grip with 3 mm step
- ▲ 4 = Carbide grip with 8mm step
- ▲ 5 = Round carbide grip with 8 mm step
- ▲ 6 = Round carbide grip
- ▲ Incl. fixing screws

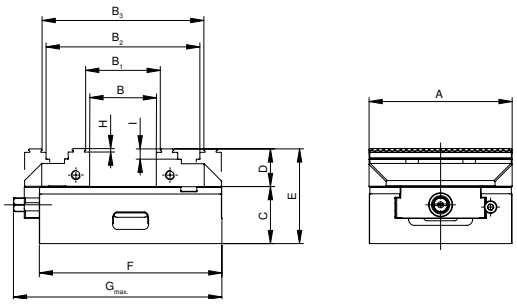
| Description | A | D | $D_1$ | $D_2$ | M | price | Article no. | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | £ | NEW Y4 | | | | | | | | | | |
| | | 18 | | | | 93.33 | 80 890 35300 | ● | ● | ● | | ● | | ● | | ● | |

The matching pendulum jaw and adapter plate with item numbers 80 898 525/80 898 425 can be found in the workpiece clamping catalogue 2019 on → **page 23**.

# Single vice ESG 5, jaw width 125 mm

- New version of the sealed centric vice ZSG 4 as single vice, fixed jaw with transverse slot
- Identical dimensions and function as the ZSG 4
- Available in base body length F = 160 mm

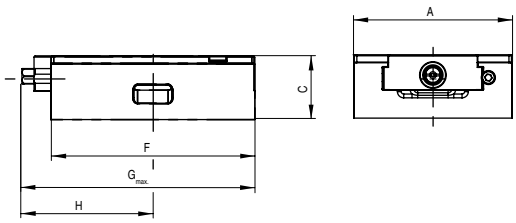





| A mm | B mm | $B_1$ mm | $B_2$ mm | $B_3$ mm | C mm | D mm | E mm | F mm | $G_{max.}$ mm |
|---|---|---|---|---|---|---|---|---|---|
| **125** | 0 - 57 | 8 - 64 | 77 - 134 | 85 - 141 | 50 | 33 | 83 | 160 | 183 |

# Single vice without system jaws

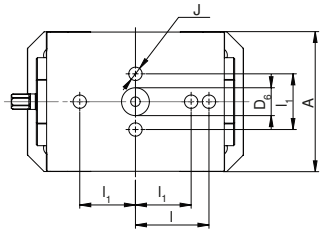
- without system jaws
- ball bearing mounted spindle
- ± 0.01 mm repeatability



| A mm | $C_{\pm 0,01}$ mm | F mm | $G_{max.}$ mm | H mm | Clamping force kN | kg | NEW Y4 Article no. 80 857 ... £ | |
|---|---|---|---|---|---|---|---|---|
| **125** | 50 | 160 | 182.7 | 102,7 | 35 | 6.4 | 665.71 | **12500** |

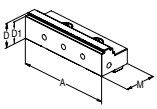
# ESG 5 underside dimensions

## Base width 125 mm and length 160 mm




| A mm | $D_{6\ H6}$ mm | $l_{\pm 0,015}$ mm | $l_{1\ \pm 0,015}$ mm | $J_{H7}$ mm |
|---|---|---|---|---|
| **125** | 25 | 66 | 50 | 12 |

# System jaws overview

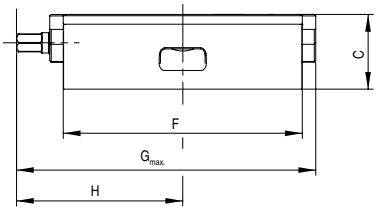
| Description | A | D | $D_1$ | M | price | Article no. | Type association | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | NEW Y4 | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
| **Indexable jaw, grip 3 mm, fixed** | | | | | | | | | | | | | | | | |
|  ▲ Price per piece | **125** | **33** | **30** | **66** | £ 188.57 | **80 857 30000** | | | | ● | | | | | | |

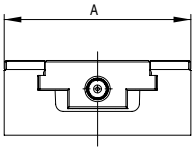
The matching indexable jaw, grip 3 mm, movable with item number 80 878 510 can be found in the workpiece clamping catalogue 2019 on → **page 44**.

# Sealed Centric Vice

- without system jaws
- ball bearing mounted spindle
- ±0.01 mm repeatability

ZSG 4



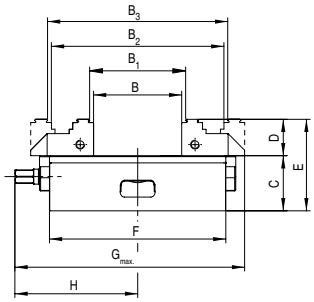



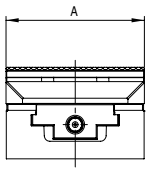
| A mm | C ±0,01 mm | F mm | $G_{max.}$ mm | H mm | SW mm | Clamping force kN | kg | NEW Y4 Article no. 80 878 ... £ | |
|---|---|---|---|---|---|---|---|---|---|
| 125 | 50 | 235 | 272 | 143,5 | 12 | 35 | 9 | 789.52 | 12900 |

# Sealed Centric vice

- with 2 reversible grip jaws
- ball bearing mounted spindle
- ±0.01 mm repeatability

ZSG 4



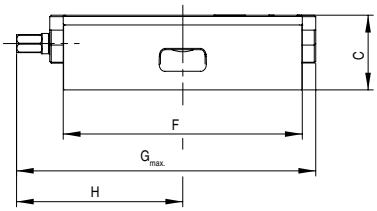



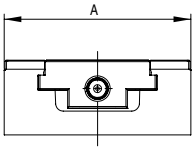
| A mm | B mm | $B_1$ mm | $B_2$ mm | $B_3$ mm | C mm | D mm | E mm | F mm | $G_{max.}$ mm | H mm | Clamping force kN | kg | NEW Y4 Article no. 80 878 ... £ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125 | 0 - 155 | 8 - 162 | 77 - 218 | 84 - 225 | 50 | 33 | 83 | 235 | 272 | 143,5 | 35 | 9.5 | 1,005.71 | 12800 |

# Sealed centric vice suitable for Lang and PNG, MNG zero point clamping systems

- without system jaws
- ball bearing mounted spindle
- ± 0.01 mm repeatability

ZSG 4



| A mm | C mm | F mm | $G_{max.}$ mm | H mm | Clamping force kN | kg | NEW Y4 Article no. 80 878 ... £ |
|---|---|---|---|---|---|---|---|
| **125** | 50 | 235 | 272 | 143,5 | 35 | 9 | 819.05 **13000** |

WNT MNG

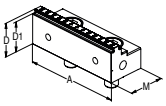
Schunk VERO-S / WNT – PNG

Lang Quick Point 96 x 96

Lang Quick Point 52 x 52

# System jaws overview

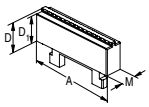
## Indexable jaw embossed profile




- Price per piece
- suitable for LANG embossed profile

| Description | Clamping Ø | A | D | $D_1$ | M | price £ | NEW Article no. Y4 | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 28 | 25 | 40 | 144.76 | 80 878 31000 | | | | | | | ● | | | |
| | | 125 | 33 | 30 | 57 | 198.10 | 80 878 31100 | | | | | | | ● | | | |

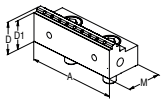
## Centre jaw, grip 3 mm




- price per piece

| Description | Clamping Ø | A | D | $D_1$ | M | price £ | NEW Article no. Y4 | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 28 | 25 | 16 | 93.33 | 80 878 31200 | | | | | | | ● | | | |
| | | 125 | 33 | 30 | 16 | 131.43 | 80 878 31300 | | | | | | | ● | | | |

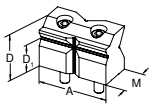
## Indexable jaw, carbide, grip 3 mm, movable




- Price per piece

| Description | Clamping Ø | A | D | $D_1$ | M | price £ | NEW Article no. Y4 | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80 | 28 | 25 | 40 | 204.76 | 80 878 31500 | | | | | | | ● | | | |
| | | 125 | 33 | 30 | 57 | 290.48 | 80 878 31600 | | | | | | | ● | | | |
| | | 160 | 50 | 47 | 81 | 457.14 | 80 878 31700 | | | | | | | ● | | | |

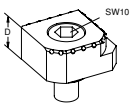
## Prismatic jaw




- Prism jaw with horizontal and vertical prism
- price per piece

| Description | Clamping Ø | A | D | $D_1$ | M | price £ | NEW Article no. Y4 | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 - 60 | 80 | 52 | 32 | 38,5 | 271.43 | 80 878 31800 | | | | | | | ● | | | |
| | 10 - 80 | 125 | 67 | 42 | 57 | 414.29 | 80 878 31900 | | | | | | | ● | | | |

## 6x indexable jaw, carbide, grip



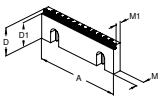

- 1 = Smooth
- 2 = Carbide grip
- 3 = Carbide grip with 3 mm step
- 4 = Carbide grip with 8 mm step
- 5 = Round carbide grip with 8 mm step
- 6 = Round carbide grip
- Incl. fixing screws

| Description | Clamping Ø | A | D | $D_1$ | M | price £ | NEW Article no. Y4 | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 18 | | | 93.33 | 80 890 35300 | ● | ● | ● | | ● | | ● | | ● | |

The matching pendulum jaw and adapter plate can be found in the workpiece clamping catalogue 2019 on → **page 45**.

# General top jaws overview

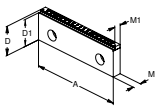
## Stepped jaw, grip 5 mm for aluminium and plastic




▲ Price per piece

| Description | A | D | $D_1$ | M | $M_1$ | price | Article no. | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | £ | NEW Y4 | | | | | | | | | | |
| | 125 | 40 | 35 | 11,5 | 8 | 119.05 | 80 892 36100 | ● | ● | ● | | | ● | ● | | ● | |

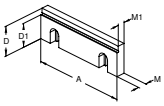
## Stepped jaw embossed profile




▲ Price per piece
▲ suitable for LANG embossed profile

| Description | A | D | $D_1$ | M | $M_1$ | price | Article no. | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | £ | NEW Y4 | | | | | | | | | | |
| | 125 | 40 | 37 | 11,5 | | 114.29 | 80 892 36200 | ● | ● | ● | | | ● | ● | | ● | |

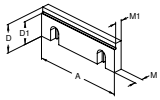
## Stepped jaw, coated 5 mm




▲ Price per piece

| Description | A | D | $D_1$ | M | $M_1$ | price | Article no. | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | £ | NEW Y4 | | | | | | | | | | |
| | 80 | 28 | 23 | 10 | 7,5 | 128.57 | 80 878 31400 | | | ● | | | | ● | | ● | |

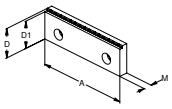
## Stepped jaw, coated 5 mm




▲ Price per piece

| Description | A | D | $D_1$ | M | $M_1$ | price | Article no. | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | £ | NEW Y4 | | | | | | | | | | |
| | 100 | 35 | 30 | 10 | 7,5 | 142.86 | 80 892 36300 | ● | | | | ● | ● | | | | |
| | 160 | 50 | 45 | 13,5 | 10,5 | 176.19 | 80 892 36400 | ● | | | | ● | ● | ● | | | |

## Stepped jaw, carbide, grip 3 mm




▲ price per piece

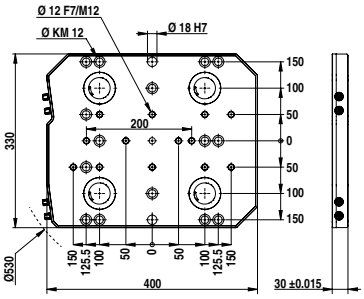
| Description | A | D | $D_1$ | M | $M_1$ | price | Article no. | NCG | H5G / -S / -Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | £ | NEW Y4 | | | | | | | | | | |
| | 125 | 40 | 37 | 11,5 | | 142.86 | 80 892 36500 | ● | ● | ● | | | ● | ● | | ● | |

# MNG Zero Point System Overview

## 4 location base plate, 330 x 400 mm

- Stainless and vacuum-hardened
- Insertion force 20 kN on the clamping bolt
- 15 x mounting holes for M12, for T-slot spacing 50, 63, 100, 125 mm
- 14 x grid bushes Ø12 F7 / M12
- 3 x mating holes Ø18 H7 for positioning

**MNG**



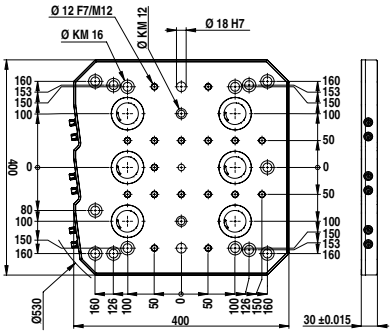
| Size | kg | NEW Y4 Article no. 80 899 ... £ | |
|---|---|---|---|
| 330x400 mm | 27 | 3,571.89 | 63000 1) |

1) Not ex-stock

## 6 location base plate, 400 x 400 mm

- Stainless and vacuum-hardened
- Insertion force 20 kN on the clamping bolt
- 14 x mounting holes for M16, for T-slot spacing 63, 80, 100, 125 mm
- 2 x mounting holes for M12
- 18 x bushings Ø 12 F7 / M12
- 3 x fitting holes Ø 18 H7 for positioning

**MNG**



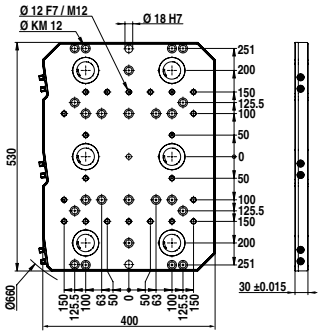
| Size | kg | NEW Y4 Article no. 80 899 ... £ | |
|---|---|---|---|
| 400x400 mm | 31 | 4,457.73 | 63100 1) |

1) Not ex-stock

# 6 location base plate, 400 x 530 mm

- Stainless and vacuum-hardened
- Insertion force 20 kN on the clamping bolt
- 24 x mounting holes for M12, for T-slot spacing 50, 63, 100, 125 mm
- 22 x bushings Ø12 F7 / M12
- 3 x mating holes Ø18 H7 for positioning

**MNG**



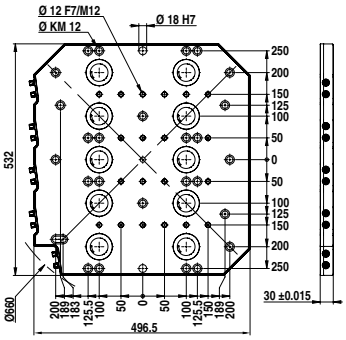
| Size | kg | NEW Y4 Article no. 80 899 ... £ | |
|---|---|---|---|
| 400x530 mm | 44 | 5,310.08 | 63200 1) |

1) Not ex-stock

# 10 location base plate, 497 x 532 mm

- Stainless and vacuum-hardened
- Insertion force 20 kN on the clamping bolt
- 27 x mounting holes M12 for T-slot spacing 50, 63, 100, 125 mm and star slots 45°
- 24 x bushings Ø12 F7 / M12
- 3 x mating holes Ø18 H7 for positioning

**MNG**



| Size | kg | NEW Y4 Article no. 80 899 ... £ | |
|---|---|---|---|
| 497x532 mm | 51 | 7,533.36 | 63300 1) |

1) Not ex-stock

# Centering Pin

MNG

| $D_{1\ n6}$ mm | $D_{2\ h6}$ mm | NEW Y4 Article no. 80 899 ... £ | |
|---|---|---|---|
| 12 | 30 | 44.55 | 61700 |
| 12 | 32 | 44.55 | 61800 |
| 12 | 50 | 44.55 | 61900 |

# Clamping Screw Set for T-slot for MNG

**Scope of supply:**
Clamping screw and T-Nuts

MNG

| for slot width mm | G | NEW Y4 Article no. 80 899 ... £ | |
|---|---|---|---|
| 14 | M12 | 14.89 | 63500 |
| 16 | M12 | 14.89 | 63600 |
| 18 | M12 | 14.89 | 63700 |

# Alignment Pin

MNG

| $D_{1\ n6}$ mm | $D_{2\ h6}$ mm | Y4 Article no. 80 899 ... £ | |
|---|---|---|---|
| 18 | 14 | 28.11 | 607 |
| 18 | 18 | 35.68 | 608 |
| 18 | 20 | 36.76 | 609 |
| 18 | 22 | 37.85 | 610 |

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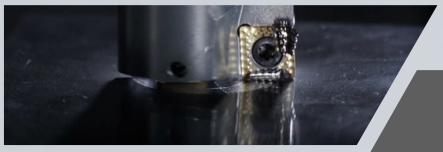

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