

# 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



KLENK

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

**Tooling the Future**

[www.ceratizit.com](http://www.ceratizit.com)

# Welcome!



It couldn't be easier  
**Ordering via the  
Online Shop**

<http://cuttingtools.ceratizit.com>



On-site technical support  
**Your Local Technical  
Sales Engineer**

Your customer number



**SPECIALIST FOR INDEXABLE INSERT TOOLS  
FOR TURNING, MILLING AND GROOVING**



**THE QUALITY LABEL FOR  
EFFICIENT BORE PRODUCTION**



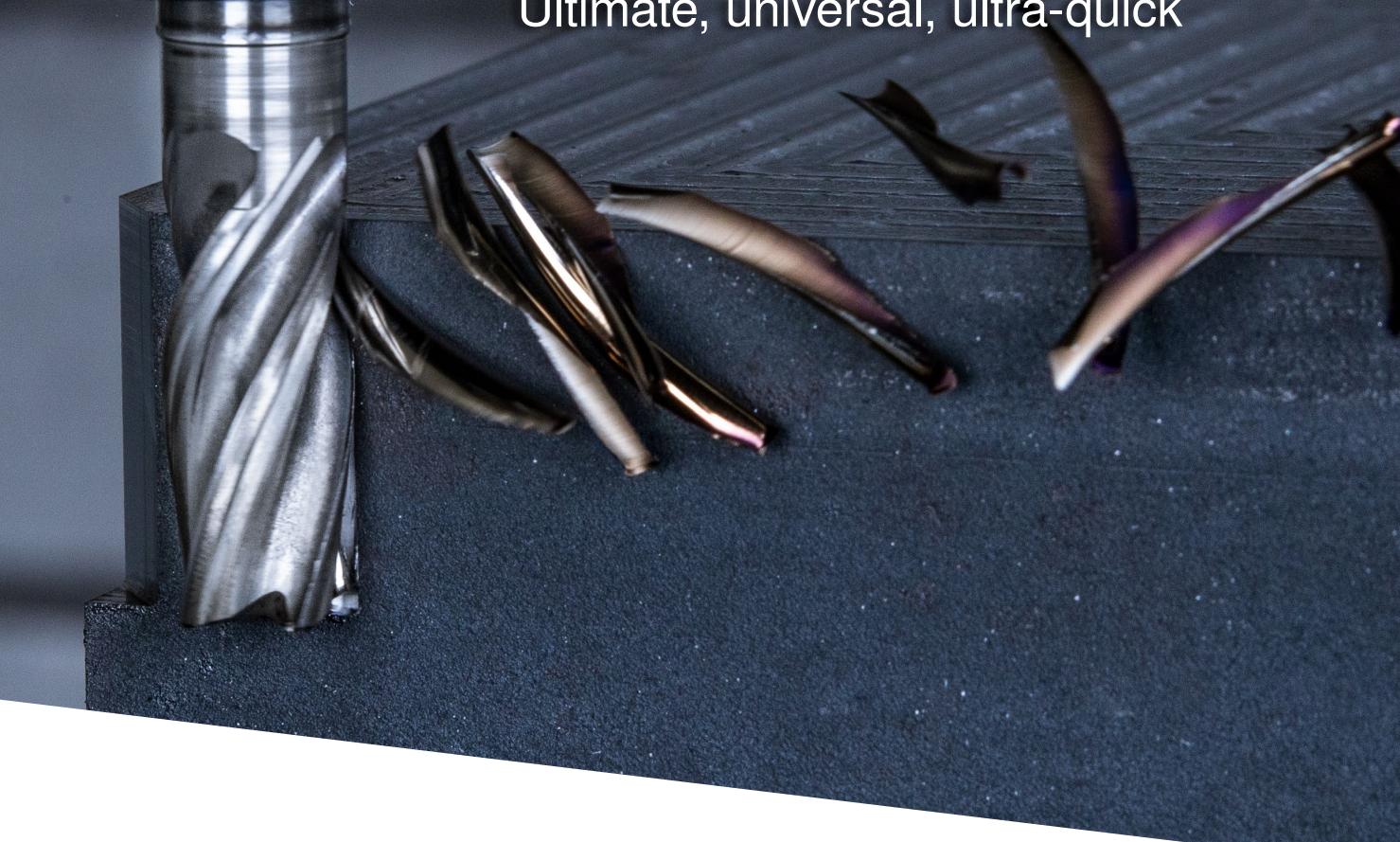
**EXPERTS FOR ROTATING TOOLS,  
TOOL HOLDERS AND CLAMPING SOLUTIONS**



**CUTTING TOOLS  
FOR THE AEROSPACE INDUSTRY**

# SilverLine

Ultimate, universal, ultra-quick



DRAUGSKIN

**SilverLine is now even stronger with Dragonskin!**

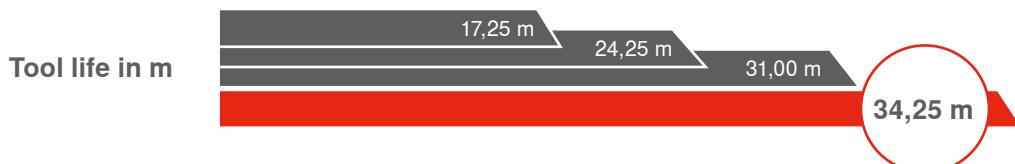
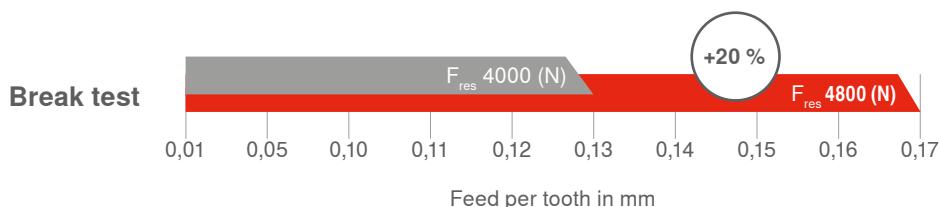


Simply spectacular! In the new, expanded SilverLine generation, we have really tightened up the performance. Thanks to the legendary Dragonskin coating and the optimised geometry, you can now machine a variety of materials even more efficiently.

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       |

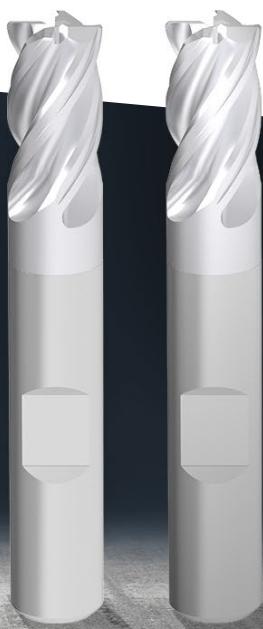


‘’

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



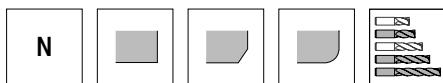
... and it still mills!

# Product programme

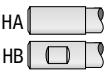
## Endmill



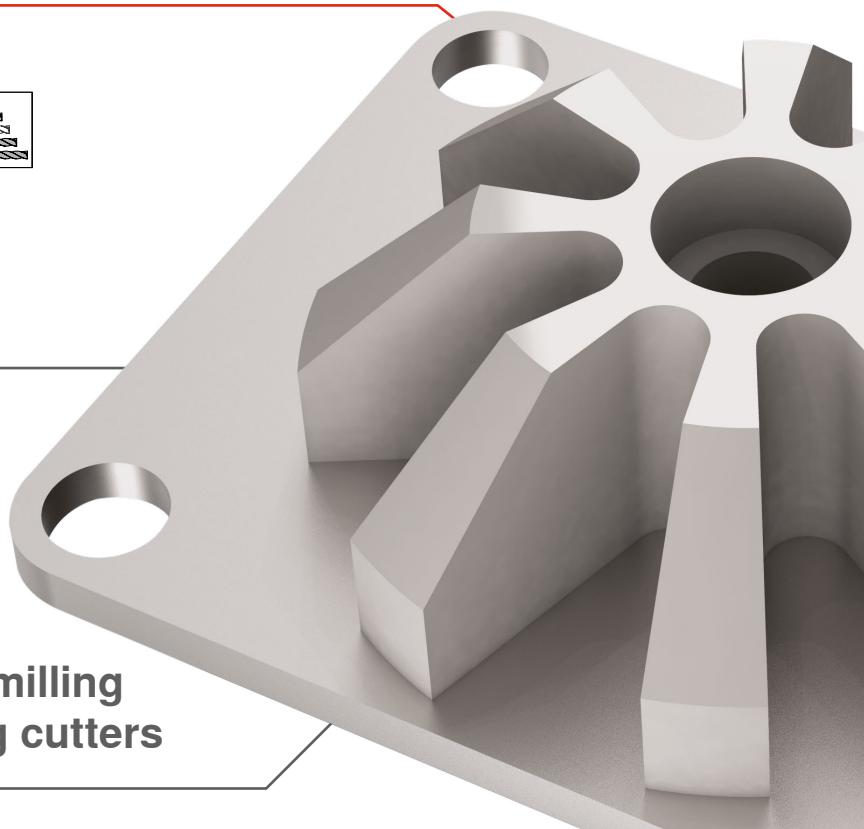
▲ also with thro' coolant



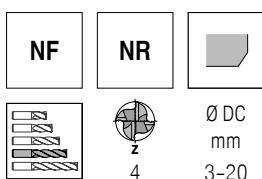
Ø DC  
mm  
2-4      3-20



→ Page 45–54



## Roughing-finishing milling cutters/rough milling cutters



Ø DC  
mm  
4      3-20



→ Page 55+56

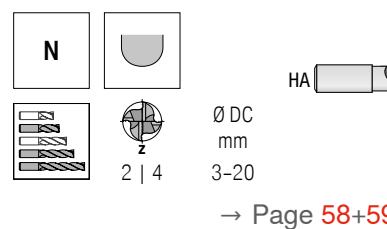


Our product video for the SilverLine

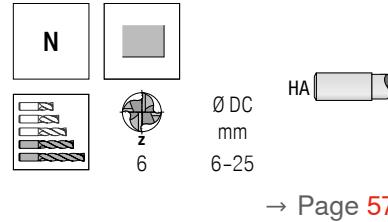
can be found here:

[cuttingtools.ceratizit.com/gb/en/silverline](http://cuttingtools.ceratizit.com/gb/en/silverline)

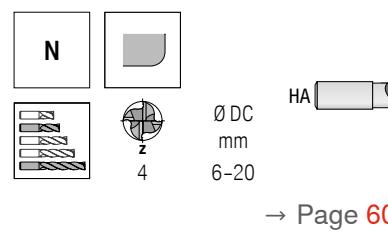
## Ball nose end milling cutters



## High-precision finish milling cutters



## Torus face cutters



# MultiLock

The exchangeable head system  
for advanced performance

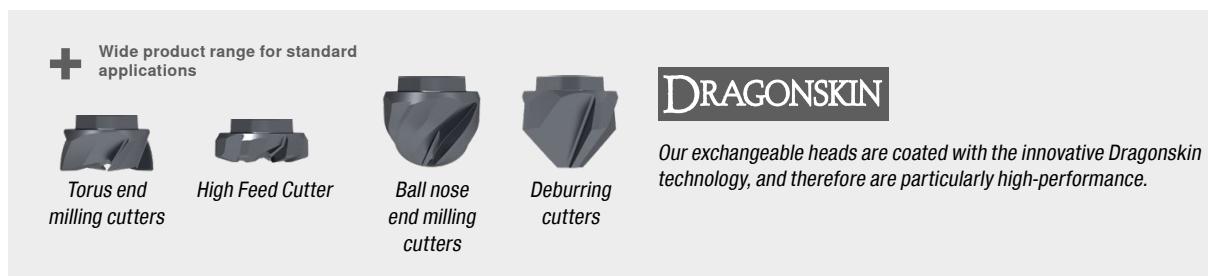


Conventional exchangeable head systems as a cost-effective alternative to solid carbide milling cutters are now obsolete. With MultiLock, we have developed an advanced exchangeable head system that performs much better than comparable products due to its precision-sintered, positive-locking interface. 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.



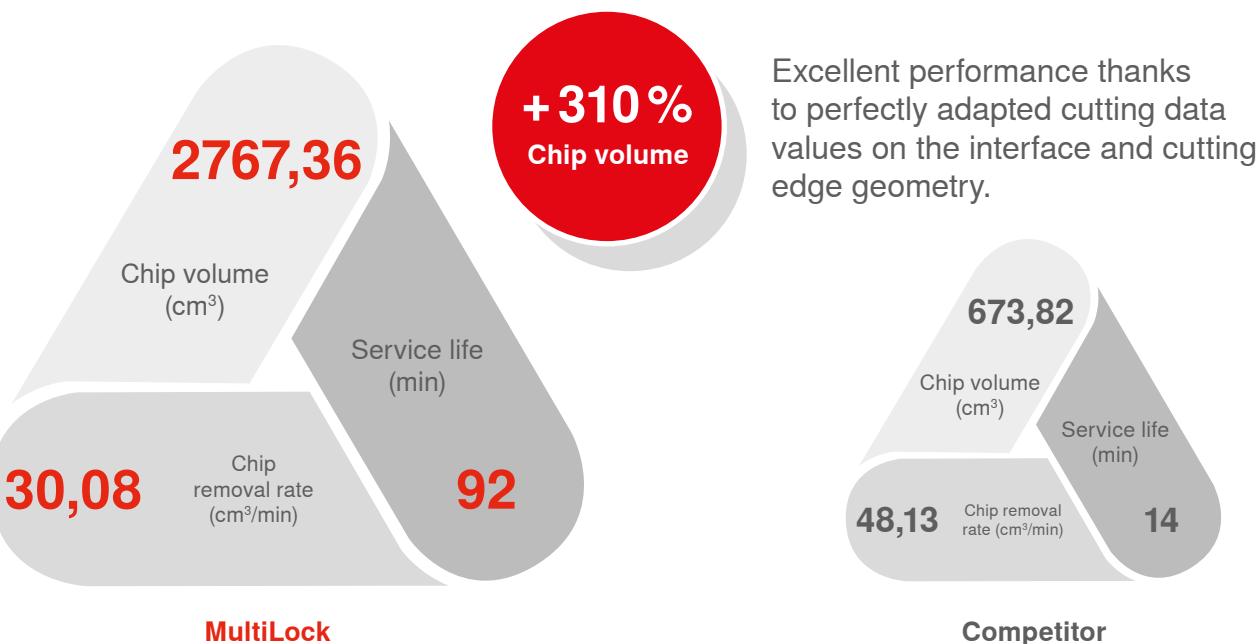
Further information on the  
product can be found on  
page 81–84

# OPTIMUM PERFORMANCE THANKS TO UNIQUE INTERFACE TECHNOLOGY



## Test report on the phenomenal service life of MultiLock

Material: 1.2379



# The multi-application grade

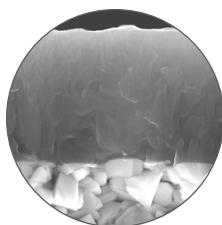
Many materials,  
many requirements...  
... only one indexable insert!



## 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

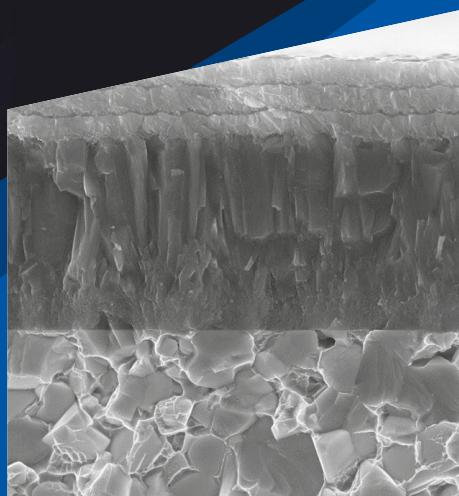
Decades of experience coupled to consistent and constant development are in the unique Dragonskin coating technology. Thanks to our innovative design and expertise in powder metallurgy, we – and above all you – achieve an unmatched level of performance in machining.

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 – The coatings for the highest performance

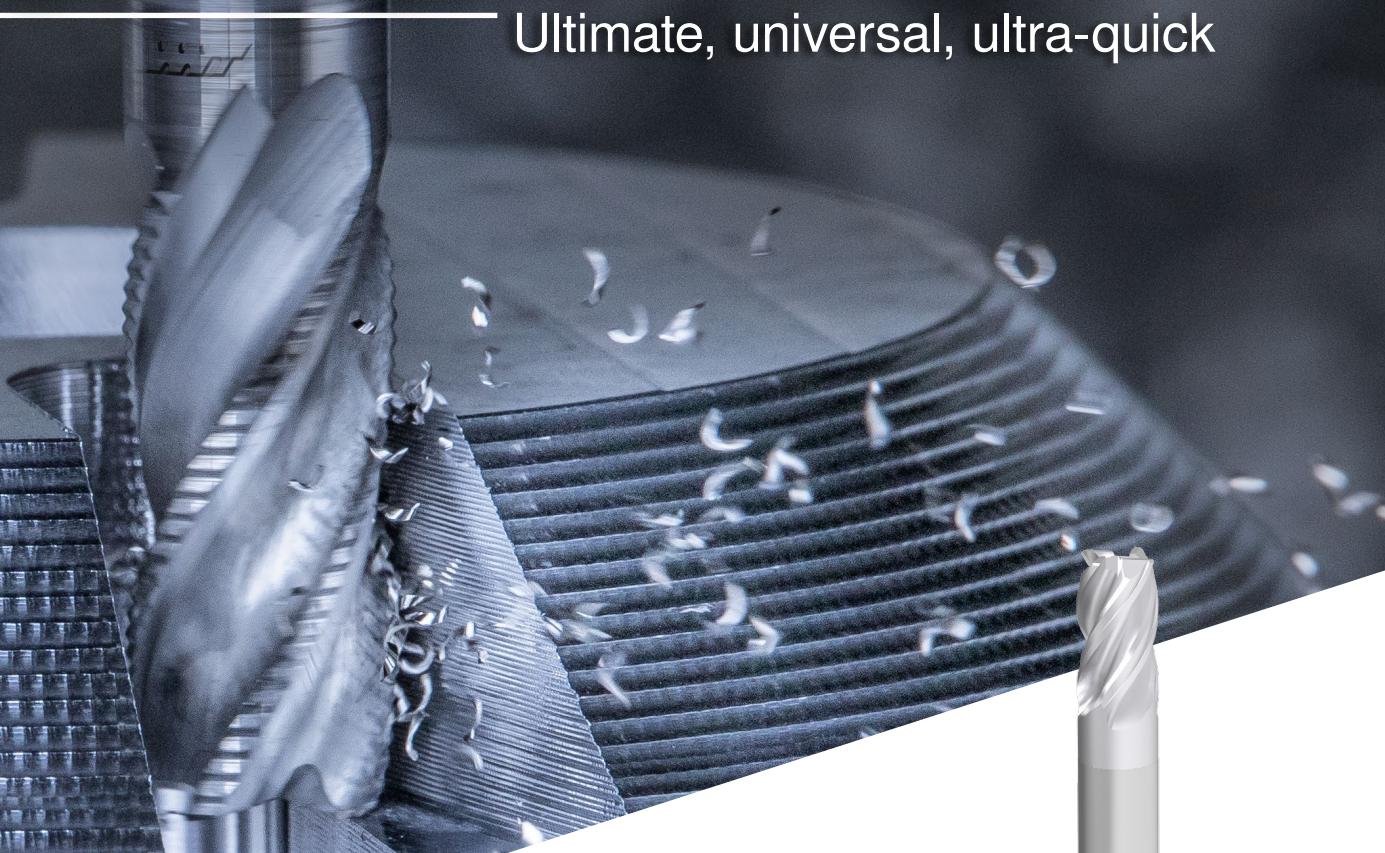
The product category Dragonskin is intended to help make tools easily recognizable and quick to find using CERATIZIT's high-performance coating technology. All products that are marked with the Dragonskin icon represent unmatchable performance, maximum tool life and maximum process reliability.



Dragonskin Coating

# SilverLine

Ultimate, universal, ultra-quick



Solid Carbide milling cutters

SilverLine – the next level

44–79



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### Solid Carbide Drilling

WTX – Speed VA 12xD

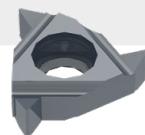
16+17



### Thread turning

Mini 06 and Mini 08 inserts and holders

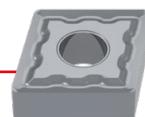
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### Turning Tools

Indexable inserts – the multi-application grade

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### Solid Carbide milling cutters

MultiLock

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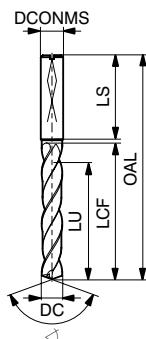
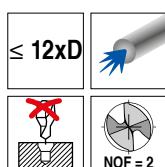
### Vices

Clamping systems

104–116

# WTX – High Speed Drill, DIN 6537

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



| Speed VA |
|----------|
| Ti800    |



135°  
Solid carbide

**NEW**  
**Article no.**  
**10 774 ...**

| DC mm | DCONMS h6 | OAL | LCF | LU | LS |
|-------|-----------|-----|-----|----|----|
| 3,00  | 6         | 92  | 54  | 48 | 36 |

| DC mm | DCONMS h6 | OAL | LCF | LU | LS |
|-------|-----------|-----|-----|----|----|
| 3,00  | 6         | 92  | 54  | 48 | 36 |
| 3,10  | 6         | 92  | 54  | 48 | 36 |
| 3,20  | 6         | 92  | 54  | 48 | 36 |
| 3,30  | 6         | 92  | 54  | 48 | 36 |
| 3,40  | 6         | 92  | 54  | 48 | 36 |
| 3,50  | 6         | 92  | 54  | 48 | 36 |
| 3,60  | 6         | 92  | 54  | 48 | 36 |
| 3,70  | 6         | 92  | 54  | 48 | 36 |
| 3,80  | 6         | 102 | 64  | 58 | 36 |
| 3,90  | 6         | 102 | 64  | 58 | 36 |
| 4,00  | 6         | 102 | 64  | 58 | 36 |
| 4,10  | 6         | 102 | 64  | 58 | 36 |
| 4,20  | 6         | 102 | 64  | 58 | 36 |
| 4,30  | 6         | 102 | 64  | 58 | 36 |
| 4,40  | 6         | 102 | 64  | 58 | 36 |
| 4,50  | 6         | 102 | 64  | 58 | 36 |
| 4,60  | 6         | 102 | 64  | 58 | 36 |
| 4,70  | 6         | 102 | 64  | 58 | 36 |
| 4,80  | 6         | 116 | 78  | 70 | 36 |
| 4,90  | 6         | 116 | 78  | 70 | 36 |
| 5,00  | 6         | 116 | 78  | 70 | 36 |
| 5,10  | 6         | 116 | 78  | 70 | 36 |
| 5,20  | 6         | 116 | 78  | 70 | 36 |
| 5,30  | 6         | 116 | 78  | 70 | 36 |
| 5,40  | 6         | 116 | 78  | 70 | 36 |
| 5,50  | 6         | 116 | 78  | 70 | 36 |
| 5,60  | 6         | 116 | 78  | 70 | 36 |
| 5,70  | 6         | 116 | 78  | 70 | 36 |
| 5,80  | 6         | 116 | 78  | 70 | 36 |
| 5,90  | 6         | 116 | 78  | 70 | 36 |
| 6,00  | 6         | 116 | 78  | 70 | 36 |
| 6,10  | 8         | 146 | 108 | 94 | 36 |
| 6,20  | 8         | 146 | 108 | 94 | 36 |
| 6,30  | 8         | 146 | 108 | 94 | 36 |
| 6,40  | 8         | 146 | 108 | 94 | 36 |
| 6,50  | 8         | 146 | 108 | 94 | 36 |
| 6,60  | 8         | 146 | 108 | 94 | 36 |
| 6,70  | 8         | 146 | 108 | 94 | 36 |
| 6,80  | 8         | 146 | 108 | 94 | 36 |
| 6,90  | 8         | 146 | 108 | 94 | 36 |
| 7,00  | 8         | 146 | 108 | 94 | 36 |
| 7,10  | 8         | 146 | 108 | 94 | 36 |
| 7,20  | 8         | 146 | 108 | 94 | 36 |
| 7,30  | 8         | 146 | 108 | 94 | 36 |
| 7,40  | 8         | 146 | 108 | 94 | 36 |
| 7,50  | 8         | 146 | 108 | 94 | 36 |
| 7,60  | 8         | 146 | 108 | 94 | 36 |
| 7,70  | 8         | 146 | 108 | 94 | 36 |
| 7,80  | 8         | 146 | 108 | 94 | 36 |
| 7,90  | 8         | 146 | 108 | 94 | 36 |

| DC mm | DCONMS h6 | OAL | LCF | LU  | LS | Article no. | NEW |
|-------|-----------|-----|-----|-----|----|-------------|-----|
| 8,00  | 8         | 146 | 108 | 94  | 36 | 08000       |     |
| 8,10  | 10        | 162 | 120 | 110 | 40 | 08100       |     |
| 8,20  | 10        | 162 | 120 | 110 | 40 | 08200       |     |
| 8,30  | 10        | 162 | 120 | 110 | 40 | 08300       |     |
| 8,40  | 10        | 162 | 120 | 110 | 40 | 08400       |     |
| 8,50  | 10        | 162 | 120 | 110 | 40 | 08500       |     |
| 8,60  | 10        | 162 | 120 | 110 | 40 | 08600       |     |
| 8,70  | 10        | 162 | 120 | 110 | 40 | 08700       |     |
| 8,80  | 10        | 162 | 120 | 110 | 40 | 08800       |     |
| 8,90  | 10        | 162 | 120 | 110 | 40 | 08900       |     |
| 9,00  | 10        | 162 | 120 | 110 | 40 | 09000       |     |
| 9,10  | 10        | 162 | 120 | 110 | 40 | 09100       |     |
| 9,20  | 10        | 162 | 120 | 110 | 40 | 09200       |     |
| 9,30  | 10        | 162 | 120 | 110 | 40 | 09300       |     |
| 9,40  | 10        | 162 | 120 | 110 | 40 | 09400       |     |
| 9,50  | 10        | 162 | 120 | 110 | 40 | 09500       |     |
| 9,60  | 10        | 162 | 120 | 110 | 40 | 09600       |     |
| 9,70  | 10        | 162 | 120 | 110 | 40 | 09700       |     |
| 9,80  | 10        | 162 | 120 | 110 | 40 | 09800       |     |
| 9,90  | 10        | 162 | 120 | 110 | 40 | 09900       |     |
| 10,00 | 10        | 162 | 120 | 110 | 40 | 10000       |     |
| 10,10 | 12        | 204 | 156 | 142 | 45 | 10100       |     |
| 10,20 | 12        | 204 | 156 | 142 | 45 | 10200       |     |
| 10,30 | 12        | 204 | 156 | 142 | 45 | 10300       |     |
| 10,40 | 12        | 204 | 156 | 142 | 45 | 10400       |     |
| 10,50 | 12        | 204 | 156 | 142 | 45 | 10500       |     |
| 10,60 | 12        | 204 | 156 | 142 | 45 | 10600       |     |
| 10,70 | 12        | 204 | 156 | 142 | 45 | 10700       |     |
| 10,80 | 12        | 204 | 156 | 142 | 45 | 10800       |     |
| 10,90 | 12        | 204 | 156 | 142 | 45 | 10900       |     |
| 11,00 | 12        | 204 | 156 | 142 | 45 | 11000       |     |
| 11,10 | 12        | 204 | 156 | 142 | 45 | 11100       |     |
| 11,20 | 12        | 204 | 156 | 142 | 45 | 11200       |     |
| 11,30 | 12        | 204 | 156 | 142 | 45 | 11300       |     |
| 11,40 | 12        | 204 | 156 | 142 | 45 | 11400       |     |
| 11,50 | 12        | 204 | 156 | 142 | 45 | 11500       |     |
| 11,60 | 12        | 204 | 156 | 142 | 45 | 11600       |     |
| 11,70 | 12        | 204 | 156 | 142 | 45 | 11700       |     |
| 11,80 | 12        | 204 | 156 | 142 | 45 | 11800       |     |
| 11,90 | 12        | 204 | 156 | 142 | 45 | 11900       |     |
| 12,00 | 12        | 204 | 156 | 142 | 45 | 12000       |     |
| 12,20 | 14        | 230 | 182 | 166 | 45 | 12200       |     |
| 12,50 | 14        | 230 | 182 | 166 | 45 | 12500       |     |
| 12,80 | 14        | 230 | 182 | 166 | 45 | 12800       |     |
| 13,00 | 14        | 230 | 182 | 166 | 45 | 13000       |     |
| 13,50 | 14        | 230 | 182 | 166 | 45 | 13500       |     |
| 13,80 | 14        | 230 | 182 | 166 | 45 | 13800       |     |
| 14,00 | 14        | 230 | 182 | 166 | 45 | 14000       |     |
| 14,20 | 16        | 260 | 208 | 192 | 48 | 14200       |     |
| 14,50 | 16        | 260 | 208 | 192 | 48 | 14500       |     |
| 15,00 | 16        | 260 | 208 | 192 | 48 | 15000       |     |
| 15,10 | 16        | 260 | 208 | 192 | 48 | 15100       |     |
| 15,20 | 16        | 260 | 208 | 192 | 48 | 15200       |     |
| 15,50 | 16        | 260 | 208 | 192 | 48 | 15500       |     |
| 15,80 | 16        | 260 | 208 | 192 | 48 | 15800       |     |
| 16,00 | 16        | 260 | 208 | 192 | 48 | 16000       |     |
| 17,00 | 18        | 285 | 234 | 216 | 48 | 17000       |     |
| 17,50 | 18        | 285 | 234 | 216 | 48 | 17500       |     |

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

## Cutting data standard values – WTX – Speed VA

|   |       |  | Drilling depth 12xD<br>Speed VA<br>10 774 ... |  |                       |                       |                        |                         |                         |
|---|-------|--|---|--|-----------------------|-----------------------|------------------------|-------------------------|-------------------------|
|   | Index | Material                                 | Strength<br>N/mm <sup>2</sup> / HB / HRC      | v <sub>c</sub> m/min<br>with through coolant | Ø 3-5<br>f<br>mm/rev. | Ø 5-8<br>f<br>mm/rev. | Ø 8-12<br>f<br>mm/rev. | Ø 12-16<br>f<br>mm/rev. | Ø 16-20<br>f<br>mm/rev. |
|   |       |  |   |  |                       |                       |                        |                         |                         |
| P | 1.1   | General construction steel               | < 800 N/mm <sup>2</sup>                       | 200  | 0,10                  | 0,13                  | 0,17                   | 0,20                    | 0,23                    |
|   | 1.2   | Free cutting steel                       | < 800 N/mm <sup>2</sup>                       | 240  | 0,17                  | 0,21                  | 0,27                   | 0,33                    | 0,37                    |
|   | 1.3   | Hardened steel, non alloyed              | < 800 N/mm <sup>2</sup>                       | 200  | 0,13                  | 0,17                  | 0,21                   | 0,26                    | 0,29                    |
|   | 1.4   | Alloyed hardened steel                   | < 1000 N/mm <sup>2</sup>                      | 160  | 0,11                  | 0,14                  | 0,19                   | 0,23                    | 0,25                    |
|   | 1.5   | Tempering steel, unalloyed               | < 850 N/mm <sup>2</sup>                       | 180  | 0,13                  | 0,17                  | 0,21                   | 0,26                    | 0,29                    |
|   | 1.6   | Tempering steel, unalloyed               | < 1000 N/mm <sup>2</sup>                      | 160  | 0,11                  | 0,14                  | 0,19                   | 0,23                    | 0,25                    |
|   | 1.7   | Tempering steel, alloyed                 | < 800 N/mm <sup>2</sup>                       | 160  | 0,11                  | 0,14                  | 0,19                   | 0,23                    | 0,25                    |
|   | 1.8   | Tempering steel, alloyed                 | < 1300 N/mm <sup>2</sup>                      | 120  | 0,09                  | 0,12                  | 0,15                   | 0,18                    | 0,21                    |
|   | 1.9   | Steel castings                           | < 850 N/mm <sup>2</sup>                       | 180  | 0,13                  | 0,17                  | 0,21                   | 0,26                    | 0,29                    |
|   | 1.10  | Nitriding steel                          | < 1000 N/mm <sup>2</sup>                      | 120  | 0,09                  | 0,12                  | 0,15                   | 0,18                    | 0,21                    |
|   | 1.11  | Nitriding steel                          | < 1200 N/mm <sup>2</sup>                      | 100  | 0,08                  | 0,11                  | 0,14                   | 0,16                    | 0,18                    |
|   | 1.12  | Roller bearing steel                     | < 1200 N/mm <sup>2</sup>                      | 120  | 0,09                  | 0,12                  | 0,15                   | 0,18                    | 0,21                    |
|   | 1.13  | Spring steel                             | < 1200 N/mm <sup>2</sup>                      | 120  | 0,09                  | 0,12                  | 0,15                   | 0,18                    | 0,21                    |
|   | 1.14  | High-speed steel                         | < 1300 N/mm <sup>2</sup>                      | 100  | 0,08                  | 0,11                  | 0,14                   | 0,16                    | 0,18                    |
|   | 1.15  | Cold working tool steel                  | < 1300 N/mm <sup>2</sup>                      | 100  | 0,09                  | 0,12                  | 0,15                   | 0,18                    | 0,21                    |
|   | 1.16  | Hot working tool steel                   | < 1300 N/mm <sup>2</sup>                      | 100  | 0,09                  | 0,12                  | 0,15                   | 0,18                    | 0,21                    |
| M | 2.1   | Cast steel and sulphured stainless steel | < 850 N/mm <sup>2</sup>                       | 90   | 0,10                  | 0,13                  | 0,17                   | 0,20                    | 0,23                    |
|   | 2.2   | Stainless steel, ferritic                | < 750 N/mm <sup>2</sup>                       | 75   | 0,08                  | 0,11                  | 0,14                   | 0,18                    | 0,20                    |
|   | 2.3   | Stainless steel, martensitic             | < 900 N/mm <sup>2</sup>                       | 90   | 0,08                  | 0,10                  | 0,13                   | 0,16                    | 0,18                    |
|   | 2.4   | Stainless steel, ferritic / martensitic  | < 1100 N/mm <sup>2</sup>                      | 60   | 0,08                  | 0,10                  | 0,13                   | 0,16                    | 0,18                    |
|   | 2.5   | Stainless steel, austenitic / ferritic   | < 850 N/mm <sup>2</sup>                       | 65   | 0,08                  | 0,10                  | 0,13                   | 0,16                    | 0,18                    |
|   | 2.6   | Stainless steel, austenitic              | < 750 N/mm <sup>2</sup>                       | 75   | 0,08                  | 0,11                  | 0,14                   | 0,18                    | 0,20                    |
|   | 2.7   | Heat resistant steel                     | < 1100 N/mm <sup>2</sup>                      | 50   | 0,07                  | 0,09                  | 0,12                   | 0,14                    | 0,16                    |
| K | 3.1   | Grey cast iron with lamellar graphite    | 100–350 N/mm <sup>2</sup>                     | 140  | 0,17                  | 0,22                  | 0,28                   | 0,34                    | 0,38                    |
|   | 3.2   | Grey cast iron with lamellar graphite    | 300–500 N/mm <sup>2</sup>                     | 100  | 0,15                  | 0,20                  | 0,25                   | 0,30                    | 0,34                    |
|   | 3.3   | Gray cast iron with spheroidal graphite  | 300–500 N/mm <sup>2</sup>                     | 120  | 0,19                  | 0,25                  | 0,32                   | 0,38                    | 0,43                    |
|   | 3.4   | Gray cast iron with spheroidal graphite  | 500–900 N/mm <sup>2</sup>                     | 75   | 0,15                  | 0,20                  | 0,25                   | 0,30                    | 0,34                    |
|   | 3.5   | White malleable cast iron                | 270–450 N/mm <sup>2</sup>                     | 170  | 0,22                  | 0,28                  | 0,35                   | 0,42                    | 0,48                    |
|   | 3.6   | White malleable cast iron                | 500–650 N/mm <sup>2</sup>                     | 140  | 0,19                  | 0,25                  | 0,32                   | 0,38                    | 0,43                    |
|   | 3.7   | Black malleable cast iron                | 300–450 N/mm <sup>2</sup>                     | 170  | 0,19                  | 0,25                  | 0,32                   | 0,38                    | 0,43                    |
|   | 3.8   | Black malleable cast iron                | 500–800 N/mm <sup>2</sup>                     | 140  | 0,15                  | 0,20                  | 0,25                   | 0,30                    | 0,34                    |
| N | 4.1   | Aluminium (non alloyed, low alloyed)     | < 350 N/mm <sup>2</sup>                       |  |                       |                       |                        |                         |                         |
|   | 4.2   | Aluminium alloys < 0,5 % Si              | < 500 N/mm <sup>2</sup>                       |  |                       |                       |                        |                         |                         |
|   | 4.3   | Aluminium alloy 0,5–10 % Si              | < 400 N/mm <sup>2</sup>                       |  |                       |                       |                        |                         |                         |
|   | 4.4   | Aluminium alloys 10–15 % Si              | < 400 N/mm <sup>2</sup>                       |  |                       |                       |                        |                         |                         |
|   | 4.5   | Aluminum alloys > 15 % Si                | < 400 N/mm <sup>2</sup>                       |  |                       |                       |                        |                         |                         |
|   | 4.6   | Copper (non alloyed, low alloyed)        | < 350 N/mm <sup>2</sup>                       |  |                       |                       |                        |                         |                         |
|   | 4.7   | Copper wrought alloys                    | < 700 N/mm <sup>2</sup>                       |  |                       |                       |                        |                         |                         |
|   | 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/mm <sup>2</sup>                       | 200  | 0,24                  | 0,31                  | 0,39                   | 0,47                    | 0,54                    |
|   | 4.12  | Long-chipping brass                      | < 600 N/mm <sup>2</sup>                       | 200  | 0,21                  | 0,27                  | 0,35                   | 0,42                    | 0,47                    |
| S | 4.13  | Thermoplastics                           |   |  |                       |                       |                        |                         |                         |
|   | 4.14  | Duroplastics                             |   |  |                       |                       |                        |                         |                         |
|   | 4.15  | Fibre-reinforced plastics                |   |  |                       |                       |                        |                         |                         |
|   | 4.16  | Magnesium and magnesium alloys           | < 850 N/mm <sup>2</sup>                       |  |                       |                       |                        |                         |                         |
|   | 4.17  | Graphite                                 |   |  |                       |                       |                        |                         |                         |
|   | 4.18  | Tungsten and tungsten alloys             |   |  |                       |                       |                        |                         |                         |
|   | 4.19  | Molybdenum and molybdenum alloys         |   |  |                       |                       |                        |                         |                         |
|   | 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/mm <sup>2</sup>                       | 25   | 0,06                  | 0,08                  | 0,10                   | 0,12                    | 0,13                    |
| H | 5.4   | Nickel molybdenum alloys                 |   | 25   | 0,06                  | 0,08                  | 0,10                   | 0,12                    | 0,13                    |
|   | 5.5   | Nickel-chromium alloys                   | < 1300 N/mm <sup>2</sup>                      | 25   | 0,06                  | 0,08                  | 0,10                   | 0,12                    | 0,13                    |
|   | 5.6   | Cobalt Chrome Alloys                     | < 1300 N/mm <sup>2</sup>                      | 25   | 0,06                  | 0,08                  | 0,10                   | 0,12                    | 0,13                    |
|   | 5.7   | Heat resistant alloys                    | < 1300 N/mm <sup>2</sup>                      | 50   | 0,06                  | 0,08                  | 0,10                   | 0,12                    | 0,13                    |
|   | 5.8   | Nickel-cobalt-chromium alloys            | < 1400 N/mm <sup>2</sup>                      | 15   | 0,06                  | 0,08                  | 0,10                   | 0,12                    | 0,13                    |
|   | 5.9   | Pure titanium                            | < 900 N/mm <sup>2</sup>                       | 50   | 0,12                  | 0,16                  | 0,20                   | 0,25                    | 0,28                    |
|   | 5.10  | Titanium alloys                          | < 700 N/mm <sup>2</sup>                       | 40   | 0,15                  | 0,19                  | 0,25                   | 0,31                    | 0,35                    |
|   | 5.11  | Titanium alloys                          | < 1200 N/mm <sup>2</sup>                      | 40   | 0,12                  | 0,16                  | 0,20                   | 0,25                    | 0,28                    |
|   | 6.1   |  | < 45 HRC                                      |  |                       |                       |                        |                         |                         |
|   | 6.2   |  | 46–55 HRC                                     |  |                       |                       |                        |                         |                         |
|   | 6.3   | Tempered steel                           | 56–60 HRC                                     |  |                       |                       |                        |                         |                         |
|   | 6.4   |  | 61–65 HRC                                     |  |                       |                       |                        |                         |                         |
|   | 6.5   |  | 65–70 HRC                                     |  |                       |                       |                        |                         |                         |

**i** 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 06

Full profile



19



19

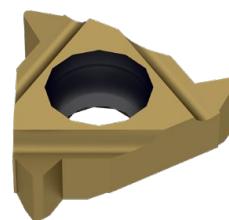
Partial profile



20



20



Mini 08

Full profile



21

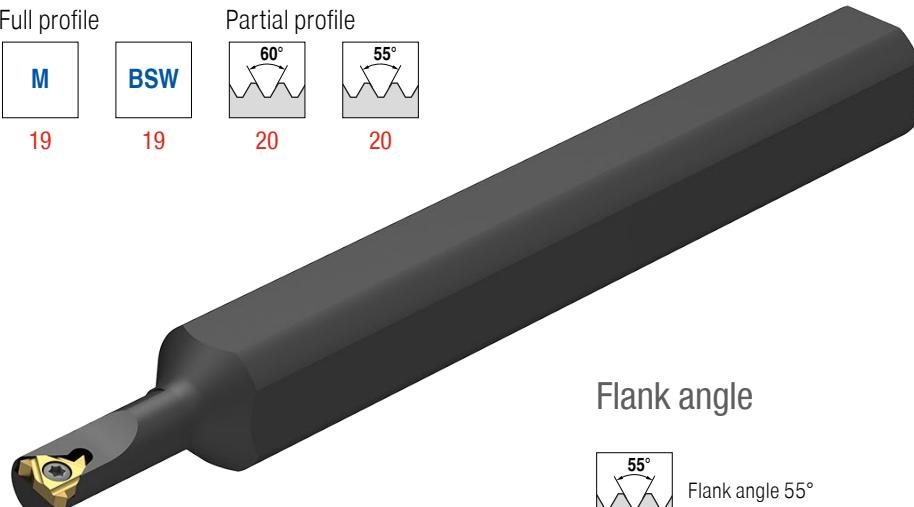
Partial profile



21+22



22+23



Flank angle



Flank angle 55°



Flank angle 60°

## Tool holder

Size 06

24

Size 08

24

## Threading



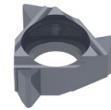
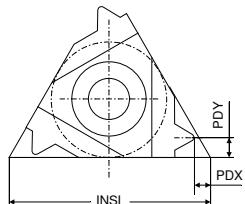
ISO metric coarse thread DIN 13



British Whitworth thread BS 84

## Right hand internal thread turning insert – Mini size 06

- ▲ Full profile
- ▲ Thread production from diameter 6mm



| Designation | TP   | PDX | PDY | INSL | IR<br><b>NEW</b><br>Article no.<br>71 224 ... |
|-------------|------|-----|-----|------|---|
|             | mm   | mm  | mm  | mm   |   |
| 06 IR 0,5   | 0,50 | 0,9 | 0,5 | 6    | 35700   |
| 06 IR 0,75  | 0,75 | 0,8 | 0,5 | 6    | 36100   |
| 06 IR 1,0   | 1,00 | 0,7 | 0,6 | 6    | 36500   |
| 06 IR 1,25  | 1,25 | 0,6 | 0,6 | 6    | 36700   |

Steel

Stainless steel

Cast iron

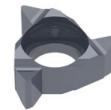
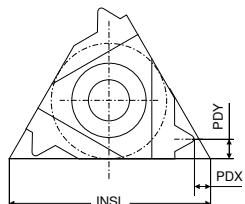
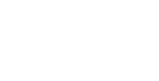
Non ferrous metals

Heat resistant alloys

→ v<sub>c</sub> Page 26

## Right hand internal thread turning insert – Mini size 06

- ▲ Full profile
- ▲ Thread production from diameter 6mm



| Designation | TPI | PDX | PDY | INSL | IR<br><b>NEW</b><br>Article no.<br>71 230 ... | IR<br><b>NEW</b><br>Article no.<br>71 230 ... |
|-------------|-----|-----|-----|------|---|---|
|             | 1/" | mm  | mm  | mm   |   |   |
| 06 IR 26    | 26  | 0,7 | 0,6 | 6    |   | 13500   |
| 06 IR 26    | 26  | 0,6 | 0,6 | 6    | 33500   |   |
| 06 IR 22    | 22  | 0,6 | 0,6 | 6    | 33100   | 13100   |
| 06 IR 20    | 20  | 0,6 | 0,6 | 6    | 32900   |   |
| 06 IR 20    | 20  | 0,6 | 0,7 | 6    |   | 12900   |
| 06 IR 18    | 18  | 0,6 | 0,6 | 6    | 32500   |   |
| 06 IR 18    | 18  | 0,6 | 0,7 | 6    |   | 12500   |

Steel

Stainless steel

Cast iron

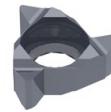
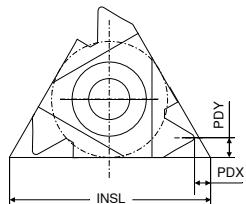
Non ferrous metals

Heat resistant alloys

→ v<sub>c</sub> Page 26

## Right hand internal thread turning insert – Mini size 06

- ▲ Partial profile
- ▲ Thread production from diameter 6mm



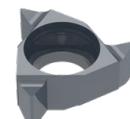
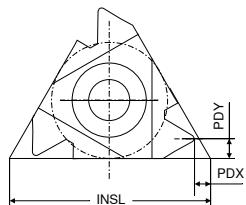
| Designation      | TP         | INSL | PDX | PDY | Article no.<br><b>71 272 ...</b> | IR  |
|------------------|------------|------|-----|-----|----------------------------------|-----|
|                  | mm         | mm   | mm  | mm  |                                  | NEW |
| <b>06 IR A60</b> | 0,5 - 1,25 | 6    | 0,6 | 0,6 | 30000                            |     |

Steel  
Stainless steel  
Cast iron  
Non ferrous metals  
Heat resistant alloys

→ v<sub>c</sub> Page 26

## Right hand internal thread turning insert – Mini size 06

- ▲ Partial profile
- ▲ Thread production from diameter 6mm



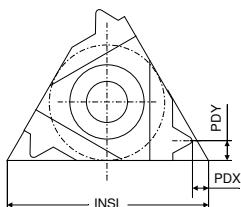
| Designation      | TPI   | INSL | PDX | PDY | Article no.<br><b>71 272 ...</b> | IR  | Article no.<br><b>71 272 ...</b> | IR  |
|------------------|-------|------|-----|-----|----------------------------------|-----|----------------------------------|-----|
|                  | 1/"   | mm   | mm  | mm  |                                  | NEW |                                  | NEW |
| <b>06 IR A55</b> | 48-20 | 6    | 0,5 | 0,6 | 30100                            |     | 10100                            |     |

Steel  
Stainless steel  
Cast iron  
Non ferrous metals  
Heat resistant alloys

→ v<sub>c</sub> Page 26

## Right hand internal thread turning insert – Mini size 08

- ▲ Full profile
- ▲ Thread production from diameter 8mm



| Designation | TP<br>mm | PDX<br>mm | PDY<br>mm | INSL<br>mm | IR                            | IR                            |
|-------------|----------|-----------|-----------|------------|-------------------------------|-------------------------------|
|             |          |           |           |            | NEW Article no.<br>71 224 ... | NEW Article no.<br>71 224 ... |
| 08 IR 0,5   | 0,50     | 0,6       | 0,5       | 8          | 34300                         | 14300                         |
| 08 IR 0,75  | 0,75     | 0,6       | 0,5       | 8          | 33700                         | 13700                         |
| 08 IR 1,0   | 1,00     | 0,6       | 0,6       | 8          | 33300                         | 13300                         |
| 08 IR 1,25  | 1,25     | 0,6       | 0,7       | 8          | 33100                         | 13100                         |
| 08 IR 1,5   | 1,50     | 0,6       | 0,7       | 8          | 32900                         | 12900                         |
| 08 IR 1,75  | 1,75     | 0,6       | 0,8       | 8          | 32700                         | 12700                         |
| 08 IN 2,0   | 2,00     | 1,0       | 4,0       | 8          | 32500 <sup>1)</sup>           | 12500 <sup>1)</sup>           |
| 08 IN 2,0   | 2,00     | 0,9       | 4,0       | 8          |                               | 12500 <sup>1)</sup>           |

Steel



Stainless steel



Cast iron



Non ferrous metals



Heat resistant alloys

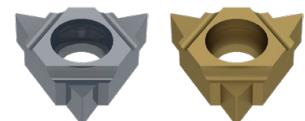
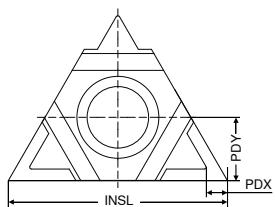


1) Neutral version (N)

→ v<sub>c</sub> Page 26

## Right hand internal thread turning insert – Mini size 08

- ▲ Partial profile
- ▲ Thread production from diameter 8mm



| Designation | TP<br>mm   | PDX<br>mm | PDY<br>mm | INSL<br>mm | IN                            | IN                            |
|-------------|------------|-----------|-----------|------------|-------------------------------|-------------------------------|
|             |            |           |           |            | NEW Article no.<br>71 273 ... | NEW Article no.<br>71 273 ... |
| 08 IN M60   | 1,75 - 2,0 | 0,8       | 4         | 8          | 30800                         | 10800                         |

Steel



Stainless steel



Cast iron



Non ferrous metals

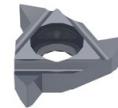
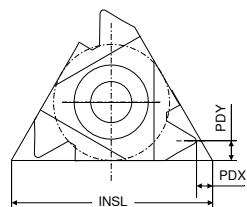


Heat resistant alloys

→ v<sub>c</sub> Page 26

## Right hand internal thread turning insert – Mini size 08

- ▲ Partial profile
- ▲ Thread production from diameter 8mm



| Designation | TP<br>mm   | PDX<br>mm | PDY<br>mm | INSL<br>mm |
|-------------|------------|-----------|-----------|------------|
| 08 IR A60   | 0,5 - 1,25 | 0,6       | 0,6       | 8          |
| 08 IR A60   | 0,5 - 1,5  | 0,6       | 0,7       | 8          |

**IR**  
**NEW**  
Article no.  
71 272 ...

**IR**  
**NEW**  
Article no.  
71 272 ...

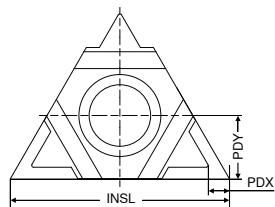
10600

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

→ v<sub>c</sub> Page 26

## Right hand internal thread turning insert – Mini size 08

- ▲ Partial profile
- ▲ Thread production from diameter 8mm



| Designation | TPI     | INSL | PDX | PDY |
|-------------|---------|------|-----|-----|
| 08 IN M55   | 14 - 11 | 8    | 0,9 | 4   |

**IN**  
**NEW**  
Article no.  
71 273 ...

**IN**  
**NEW**  
Article no.  
71 273 ...

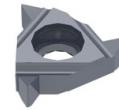
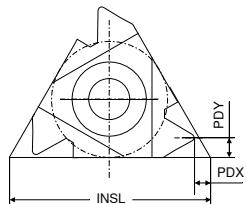
30900 10900

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

→ v<sub>c</sub> Page 26

## Right hand internal thread turning insert – Mini size 08

- ▲ Partial profile
- ▲ Thread production from diameter 8mm

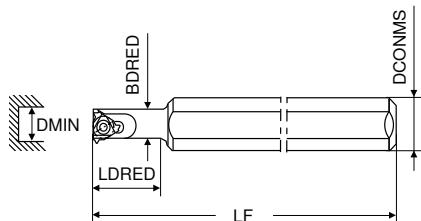


| Designation | TPI   | INSL | PDX | PDY | IR          | IR          |
|-------------|-------|------|-----|-----|-------------|-------------|
|             | 1/"   | mm   | mm  | mm  | Article no. | Article no. |
| 08 IR A55   | 48-16 | 8    | 0,6 | 0,7 | 30700       | 10700       |

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

→ v. Page 26

## Right Hand Internal Thread Holder – Mini size 06



Right-hand

**NEW**Article no.  
**71 282 ...**

| Designation            | LF<br>mm | LDRED<br>mm | DCONMS<br>mm | BDRED<br>mm | DMIN<br>mm | Insert |
|------------------------|----------|-------------|--------------|-------------|------------|--------|
| <b>SI R 0005 H06</b>   | 100      | 12          | 12           | 5,1         | 6          | 06 ..  |
| <b>SI R 0005 H06 C</b> | 100      | 26          | 6            | 5,1         | 6          | 06 ..  |

1) Solid Carbide Shank with Thro' Coolant



Clamping screw

### Spare parts

for Article no.

71 282 00500

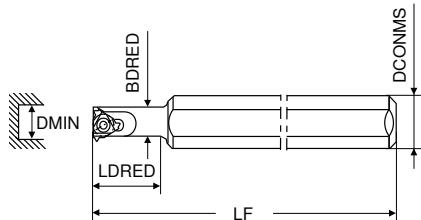
71 282 10500

Article no.  
**71 950 ...**

23800

23800

## Right Hand Internal Thread Holder – Mini size 08



Right-hand

**NEW**Article no.  
**71 282 ...**

| Designation           | LF<br>mm | LDRED<br>mm | DCONMS<br>mm | BDRED<br>mm | DMIN<br>mm | Insert |
|-----------------------|----------|-------------|--------------|-------------|------------|--------|
| <b>SI R 0007 K08</b>  | 125      | 18          | 16           | 6,6         | 7,8        | 08 ..  |
| <b>SI R 0007 K08U</b> | 125      | 21          | 16           | 7,3         | 9,0        | 08.N   |
| <b>SI R 0007 K08C</b> | 125      | 30          | 8            | 6,6         | 7,8        | 08 ..  |

1) Neutral insert indicated by marking (N)

2) Solid Carbide Shank with Thro' Coolant



Clamping screw

### Spare parts

for Article no.

71 282 00700

71 282 00800

71 282 10700

Article no.  
**71 950 ...**

23900

23900

23900

## Material examples referring to the cutting data tables

| Index | Material                                      | Strength N/mm <sup>2</sup> / HB / HRC | Material number | Material designation      | Material number         | Material designation      | Material number  | Material designation      |
|-------|---|---------------------------------------|-----------------|---------------------------|-------------------------|---------------------------|------------------|---------------------------|
| P     | 1.1 General construction steel                | < 800 N/mm <sup>2</sup>               | 1.0402          | EN3B                      |                         |                           |                  |                           |
|       | 1.2 Free cutting steel                        | < 800 N/mm <sup>2</sup>               | 1.0711          | EN1A                      |                         |                           |                  |                           |
|       | 1.3 Hardened steel, non alloyed               | < 800 N/mm <sup>2</sup>               | 1.0401          | EN32C                     |                         |                           |                  |                           |
|       | 1.4 Alloyed hardened steel                    | < 1000 N/mm <sup>2</sup>              | 1.7325          | 25 CD4                    |                         |                           |                  |                           |
|       | 1.5 Tempering steel, unalloyed                | < 850 N/mm <sup>2</sup>               | 1.5752          | EN36                      | 1.0535                  | EN9                       |                  |                           |
|       | 1.6 Tempering steel, unalloyed                | < 1000 N/mm <sup>2</sup>              | 1.6582          | EN24                      |                         |                           |                  |                           |
|       | 1.7 Tempering steel, alloyed                  | < 800 N/mm <sup>2</sup>               | 1.7225          | EN19                      |                         |                           |                  |                           |
|       | 1.8 Tempering steel, alloyed                  | < 1300 N/mm <sup>2</sup>              | 1.8515          | EN40B                     |                         |                           |                  |                           |
|       | 1.9 Steel castings                            | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 1.8509          | EN41B                     |                         |                           |                  |                           |
|       | 1.11 Nitriding steel                          | < 1200 N/mm <sup>2</sup>              | 1.1186          | EN8                       | 1.1160                  | EN14A                     |                  |                           |
|       | 1.12 Roller bearing steel                     | < 1200 N/mm <sup>2</sup>              | 1.3505          | 534A99                    |                         |                           |                  |                           |
|       | 1.13 Spring steel                             | < 1200 N/mm <sup>2</sup>              |                 | EN45                      |                         | EN47                      |                  | EN43                      |
|       | 1.14 High-speed steel                         | < 1300 N/mm <sup>2</sup>              | 1.3343          | M2                        | 1.3249                  | M34                       |                  |                           |
|       | 1.15 Cold working tool steel                  | < 1300 N/mm <sup>2</sup>              | 1.2379          | D2                        | 1.2311                  | P20                       |                  |                           |
|       | 1.16 Hot working tool steel                   | < 1300 N/mm <sup>2</sup>              | 1.2344          | H13                       |                         |                           |                  |                           |
| M     | 2.1 Cast steel and sulphured stainless steel  | < 850 N/mm <sup>2</sup>               | 1.4581          | 318                       |                         |                           |                  |                           |
|       | 2.2 Stainless steel, ferritic                 | < 750 N/mm <sup>2</sup>               | 1.4000          | 403                       |                         |                           |                  |                           |
|       | 2.3 Stainless steel, martensitic              | < 900 N/mm <sup>2</sup>               | 1.4057          | EN57                      |                         |                           |                  |                           |
|       | 2.4 Stainless steel, ferritic / martensitic   | < 1100 N/mm <sup>2</sup>              | 1.4028          | EN56B                     |                         |                           |                  |                           |
|       | 2.5 Stainless steel, austenitic / ferritic    | < 850 N/mm <sup>2</sup>               | 1.4542          | 17-4PH                    |                         |                           |                  |                           |
|       | 2.6 Stainless steel, austenitic               | < 750 N/mm <sup>2</sup>               | 1.4305          | 303                       | 1.4401                  | 316                       | 1.4301           | 304                       |
|       | 2.7 Heat resistant steel                      | < 1100 N/mm <sup>2</sup>              | 1.4876          | Incoloy 800               |                         |                           |                  |                           |
| K     | 3.1 Grey cast iron with lamellar graphite     | 100–350 N/mm <sup>2</sup>             | 0.6015          | Grade 150                 | 0.6020                  | Grade 220                 | 0.6025           | Grade 260                 |
|       | 3.2 Grey cast iron with lamellar graphite     | 300–500 N/mm <sup>2</sup>             | 0.6030          | Grade 300                 | 0.6035                  | Grade 350                 | 0.6040           | Grade 400                 |
|       | 3.3 Gray cast iron with spheroidal graphite   | 300–500 N/mm <sup>2</sup>             | 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/mm <sup>2</sup>             | 0.7060          | SG 600-3                  | 0.7070                  | SG 700-2                  | 0.7080           | SG 800-2                  |
|       | 3.5 White malleable cast iron                 | 270–450 N/mm <sup>2</sup>             | 0.8035          | GTW-35                    | 0.8045                  | GTW-45                    |                  |                           |
|       | 3.6 White malleable cast iron                 | 500–650 N/mm <sup>2</sup>             | 0.8055          | GTW-55                    | 0.8065                  | GTW-65                    |                  |                           |
|       | 3.7 Black malleable cast iron                 | 300–450 N/mm <sup>2</sup>             | 0.8135          | GTS-35                    | 0.8145                  | GTS-45                    |                  |                           |
|       | 3.8 Black malleable cast iron                 | 500–800 N/mm <sup>2</sup>             | 0.8155          | GTS-55                    | 0.8170                  | GTS-70                    |                  |                           |
| N     | 4.1 Aluminium (non alloyed, low alloyed)      | < 350 N/mm <sup>2</sup>               | 3.0255          | 1050 A                    | 3.0275                  | 1070 A                    | 3.0285           | 1080 A (A8)               |
|       | 4.2 Aluminium alloys < 0.5 % Si               | < 500 N/mm <sup>2</sup>               | 3.1325          | 2017 A (AU4G)             | 3.4335                  | 7005 (AZ5G)               | 3.4365           | 7075 (AZ5GU)              |
|       | 4.3 Aluminium alloy 0.5–10 % Si               | < 400 N/mm <sup>2</sup>               | 3.2315          | A-G 51                    | 3.2373                  | A-S9 G                    | 3.2151           | A-S 6 U4                  |
|       | 4.4 Aluminium alloys 10–15 % Si               | < 400 N/mm <sup>2</sup>               | 3.2581          | A-S12                     | 3.2583                  | A-S12 U                   |                  |                           |
|       | 4.5 Aluminum alloys > 15 % Si                 | < 400 N/mm <sup>2</sup>               |                 | A-S18                     | A-S17 U4                |                           |                  |                           |
|       | 4.6 Copper (non alloyed, low alloyed)         | < 350 N/mm <sup>2</sup>               | 2.0040          | Cu-c1                     | 2.0060                  | Cu-a1                     | 2.0090           | Cu-b1                     |
|       | 4.7 Copper wrought alloys                     | < 700 N/mm <sup>2</sup>               | 2.1247          | Cub2 (Beryllium 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/mm <sup>2</sup>               | 2.0331          | Cu Zn36 Pb1,5             | 2.0380                  | Cu Zn39 Pb2 (Ms 56)       | 2.0410           | Cu Zn44 Pb2               |
| S     | 4.12 Long-chipping brass                      | < 600 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>               | 3.5812          | Mg A7 Z1                  | 3.5662                  | Mg A9                     | 3.5105           | Mg Tr 22 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                      |
|       | 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)             |
| H     | 5.3 Nickel alloys                             | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4964          | Co Cr20 W15 Ni10          |                         | Co Cr20 Ni16 Mo7          |                  | Co Cr28 Mo 6              |
|       | 5.7 Heat resistant alloys                     | < 1300 N/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4851          | Ni Cr23Fe (Inconel 601)   | 2.4668                  | Ni Cr19NbMo (Inconel 718) | 2.4602           | Ni Cr21Mo14 Hastelloy C22 |
|       | 5.9 Pure titanium                             | < 900 N/mm <sup>2</sup>               | 3.7025          | T35 (Titanium Grade 1)    | 3.7034                  | T40 (Titanium Grade 2)    | 3.7064           | T60 (Titanium Grade 4)    |
|       | 5.10 Titanium alloys                          | < 700 N/mm <sup>2</sup>               | T-A6-Nb7 (367)  |                           | T-A5-Sn2-Mo4-Cr4 (Ti17) |                           | T-A3-V2,5 (Gr18) |                           |
|       | 5.11 Titanium alloys                          | < 1200 N/mm <sup>2</sup>              | 3.7165          | T-A6-V4 (Ta6V)            |                         | T-A4-3V-Mo2-Fe2 (SP700)   |                  | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
|       | 6.1   | < 45 HRC                              |                 |                           |                         |                           |                  |                           |
|       | 6.2   | 46–55 HRC                             |                 |                           |                         |                           |                  |                           |
|       | 6.3   | Tempered steel                        | 56–60 HRC       |                           |                         |                           |                  |                           |
|       | 6.4   |                                       | 61–65 HRC       |                           |                         |                           |                  |                           |
|       | 6.5   |                                       | 65–70 HRC       |                           |                         |                           |                  |                           |

## Cutting data standard values

|       | Mini<br>CCN1525 | Mini<br>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



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



- ▲ 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.



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| Technical Information                 |       |
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## 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

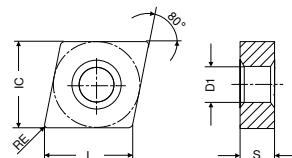
|          |        | Steel |   |   |   |   | Stainless steel |      |      |      |      | Cast iron |    |    |  |  | Non ferrous metals |  |  |  |  | Heat resistant |  |  |  |  | Geometry |  |  |  |  |  |
|----------|--------|-------|---|---|---|---|-----------------|------|------|------|------|-----------|----|----|--|--|--------------------|--|--|--|--|----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

|          |        | Steel |   |   |   |   | Stainless steel |      |      |      |      | Cast iron |    |    |  |  | Non ferrous metals |  |  |  |  | Heat resistant |  |  |  |  | Geometry |  |    |    |  |  |
|----------|--------|-------|---|---|---|---|-----------------|------|------|------|------|-----------|----|----|--|--|--------------------|--|--|--|--|----------------|--|--|--|--|----------|--|----|----|--|--|
|          |        | P     | M | K | N | S | CC..            | DC.. | RC.. | SC.. | TC.. | VC..      |    |    |  |  |                    |  |  |  |  |                |  |  |  |  |          |  |    |    |  |  |
| Positive | 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<br>mm | S<br>mm | D1<br>mm | IC<br>mm |
|-------------|---------|---------|----------|----------|
| CNMG 1204.. | 12,9    | 4,76    | 5,16     | 12,7     |

**CNMG**

-M34  
CTPX710

DRAGOSKIN



M

CNMG

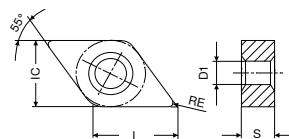
**NEW**  
Article no.  
**75 003 ...**

| ISO      | RE<br>mm | 62800 |
|----------|----------|-------|
| 120404EN | 0,4      | 62800 |
| 120408EN | 0,8      | 63000 |
| 120412EN | 1,2      | 63200 |
| 120416EN | 1,6      | 63400 |

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

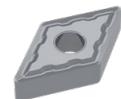
**DNMG**

| Designation | L<br>mm | S<br>mm | D1<br>mm | IC<br>mm |
|-------------|---------|---------|----------|----------|
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| DNMG 1506.. | 15,5    | 6,35    | 5,16     | 12,7     |

**DNMG**

-M34  
CTPX710

DRAGONSKIN



M

DNMG

NEW

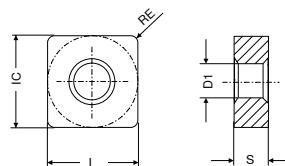
Article no.  
75 004 ...

| ISO      | RE<br>mm |       |
|----------|----------|-------|
| 150404EN | 0,4      | 61600 |
| 150408EN | 0,8      | 61800 |
| 150412EN | 1,2      | 62000 |
| 150608EN | 0,8      | 63000 |
| 150612EN | 1,2      | 63200 |

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

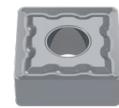
**SNMG**

| Designation  | L<br>mm | S<br>mm | D1<br>mm | IC<br>mm |
|--------------|---------|---------|----------|----------|
| SNMG 1204... | 12,7    | 4,76    | 5,16     | 12,7     |

**SNMG**

-M34  
CTPX710

DRAGOSKIN



M

SNMG

NEW

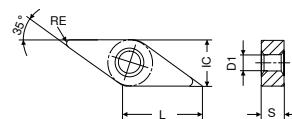
Article no.  
75 005 ...

| ISO      | RE<br>mm |  |       |
|----------|----------|--|-------|
| 120408EN | 0,8      |  | 61800 |
| 120412EN | 1,2      |  | 62000 |

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

## VNMG

| Designation | L<br>mm | S<br>mm | D1<br>mm | IC<br>mm |
|-------------|---------|---------|----------|----------|
| VNMG 1604.. | 16,6    | 4,76    | 3,81     | 9,52     |



## VNMG

-M34  
CTPX710

DRAGONSKIN



M

VNMG

NEW

Article no.  
75 009 ...

| ISO      | RE<br>mm | 61600 |
|----------|----------|-------|
| 160404EN | 0,4      | 61600 |
| 160408EN | 0,8      | 61800 |
| 160412EN | 1,2      | 62000 |

Steel



Stainless steel



Cast iron



Non ferrous metals

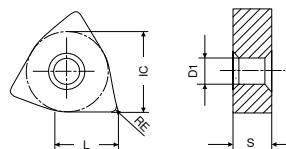


Heat resistant alloys



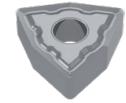
**WNMG**

| Designation | L<br>mm | S<br>mm | D1<br>mm | IC<br>mm |
|-------------|---------|---------|----------|----------|
| WNMG 0804.. | 8,6     | 4,76    | 5,16     | 12,7     |

**WNMG**

-M34  
CTPX710

DRAGONSKIN



M

WNMG

NEW

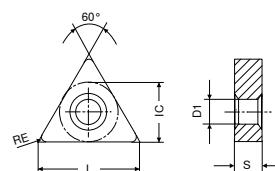
Article no.  
**75 008 ...**

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|----------|----------|--|-------|
| 080408EN | 0,8      |  | 61800 |
| 080412EN | 1,2      |  | 62000 |

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

## TNMG

| Designation | L<br>mm | S<br>mm | D1<br>mm | IC<br>mm |
|-------------|---------|---------|----------|----------|
| TNMG 1604.. | 16,5    | 4,76    | 3,81     | 9,52     |
| TNMG 2204.. | 22,0    | 4,76    | 5,16     | 12,70    |



## TNMG

-M34  
CTPX710

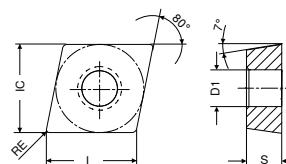


M  
TNMG  
NEW  
Article no.  
75 006 ...

| ISO                   | RE<br>mm |       |
|-----------------------|----------|-------|
| 160408EN              | 0,8      | 61800 |
| 220404EN              | 0,4      | 62800 |
| 220408EN              | 0,8      | 63000 |
| 220416EN              | 1,6      | 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

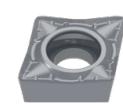
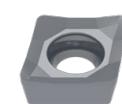
DRAGONSkin



DRAGONSkin



DRAGONSkin

M  
CCGT**NEW**  
Article no.  
70 254 ...M  
CCGT**NEW**  
Article no.  
70 248 ...M  
CCGT**NEW**  
Article no.  
70 248 ...

| ISO      | RE  | M<br>CCGT | M<br>CCGT | M<br>CCGT |
|----------|-----|-----------|-----------|-----------|
|          | mm  |           |           |           |
| 060202FN | 0,2 | 80200     |           | 70200     |
| 060204FN | 0,4 | 80400     | 75400     | 70400     |
| 09T302FN | 0,2 | 81400     |           | 71400     |
| 09T304FN | 0,4 | 81600     | 76600     | 71600     |
| 09T308FN | 0,8 | 81800     | 76800     | 71800     |
| 120402FN | 0,2 | 82600     |           |           |
| 120404FN | 0,4 | 82800     | 77800     | 72800     |
| 120408FN | 0,8 | 83000     | 78000     | 73000     |

Steel

● ● ●

Stainless steel

● ● ●

Cast iron

○ ○ ○

Non ferrous metals

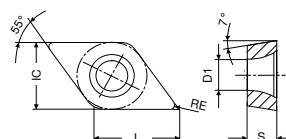
● ● ●

Heat resistant alloys

● ● ●

## DCGT

| Designation | L<br>mm | S<br>mm | D1<br>mm | IC<br>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



M  
DCGT

NEW  
Article no.  
70 260 ...

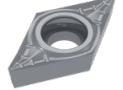
DRAGONSkin



M  
DCGT

NEW  
Article no.  
70 263 ...

DRAGONSkin



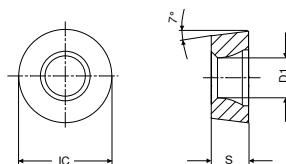
M  
DCGT

NEW  
Article no.  
70 263 ...

| ISO                   | RE<br>mm | 80200 | 70200 |
|-----------------------|----------|-------|-------|
| 070202FN              | 0,2      | 80200 | 70200 |
| 070204FN              | 0,4      | 80400 | 70400 |
| 11T302FN              | 0,2      | 81400 | 71400 |
| 11T304FL              | 0,4      |       | 75700 |
| 11T304FN              | 0,4      | 81600 | 75600 |
| 11T304FR              | 0,4      |       | 75800 |
| 11T308FN              | 0,8      | 81800 | 76000 |
| 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

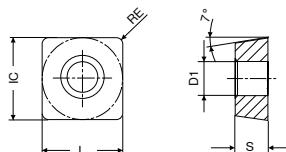
**NEW**  
Article no.  
**70 266 ...**

| ISO      | RE |  |       |
|----------|----|--|-------|
|          | mm |  |       |
| 0803MOFN | 4  |  | 80200 |
| 1003MOFN | 5  |  | 80400 |

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

## SCGT

| Designation | L<br>mm | S<br>mm | D1<br>mm | IC<br>mm |
|-------------|---------|---------|----------|----------|
| SCGT 09T3.. | 9,52    | 3,97    | 4,4      | 9,52     |
| SCGT 1204.. | 12,70   | 4,76    | 5,5      | 12,70    |



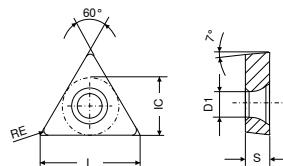
## SCGT

**-27**  
**CTPX715****-25P**  
**CTPX710**

|                       |          |            |  |                |       |
|-----------------------|----------|------------|--|----------------|-------|
| ISO                   | RE<br>mm | DRAGONSkin |  | DRAGONSkin     |       |
|                       |          |            |  |                |       |
| 09T304FN              | 0,4      |            |  |                |       |
| 09T308FN              | 0,8      |            |  | 80400<br>80600 |       |
| 120408FN              | 0,8      |            |  |                | 71600 |
| Steel                 |          | ●          |  | ●              |       |
| Stainless steel       |          | ●          |  | ●              |       |
| Cast iron             |          | ○          |  | ○              |       |
| Non ferrous metals    |          | ●          |  | ●              |       |
| Heat resistant alloys |          | ●          |  | ●              |       |

## TCGT

| Designation | L<br>mm | S<br>mm | D1<br>mm | IC<br>mm |
|-------------|---------|---------|----------|----------|
| TCGT 1102.. | 11,0    | 2,38    | 2,8      | 6,35     |
| TCGT 16T3.. | 16,5    | 3,97    | 4,4      | 9,52     |



## TCGT

-27  
CTPX715



M

TCGT

NEW

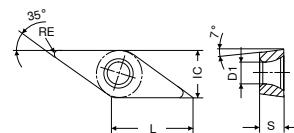
Article no.  
70 276 ...

| ISO      | RE<br>mm |  |       |
|----------|----------|--|-------|
| 110204FN | 0,4      |  | 81600 |
| 16T308FN | 0,8      |  | 83000 |

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

VCGT

| Designation        | L    | S    | D1  | IC    |
|--------------------|------|------|-----|-------|
|                    | mm   | mm   | mm  | mm    |
| <b>VCGT 1103..</b> | 11,1 | 3,18 | 2,9 | 6,35  |
| <b>VCGT 1604..</b> | 16,6 | 4,76 | 4,4 | 9,52  |
| <b>VCGT 2205..</b> | 22,1 | 5,56 | 5,5 | 12,70 |



VCGT



| ISO                   | RE<br>mm | NEW                       |                           | NEW                       |                           |
|-----------------------|----------|---------------------------|---------------------------|---------------------------|---------------------------|
|                       |          | Article no.<br>70 280 ... | Article no.<br>70 282 ... | Article no.<br>70 280 ... | Article no.<br>70 282 ... |
| 110302FN              | 0,2      |                           | 81400                     |                           | 71400                     |
| 110304FN              | 0,4      |                           | 81600                     |                           | 71600                     |
| 160404FN              | 0,4      |                           | 82800                     |                           | 72800                     |
| 160408FN              | 0,8      |                           | 83000                     |                           | 73000                     |
| 160412FN              | 1,2      |                           |                           |                           | 73200                     |
| 220530FN              | 3,0      |                           |                           |                           | 75000                     |
| Steel                 |          | ●                         | ●                         |                           |                           |
| Stainless steel       |          |                           |                           | ●                         | ●                         |
| Cast iron             |          | ●                         |                           | ○                         | ○                         |
| Non ferrous metals    |          | ●                         |                           | ●                         | ●                         |
| Heat resistant alloys |          | ●                         |                           | ●                         | ●                         |

## Material examples referring to the cutting data tables

| Index | Material                                      | Strength<br>N/mm <sup>2</sup> / HB / HRC | Material<br>number | Material designation      | Material<br>number | Material designation      | Material<br>number | Material designation      |
|-------|---|--|--------------------|---------------------------|--------------------|---------------------------|--------------------|---------------------------|
| P     | 1.1 General construction steel                | < 800 N/mm <sup>2</sup>                  | 1.0402             | EN3B                      |                    |                           |                    |                           |
|       | 1.2 Free cutting steel                        | < 800 N/mm <sup>2</sup>                  | 1.0711             | EN1A                      |                    |                           |                    |                           |
|       | 1.3 Hardened steel, non alloyed               | < 800 N/mm <sup>2</sup>                  | 1.0401             | EN32C                     |                    |                           |                    |                           |
|       | 1.4 Alloyed hardened steel                    | < 1000 N/mm <sup>2</sup>                 | 1.7325             | 25 CD4                    |                    |                           |                    |                           |
|       | 1.5 Tempering steel, unalloyed                | < 850 N/mm <sup>2</sup>                  | 1.5752             | EN36                      | 1.0535             | EN9                       |                    |                           |
|       | 1.6 Tempering steel, unalloyed                | < 1000 N/mm <sup>2</sup>                 | 1.6582             | EN24                      |                    |                           |                    |                           |
|       | 1.7 Tempering steel, alloyed                  | < 800 N/mm <sup>2</sup>                  | 1.7225             | EN19                      |                    |                           |                    |                           |
|       | 1.8 Tempering steel, alloyed                  | < 1300 N/mm <sup>2</sup>                 | 1.8515             | EN40B                     |                    |                           |                    |                           |
|       | 1.9 Steel castings                            | < 850 N/mm <sup>2</sup>                  | 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/mm <sup>2</sup>                 | 1.8509             | EN41B                     |                    |                           |                    |                           |
|       | 1.11 Nitriding steel                          | < 1200 N/mm <sup>2</sup>                 | 1.1186             | EN8                       | 1.1160             | EN14A                     |                    |                           |
|       | 1.12 Roller bearing steel                     | < 1200 N/mm <sup>2</sup>                 | 1.3505             | 534A99                    |                    |                           |                    |                           |
|       | 1.13 Spring steel                             | < 1200 N/mm <sup>2</sup>                 |                    | EN45                      |                    | EN47                      |                    | EN43                      |
|       | 1.14 High-speed steel                         | < 1300 N/mm <sup>2</sup>                 | 1.3343             | M2                        | 1.3249             | M34                       |                    |                           |
|       | 1.15 Cold working tool steel                  | < 1300 N/mm <sup>2</sup>                 | 1.2379             | D2                        | 1.2311             | P20                       |                    |                           |
|       | 1.16 Hot working tool steel                   | < 1300 N/mm <sup>2</sup>                 | 1.2344             | H13                       |                    |                           |                    |                           |
| M     | 2.1 Cast steel and sulphured stainless steel  | < 850 N/mm <sup>2</sup>                  | 1.4581             | 318                       |                    |                           |                    |                           |
|       | 2.2 Stainless steel, ferritic                 | < 750 N/mm <sup>2</sup>                  | 1.4000             | 403                       |                    |                           |                    |                           |
|       | 2.3 Stainless steel, martensitic              | < 900 N/mm <sup>2</sup>                  | 1.4057             | EN57                      |                    |                           |                    |                           |
|       | 2.4 Stainless steel, ferritic / martensitic   | < 1100 N/mm <sup>2</sup>                 | 1.4028             | EN56B                     |                    |                           |                    |                           |
|       | 2.5 Stainless steel, austenitic / ferritic    | < 850 N/mm <sup>2</sup>                  | 1.4542             | 17-4PH                    |                    |                           |                    |                           |
|       | 2.6 Stainless steel, austenitic               | < 750 N/mm <sup>2</sup>                  | 1.4305             | 303                       | 1.4401             | 316                       | 1.4301             | 304                       |
|       | 2.7 Heat resistant steel                      | < 1100 N/mm <sup>2</sup>                 | 1.4876             | Incoloy 800               |                    |                           |                    |                           |
| K     | 3.1 Grey cast iron with lamellar graphite     | 100–350 N/mm <sup>2</sup>                | 0.6015             | Grade 150                 | 0.6020             | Grade 220                 | 0.6025             | Grade 260                 |
|       | 3.2 Grey cast iron with lamellar graphite     | 300–500 N/mm <sup>2</sup>                | 0.6030             | Grade 300                 | 0.6035             | Grade 350                 | 0.6040             | Grade 400                 |
|       | 3.3 Gray cast iron with spheroidal graphite   | 300–500 N/mm <sup>2</sup>                | 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/mm <sup>2</sup>                | 0.7060             | SG 600-3                  | 0.7070             | SG 700-2                  | 0.7080             | SG 800-2                  |
|       | 3.5 White malleable cast iron                 | 270–450 N/mm <sup>2</sup>                | 0.8035             | GTW-35                    | 0.8045             | GTW-45                    |                    |                           |
|       | 3.6 White malleable cast iron                 | 500–650 N/mm <sup>2</sup>                | 0.8055             | GTW-55                    | 0.8065             | GTW-65                    |                    |                           |
|       | 3.7 Black malleable cast iron                 | 300–450 N/mm <sup>2</sup>                | 0.8135             | GTS-35                    | 0.8145             | GTS-45                    |                    |                           |
|       | 3.8 Black malleable cast iron                 | 500–800 N/mm <sup>2</sup>                | 0.8155             | GTS-55                    | 0.8170             | GTS-70                    |                    |                           |
| N     | 4.1 Aluminium (non alloyed, low alloyed)      | < 350 N/mm <sup>2</sup>                  | 3.0255             | 1050 A                    | 3.0275             | 1070 A                    | 3.0285             | 1080 A (A8)               |
|       | 4.2 Aluminium alloys < 0.5 % Si               | < 500 N/mm <sup>2</sup>                  | 3.1325             | 2017 A (AU4G)             | 3.4335             | 7005 (AZ5G)               | 3.4365             | 7075 (AZ5GU)              |
|       | 4.3 Aluminium alloy 0.5–10 % Si               | < 400 N/mm <sup>2</sup>                  | 3.2315             | A-G 51                    | 3.2373             | A-S9 G                    | 3.2151             | A-S 6 U4                  |
|       | 4.4 Aluminium alloys 10–15 % Si               | < 400 N/mm <sup>2</sup>                  | 3.2581             | A-S12                     | 3.2583             | A-S12 U                   |                    |                           |
|       | 4.5 Aluminum alloys > 15 % Si                 | < 400 N/mm <sup>2</sup>                  |                    | A-S18                     | A-S17 U4           |                           |                    |                           |
|       | 4.6 Copper (non alloyed, low alloyed)         | < 350 N/mm <sup>2</sup>                  | 2.0040             | Cu-c1                     | 2.0060             | Cu-a1                     | 2.0090             | Cu-b1                     |
|       | 4.7 Copper wrought alloys                     | < 700 N/mm <sup>2</sup>                  | 2.1247             | Cub2 (Beryllium 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/mm <sup>2</sup>                  | 2.0331             | Cu Zn36 Pb1,5             | 2.0380             | Cu Zn39 Pb2 (Ms 56)       | 2.0410             | Cu Zn44 Pb2               |
| S     | 4.12 Long-chipping brass                      | < 600 N/mm <sup>2</sup>                  | 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/mm <sup>2</sup>                  | 3.5812             | Mg A7 Z1                  | 3.5662             | Mg A9                     | 3.5105             | Mg Tr 22 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                      |
|       | 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)             |
| H     | 5.3 Nickel alloys                             | < 850 N/mm <sup>2</sup>                  | 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/mm <sup>2</sup>                 | 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/mm <sup>2</sup>                 | 2.4964             | Co Cr20 W15 Ni10          |                    | Co Cr20 Ni16 Mo7          |                    | Co Cr28 Mo 6              |
|       | 5.7 Heat resistant alloys                     | < 1300 N/mm <sup>2</sup>                 | 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/mm <sup>2</sup>                 | 2.4851             | Ni Cr23Fe (Inconel 601)   | 2.4668             | Ni Cr19NbMo (Inconel 718) | 2.4602             | Ni Cr21Mo14 Hastelloy C22 |
|       | 5.9 Pure titanium                             | < 900 N/mm <sup>2</sup>                  | 3.7025             | T35 (Titanium Grade 1)    | 3.7034             | T40 (Titanium Grade 2)    | 3.7064             | T60 (Titanium Grade 4)    |
|       | 5.10 Titanium alloys                          | < 700 N/mm <sup>2</sup>                  |                    | T-A6-Nb7 (367)            |                    | T-A5-Sn2-Mo4-Cr4 (Ti17)   |                    | T-A3-V2,5 (Gr18)          |
|       | 5.11 Titanium alloys                          | < 1200 N/mm <sup>2</sup>                 | 3.7165             | T-A6-V4 (Ta6V)            |                    | T-A4-3V-Mo2-Fe2 (SP700)   |                    | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
|       | 6.1   | < 45 HRC                                 |                    |                           |                    |                           |                    |                           |
|       | 6.2   | 46–55 HRC                                |                    |                           |                    |                           |                    |                           |
|       | 6.3   | Tempered steel                           | 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<br>-M34 | CTPX710<br>-25P / -25Q | CTPX715<br>-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 |           | Geometry |
|---|---|--------|------------|-------------------------|-----------------|------------------------|-----------|----------|
|   |   |        |            |                         |                 | $a_p$<br>mm            | f<br>mm   |          |
| <b>Main applications super alloys</b>   | -M34 (-M34)                                   | M      | CTPX710    | CTPX710                 |                 |                        |           |          |
|   | ▲ First choice for superalloys                |        | CTPX710    | CTPX710                 |                 |                        |           | CN..     |
|   | ▲ Light cutting geometry                      |        | CTPX710    | CTPX710                 |                 |                        |           | DN..     |
|   | ▲ Little built-up edge                        |        | CTPX710    | CTPX710                 |                 |                        |           | SN..     |
|   | ▲ Low cutting forces                          |        | CTPX710    | CTPX710                 |                 |                        |           | VN..     |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           | WN..     |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           | TN..     |
|   |   |        | CTPX710    | CTPX710                 |                 | 0,80-3,0               | 0,10-0,30 |          |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           |          |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           |          |
| <b>Main application non-ferrous metals, secondary application stainless steels, steels, super alloys, cast iron</b> | -25P (-25P)                                   | F<br>M | CTPX710    | CTPX710                 |                 |                        |           |          |
|   | ▲ Sharp cutting edge                          |        | CTPX710    | CTPX710                 |                 |                        |           | CC..     |
|   | ▲ Good swarf control on soft aluminium alloys |        | CTPX710    | CTPX710                 |                 |                        |           | DC..     |
|   | ▲ Low adhesion                                |        | CTPX710    | CTPX710                 |                 |                        |           | SC..     |
|   |   |        | CTPX710    | CTPX710                 | CTPX710         |                        |           | VC..     |
|   |   |        | CTPX710    | CTPX710                 |                 | 0,50-4,50              | 0,05-0,60 |          |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           |          |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           |          |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           |          |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           |          |
| <b>Main application non-ferrous metals, secondary application stainless steels, steels, super alloys, cast iron</b> | -25Q (-25Q)                                   | M      | CTPX710    | CTPX710                 |                 |                        |           |          |
|   | ▲ Wiper geometry                              |        | CTPX710    | CTPX710                 |                 |                        |           | CC..     |
|   | ▲ High feed rates                             |        | CTPX710    | CTPX710                 |                 |                        |           | DC..     |
|   | ▲ High surface quality                        |        | CTPX710    | CTPX710                 |                 |                        |           | VC..     |
|   | ▲ Good swarf control on soft aluminium alloys |        | CTPX710    | CTPX710                 |                 |                        |           |          |
|   | ▲ Low adhesion                                |        | CTPX710    | CTPX710                 | CTPX710         |                        |           |          |
|   |   |        | CTPX710    | CTPX710                 |                 | 0,05-6,50              | 0,05-0,60 |          |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           |          |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           |          |
|   |   |        | CTPX710    | CTPX710                 |                 |                        |           |          |
| <b>Main application non-ferrous metals, secondary application stainless steels, steels, super alloys, cast iron</b> | -27 (-27)                                     | M<br>R | CTPX715    | CTPX715                 |                 |                        |           |          |
|   | ▲ The universal Alu geometry                  |        | CTPX715    | CTPX715                 |                 |                        |           | CC..     |
|   | ▲ Sharp cutting edge                          |        | CTPX715    | CTPX715                 |                 |                        |           | DC..     |
|   | ▲ Extremely positive rake angle               |        | CTPX715    | CTPX715                 |                 |                        |           | RC..     |
|   | ▲ Low adhesion                                |        | CTPX715    | CTPX715                 |                 |                        |           | SC..     |
|   | ▲ High feed rates                             |        | CTPX715    | CTPX715                 | CTPX715         |                        |           | TC..     |
|   |   |        | CTPX715    | CTPX715                 |                 | 1,00-10,00             | 0,10-0,75 | VC..     |
|   |   |        | CTPX715    | CTPX715                 |                 |                        |           |          |
|   |   |        | CTPX715    | CTPX715                 |                 |                        |           |          |
|   |   |        | 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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|   |       |
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| Overview High Performance Milling Cutters | 44    |
| Product programme                         | 45–60 |
| Technical Information                     |       |
| Cutting Data                              | 61–79 |

**WNT** \ Performance

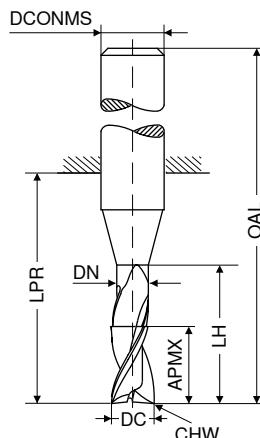
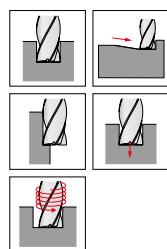
Premium quality tools for high performance.

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

| Tooltype | Number of flutes | Diameter in mm |       |                 |           |                    |                                      | Length | Tool design | Pages  |             |     |  |       |
|----------|------------------|----------------|-------|-----------------|-----------|--------------------|--------------------------------------|--------|-------------|--------|-------------|-----|--|-------|
|          |                  |                | Steel | Stainless steel | Cast iron | Non ferrous metals | Heat resistant<br>hardened materials | Sharp  | Chamfer     | Radius | Full Radius |     |  |       |
| N        | 2                | 3-20           | ●     | ●               | ●         | ○                  | ●                                    |        |             |        |             | HPC |  | 45    |
| N        | 3                | 3-20           | ●     | ●               | ●         | ○                  | ●                                    |        |             |        |             | HPC |  | 46-48 |
| N        | 4                | 3-20           | ●     | ●               | ●         | ○                  | ●                                    |        |             |        |             | HPC |  | 49+50 |
| N        | 4                | 3-20           | ●     | ●               | ●         | ○                  | ●                                    |        |             |        |             | HPC |  | 51    |
| N        | 4                | 6-20           | ●     | ●               | ●         | ○                  | ●                                    |        |             |        |             | HPC |  | 52    |
| N        | 4                | 3-20           | ●     | ●               | ●         | ○                  | ●                                    |        |             |        |             | HPC |  | 53+54 |
| NF       | 4                | 3-20           | ●     | ●               | ●         | ○                  | ●                                    |        |             |        |             | HPC |  | 55    |
| NR       | 4                | 3-20           | ●     | ●               | ●         | ○                  | ●                                    |        |             |        |             | HPC |  | 56    |
| N        | 6                | 6-25           | ●     | ●               | ○         | ○                  | ●                                    |        |             |        |             |     |  | 57    |
| N        | 2                | 3-20           | ●     | ●               | ●         | ○                  | ○                                    |        |             |        |             |     |  | 58    |
| N        | 4                | 4-20           | ●     | ○               | ●         | ○                  | ○                                    |        |             |        |             |     |  | 59    |
| N        | 4                | 6-20           | ●     | ○               | ●         | ○                  | ○                                    |        |             |        |             | HPC |  | 60    |

## SilverLine – End milling cutter



DPB72S

DRAGONSKIN

≈DIN 6527  
HB

NEW

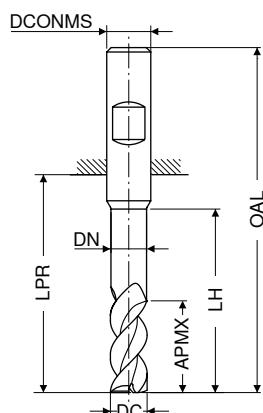
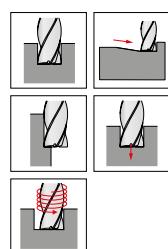
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50 958 ...

| DC <sub>e8</sub> | APMX | DN   | LH | LPR | OAL | DCONMS <sub>h6</sub> | CHW | ZEFP |       |
|------------------|------|------|----|-----|-----|----------------------|-----|------|-------|
| mm               | mm   | mm   | mm | mm  | mm  | mm                   | mm  |      |       |
| 3,0              | 8    | 2,8  | 15 | 21  | 57  | 6                    | 0,1 | 2    | 03200 |
| 3,5              | 11   | 3,3  | 15 | 21  | 57  | 6                    | 0,1 | 2    | 03700 |
| 4,0              | 11   | 3,8  | 15 | 21  | 57  | 6                    | 0,1 | 2    | 04200 |
| 4,5              | 13   | 4,3  | 21 | 21  | 57  | 6                    | 0,1 | 2    | 04700 |
| 5,0              | 13   | 4,8  | 21 | 21  | 57  | 6                    | 0,1 | 2    | 05200 |
| 5,5              | 13   | 5,3  | 21 | 21  | 57  | 6                    | 0,1 | 2    | 05700 |
| 6,0              | 13   | 5,8  | 21 | 21  | 57  | 6                    | 0,1 | 2    | 06200 |
| 7,0              | 16   | 6,8  | 27 | 27  | 63  | 8                    | 0,1 | 2    | 07200 |
| 8,0              | 19   | 7,8  | 27 | 27  | 63  | 8                    | 0,1 | 2    | 08200 |
| 9,0              | 19   | 8,8  | 32 | 32  | 72  | 10                   | 0,1 | 2    | 09200 |
| 10,0             | 22   | 9,8  | 32 | 32  | 72  | 10                   | 0,1 | 2    | 10200 |
| 11,0             | 26   | 10,8 | 38 | 38  | 83  | 12                   | 0,1 | 2    | 11200 |
| 12,0             | 26   | 11,8 | 38 | 38  | 83  | 12                   | 0,1 | 2    | 12200 |
| 14,0             | 26   | 13,8 | 38 | 38  | 83  | 14                   | 0,1 | 2    | 14200 |
| 15,0             | 32   | 14,7 | 44 | 44  | 92  | 16                   | 0,1 | 2    | 15200 |
| 16,0             | 32   | 15,7 | 44 | 44  | 92  | 16                   | 0,1 | 2    | 16200 |
| 17,0             | 32   | 16,7 | 44 | 44  | 92  | 18                   | 0,1 | 2    | 17200 |
| 18,0             | 32   | 17,7 | 44 | 44  | 92  | 18                   | 0,1 | 2    | 18200 |
| 19,0             | 38   | 18,7 | 54 | 54  | 104 | 20                   | 0,1 | 2    | 19200 |
| 20,0             | 38   | 19,7 | 54 | 54  | 104 | 20                   | 0,1 | 2    | 20200 |

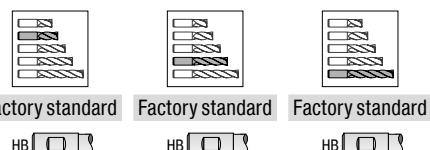
|                       |   |
|-----------------------|---|
| Steel                 | ● |
| Stainless steel       | ● |
| Cast iron             | ● |
| Non ferrous metals    | ○ |
| Heat resistant alloys | ● |
| Hardened materials    | ● |

→ v<sub>c</sub>/f<sub>z</sub> Page 62+63

## SilverLine – End milling cutter



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DRAGONSkin    DRAGONSkin    DRAGONSkin

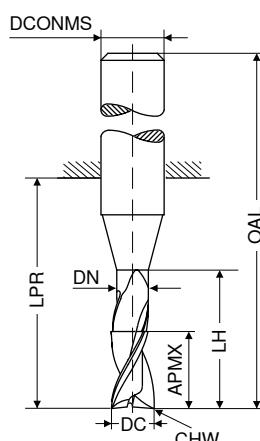
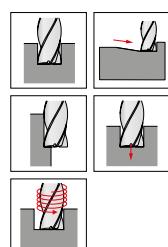


| DC <sub>f8</sub> | APMX | DN   | LH | LPR | OAL | DCONMS <sub>h6</sub> | ZEFP | NEW Article no. 50 992 ... | NEW Article no. 50 992 ... | NEW Article no. 50 992 ... |
|------------------|------|------|----|-----|-----|----------------------|------|----------------------------|----------------------------|----------------------------|
| mm               | mm   | mm   | mm | mm  | mm  | mm                   |      |                            |                            |                            |
| 3,0              | 8    | 2,9  | 15 | 21  | 57  | 6                    | 3    |                            | 03200                      |                            |
| 3,5              | 11   | 3,4  | 16 | 21  | 57  | 6                    | 3    |                            | 03700                      |                            |
| 4,0              | 8    | 3,9  | 15 | 18  | 54  | 6                    | 3    | 04100                      |                            | 04200                      |
| 4,0              | 11   | 3,9  | 16 | 21  | 57  | 6                    | 3    |                            |                            | 04400                      |
| 4,0              | 16   |      |    | 26  | 62  | 6                    | 3    |                            |                            |                            |
| 4,5              | 13   | 4,4  | 19 | 21  | 57  | 6                    | 3    |                            | 04700                      |                            |
| 5,0              | 9    | 4,9  | 16 | 18  | 54  | 6                    | 3    | 05100                      |                            | 05200                      |
| 5,0              | 13   | 4,9  | 19 | 21  | 57  | 6                    | 3    |                            |                            | 05400                      |
| 5,0              | 17   |      |    | 26  | 62  | 6                    | 3    |                            |                            |                            |
| 5,5              | 13   | 5,4  | 19 | 21  | 57  | 6                    | 3    |                            | 05700                      |                            |
| 6,0              | 10   | 5,9  | 17 | 18  | 54  | 6                    | 3    | 06100                      |                            | 06200                      |
| 6,0              | 13   | 5,9  | 19 | 21  | 57  | 6                    | 3    |                            |                            | 06400                      |
| 6,0              | 18   |      |    | 26  | 62  | 6                    | 3    |                            |                            |                            |
| 6,5              | 19   | 6,3  | 25 | 27  | 63  | 8                    | 3    |                            | 06700                      |                            |
| 7,0              | 19   | 6,8  | 25 | 27  | 63  | 8                    | 3    |                            | 07200                      |                            |
| 7,5              | 19   | 7,3  | 25 | 27  | 63  | 8                    | 3    |                            | 07700                      |                            |
| 8,0              | 12   |      | 20 | 22  | 58  | 8                    | 3    | 08100                      |                            |                            |
| 8,0              | 19   | 7,8  | 25 | 27  | 63  | 8                    | 3    |                            | 08200                      |                            |
| 8,0              | 24   |      |    | 32  | 68  | 8                    | 3    |                            |                            | 08400                      |
| 8,5              | 22   | 8,2  | 30 | 32  | 72  | 10                   | 3    |                            | 08700                      |                            |
| 9,0              | 22   | 8,7  | 30 | 32  | 72  | 10                   | 3    |                            | 09200                      |                            |
| 9,5              | 22   | 9,2  | 30 | 32  | 72  | 10                   | 3    |                            | 09700                      |                            |
| 10,0             | 14   | 9,7  | 24 | 26  | 66  | 10                   | 3    | 10100                      |                            |                            |
| 10,0             | 22   | 9,7  | 30 | 32  | 72  | 10                   | 3    |                            | 10200                      |                            |
| 10,0             | 30   |      |    | 40  | 80  | 10                   | 3    |                            |                            | 10400                      |
| 12,0             | 16   | 11,7 | 26 | 28  | 73  | 12                   | 3    | 12100                      |                            |                            |
| 12,0             | 26   | 11,7 | 36 | 38  | 83  | 12                   | 3    |                            | 12200                      |                            |
| 12,0             | 36   |      |    | 48  | 93  | 12                   | 3    |                            |                            | 12400                      |
| 14,0             | 18   | 13,7 | 28 | 30  | 75  | 14                   | 3    | 14100                      |                            |                            |
| 14,0             | 26   | 13,7 | 36 | 38  | 83  | 14                   | 3    |                            | 14200                      |                            |
| 14,0             | 42   |      |    | 54  | 99  | 14                   | 3    |                            |                            | 14400                      |
| 16,0             | 22   | 15,5 | 32 | 34  | 82  | 16                   | 3    | 16100                      |                            |                            |
| 16,0             | 32   | 15,5 | 42 | 44  | 92  | 16                   | 3    |                            | 16200                      |                            |
| 16,0             | 48   |      |    | 60  | 108 | 16                   | 3    |                            |                            | 16400                      |
| 18,0             | 24   | 17,5 | 34 | 36  | 84  | 18                   | 3    | 18100                      |                            |                            |
| 18,0             | 32   | 17,5 | 42 | 44  | 92  | 18                   | 3    |                            | 18200                      |                            |
| 18,0             | 54   |      |    | 66  | 114 | 18                   | 3    |                            |                            | 18400                      |
| 20,0             | 26   | 19,5 | 40 | 42  | 92  | 20                   | 3    | 20100                      |                            |                            |
| 20,0             | 38   | 19,5 | 52 | 54  | 104 | 20                   | 3    |                            | 20200                      |                            |
| 20,0             | 60   |      |    | 76  | 126 | 20                   | 3    |                            |                            | 20400                      |

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

→ v<sub>c</sub>/f<sub>z</sub> Page 64+65

## SilverLine – End milling cutter



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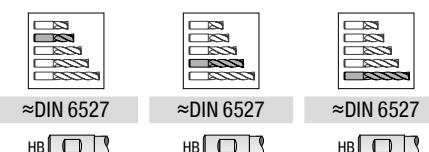
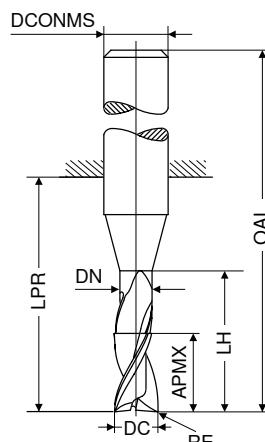
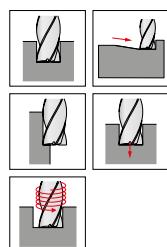
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HB HB HB

| DC <sub>f8</sub> | APMX | DN   | LH | LPR | OAL | DCONMS <sub>h6</sub> | CHW | ZEFP | NEW Article no. 50 966 ... | NEW Article no. 50 966 ... | NEW Article no. 50 966 ... |
|------------------|------|------|----|-----|-----|----------------------|-----|------|----------------------------|----------------------------|----------------------------|
| mm               | mm   | mm   | mm | mm  | mm  | mm                   | mm  |      |                            |                            |                            |
| 3,0              | 8    | 2,9  | 15 | 21  | 57  | 6                    | 0,1 | 3    |                            | 03200                      |                            |
| 3,5              | 11   | 3,4  | 16 | 21  | 57  | 6                    | 0,1 | 3    |                            | 03700                      |                            |
| 4,0              | 8    | 3,9  | 15 | 18  | 54  | 6                    | 0,1 | 3    | 04100                      | 04200                      |                            |
| 4,0              | 11   | 3,9  | 16 | 21  | 57  | 6                    | 0,1 | 3    |                            |                            | 04400                      |
| 4,0              | 16   |      |    | 26  | 62  | 6                    | 0,1 | 3    |                            |                            |                            |
| 4,5              | 13   | 4,4  | 19 | 21  | 57  | 6                    | 0,1 | 3    |                            | 04700                      |                            |
| 5,0              | 9    | 4,9  | 16 | 18  | 54  | 6                    | 0,1 | 3    | 05100                      | 05200                      |                            |
| 5,0              | 13   | 4,9  | 19 | 21  | 57  | 6                    | 0,1 | 3    |                            |                            | 05400                      |
| 5,0              | 17   |      |    | 26  | 62  | 6                    | 0,1 | 3    |                            |                            |                            |
| 5,5              | 13   | 5,4  | 19 | 21  | 57  | 6                    | 0,1 | 3    |                            | 05700                      |                            |
| 6,0              | 10   | 5,9  | 17 | 18  | 54  | 6                    | 0,2 | 3    | 06100                      | 06200                      |                            |
| 6,0              | 13   | 5,9  | 19 | 21  | 57  | 6                    | 0,2 | 3    |                            |                            | 06400                      |
| 6,0              | 18   |      |    | 26  | 62  | 6                    | 0,2 | 3    |                            |                            |                            |
| 6,5              | 19   | 6,3  | 25 | 27  | 63  | 8                    | 0,2 | 3    |                            | 06700                      |                            |
| 7,0              | 19   | 6,8  | 25 | 27  | 63  | 8                    | 0,2 | 3    |                            | 07200                      |                            |
| 7,5              | 19   | 7,3  | 25 | 27  | 63  | 8                    | 0,2 | 3    |                            | 07700                      |                            |
| 8,0              | 12   | 7,8  | 20 | 22  | 58  | 8                    | 0,2 | 3    | 08100                      | 08200                      |                            |
| 8,0              | 19   | 7,8  | 25 | 27  | 63  | 8                    | 0,2 | 3    |                            |                            | 08400                      |
| 8,0              | 24   |      |    | 32  | 68  | 8                    | 0,2 | 3    |                            |                            |                            |
| 8,5              | 22   | 8,2  | 30 | 32  | 72  | 10                   | 0,2 | 3    |                            | 08700                      |                            |
| 9,0              | 22   | 8,7  | 30 | 32  | 72  | 10                   | 0,2 | 3    |                            | 09200                      |                            |
| 9,5              | 22   | 9,2  | 30 | 32  | 72  | 10                   | 0,2 | 3    |                            | 09700                      |                            |
| 10,0             | 14   | 9,7  | 24 | 26  | 66  | 10                   | 0,2 | 3    | 10100                      | 10200                      |                            |
| 10,0             | 22   | 9,7  | 30 | 32  | 72  | 10                   | 0,2 | 3    |                            |                            | 10400                      |
| 10,0             | 30   |      |    | 40  | 80  | 10                   | 0,2 | 3    |                            |                            |                            |
| 12,0             | 16   | 11,7 | 26 | 28  | 73  | 12                   | 0,2 | 3    | 12100                      | 12200                      |                            |
| 12,0             | 26   | 11,7 | 36 | 38  | 83  | 12                   | 0,2 | 3    |                            |                            | 12400                      |
| 12,0             | 36   |      |    | 48  | 93  | 12                   | 0,2 | 3    |                            |                            |                            |
| 14,0             | 18   | 13,7 | 28 | 30  | 75  | 14                   | 0,2 | 3    | 14100                      | 14200                      |                            |
| 14,0             | 26   | 13,7 | 36 | 38  | 83  | 14                   | 0,2 | 3    |                            |                            | 14400                      |
| 14,0             | 42   |      |    | 54  | 99  | 14                   | 0,2 | 3    |                            |                            |                            |
| 16,0             | 22   | 15,5 | 32 | 34  | 82  | 16                   | 0,2 | 3    | 16100                      | 16200                      |                            |
| 16,0             | 32   | 15,5 | 42 | 44  | 92  | 16                   | 0,2 | 3    |                            |                            | 16400                      |
| 16,0             | 48   |      |    | 60  | 108 | 16                   | 0,2 | 3    |                            |                            |                            |
| 18,0             | 24   | 17,5 | 34 | 36  | 84  | 18                   | 0,2 | 3    | 18100                      | 18200                      |                            |
| 18,0             | 32   | 17,5 | 42 | 44  | 92  | 18                   | 0,2 | 3    |                            |                            | 18400                      |
| 18,0             | 54   |      |    | 66  | 114 | 18                   | 0,2 | 3    |                            |                            |                            |
| 20,0             | 26   | 19,5 | 40 | 42  | 92  | 20                   | 0,2 | 3    | 20100                      | 20200                      |                            |
| 20,0             | 38   | 19,5 | 52 | 54  | 104 | 20                   | 0,2 | 3    |                            |                            | 20400                      |
| 20,0             | 60   |      |    | 76  | 126 | 20                   | 0,2 | 3    |                            |                            |                            |

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

→ v<sub>c</sub>/f<sub>z</sub> Page 64+65

## SilverLine – End milling cutter with corner radius

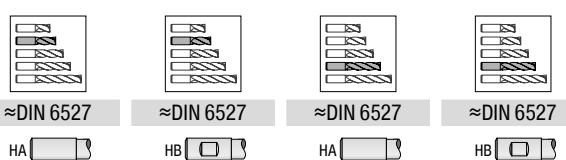
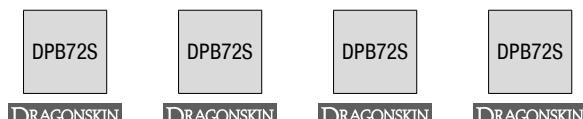
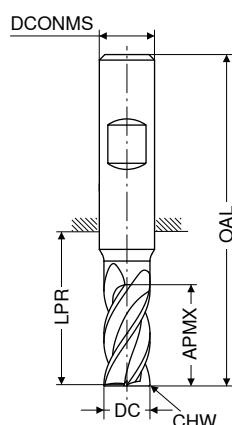
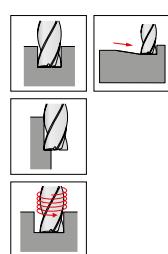


| DC <sub>f8</sub><br>mm | RE<br>mm | APMX<br>mm | DN<br>mm | LH<br>mm | LPR<br>mm | OAL<br>mm | DCONMS <sub>H6</sub><br>mm | ZEFP | NEW Article no. 50 967 ... |       |       |
|------------------------|----------|------------|----------|----------|-----------|-----------|----------------------------|------|----------------------------|-------|-------|
|                        |          |            |          |          |           |           |                            |      | 04105                      | 04205 | 04405 |
| 4,0                    | 0,5      | 8          | 3,9      | 15       | 18        | 54        | 6                          | 3    |                            |       |       |
| 4,0                    | 0,5      | 11         | 3,9      | 16       | 21        | 57        | 6                          | 3    |                            |       |       |
| 4,0                    | 0,5      | 16         |          |          | 26        | 62        | 6                          | 3    |                            |       |       |
| 5,0                    | 0,5      | 9          | 4,9      | 16       | 18        | 54        | 6                          | 3    | 05105                      |       |       |
| 5,0                    | 0,5      | 13         | 4,9      | 19       | 21        | 57        | 6                          | 3    |                            | 05205 |       |
| 5,0                    | 0,5      | 17         |          |          | 26        | 62        | 6                          | 3    |                            |       | 05405 |
| 6,0                    | 0,5      | 10         | 5,9      | 17       | 18        | 54        | 6                          | 3    | 06105                      |       |       |
| 6,0                    | 0,5      | 13         | 5,9      | 19       | 21        | 57        | 6                          | 3    |                            | 06205 |       |
| 6,0                    | 0,5      | 18         |          |          | 26        | 62        | 6                          | 3    |                            |       | 06405 |
| 8,0                    | 1,0      | 12         | 7,8      | 20       | 22        | 58        | 8                          | 3    | 08110                      |       |       |
| 8,0                    | 1,0      | 19         | 7,8      | 25       | 27        | 63        | 8                          | 3    |                            | 08210 |       |
| 8,0                    | 1,0      | 24         |          |          | 32        | 68        | 8                          | 3    |                            |       | 08410 |
| 10,0                   | 1,0      | 14         | 9,7      | 24       | 26        | 66        | 10                         | 3    | 10110                      |       |       |
| 10,0                   | 1,0      | 22         | 9,7      | 30       | 32        | 72        | 10                         | 3    |                            | 10210 |       |
| 10,0                   | 1,0      | 30         |          |          | 40        | 80        | 10                         | 3    |                            |       | 10410 |
| 12,0                   | 1,5      | 16         | 11,7     | 26       | 28        | 73        | 12                         | 3    | 12115                      |       |       |
| 12,0                   | 1,5      | 26         | 11,7     | 36       | 38        | 83        | 12                         | 3    |                            | 12215 |       |
| 12,0                   | 1,5      | 36         |          |          | 48        | 93        | 12                         | 3    |                            |       | 12415 |
| 16,0                   | 2,0      | 22         | 15,5     | 32       | 34        | 82        | 16                         | 3    | 16120                      |       |       |
| 16,0                   | 2,0      | 32         | 15,5     | 42       | 44        | 92        | 16                         | 3    |                            | 16220 |       |
| 16,0                   | 2,0      | 48         |          |          | 60        | 108       | 16                         | 3    |                            |       | 16420 |
| 20,0                   | 2,0      | 26         | 19,5     | 40       | 42        | 92        | 20                         | 3    | 20120                      |       |       |
| 20,0                   | 2,0      | 38         | 19,5     | 52       | 54        | 104       | 20                         | 3    |                            | 20220 |       |
| 20,0                   | 2,0      | 60         |          |          | 76        | 126       | 20                         | 3    |                            |       | 20420 |

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

→ v<sub>c</sub>/f<sub>z</sub> Page 64+65

## SilverLine – End milling cutter

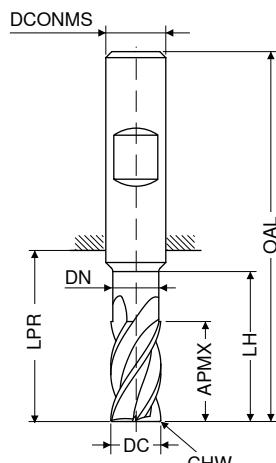
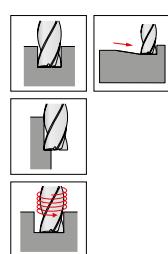


| DC <sub>f8</sub><br>mm | APMX<br>mm | LPR<br>mm | OAL<br>mm | DCONMS <sub>h6</sub><br>mm | CHW<br>mm | ZEFP | NEW Article no. |            |            |            |
|------------------------|------------|-----------|-----------|----------------------------|-----------|------|-----------------|------------|------------|------------|
|                        |            |           |           |                            |           |      | 50 972 ...      | 50 973 ... | 50 972 ... | 50 973 ... |
| 3,0                    | 5          | 14        | 50        | 6                          | 0,1       | 4    | 03100           | 03100      |            |            |
| 3,0                    | 8          | 21        | 57        | 6                          | 0,1       | 4    |                 |            | 03200      | 03200      |
| 3,5                    | 8          | 18        | 54        | 6                          | 0,1       | 4    | 03600           | 03600      |            |            |
| 3,5                    | 11         | 21        | 57        | 6                          | 0,1       | 4    |                 | 04100      | 03700      | 03700      |
| 4,0                    | 8          | 18        | 54        | 6                          | 0,1       | 4    |                 |            | 04200      |            |
| 4,0                    | 11         | 21        | 57        | 6                          | 0,1       | 4    | 04600           | 04600      |            |            |
| 4,5                    | 9          | 18        | 54        | 6                          | 0,1       | 4    |                 |            | 05100      |            |
| 4,5                    | 13         | 21        | 57        | 6                          | 0,1       | 4    | 05600           | 05600      |            |            |
| 5,0                    | 9          | 18        | 54        | 6                          | 0,1       | 4    |                 |            | 05700      |            |
| 5,0                    | 13         | 21        | 57        | 6                          | 0,1       | 4    | 06100           | 06100      |            |            |
| 5,5                    | 10         | 18        | 54        | 6                          | 0,1       | 4    |                 |            | 06200      |            |
| 5,5                    | 13         | 21        | 57        | 6                          | 0,1       | 4    | 07100           | 07100      |            |            |
| 6,0                    | 10         | 18        | 54        | 6                          | 0,1       | 4    |                 |            | 07200      |            |
| 6,0                    | 13         | 21        | 57        | 6                          | 0,1       | 4    | 08100           | 08100      |            |            |
| 7,0                    | 12         | 22        | 58        | 8                          | 0,2       | 4    |                 |            | 08200      |            |
| 7,0                    | 21         | 27        | 63        | 8                          | 0,2       | 4    | 09100           | 09100      |            |            |
| 8,0                    | 12         | 22        | 58        | 8                          | 0,2       | 4    |                 |            | 09200      |            |
| 8,0                    | 21         | 27        | 63        | 8                          | 0,2       | 4    | 10100           | 10100      |            |            |
| 9,0                    | 14         | 26        | 66        | 10                         | 0,2       | 4    |                 |            | 10200      |            |
| 9,0                    | 22         | 32        | 72        | 10                         | 0,2       | 4    | 11100           | 11100      |            |            |
| 10,0                   | 14         | 26        | 66        | 10                         | 0,2       | 4    |                 |            | 11200      |            |
| 10,0                   | 22         | 32        | 72        | 10                         | 0,2       | 4    | 12100           | 12100      |            |            |
| 11,0                   | 16         | 28        | 73        | 12                         | 0,3       | 4    |                 |            | 12200      |            |
| 11,0                   | 26         | 38        | 83        | 12                         | 0,3       | 4    | 14100           | 14100      |            |            |
| 12,0                   | 16         | 28        | 73        | 12                         | 0,3       | 4    |                 |            | 14200      |            |
| 12,0                   | 26         | 38        | 83        | 12                         | 0,3       | 4    | 15100           | 15100      |            |            |
| 14,0                   | 16         | 28        | 73        | 14                         | 0,3       | 4    |                 |            | 15200      |            |
| 14,0                   | 26         | 38        | 83        | 14                         | 0,3       | 4    | 16100           | 16100      |            |            |
| 15,0                   | 22         | 34        | 82        | 16                         | 0,3       | 4    |                 |            | 16200      |            |
| 15,0                   | 36         | 44        | 92        | 16                         | 0,3       | 4    | 17100           | 17100      |            |            |
| 16,0                   | 22         | 34        | 82        | 16                         | 0,3       | 4    |                 |            | 17200      |            |
| 16,0                   | 36         | 44        | 92        | 16                         | 0,3       | 4    | 18100           | 18100      |            |            |
| 17,0                   | 22         | 34        | 82        | 18                         | 0,3       | 4    |                 |            | 18200      |            |
| 17,0                   | 36         | 44        | 92        | 18                         | 0,3       | 4    | 19100           | 19100      |            |            |
| 18,0                   | 22         | 34        | 82        | 18                         | 0,3       | 4    |                 |            | 19200      |            |
| 18,0                   | 36         | 44        | 92        | 18                         | 0,3       | 4    | 20100           | 20100      |            |            |
| 19,0                   | 26         | 42        | 92        | 20                         | 0,3       | 4    |                 |            | 20200      |            |
| 19,0                   | 41         | 54        | 104       | 20                         | 0,3       | 4    |                 |            | 20200      |            |
| 20,0                   | 26         | 42        | 92        | 20                         | 0,3       | 4    |                 |            | 20200      |            |
| 20,0                   | 41         | 54        | 104       | 20                         | 0,3       | 4    |                 |            | 20200      |            |

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

→ v<sub>c</sub>/f<sub>z</sub> Page 68+69

## SilverLine – End milling cutter



DRAGONSkin

DRAGONSkin

DRAGONSkin

DRAGONSkin



DIN 6527 HA

DIN 6527 HB

DIN 6527 HA

DIN 6527 HB

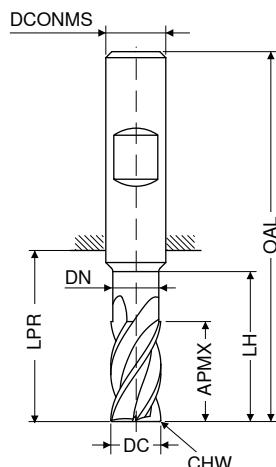
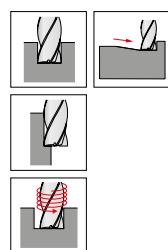
| DC <sub>f8</sub> | APMX | DN   | LH  | LPR | OAL | DCONMS <sub>h6</sub> | CHW | ZEFP | NEW Article no. 50 974 ... | NEW Article no. 50 975 ... | NEW Article no. 50 974 ... | NEW Article no. 50 975 ... |
|------------------|------|------|-----|-----|-----|----------------------|-----|------|----------------------------|----------------------------|----------------------------|----------------------------|
| mm               | mm   | mm   | mm  | mm  | mm  | mm                   | mm  |      | 03200                      | 03200                      | 03400                      | 03400                      |
| 3,0              | 6,5  | 2,8  | 9   | 19  | 55  | 6                    | 0,1 | 4    | 03200                      | 03200                      | 04200                      | 04200                      |
| 3,0              | 6,5  | 2,8  | 15  | 22  | 58  | 6                    | 0,1 | 4    | 04200                      | 04200                      | 05200                      | 05200                      |
| 4,0              | 8,5  | 3,8  | 12  | 19  | 55  | 6                    | 0,1 | 4    | 05200                      | 05200                      | 06200                      | 06200                      |
| 4,0              | 8,5  | 3,8  | 20  | 26  | 62  | 6                    | 0,1 | 4    | 06200                      | 06200                      | 08200                      | 08200                      |
| 5,0              | 10,5 | 4,8  | 15  | 22  | 58  | 6                    | 0,1 | 4    | 08200                      | 08200                      | 08400                      | 08400                      |
| 5,0              | 10,5 | 4,8  | 25  | 34  | 70  | 6                    | 0,1 | 4    | 08400                      | 08400                      | 10200                      | 10200                      |
| 6,0              | 13,0 | 5,8  | 18  | 22  | 58  | 6                    | 0,1 | 4    | 10200                      | 10200                      | 12200                      | 12200                      |
| 6,0              | 13,0 | 5,8  | 30  | 34  | 70  | 6                    | 0,1 | 4    | 12200                      | 12200                      | 12400                      | 12400                      |
| 8,0              | 17,0 | 7,7  | 24  | 28  | 64  | 8                    | 0,2 | 4    | 14200                      | 14200                      | 14400                      | 14400                      |
| 8,0              | 17,0 | 7,7  | 40  | 44  | 80  | 8                    | 0,2 | 4    | 14400                      | 14400                      | 16200                      | 16200                      |
| 10,0             | 21,0 | 9,7  | 30  | 34  | 74  | 10                   | 0,2 | 4    | 16200                      | 16200                      | 16400                      | 16400                      |
| 10,0             | 21,0 | 9,7  | 50  | 54  | 94  | 10                   | 0,2 | 4    | 18200                      | 18200                      | 18400                      | 18400                      |
| 12,0             | 25,0 | 11,6 | 36  | 40  | 85  | 12                   | 0,3 | 4    | 20200                      | 20200                      | 20400                      | 20400                      |
| 12,0             | 25,0 | 11,6 | 60  | 64  | 109 | 12                   | 0,3 | 4    | 20400                      | 20400                      | 20400                      | 20400                      |
| 14,0             | 29,0 | 13,6 | 42  | 46  | 91  | 14                   | 0,3 | 4    |                            |                            |                            |                            |
| 14,0             | 29,0 | 13,6 | 70  | 74  | 119 | 14                   | 0,3 | 4    |                            |                            |                            |                            |
| 16,0             | 33,0 | 15,5 | 48  | 52  | 100 | 16                   | 0,3 | 4    |                            |                            |                            |                            |
| 16,0             | 33,0 | 15,5 | 80  | 84  | 132 | 16                   | 0,3 | 4    |                            |                            |                            |                            |
| 18,0             | 38,0 | 17,5 | 54  | 58  | 106 | 18                   | 0,3 | 4    |                            |                            |                            |                            |
| 18,0             | 38,0 | 17,5 | 90  | 94  | 142 | 18                   | 0,3 | 4    |                            |                            |                            |                            |
| 20,0             | 42,0 | 19,5 | 60  | 64  | 114 | 20                   | 0,3 | 4    |                            |                            |                            |                            |
| 20,0             | 42,0 | 19,5 | 100 | 104 | 154 | 20                   | 0,3 | 4    |                            |                            |                            |                            |

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

→ v<sub>c</sub>/f<sub>z</sub> Page 68-71

## SilverLine – End milling cutter

▲ Specially for full slot milling



DRAGONSKIN



DRAGONSKIN



DIN 6527



DIN 6527



HA



HB

**NEW**  
Article no.  
**50 976 ...**

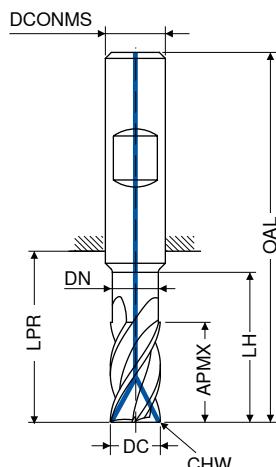
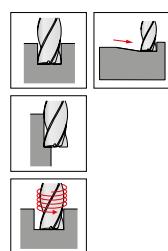
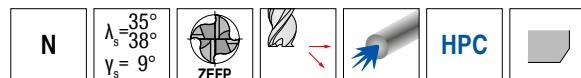
**NEW**  
Article no.  
**50 977 ...**

| DC <sub>r8</sub> | APMX | DN   | LH | LPR | OAL | DCONMS <sub>h6</sub> | CHW | ZEFP |
|------------------|------|------|----|-----|-----|----------------------|-----|------|
| mm               | mm   | mm   | mm | mm  | mm  | mm                   | mm  |      |
| 3,0              | 8    | 2,8  | 13 | 21  | 57  | 6                    | 0,1 | 4    |
| 4,0              | 11   | 3,8  | 17 | 21  | 57  | 6                    | 0,1 | 4    |
| 5,0              | 13   | 4,8  | 19 | 21  | 57  | 6                    | 0,1 | 4    |
| 6,0              | 13   | 5,8  | 19 | 21  | 57  | 6                    | 0,1 | 4    |
| 8,0              | 21   | 7,7  | 25 | 27  | 63  | 8                    | 0,2 | 4    |
| 10,0             | 22   | 9,7  | 30 | 32  | 72  | 10                   | 0,2 | 4    |
| 12,0             | 26   | 11,6 | 36 | 38  | 83  | 12                   | 0,3 | 4    |
| 14,0             | 26   | 13,6 | 36 | 38  | 83  | 14                   | 0,3 | 4    |
| 16,0             | 36   | 15,5 | 42 | 44  | 92  | 16                   | 0,3 | 4    |
| 18,0             | 36   | 17,5 | 42 | 44  | 92  | 18                   | 0,3 | 4    |
| 20,0             | 41   | 19,5 | 52 | 54  | 104 | 20                   | 0,3 | 4    |

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

→ v<sub>c</sub>/f<sub>z</sub> Page 66+67

## SilverLine – End milling cutter



DRAGONSKIN



DIN 6527



NEW

Article no.  
50 978 ...

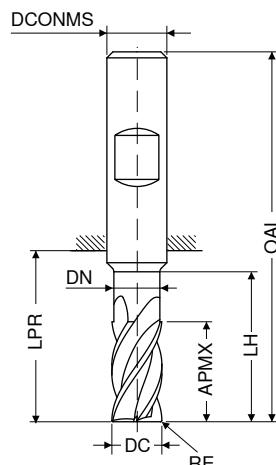
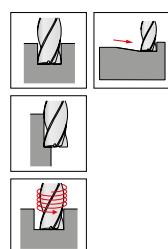
| DC <sub>f8</sub> | APMX | DN   | LH | LPR | OAL | DCONMS <sub>h6</sub> | CHW | ZEFP |
|------------------|------|------|----|-----|-----|----------------------|-----|------|
| mm               | mm   | mm   | mm | mm  | mm  | mm                   | mm  |      |
| 6,0              | 13   | 5,8  | 19 | 21  | 57  | 6                    | 0,1 | 4    |
| 8,0              | 21   | 7,7  | 25 | 27  | 63  | 8                    | 0,2 | 4    |
| 10,0             | 22   | 9,7  | 30 | 32  | 72  | 10                   | 0,2 | 4    |
| 12,0             | 26   | 11,6 | 36 | 38  | 83  | 12                   | 0,3 | 4    |
| 14,0             | 26   | 13,6 | 36 | 38  | 83  | 14                   | 0,3 | 4    |
| 16,0             | 36   | 15,5 | 42 | 44  | 92  | 16                   | 0,3 | 4    |
| 18,0             | 36   | 17,5 | 42 | 44  | 92  | 18                   | 0,3 | 4    |
| 20,0             | 41   | 19,5 | 52 | 54  | 104 | 20                   | 0,3 | 4    |

06200  
08200  
10200  
12200  
14200  
16200  
18200  
20200

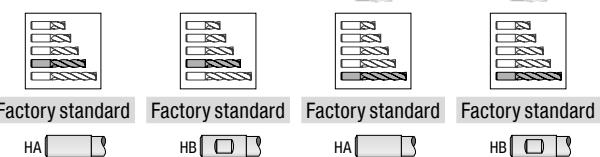
|                       |   |
|-----------------------|---|
| Steel                 | ● |
| Stainless steel       | ● |
| Cast iron             | ● |
| Non ferrous metals    | ○ |
| Heat resistant alloys | ● |
| Hardened materials    | ● |

→ v<sub>c</sub>/f<sub>z</sub> Page 68+69

## SilverLine – End milling cutter with corner radius



DPB72S DRAGONSkin DPB72S DRAGONSkin



| DC <sub>f8</sub> | RE <sub>±0,01</sub> | APMX | DN   | LH | LPR | OAL | DCONMS <sub>H6</sub> | ZEFP | NEW Article no. 50 970 ... |       | NEW Article no. 50 971 ... |    | NEW Article no. 50 970 ... |    | NEW Article no. 50 971 ... |    |  |
|------------------|---------------------|------|------|----|-----|-----|----------------------|------|----------------------------|-------|----------------------------|----|----------------------------|----|----------------------------|----|--|
|                  |                     |      |      |    |     |     |                      |      | HA                         | HB    | HA                         | HB | HA                         | HB | HA                         | HB |  |
| 3,0              | 0,10                | 8,0  | 2,8  | 13 | 21  | 57  | 6                    | 4    | 03201                      | 03201 |                            |    |                            |    |                            |    |  |
| 3,0              | 0,40                | 8,0  | 2,8  | 13 | 21  | 57  | 6                    | 4    | 03204                      | 03204 |                            |    |                            |    |                            |    |  |
| 3,0              | 0,50                | 8,0  | 2,8  | 13 | 21  | 57  | 6                    | 4    | 03205                      | 03205 |                            |    |                            |    |                            |    |  |
| 3,0              | 1,00                | 8,0  | 2,8  | 13 | 21  | 57  | 6                    | 4    | 03210                      | 03210 |                            |    |                            |    |                            |    |  |
| 3,0              | 0,30                | 6,5  | 2,8  | 15 | 22  | 58  | 6                    | 4    |                            | 04201 | 04201                      |    |                            |    |                            |    |  |
| 3,0              | 0,50                | 6,5  | 2,8  | 15 | 22  | 58  | 6                    | 4    |                            | 04204 | 04204                      |    |                            |    |                            |    |  |
| 3,0              | 0,80                | 6,5  | 2,8  | 15 | 22  | 58  | 6                    | 4    |                            | 04205 | 04205                      |    |                            |    |                            |    |  |
| 4,0              | 0,10                | 11,0 | 3,8  | 17 | 21  | 57  | 6                    | 4    |                            | 04210 | 04210                      |    |                            |    |                            |    |  |
| 4,0              | 0,40                | 11,0 | 3,8  | 17 | 21  | 57  | 6                    | 4    |                            | 04403 | 04403                      |    |                            |    |                            |    |  |
| 4,0              | 0,50                | 11,0 | 3,8  | 17 | 21  | 57  | 6                    | 4    |                            | 04405 | 04405                      |    |                            |    |                            |    |  |
| 4,0              | 1,00                | 11,0 | 3,8  | 17 | 21  | 57  | 6                    | 4    |                            | 04408 | 04408                      |    |                            |    |                            |    |  |
| 4,0              | 0,40                | 8,5  | 3,8  | 20 | 26  | 62  | 6                    | 4    |                            | 04404 | 04404                      |    |                            |    |                            |    |  |
| 4,0              | 0,50                | 8,5  | 3,8  | 20 | 26  | 62  | 6                    | 4    |                            | 04405 | 04405                      |    |                            |    |                            |    |  |
| 4,0              | 0,80                | 8,5  | 3,8  | 20 | 26  | 62  | 6                    | 4    |                            | 04408 | 04408                      |    |                            |    |                            |    |  |
| 5,0              | 0,10                | 13,0 | 4,8  | 19 | 21  | 57  | 6                    | 4    | 05201                      | 05201 |                            |    |                            |    |                            |    |  |
| 5,0              | 0,50                | 13,0 | 4,8  | 19 | 21  | 57  | 6                    | 4    | 05205                      | 05205 |                            |    |                            |    |                            |    |  |
| 5,0              | 1,00                | 13,0 | 4,8  | 19 | 21  | 57  | 6                    | 4    | 05210                      | 05210 |                            |    |                            |    |                            |    |  |
| 5,0              | 0,50                | 10,5 | 4,8  | 25 | 34  | 70  | 6                    | 4    |                            | 05405 | 05405                      |    |                            |    |                            |    |  |
| 5,0              | 0,80                | 10,5 | 4,8  | 25 | 34  | 70  | 6                    | 4    |                            | 05408 | 05408                      |    |                            |    |                            |    |  |
| 6,0              | 0,10                | 13,0 | 5,8  | 19 | 21  | 57  | 6                    | 4    | 06201                      | 06201 |                            |    |                            |    |                            |    |  |
| 6,0              | 0,50                | 13,0 | 5,8  | 19 | 21  | 57  | 6                    | 4    | 06205                      | 06205 |                            |    |                            |    |                            |    |  |
| 6,0              | 1,00                | 13,0 | 5,8  | 19 | 21  | 57  | 6                    | 4    | 06210                      | 06210 |                            |    |                            |    |                            |    |  |
| 6,0              | 1,50                | 13,0 | 5,8  | 19 | 21  | 57  | 6                    | 4    | 06215                      | 06215 |                            |    |                            |    |                            |    |  |
| 6,0              | 0,60                | 13,0 | 5,8  | 30 | 34  | 70  | 6                    | 4    |                            | 06406 | 06406                      |    |                            |    |                            |    |  |
| 6,0              | 0,80                | 13,0 | 5,8  | 30 | 34  | 70  | 6                    | 4    |                            | 06408 | 06408                      |    |                            |    |                            |    |  |
| 6,0              | 1,00                | 13,0 | 5,8  | 30 | 34  | 70  | 6                    | 4    |                            | 06410 | 06410                      |    |                            |    |                            |    |  |
| 8,0              | 0,15                | 21,0 | 7,7  | 25 | 27  | 63  | 8                    | 4    | 08202                      | 08202 |                            |    |                            |    |                            |    |  |
| 8,0              | 0,50                | 21,0 | 7,7  | 25 | 27  | 63  | 8                    | 4    | 08205                      | 08205 |                            |    |                            |    |                            |    |  |
| 8,0              | 1,00                | 21,0 | 7,7  | 25 | 27  | 63  | 8                    | 4    | 08210                      | 08210 |                            |    |                            |    |                            |    |  |
| 8,0              | 1,50                | 21,0 | 7,7  | 25 | 27  | 63  | 8                    | 4    | 08215                      | 08215 |                            |    |                            |    |                            |    |  |
| 8,0              | 2,00                | 21,0 | 7,7  | 25 | 27  | 63  | 8                    | 4    | 08220                      | 08220 |                            |    |                            |    |                            |    |  |
| 8,0              | 0,80                | 17,0 | 7,7  | 40 | 44  | 80  | 8                    | 4    |                            | 08408 | 08408                      |    |                            |    |                            |    |  |
| 8,0              | 1,00                | 17,0 | 7,7  | 40 | 44  | 80  | 8                    | 4    |                            | 08410 | 08410                      |    |                            |    |                            |    |  |
| 8,0              | 1,50                | 17,0 | 7,7  | 40 | 44  | 80  | 8                    | 4    |                            | 08415 | 08415                      |    |                            |    |                            |    |  |
| 8,0              | 2,00                | 17,0 | 7,7  | 40 | 44  | 80  | 8                    | 4    |                            | 08420 | 08420                      |    |                            |    |                            |    |  |
| 10,0             | 0,15                | 22,0 | 9,7  | 30 | 32  | 72  | 10                   | 4    | 10202                      | 10202 |                            |    |                            |    |                            |    |  |
| 10,0             | 0,50                | 22,0 | 9,7  | 30 | 32  | 72  | 10                   | 4    | 10205                      | 10205 |                            |    |                            |    |                            |    |  |
| 10,0             | 1,00                | 22,0 | 9,7  | 30 | 32  | 72  | 10                   | 4    | 10210                      | 10210 |                            |    |                            |    |                            |    |  |
| 10,0             | 1,50                | 22,0 | 9,7  | 30 | 32  | 72  | 10                   | 4    | 10215                      | 10215 |                            |    |                            |    |                            |    |  |
| 10,0             | 2,00                | 22,0 | 9,7  | 30 | 32  | 72  | 10                   | 4    | 10220                      | 10220 |                            |    |                            |    |                            |    |  |
| 10,0             | 0,50                | 21,0 | 9,7  | 50 | 54  | 94  | 10                   | 4    |                            | 10405 | 10405                      |    |                            |    |                            |    |  |
| 10,0             | 1,00                | 21,0 | 9,7  | 50 | 54  | 94  | 10                   | 4    |                            | 10410 | 10410                      |    |                            |    |                            |    |  |
| 10,0             | 1,50                | 21,0 | 9,7  | 50 | 54  | 94  | 10                   | 4    |                            | 10415 | 10415                      |    |                            |    |                            |    |  |
| 10,0             | 2,00                | 21,0 | 9,7  | 50 | 54  | 94  | 10                   | 4    |                            | 10420 | 10420                      |    |                            |    |                            |    |  |
| 12,0             | 0,20                | 26,0 | 11,6 | 36 | 38  | 83  | 12                   | 4    | 12202                      | 12202 |                            |    |                            |    |                            |    |  |
| 12,0             | 0,50                | 26,0 | 11,6 | 36 | 38  | 83  | 12                   | 4    | 12205                      | 12205 |                            |    |                            |    |                            |    |  |
| 12,0             | 1,00                | 26,0 | 11,6 | 36 | 38  | 83  | 12                   | 4    | 12210                      | 12210 |                            |    |                            |    |                            |    |  |
| 12,0             | 1,50                | 26,0 | 11,6 | 36 | 38  | 83  | 12                   | 4    | 12215                      | 12215 |                            |    |                            |    |                            |    |  |

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

→ v<sub>c</sub>/f<sub>z</sub> Page 68-71

## SilverLine – End milling cutter with corner radius

**Technical Diagram Labels:**

- N
- $\lambda_s = 35^\circ$
- $\lambda_s = 38^\circ$
- $V_s = 9^\circ$
- ZEFP
- HPC
- DPB72S
- DRAGONSkin
- DRAGONSkin
- DRAGONSkin
- DRAGONSkin
- Factory standard
- Factory standard
- Factory standard
- Factory standard
- DC<sub>f8</sub>
- RE<sub>±0,01</sub>
- APMX
- DN
- LH
- LPR
- OAL
- DCONMS<sub>h6</sub>
- ZEFP
- HA
- HB
- NEW Article no. 50 970 ...
- NEW Article no. 50 971 ...
- NEW Article no. 50 970 ...
- NEW Article no. 50 971 ...

**Table Headers:**

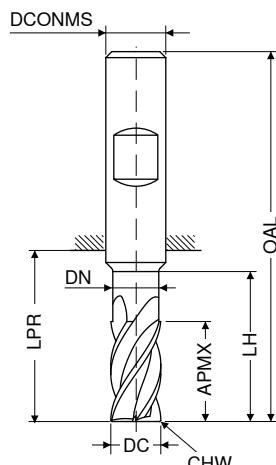
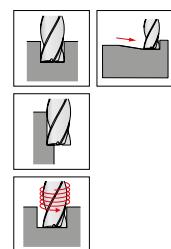
| DC <sub>f8</sub> | RE <sub>±0,01</sub> | APMX | DN | LH | LPR | OAL | DCONMS <sub>h6</sub> | ZEFP | HA | HB | NEW Article no. 50 970 ... | NEW Article no. 50 971 ... | NEW Article no. 50 970 ... | NEW Article no. 50 971 ... |
|------------------|---------------------|------|----|----|-----|-----|----------------------|------|----|----|----------------------------|----------------------------|----------------------------|----------------------------|
| mm               | mm                  | mm   | mm | mm | mm  | mm  | mm                   |      |    |    |                            |                            |                            |                            |

**Table Data:**

|                        |      |      |      |     |     |     |    |   |       |       |       |       |  |  |
|------------------------|------|------|------|-----|-----|-----|----|---|-------|-------|-------|-------|--|--|
| 12,0                   | 2,00 | 26,0 | 11,6 | 36  | 38  | 83  | 12 | 4 | 12220 | 12220 |       |       |  |  |
| 12,0                   | 3,00 | 26,0 | 11,6 | 36  | 38  | 83  | 12 | 4 | 12230 | 12230 |       |       |  |  |
| 12,0                   | 4,00 | 26,0 | 11,6 | 36  | 38  | 83  | 12 | 4 | 12240 | 12240 |       |       |  |  |
| 12,0                   | 0,50 | 25,0 | 11,6 | 60  | 64  | 109 | 12 | 4 |       |       | 12405 | 12405 |  |  |
| 12,0                   | 1,00 | 25,0 | 11,6 | 60  | 64  | 109 | 12 | 4 |       |       | 12410 | 12410 |  |  |
| 12,0                   | 1,50 | 25,0 | 11,6 | 60  | 64  | 109 | 12 | 4 |       |       | 12415 | 12415 |  |  |
| 12,0                   | 2,00 | 25,0 | 11,6 | 60  | 64  | 109 | 12 | 4 |       |       | 12420 | 12420 |  |  |
| 12,0                   | 3,00 | 25,0 | 11,6 | 60  | 64  | 109 | 12 | 4 |       |       | 12430 | 12430 |  |  |
| 12,0                   | 4,00 | 25,0 | 11,6 | 60  | 64  | 109 | 12 | 4 |       |       | 12440 | 12440 |  |  |
| 14,0                   | 0,30 | 26,0 | 13,6 | 36  | 38  | 83  | 14 | 4 | 14203 | 14203 |       |       |  |  |
| 14,0                   | 1,00 | 26,0 | 13,6 | 36  | 38  | 83  | 14 | 4 | 14210 | 14210 |       |       |  |  |
| 14,0                   | 2,00 | 26,0 | 13,6 | 36  | 38  | 83  | 14 | 4 | 14220 | 14220 |       |       |  |  |
| 14,0                   | 3,00 | 26,0 | 13,6 | 36  | 38  | 83  | 14 | 4 | 14230 | 14230 |       |       |  |  |
| 14,0                   | 4,00 | 26,0 | 13,6 | 36  | 38  | 83  | 14 | 4 | 14240 | 14240 |       |       |  |  |
| 14,0                   | 1,00 | 29,0 | 13,6 | 70  | 74  | 119 | 14 | 4 |       |       | 14410 | 14410 |  |  |
| 14,0                   | 2,00 | 29,0 | 13,6 | 70  | 74  | 119 | 14 | 4 |       |       | 14420 | 14420 |  |  |
| 14,0                   | 3,00 | 29,0 | 13,6 | 70  | 74  | 119 | 14 | 4 |       |       | 14430 | 14430 |  |  |
| 14,0                   | 4,00 | 29,0 | 13,6 | 70  | 74  | 119 | 14 | 4 |       |       | 14440 | 14440 |  |  |
| 16,0                   | 0,30 | 36,0 | 15,5 | 42  | 44  | 92  | 16 | 4 | 16203 | 16203 |       |       |  |  |
| 16,0                   | 1,00 | 36,0 | 15,5 | 42  | 44  | 92  | 16 | 4 | 16210 | 16210 |       |       |  |  |
| 16,0                   | 2,00 | 36,0 | 15,5 | 42  | 44  | 92  | 16 | 4 | 16220 | 16220 |       |       |  |  |
| 16,0                   | 3,00 | 36,0 | 15,5 | 42  | 44  | 92  | 16 | 4 | 16230 | 16230 |       |       |  |  |
| 16,0                   | 4,00 | 36,0 | 15,5 | 42  | 44  | 92  | 16 | 4 | 16240 | 16240 |       |       |  |  |
| 16,0                   | 1,00 | 33,0 | 15,5 | 80  | 84  | 132 | 16 | 4 |       |       | 16410 | 16410 |  |  |
| 16,0                   | 2,00 | 33,0 | 15,5 | 80  | 84  | 132 | 16 | 4 |       |       | 16420 | 16420 |  |  |
| 16,0                   | 3,00 | 33,0 | 15,5 | 80  | 84  | 132 | 16 | 4 |       |       | 16430 | 16430 |  |  |
| 16,0                   | 4,00 | 33,0 | 15,5 | 80  | 84  | 132 | 16 | 4 |       |       | 16440 | 16440 |  |  |
| 18,0                   | 1,00 | 36,0 | 17,5 | 42  | 44  | 92  | 18 | 4 | 18210 | 18210 |       |       |  |  |
| 18,0                   | 2,00 | 36,0 | 17,5 | 42  | 44  | 92  | 18 | 4 | 18220 | 18220 |       |       |  |  |
| 18,0                   | 3,00 | 36,0 | 17,5 | 42  | 44  | 92  | 18 | 4 | 18230 | 18230 |       |       |  |  |
| 18,0                   | 4,00 | 36,0 | 17,5 | 42  | 44  | 92  | 18 | 4 | 18240 | 18240 |       |       |  |  |
| 18,0                   | 1,00 | 38,0 | 17,5 | 90  | 94  | 142 | 18 | 4 |       |       | 18410 | 18410 |  |  |
| 18,0                   | 2,00 | 38,0 | 17,5 | 90  | 94  | 142 | 18 | 4 |       |       | 18420 | 18420 |  |  |
| 18,0                   | 3,00 | 38,0 | 17,5 | 90  | 94  | 142 | 18 | 4 |       |       | 18430 | 18430 |  |  |
| 18,0                   | 4,00 | 38,0 | 17,5 | 90  | 94  | 142 | 18 | 4 |       |       | 18440 | 18440 |  |  |
| 20,0                   | 0,30 | 41,0 | 19,5 | 52  | 54  | 104 | 20 | 4 | 20203 | 20203 |       |       |  |  |
| 20,0                   | 1,00 | 41,0 | 19,5 | 52  | 54  | 104 | 20 | 4 | 20210 | 20210 |       |       |  |  |
| 20,0                   | 2,00 | 41,0 | 19,5 | 52  | 54  | 104 | 20 | 4 | 20220 | 20220 |       |       |  |  |
| 20,0                   | 3,00 | 41,0 | 19,5 | 52  | 54  | 104 | 20 | 4 | 20230 | 20230 |       |       |  |  |
| 20,0                   | 4,00 | 41,0 | 19,5 | 52  | 54  | 104 | 20 | 4 | 20240 | 20240 |       |       |  |  |
| 20,0                   | 1,00 | 42,0 | 19,5 | 100 | 104 | 154 | 20 | 4 |       |       | 20410 | 20410 |  |  |
| 20,0                   | 2,00 | 42,0 | 19,5 | 100 | 104 | 154 | 20 | 4 |       |       | 20420 | 20420 |  |  |
| 20,0                   | 3,00 | 42,0 | 19,5 | 100 | 104 | 154 | 20 | 4 |       |       | 20430 | 20430 |  |  |
| 20,0                   | 4,00 | 42,0 | 19,5 | 100 | 104 | 154 | 20 | 4 |       |       | 20440 | 20440 |  |  |
| <b>Material Chart:</b> |      |      |      |     |     |     |    |   |       |       |       |       |  |  |
| Steel                  |      |      |      |     |     |     |    |   | ●     |       |       |       |  |  |
| Stainless steel        |      |      |      |     |     |     |    |   | ●     |       |       |       |  |  |
| Cast iron              |      |      |      |     |     |     |    |   | ●     |       |       |       |  |  |
| Non ferrous metals     |      |      |      |     |     |     |    | ○ | ○     |       |       |       |  |  |
| Heat resistant alloys  |      |      |      |     |     |     |    | ● | ●     |       |       |       |  |  |
| Hardened materials     |      |      |      |     |     |     |    | ● | ●     |       |       |       |  |  |

→ v<sub>c</sub>/f<sub>z</sub> Page 68-71

## SilverLine – End milling cutter



DRAGONSKIN



DIN 6527



NEW

Article no.  
50 969 ...

| DC <sub>f8</sub> | APMX | DN   | LH | LPR | OAL | DCONMS <sub>h6</sub> | CHW | ZEFP |       |
|------------------|------|------|----|-----|-----|----------------------|-----|------|-------|
| mm               | mm   | mm   | mm | mm  | mm  | mm                   | mm  |      |       |
| 3,0              | 8    | 2,8  | 13 | 21  | 57  | 6                    | 0,1 | 4    | 03200 |
| 3,5              | 11   | 3,3  | 17 | 21  | 57  | 6                    | 0,1 | 4    | 03700 |
| 4,0              | 11   | 3,8  | 17 | 21  | 57  | 6                    | 0,1 | 4    | 04200 |
| 4,5              | 13   | 4,3  | 19 | 21  | 57  | 6                    | 0,1 | 4    | 04700 |
| 5,0              | 13   | 4,8  | 19 | 21  | 57  | 6                    | 0,1 | 4    | 05200 |
| 5,5              | 13   | 5,3  | 19 | 21  | 57  | 6                    | 0,1 | 4    | 05700 |
| 6,0              | 13   | 5,8  | 19 | 21  | 57  | 6                    | 0,1 | 4    | 06200 |
| 7,0              | 21   | 6,7  | 25 | 27  | 63  | 8                    | 0,2 | 4    | 07200 |
| 8,0              | 21   | 7,7  | 25 | 27  | 63  | 8                    | 0,2 | 4    | 08200 |
| 9,0              | 22   | 8,7  | 30 | 32  | 72  | 10                   | 0,2 | 4    | 09200 |
| 10,0             | 22   | 9,7  | 30 | 32  | 72  | 10                   | 0,2 | 4    | 10200 |
| 11,0             | 26   | 10,6 | 36 | 38  | 83  | 12                   | 0,3 | 4    | 11200 |
| 12,0             | 26   | 11,6 | 36 | 38  | 83  | 12                   | 0,3 | 4    | 12200 |
| 14,0             | 26   | 13,6 | 36 | 38  | 83  | 14                   | 0,3 | 4    | 14200 |
| 15,0             | 36   | 14,5 | 42 | 44  | 92  | 16                   | 0,3 | 4    | 15200 |
| 16,0             | 36   | 15,5 | 42 | 44  | 92  | 16                   | 0,3 | 4    | 16200 |
| 17,0             | 36   | 16,5 | 42 | 44  | 92  | 18                   | 0,3 | 4    | 17200 |
| 18,0             | 36   | 17,5 | 42 | 44  | 92  | 18                   | 0,3 | 4    | 18200 |
| 19,0             | 41   | 18,5 | 52 | 54  | 104 | 20                   | 0,3 | 4    | 19200 |
| 20,0             | 41   | 19,5 | 52 | 54  | 104 | 20                   | 0,3 | 4    | 20200 |

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

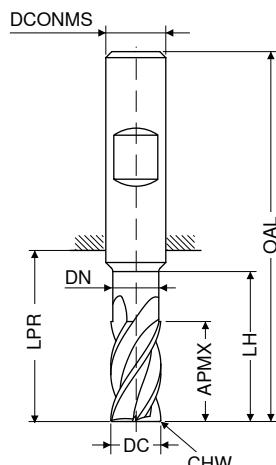
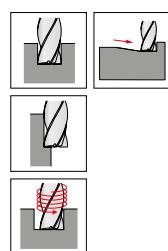
→ v<sub>c</sub>/f<sub>z</sub> Page 68+69

## SilverLine – End milling cutter



DPB72S

DRAGONSKIN



DIN 6527

HB

NEW

Article no.  
50 979 ...

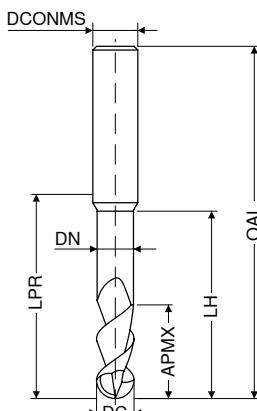
| DC <sub>f8</sub> | APMX | DN   | LH | LPR | OAL | DCONMS <sub>h6</sub> | CHW | ZEFP |       |
|------------------|------|------|----|-----|-----|----------------------|-----|------|-------|
| mm               | mm   | mm   | mm | mm  | mm  | mm                   | mm  |      |       |
| 3,0              | 8    | 2,8  | 13 | 21  | 57  | 6                    | 0,1 | 4    | 03200 |
| 3,5              | 11   | 3,3  | 17 | 21  | 57  | 6                    | 0,1 | 4    | 03700 |
| 4,0              | 11   | 3,8  | 17 | 21  | 57  | 6                    | 0,1 | 4    | 04200 |
| 4,5              | 13   | 4,3  | 19 | 21  | 57  | 6                    | 0,1 | 4    | 04700 |
| 5,0              | 13   | 4,8  | 19 | 21  | 57  | 6                    | 0,1 | 4    | 05200 |
| 5,5              | 13   | 5,3  | 19 | 21  | 57  | 6                    | 0,1 | 4    | 05700 |
| 6,0              | 13   | 5,8  | 19 | 21  | 57  | 6                    | 0,1 | 4    | 06200 |
| 7,0              | 21   | 6,7  | 25 | 27  | 63  | 8                    | 0,2 | 4    | 07200 |
| 8,0              | 21   | 7,7  | 25 | 27  | 63  | 8                    | 0,2 | 4    | 08200 |
| 9,0              | 22   | 8,7  | 30 | 32  | 72  | 10                   | 0,2 | 4    | 09200 |
| 10,0             | 22   | 9,7  | 30 | 32  | 72  | 10                   | 0,2 | 4    | 10200 |
| 11,0             | 26   | 10,6 | 36 | 38  | 83  | 12                   | 0,3 | 4    | 11200 |
| 12,0             | 26   | 11,6 | 36 | 38  | 83  | 12                   | 0,3 | 4    | 12200 |
| 14,0             | 26   | 13,6 | 36 | 38  | 83  | 14                   | 0,3 | 4    | 14200 |
| 15,0             | 36   | 14,5 | 42 | 44  | 92  | 16                   | 0,3 | 4    | 15200 |
| 16,0             | 36   | 15,5 | 42 | 44  | 92  | 16                   | 0,3 | 4    | 16200 |
| 17,0             | 36   | 16,5 | 42 | 44  | 92  | 18                   | 0,3 | 4    | 17200 |
| 18,0             | 36   | 18,0 | 42 | 44  | 92  | 18                   | 0,3 | 4    | 18200 |
| 19,0             | 41   | 19,0 | 52 | 54  | 104 | 20                   | 0,3 | 4    | 19200 |
| 20,0             | 41   | 20,0 | 52 | 54  | 104 | 20                   | 0,3 | 4    | 20200 |

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

→ v<sub>c</sub>/f<sub>z</sub> Page 68+69



## SilverLine – Ball Nosed Cutter



DRAGONSkin



DRAGONSkin



Factory standard



Factory standard

NEW

Article no.  
50 963 ...

NEW

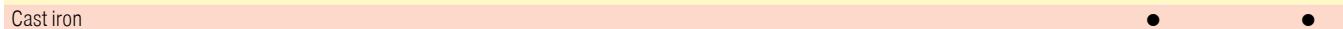
Article no.  
50 963 ...

| DC <sub>r8</sub> | APMX | DN   | LH   | LPR | OAL | DCONMS <sub>h6</sub> | ZEFP |
|------------------|------|------|------|-----|-----|----------------------|------|
| mm               | mm   | mm   | mm   | mm  | mm  | mm                   |      |
| 3,0              | 4    | 2,8  | 10,0 | 14  | 50  | 6                    | 2    |
| 3,0              | 7    | 3,0  | 8,8  | 24  | 60  | 6                    | 2    |
| 4,0              | 8    | 3,8  | 12,0 | 18  | 54  | 6                    | 2    |
| 4,0              | 10   | 4,0  | 12,5 | 39  | 75  | 6                    | 2    |
| 5,0              | 9    | 4,8  | 16,0 | 18  | 54  | 6                    | 2    |
| 5,0              | 12   | 5,0  | 15,0 | 39  | 75  | 6                    | 2    |
| 6,0              | 10   | 5,7  | 16,0 | 18  | 54  | 6                    | 2    |
| 6,0              | 12   | 6,0  | 15,0 | 64  | 100 | 6                    | 2    |
| 7,0              | 11   | 6,6  | 20,0 | 22  | 58  | 8                    | 2    |
| 8,0              | 12   | 7,6  | 20,0 | 22  | 58  | 8                    | 2    |
| 8,0              | 14   | 8,0  | 17,5 | 64  | 100 | 8                    | 2    |
| 10,0             | 14   | 9,6  | 24,0 | 26  | 66  | 10                   | 2    |
| 10,0             | 18   | 10,0 | 22,5 | 60  | 100 | 10                   | 2    |
| 12,0             | 16   | 11,5 | 26,0 | 28  | 73  | 12                   | 2    |
| 12,0             | 22   | 12,0 | 27,5 | 55  | 100 | 12                   | 2    |
| 14,0             | 18   | 13,3 | 28,0 | 30  | 75  | 14                   | 2    |
| 14,0             | 26   | 14,0 | 32,5 | 75  | 120 | 14                   | 2    |
| 16,0             | 22   | 15,2 | 32,0 | 34  | 82  | 16                   | 2    |
| 16,0             | 30   | 16,0 | 37,5 | 102 | 150 | 16                   | 2    |
| 18,0             | 24   | 17,1 | 34,0 | 36  | 84  | 18                   | 2    |
| 20,0             | 26   | 19,0 | 40,0 | 42  | 92  | 20                   | 2    |
| 20,0             | 38   | 20,0 | 47,5 | 100 | 150 | 20                   | 2    |

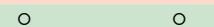
Steel



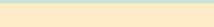
Stainless steel



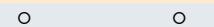
Cast iron



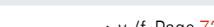
Non ferrous metals



Heat resistant alloys



Hardened materials

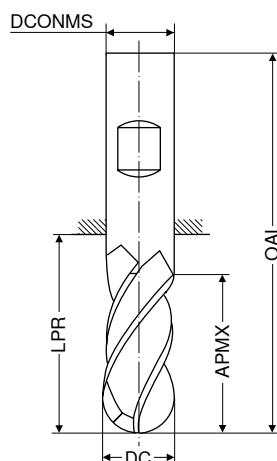
→ v<sub>c</sub>/f<sub>x</sub> Page 72

## SilverLine – Ball Nosed Cutter



DPB72S

DRAGONSKIN



Factory standard

HA

NEW

Article no.  
50 990 ...04220  
05225  
06230  
08280  
10250  
12260  
16280  
20210

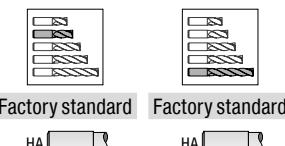
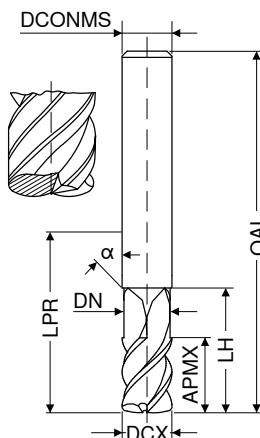
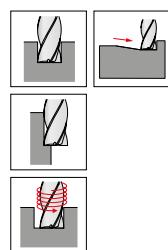
| DC <sub>f8</sub> | APMX | LPR | OAL | DCONMS <sub>h6</sub> | ZEFP |
|------------------|------|-----|-----|----------------------|------|
| mm               | mm   | mm  | mm  | mm                   |      |
| 4,0              | 11   | 21  | 57  | 6                    | 4    |
| 5,0              | 13   | 21  | 57  | 6                    | 4    |
| 6,0              | 13   | 21  | 57  | 6                    | 4    |
| 8,0              | 19   | 36  | 72  | 8                    | 4    |
| 10,0             | 22   | 32  | 72  | 10                   | 4    |
| 12,0             | 26   | 38  | 83  | 12                   | 4    |
| 16,0             | 32   | 44  | 92  | 16                   | 4    |
| 20,0             | 38   | 54  | 104 | 20                   | 4    |

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

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## SilverLine – Torus Face Milling Cutter

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



| DCX <sub>18</sub> | $r_{3D}$ | APMX | DN   | LH | LPR | OAL | $\alpha^\circ$ | DCONMS <sub>h6</sub> | ZEFP |
|-------------------|----------|------|------|----|-----|-----|----------------|----------------------|------|
| mm                | mm       | mm   | mm   | mm | mm  | mm  |                | mm                   |      |
| 6,00              | 1,12     | 6    | 5,5  | 21 | 21  | 57  | 45             | 6                    | 4    |
| 6,00              | 1,12     | 6    | 5,5  | 64 | 64  | 100 | 45             | 6                    | 4    |
| 8,00              | 1,23     | 8    | 7,4  | 27 | 27  | 63  | 45             | 8                    | 4    |
| 8,00              | 1,23     | 8    | 7,4  | 64 | 64  | 100 | 45             | 8                    | 4    |
| 10,00             | 1,17     | 10   | 9,2  | 32 | 32  | 72  | 45             | 10                   | 4    |
| 10,00             | 1,17     | 10   | 9,2  | 60 | 60  | 100 | 45             | 10                   | 4    |
| 12,00             | 1,86     | 12   | 11,0 | 32 | 38  | 83  | 45             | 12                   | 4    |
| 12,00             | 1,86     | 12   | 11,0 | 65 | 65  | 110 | 45             | 12                   | 4    |
| 16,00             | 2,47     | 16   | 15,0 | 38 | 44  | 92  | 45             | 16                   | 4    |
| 16,00             | 2,47     | 16   | 15,0 | 65 | 102 | 150 | 45             | 16                   | 4    |
| 20,00             | 2,61     | 20   | 18,5 | 40 | 42  | 92  | 45             | 20                   | 4    |
| 20,00             | 2,61     | 20   | 18,5 | 65 | 100 | 150 | 45             | 20                   | 4    |

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

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## Material examples referring to the cutting data tables

| Index | Material                                      | Strength N/mm <sup>2</sup> / HB / HRC | Material number | Material designation      | Material number         | Material designation      | Material number  | Material designation      |
|-------|---|---------------------------------------|-----------------|---------------------------|-------------------------|---------------------------|------------------|---------------------------|
| P     | 1.1 General construction steel                | < 800 N/mm <sup>2</sup>               | 1.0402          | EN3B                      |                         |                           |                  |                           |
|       | 1.2 Free cutting steel                        | < 800 N/mm <sup>2</sup>               | 1.0711          | EN1A                      |                         |                           |                  |                           |
|       | 1.3 Hardened steel, non alloyed               | < 800 N/mm <sup>2</sup>               | 1.0401          | EN32C                     |                         |                           |                  |                           |
|       | 1.4 Alloyed hardened steel                    | < 1000 N/mm <sup>2</sup>              | 1.7325          | 25 CD4                    |                         |                           |                  |                           |
|       | 1.5 Tempering steel, unalloyed                | < 850 N/mm <sup>2</sup>               | 1.5752          | EN36                      | 1.0535                  | EN9                       |                  |                           |
|       | 1.6 Tempering steel, unalloyed                | < 1000 N/mm <sup>2</sup>              | 1.6582          | EN24                      |                         |                           |                  |                           |
|       | 1.7 Tempering steel, alloyed                  | < 800 N/mm <sup>2</sup>               | 1.7225          | EN19                      |                         |                           |                  |                           |
|       | 1.8 Tempering steel, alloyed                  | < 1300 N/mm <sup>2</sup>              | 1.8515          | EN40B                     |                         |                           |                  |                           |
|       | 1.9 Steel castings                            | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 1.8509          | EN41B                     |                         |                           |                  |                           |
|       | 1.11 Nitriding steel                          | < 1200 N/mm <sup>2</sup>              | 1.1186          | EN8                       | 1.1160                  | EN14A                     |                  |                           |
|       | 1.12 Roller bearing steel                     | < 1200 N/mm <sup>2</sup>              | 1.3505          | 534A99                    |                         |                           |                  |                           |
|       | 1.13 Spring steel                             | < 1200 N/mm <sup>2</sup>              |                 | EN45                      |                         | EN47                      |                  | EN43                      |
|       | 1.14 High-speed steel                         | < 1300 N/mm <sup>2</sup>              | 1.3343          | M2                        | 1.3249                  | M34                       |                  |                           |
|       | 1.15 Cold working tool steel                  | < 1300 N/mm <sup>2</sup>              | 1.2379          | D2                        | 1.2311                  | P20                       |                  |                           |
|       | 1.16 Hot working tool steel                   | < 1300 N/mm <sup>2</sup>              | 1.2344          | H13                       |                         |                           |                  |                           |
| M     | 2.1 Cast steel and sulphured stainless steel  | < 850 N/mm <sup>2</sup>               | 1.4581          | 318                       |                         |                           |                  |                           |
|       | 2.2 Stainless steel, ferritic                 | < 750 N/mm <sup>2</sup>               | 1.4000          | 403                       |                         |                           |                  |                           |
|       | 2.3 Stainless steel, martensitic              | < 900 N/mm <sup>2</sup>               | 1.4057          | EN57                      |                         |                           |                  |                           |
|       | 2.4 Stainless steel, ferritic / martensitic   | < 1100 N/mm <sup>2</sup>              | 1.4028          | EN56B                     |                         |                           |                  |                           |
|       | 2.5 Stainless steel, austenitic / ferritic    | < 850 N/mm <sup>2</sup>               | 1.4542          | 17-4PH                    |                         |                           |                  |                           |
|       | 2.6 Stainless steel, austenitic               | < 750 N/mm <sup>2</sup>               | 1.4305          | 303                       | 1.4401                  | 316                       | 1.4301           | 304                       |
|       | 2.7 Heat resistant steel                      | < 1100 N/mm <sup>2</sup>              | 1.4876          | Incoloy 800               |                         |                           |                  |                           |
| K     | 3.1 Grey cast iron with lamellar graphite     | 100–350 N/mm <sup>2</sup>             | 0.6015          | Grade 150                 | 0.6020                  | Grade 220                 | 0.6025           | Grade 260                 |
|       | 3.2 Grey cast iron with lamellar graphite     | 300–500 N/mm <sup>2</sup>             | 0.6030          | Grade 300                 | 0.6035                  | Grade 350                 | 0.6040           | Grade 400                 |
|       | 3.3 Gray cast iron with spheroidal graphite   | 300–500 N/mm <sup>2</sup>             | 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/mm <sup>2</sup>             | 0.7060          | SG 600-3                  | 0.7070                  | SG 700-2                  | 0.7080           | SG 800-2                  |
|       | 3.5 White malleable cast iron                 | 270–450 N/mm <sup>2</sup>             | 0.8035          | GTW-35                    | 0.8045                  | GTW-45                    |                  |                           |
|       | 3.6 White malleable cast iron                 | 500–650 N/mm <sup>2</sup>             | 0.8055          | GTW-55                    | 0.8065                  | GTW-65                    |                  |                           |
|       | 3.7 Black malleable cast iron                 | 300–450 N/mm <sup>2</sup>             | 0.8135          | GTS-35                    | 0.8145                  | GTS-45                    |                  |                           |
|       | 3.8 Black malleable cast iron                 | 500–800 N/mm <sup>2</sup>             | 0.8155          | GTS-55                    | 0.8170                  | GTS-70                    |                  |                           |
| N     | 4.1 Aluminium (non alloyed, low alloyed)      | < 350 N/mm <sup>2</sup>               | 3.0255          | 1050 A                    | 3.0275                  | 1070 A                    | 3.0285           | 1080 A (A8)               |
|       | 4.2 Aluminium alloys < 0.5 % Si               | < 500 N/mm <sup>2</sup>               | 3.1325          | 2017 A (AU4G)             | 3.4335                  | 7005 (AZ5G)               | 3.4365           | 7075 (AZ5GU)              |
|       | 4.3 Aluminium alloy 0.5–10 % Si               | < 400 N/mm <sup>2</sup>               | 3.2315          | A-G 51                    | 3.2373                  | A-S9 G                    | 3.2151           | A-S 6 U4                  |
|       | 4.4 Aluminium alloys 10–15 % Si               | < 400 N/mm <sup>2</sup>               | 3.2581          | A-S12                     | 3.2583                  | A-S12 U                   |                  |                           |
|       | 4.5 Aluminum alloys > 15 % Si                 | < 400 N/mm <sup>2</sup>               |                 | A-S18                     | A-S17 U4                |                           |                  |                           |
|       | 4.6 Copper (non alloyed, low alloyed)         | < 350 N/mm <sup>2</sup>               | 2.0040          | Cu-c1                     | 2.0060                  | Cu-a1                     | 2.0090           | Cu-b1                     |
|       | 4.7 Copper wrought alloys                     | < 700 N/mm <sup>2</sup>               | 2.1247          | Cub2 (Beryllium 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/mm <sup>2</sup>               | 2.0331          | Cu Zn36 Pb1,5             | 2.0380                  | Cu Zn39 Pb2 (Ms 56)       | 2.0410           | Cu Zn44 Pb2               |
| S     | 4.12 Long-chipping brass                      | < 600 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>               | 3.5812          | Mg A7 Z1                  | 3.5662                  | Mg A9                     | 3.5105           | Mg Tr 22 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                      |
|       | 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)             |
| H     | 5.3 Nickel alloys                             | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4964          | Co Cr20 W15 Ni10          |                         | Co Cr20 Ni16 Mo7          |                  | Co Cr28 Mo 6              |
|       | 5.7 Heat resistant alloys                     | < 1300 N/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4851          | Ni Cr23Fe (Inconel 601)   | 2.4668                  | Ni Cr19NbMo (Inconel 718) | 2.4602           | Ni Cr21Mo14 Hastelloy C22 |
|       | 5.9 Pure titanium                             | < 900 N/mm <sup>2</sup>               | 3.7025          | T35 (Titanium Grade 1)    | 3.7034                  | T40 (Titanium Grade 2)    | 3.7064           | T60 (Titanium Grade 4)    |
|       | 5.10 Titanium alloys                          | < 700 N/mm <sup>2</sup>               | T-A6-Nb7 (367)  |                           | T-A5-Sn2-Mo4-Cr4 (Ti17) |                           | T-A3-V2,5 (Gr18) |                           |
|       | 5.11 Titanium alloys                          | < 1200 N/mm <sup>2</sup>              | 3.7165          | T-A6-V4 (Ta6V)            |                         | T-A4-3V-Mo2-Fe2 (SP700)   |                  | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
|       | 6.1   | < 45 HRC                              |                 |                           |                         |                           |                  |                           |
|       | 6.2   | 46–55 HRC                             |                 |                           |                         |                           |                  |                           |
|       | 6.3   | Tempered steel                        | 56–60 HRC       |                           |                         |                           |                  |                           |
|       | 6.4   |                                       | 61–65 HRC       |                           |                         |                           |                  |                           |
|       | 6.5   |                                       | 65–70 HRC       |                           |                         |                           |                  |                           |

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

| Index | v <sub>c</sub><br>m/min | a <sub>p max</sub> x DC | f <sub>z</sub><br>mm | 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 <sub>e</sub>    |             |             | a <sub>e</sub>    |             |             | a <sub>e</sub>    |             |             | a <sub>e</sub>    |             |             | a <sub>e</sub>    |             |             | a <sub>e</sub>      |             |             |  |  |
|       |                         |                         |                      | 0,1–<br>0,2       | 0,3–<br>0,4 | 0,6–<br>1,0 | 0,1–<br>0,2         | 0,3–<br>0,4 | 0,6–<br>1,0 |  |  |
| 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       |                     |             | </          |  |  |

|              | $\varnothing DC = 12,0\text{ mm}$ |                     |                     | $\varnothing DC = 14,0\text{--}15,0\text{ mm}$ |                     |                     | $\varnothing DC = 16,0\text{--}17,0\text{ mm}$ |                     |                     | $\varnothing DC = 18,0\text{--}19,0\text{ mm}$ |                     |                     | $\varnothing DC = 20,0\text{ mm}$ |                     |                     | <span style="color: black;">●</span> | <span style="color: orange;">○</span> |                                       |
|--------------|-----------------------------------|---------------------|---------------------|--|---------------------|---------------------|--|---------------------|---------------------|--|---------------------|---------------------|-----------------------------------|---------------------|---------------------|--------------------------------------|---------------------------------------|---------------------------------------|
|              | $a_e$                             |                     |                     | $a_e$  |                     |                     | $a_e$  |                     |                     | $a_e$  |                     |                     | $a_e$                             |                     |                     | 1st choice                           | suitable                              |                                       |
|              | 0,1-<br>0,2<br>x DC               | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC                            | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC                            | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC                            | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC               | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | Emulsion                             | Compressed air                        | MMS                                   |
| <b>Index</b> | $f_z$<br>mm                       |                     |                     | $f_z$<br>mm                                    |                     |                     | $f_z$<br>mm                                    |                     |                     | $f_z$<br>mm                                    |                     |                     | $f_z$<br>mm                       |                     |                     |                                      |                                       |                                       |
| <b>1.1</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.2</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.3</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.4</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.5</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.6</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.7</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.8</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.9</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.10</b>  | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.11</b>  | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.12</b>  | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.13</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>1.14</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>1.15</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>1.16</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>2.1</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.2</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.3</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.4</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.5</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.6</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.7</b>   | 0,030                             |                     |                     | 0,035  |                     |                     | 0,040  |                     |                     | 0,045  |                     |                     | 0,050                             |                     |                     | <span style="color: black;">●</span> |                                       |                                       |
| <b>3.1</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>3.2</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>3.3</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>3.4</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>3.5</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>3.6</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>3.7</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>3.8</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>4.1</b>   |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.2</b>   |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.3</b>   |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.4</b>   |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.5</b>   |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.6</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.7</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.8</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.9</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.10</b>  | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.11</b>  | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.12</b>  | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.13</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.14</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.15</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.16</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.17</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.18</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.19</b>  |                                   |                     |                     |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>5.1</b>   | 0,030                             |                     |                     | 0,035  |                     |                     | 0,040  |                     |                     | 0,045  |                     |                     | 0,050                             |                     |                     | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.2</b>   | 0,030                             |                     |                     | 0,035  |                     |                     | 0,040  |                     |                     | 0,045  |                     |                     | 0,050                             |                     |                     | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.3</b>   | 0,030                             |                     |                     | 0,035  |                     |                     | 0,040  |                     |                     | 0,045  |                     |                     | 0,050                             |                     |                     | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.4</b>   | 0,030                             |                     |                     | 0,035  |                     |                     | 0,040  |                     |                     | 0,045  |                     |                     | 0,050                             |                     |                     | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.5</b>   | 0,030                             |                     |                     | 0,035  |                     |                     | 0,040  |                     |                     | 0,045  |                     |                     | 0,050                             |                     |                     | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.6</b>   | 0,030                             |                     |                     | 0,035  |                     |                     | 0,040  |                     |                     | 0,045  |                     |                     | 0,050                             |                     |                     | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.7</b>   | 0,030                             |                     |                     | 0,035  |                     |                     | 0,040  |                     |                     | 0,045  |                     |                     | 0,050                             |                     |                     | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.8</b>   | 0,030                             |                     |                     | 0,035  |                     |                     | 0,040  |                     |                     | 0,045  |                     |                     | 0,050                             |                     |                     | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.9</b>   | 0,060                             | 0,048               | 0,                  |  |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |

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

|       | short                   | long | extra long              | short/long | extra long           | Ø DC = 3,0–3,5 mm |                |                      | Ø DC = 4,0–4,5 mm |                |                      | Ø DC = 5,0–5,5 mm |                |                      | Ø DC = 6,0–7,5 mm |                |                      | Ø DC = 8,0–9,5 mm |                |       |
|-------|-------------------------|------|-------------------------|------------|----------------------|-------------------|----------------|----------------------|-------------------|----------------|----------------------|-------------------|----------------|----------------------|-------------------|----------------|----------------------|-------------------|----------------|-------|
|       |                         |      |                         |            |                      | a <sub>e</sub>    | f <sub>z</sub> | x DC                 | a <sub>e</sub>    | f <sub>z</sub> | x DC                 | a <sub>e</sub>    | f <sub>z</sub> | x DC                 | a <sub>e</sub>    | f <sub>z</sub> | x DC                 | a <sub>e</sub>    | f <sub>z</sub> | x DC  |
| Index | v <sub>c</sub><br>m/min |      | a <sub>p max</sub> x DC |            | f <sub>z</sub><br>mm |                   |                | f <sub>z</sub><br>mm |                   |                | f <sub>z</sub><br>mm |                   |                | f <sub>z</sub><br>mm |                   |                | f <sub>z</sub><br>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</td      |                      |                   |                |                      |                   |                |       |

**i** Plunging angle for ramping and helical milling: 3°

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

| Index | long |                            |                            | $\varnothing DC = 3,0\text{ mm}$ |                            | $\varnothing DC = 4,0\text{ mm}$ |                            | $\varnothing DC = 5,0\text{ mm}$ |                            | $\varnothing DC = 6,0\text{ mm}$ |                            | $\varnothing DC = 8,0\text{ mm}$ |                            | $\varnothing DC = 10,0\text{ mm}$ |                            | $\varnothing DC = 12,0\text{ mm}$ |                            | $\varnothing DC = 14,0\text{ mm}$ |                            | $\varnothing DC = 16,0\text{ mm}$ |  |
|-------|------|----------------------------|----------------------------|----------------------------------|----------------------------|----------------------------------|----------------------------|----------------------------------|----------------------------|----------------------------------|----------------------------|----------------------------------|----------------------------|-----------------------------------|----------------------------|-----------------------------------|----------------------------|-----------------------------------|----------------------------|-----------------------------------|--|
|       |      |                            |                            | $a_e$                             |                            | $a_e$                             |                            | $a_e$                             |                            | $a_e$                             |  |
|       |      | $0,3-$<br>$0,4-$<br>$x DC$ | $0,6-$<br>$1,0-$<br>$x DC$ | $0,3-$<br>$0,4-$<br>$x DC$       | $0,6-$<br>$1,0-$<br>$x DC$ | $0,3-$<br>$0,4-$<br>$x DC$       | $0,6-$<br>$1,0-$<br>$x DC$ | $0,3-$<br>$0,4-$<br>$x DC$       | $0,6-$<br>$1,0-$<br>$x DC$ | $0,3-$<br>$0,4-$<br>$x DC$       | $0,6-$<br>$1,0-$<br>$x DC$ | $0,3-$<br>$0,4-$<br>$x DC$       | $0,6-$<br>$1,0-$<br>$x DC$ | $0,3-$<br>$0,4-$<br>$x DC$        | $0,6-$<br>$1,0-$<br>$x DC$ | $0,3-$<br>$0,4-$<br>$x DC$        | $0,6-$<br>$1,0-$<br>$x DC$ | $0,3-$<br>$0,4-$<br>$x DC$        | $0,6-$<br>$1,0-$<br>$x DC$ |                                   |  |
| 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   |      |                            |                            |                                  |                            |                                  |                            |                                  |                            |                                  |                            |                                  |                            |                                   |                            |                                   |                            |                                   |                            |                                   |  |

| Index                | $\varnothing DC = 18,0 \text{ mm}$ |                            | $\varnothing DC = 20,0 \text{ mm}$ |                            | 1st choice | ●<br>Emulsion | ○<br>suitable |  |  |  |
|----------------------|------------------------------------|----------------------------|------------------------------------|----------------------------|------------|---------------|---------------|--|--|--|
|                      | $a_s$                              |                            | $a_s$                              |                            |            |               |               |  |  |  |
|                      | 0,3-<br>0,4<br>$\times DC$         | 0,6-<br>1,0<br>$\times DC$ | 0,3-<br>0,4<br>$\times DC$         | 0,6-<br>1,0<br>$\times DC$ |            |               |               |  |  |  |
| f <sub>z</sub><br>mm | f <sub>z</sub><br>mm               |                            |                                    |                            |            |               | MMS           |  |  |  |
| <b>1.1</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>1.2</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>1.3</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>1.4</b>           | 0,126                              | 0,090                      | 0,140                              | 0,100                      | ●          | ○             | ○             |  |  |  |
| <b>1.5</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>1.6</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>1.7</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>1.8</b>           | 0,126                              | 0,090                      | 0,140                              | 0,100                      | ●          | ○             | ○             |  |  |  |
| <b>1.9</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>1.10</b>          | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>1.11</b>          | 0,126                              | 0,090                      | 0,140                              | 0,100                      | ●          | ○             | ○             |  |  |  |
| <b>1.12</b>          | 0,126                              | 0,090                      | 0,140                              | 0,100                      | ●          | ○             | ○             |  |  |  |
| <b>1.13</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>1.14</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>1.15</b>          | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>1.16</b>          | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ○             | ○             |  |  |  |
| <b>2.1</b>           | 0,084                              | 0,060                      | 0,098                              | 0,070                      | ●          |               |               |  |  |  |
| <b>2.2</b>           | 0,084                              | 0,060                      | 0,098                              | 0,070                      | ●          |               |               |  |  |  |
| <b>2.3</b>           | 0,084                              | 0,060                      | 0,098                              | 0,070                      | ●          |               |               |  |  |  |
| <b>2.4</b>           | 0,084                              | 0,060                      | 0,098                              | 0,070                      | ●          |               |               |  |  |  |
| <b>2.5</b>           | 0,084                              | 0,060                      | 0,098                              | 0,070                      | ●          |               |               |  |  |  |
| <b>2.6</b>           | 0,084                              | 0,060                      | 0,098                              | 0,070                      | ●          |               |               |  |  |  |
| <b>2.7</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>3.1</b>           | 0,182                              | 0,130                      | 0,196                              | 0,140                      | ●          | ●             | ●             |  |  |  |
| <b>3.2</b>           | 0,182                              | 0,130                      | 0,196                              | 0,140                      | ●          | ●             | ●             |  |  |  |
| <b>3.3</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ●             | ●             |  |  |  |
| <b>3.4</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ●             | ●             |  |  |  |
| <b>3.5</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ●             | ●             |  |  |  |
| <b>3.6</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ●             | ●             |  |  |  |
| <b>3.7</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ●             | ●             |  |  |  |
| <b>3.8</b>           | 0,154                              | 0,110                      | 0,168                              | 0,120                      | ●          | ●             | ●             |  |  |  |
| <b>4.1</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.2</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.3</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.4</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.5</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.6</b>           | 0,182                              | 0,130                      | 0,196                              | 0,140                      | ●          | ○             | ○             |  |  |  |
| <b>4.7</b>           | 0,182                              | 0,130                      | 0,196                              | 0,140                      | ●          | ○             | ○             |  |  |  |
| <b>4.8</b>           | 0,182                              | 0,130                      | 0,196                              | 0,140                      | ●          | ○             | ○             |  |  |  |
| <b>4.9</b>           | 0,182                              | 0,130                      | 0,196                              | 0,140                      | ●          | ○             | ○             |  |  |  |
| <b>4.10</b>          | 0,182                              | 0,130                      | 0,196                              | 0,140                      | ●          | ○             | ○             |  |  |  |
| <b>4.11</b>          | 0,182                              | 0,130                      | 0,196                              | 0,140                      | ●          | ○             | ○             |  |  |  |
| <b>4.12</b>          | 0,182                              | 0,130                      | 0,196                              | 0,140                      | ●          | ○             | ○             |  |  |  |
| <b>4.13</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.14</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.15</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.16</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.17</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.18</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>4.19</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.1</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.2</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.3</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.4</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.5</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.6</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.7</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.8</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.9</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.10</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>5.11</b>          |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>6.1</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>6.2</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>6.3</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>6.4</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |
| <b>6.5</b>           |                                    |                            |                                    |                            |            |               |               |  |  |  |



Plunging angle for ramping and helical milling: 3°

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

\* = long version:  $a_{p_{max.}} = 1.5 \times DC$  at  $f_z \times 0.75$

**i** Plunging angle for ramping and helical milling: 3°

/ 50 979 ...

|              | $\varnothing DC = 12,0\text{mm}$ |                     |                     | $\varnothing DC = 14,0\text{ mm}$ |                     |                     | $\varnothing DC = 16,0\text{--}17,0\text{ mm}$ |                     |                     | $\varnothing DC = 18,0\text{--}19,0\text{ mm}$ |                     |                     | $\varnothing DC = 20,0\text{ mm}$ |                     |                     | <span style="color: black;">●</span> | <span style="color: orange;">○</span> |                                       |
|--------------|----------------------------------|---------------------|---------------------|-----------------------------------|---------------------|---------------------|--|---------------------|---------------------|--|---------------------|---------------------|-----------------------------------|---------------------|---------------------|--------------------------------------|---------------------------------------|---------------------------------------|
|              | $a_e$                            |                     |                     | $a_e$                             |                     |                     | $a_e$  |                     |                     | $a_e$  |                     |                     | $a_e$                             |                     |                     | 1st choice                           | suitable                              |                                       |
|              | 0,1-<br>0,2<br>x DC              | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC               | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC                            | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC                            | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC               | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | Emulsion                             | Compressed air                        | MMS                                   |
| <b>Index</b> | $f_z$<br>mm                      |                     |                     | $f_z$<br>mm                       |                     |                     | $f_z$<br>mm                                    |                     |                     | $f_z$<br>mm                                    |                     |                     | $f_z$<br>mm                       |                     |                     |                                      |                                       |                                       |
| <b>1.1</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.2</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.3</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.4</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.5</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.6</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.7</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.8</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.9</b>   | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.10</b>  | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.11</b>  | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.12</b>  | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.13</b>  |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>1.14</b>  |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>1.15</b>  | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>1.16</b>  | 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               | <span style="color: black;">●</span> | <span style="color: orange;">○</span> | <span style="color: orange;">○</span> |
| <b>2.1</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.2</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.3</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.4</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.5</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.6</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>2.7</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>3.1</b>   | 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               | <span style="color: black;">●</span> | <span style="color: black;">●</span>  | <span style="color: black;">●</span>  |
| <b>3.2</b>   | 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               | <span style="color: black;">●</span> | <span style="color: black;">●</span>  | <span style="color: black;">●</span>  |
| <b>3.3</b>   | 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               | <span style="color: black;">●</span> | <span style="color: black;">●</span>  | <span style="color: black;">●</span>  |
| <b>3.4</b>   | 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               | <span style="color: black;">●</span> | <span style="color: black;">●</span>  | <span style="color: black;">●</span>  |
| <b>3.5</b>   | 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               | <span style="color: black;">●</span> | <span style="color: black;">●</span>  | <span style="color: black;">●</span>  |
| <b>3.6</b>   | 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               | <span style="color: black;">●</span> | <span style="color: black;">●</span>  | <span style="color: black;">●</span>  |
| <b>3.7</b>   | 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               | <span style="color: black;">●</span> | <span style="color: black;">●</span>  | <span style="color: black;">●</span>  |
| <b>3.8</b>   | 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               | <span style="color: black;">●</span> | <span style="color: black;">●</span>  | <span style="color: black;">●</span>  |
| <b>4.1</b>   |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.2</b>   |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.3</b>   |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.4</b>   |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.5</b>   |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.6</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.7</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.8</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.9</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.10</b>  | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.11</b>  | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.12</b>  | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>4.13</b>  |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.14</b>  |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.15</b>  |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.16</b>  |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.17</b>  |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.18</b>  |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>4.19</b>  |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>5.1</b>   |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>5.2</b>   |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |
| <b>5.3</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.4</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <b>5.5</b>   | 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               | <span style="color: black;">●</span> |                                       |                                       |
| <            |                                  |                     |                     |                                   |                     |                     |  |                     |                     |  |                     |                     |                                   |                     |                     |                                      |                                       |                                       |

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

\* = long version:  $a_{p_{max.}} = 1.5 \times DC$  at  $f_z \times 0.75$



Plunging angle for ramping and helical milling: 3°

## / 50 975 ...

|       | $\varnothing DC = 12,0\text{ mm}$ |                     |                     | $\varnothing DC = 14,0\text{ mm}$ |                     |                     | $\varnothing DC = 16,0\text{ mm}$ |                     |                     | $\varnothing DC = 18,0\text{ mm}$ |                     |                     | $\varnothing DC = 20,0\text{ mm}$ |                     |                     | ●<br>1st choice | ○<br>suitable  |     |  |
|-------|-----------------------------------|---------------------|---------------------|-----------------------------------|---------------------|---------------------|-----------------------------------|---------------------|---------------------|-----------------------------------|---------------------|---------------------|-----------------------------------|---------------------|---------------------|-----------------|----------------|-----|--|
|       | $a_s$                             |                     |                     | $a_s$                             |                     |                     | $a_s$                             |                     |                     | $a_s$                             |                     |                     | $a_s$                             |                     |                     |                 |                |     |  |
|       | 0,1-<br>0,2<br>x DC               | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC               | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC               | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC               | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC               | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC |                 |                |     |  |
| Index | $f_z$<br>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</td           |                                   |                     |                     |                 |                |     |  |

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

**i** Plunging angle for ramping and helical milling: 3°

|             | $\emptyset DC = 10,0\text{ mm}$ |                       |              | $\emptyset DC = 12,0\text{ mm}$ |                       |              | $\emptyset DC = 14,0\text{ mm}$ |                       |              | $\emptyset DC = 16,0\text{ mm}$ |                       |              | $\emptyset DC = 18,0\text{ mm}$ |                       |              | $\emptyset DC = 20,0\text{ mm}$ |                       |              | ●<br>1st choice | ○<br>suitable  |     |  |
|-------------|---------------------------------|-----------------------|--------------|---------------------------------|-----------------------|--------------|---------------------------------|-----------------------|--------------|---------------------------------|-----------------------|--------------|---------------------------------|-----------------------|--------------|---------------------------------|-----------------------|--------------|-----------------|----------------|-----|--|
|             | $a_e$                           |                       |              | $a_e$                           |                       |              | $a_e$                           |                       |              | $a_e$                           |                       |              | $a_e$                           |                       |              | $a_e$                           |                       |              |                 |                |     |  |
|             | 0,01-<br>0,02<br>x DC           | 0,03-<br>0,04<br>x DC | 0,05<br>x DC | 0,01-<br>0,02<br>x DC           | 0,03-<br>0,04<br>x DC | 0,05<br>x DC | 0,01-<br>0,02<br>x DC           | 0,03-<br>0,04<br>x DC | 0,05<br>x DC | 0,01-<br>0,02<br>x DC           | 0,03-<br>0,04<br>x DC | 0,05<br>x DC | 0,01-<br>0,02<br>x DC           | 0,03-<br>0,04<br>x DC | 0,05<br>x DC | 0,01-<br>0,02<br>x DC           | 0,03-<br>0,04<br>x DC | 0,05<br>x DC |                 |                |     |  |
| Index       | $f_z$<br>mm                     |                       | $f_z$<br>mm  |                                 | $f_z$<br>mm           |              | $f_z$<br>mm                     |                       | $f_z$<br>mm  |                                 | $f_z$<br>mm           |              | $f_z$<br>mm                     |                       | $f_z$<br>mm  |                                 | $f_z$<br>mm           |              | Emulsion        | Compressed air | MMS |  |
| <b>1.1</b>  | 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        | ●               | ○              | ○   |  |
| <b>1.2</b>  | 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        | ●               | ○              | ○   |  |
| <b>1.3</b>  | 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        | ●               | ○              | ○   |  |
| <b>1.4</b>  | 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        | ●               | ○              | ○   |  |
| <b>1.5</b>  | 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        | ●               | ○              | ○   |  |
| <b>1.6</b>  | 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        | ●               | ○              | ○   |  |
| <b>1.7</b>  | 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        | ●               | ○              | ○   |  |
| <b>1.8</b>  | 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        | ●               | ○              | ○   |  |
| <b>1.9</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>1.10</b> | 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        | ●               | ○              | ○   |  |
| <b>1.11</b> | 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        | ●               | ○              | ○   |  |
| <b>1.12</b> | 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        | ●               | ○              | ○   |  |
| <b>1.13</b> | 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        | ●               | ○              | ○   |  |
| <b>1.14</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>1.15</b> | 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        | ●               | ○              | ○   |  |
| <b>1.16</b> | 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        | ●               | ○              | ○   |  |
| <b>2.1</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>2.2</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>2.3</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>2.4</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>2.5</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>2.6</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>2.7</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>3.1</b>  | 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        | ●               | ○              | ○   |  |
| <b>3.2</b>  | 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        | ●               | ○              | ○   |  |
| <b>3.3</b>  | 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        | ●               | ○              | ○   |  |
| <b>3.4</b>  | 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        | ●               | ○              | ○   |  |
| <b>3.5</b>  | 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        | ●               | ○              | ○   |  |
| <b>3.6</b>  | 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        | ●               | ○              | ○   |  |
| <b>3.7</b>  | 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        | ●               | ○              | ○   |  |
| <b>3.8</b>  | 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        | ●               | ○              | ○   |  |
| <b>4.1</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.2</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.3</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.4</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.5</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.6</b>  | 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        | ●               |                |     |  |
| <b>4.7</b>  | 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        | ●               |                |     |  |
| <b>4.8</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.9</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.10</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.11</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.12</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.13</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.14</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.15</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.16</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.17</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.18</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>4.19</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.1</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.2</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.3</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.4</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.5</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.6</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.7</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.8</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.9</b>  |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.10</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>5.11</b> |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                                 |                       |              |                 |                |     |  |
| <b>6.1</b>  | 0,091                           | 0,065                 |              | 0,098                           | 0,070                 |              | 0,112                           | 0,080                 |              | 0,126                           | 0,090                 |              | 0,147                           | 0,105                 |              | 0,168                           | 0,120                 |              |                 |                |     |  |

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

| Index | v <sub>c</sub><br>m/min | v <sub>c</sub><br>m/min | a <sub>p,max</sub> x DC | 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 |  |
|-------|-------------------------|-------------------------|-------------------------|----------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------|----------------|-----|------------|--|
|       |                         |                         |                         | a <sub>e</sub> | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | a <sub>e</sub>       | Emulsion | Compressed air | MMS |            |  |
|       | long                    | extra long              |                         |                | f <sub>z</sub><br>mm |          |                |     |            |  |
| 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

**i** Plunging angle for ramping and helical milling: 3°

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



Plunging angle for ramping and helical milling: 3°

## - Rough machining

|       | $\varnothing DC = 16,0 \text{ mm}$ |                     |                     | $\varnothing DC = 20,0 \text{ mm}$ |                     |                     | ●<br>1st choice | ○<br>suitable         |  |  |
|-------|------------------------------------|---------------------|---------------------|------------------------------------|---------------------|---------------------|-----------------|-----------------------|--|--|
|       | $a_s$                              |                     |                     | $a_s$                              |                     |                     |                 |                       |  |  |
|       | 0,1-<br>0,2<br>x DC                | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC | 0,1-<br>0,2<br>x DC                | 0,3-<br>0,4<br>x DC | 0,6-<br>1,0<br>x DC |                 |                       |  |  |
| Index | $f_z$<br>mm                        |                     |                     | $f_z$<br>mm                        |                     |                     | Emulsion        | Compressed air<br>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   |                                    |                     |                     |                                    |                     |                     |                 |                       |  |  |
| 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   |                                    |                     |                     |                                    |                     |                     |                 |                       |  |  |

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

| Index | V <sub>c</sub><br>m/min | a <sub>p max</sub> x DC | f <sub>z</sub><br>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      |                     |             |
|-------|-------------------------|-------------------------|----------------------|---------------------|---------------------|-------------|---------------------|---------------------|-------------|---------------------|---------------------|-------------|---------------------|---------------------|-------------|---------------------|---------------------|-------------|
|       |                         |                         |                      | a <sub>e</sub>      |                     |             | a <sub>e</sub>      |                     |             | a <sub>e</sub>      |                     |             | a <sub>e</sub>      |                     |             | a <sub>e</sub>      |                     |             |
|       |                         |                         |                      | 0,1-<br>0,2<br>x DC | 0,3-<br>0,4<br>x DC | 0,5<br>x DC | 0,1-<br>0,2<br>x DC | 0,3-<br>0,4<br>x DC | 0,5<br>x DC | 0,1-<br>0,2<br>x DC | 0,3-<br>0,4<br>x DC | 0,5<br>x DC | 0,1-<br>0,2<br>x DC | 0,3-<br>0,4<br>x DC | 0,5<br>x DC | 0,1-<br>0,2<br>x DC | 0,3-<br>0,4<br>x DC | 0,5<br>x DC |
| 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°

| Index       | $\varnothing DC = 20,0 \text{ mm}$ |                            |                    | ●<br>1st choice | ○<br>suitable |  |  |
|-------------|------------------------------------|----------------------------|--------------------|-----------------|---------------|--|--|
|             | $a_s$                              |                            |                    |                 |               |  |  |
|             | 0.1-<br>0.2<br>$\times DC$         | 0.3-<br>0.4<br>$\times DC$ | 0.5<br>$\times DC$ |                 |               |  |  |
| Index       | $f_z$<br>mm                        | Emulsion                   | Compressed air     | MMS             |               |  |  |
| <b>1.1</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.2</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.3</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.4</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.5</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.6</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.7</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.8</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.9</b>  |                                    |                            |                    |                 |               |  |  |
| <b>1.10</b> | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.11</b> | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.12</b> | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.13</b> | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.14</b> |                                    |                            |                    |                 |               |  |  |
| <b>1.15</b> | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>1.16</b> | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>2.1</b>  | 1,100 0,880 0,550                  | ●                          |                    |                 |               |  |  |
| <b>2.2</b>  | 1,100 0,880 0,550                  | ●                          |                    |                 |               |  |  |
| <b>2.3</b>  | 1,100 0,880 0,550                  | ●                          |                    |                 |               |  |  |
| <b>2.4</b>  | 1,100 0,880 0,550                  | ●                          |                    |                 |               |  |  |
| <b>2.5</b>  | 1,100 0,880 0,550                  | ●                          |                    |                 |               |  |  |
| <b>2.6</b>  | 1,100 0,880 0,550                  | ●                          |                    |                 |               |  |  |
| <b>2.7</b>  |                                    |                            |                    |                 |               |  |  |
| <b>3.1</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>3.2</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>3.3</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>3.4</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>3.5</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>3.6</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>3.7</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>3.8</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>4.1</b>  |                                    |                            |                    |                 |               |  |  |
| <b>4.2</b>  |                                    |                            |                    |                 |               |  |  |
| <b>4.3</b>  |                                    |                            |                    |                 |               |  |  |
| <b>4.4</b>  |                                    |                            |                    |                 |               |  |  |
| <b>4.5</b>  |                                    |                            |                    |                 |               |  |  |
| <b>4.6</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>4.7</b>  | 1,100 0,880 0,550                  | ●                          | ○                  | ○               |               |  |  |
| <b>4.8</b>  |                                    |                            |                    |                 |               |  |  |
| <b>4.9</b>  |                                    |                            |                    |                 |               |  |  |
| <b>4.10</b> |                                    |                            |                    |                 |               |  |  |
| <b>4.11</b> |                                    |                            |                    |                 |               |  |  |
| <b>4.12</b> |                                    |                            |                    |                 |               |  |  |
| <b>4.13</b> |                                    |                            |                    |                 |               |  |  |
| <b>4.14</b> |                                    |                            |                    |                 |               |  |  |
| <b>4.15</b> |                                    |                            |                    |                 |               |  |  |
| <b>4.16</b> |                                    |                            |                    |                 |               |  |  |
| <b>4.17</b> |                                    |                            |                    |                 |               |  |  |
| <b>4.18</b> |                                    |                            |                    |                 |               |  |  |
| <b>4.19</b> |                                    |                            |                    |                 |               |  |  |
| <b>5.1</b>  |                                    |                            |                    |                 |               |  |  |
| <b>5.2</b>  |                                    |                            |                    |                 |               |  |  |
| <b>5.3</b>  |                                    |                            |                    |                 |               |  |  |
| <b>5.4</b>  |                                    |                            |                    |                 |               |  |  |
| <b>5.5</b>  |                                    |                            |                    |                 |               |  |  |
| <b>5.6</b>  |                                    |                            |                    |                 |               |  |  |
| <b>5.7</b>  |                                    |                            |                    |                 |               |  |  |
| <b>5.8</b>  |                                    |                            |                    |                 |               |  |  |
| <b>5.9</b>  |                                    |                            |                    |                 |               |  |  |
| <b>5.10</b> |                                    |                            |                    |                 |               |  |  |
| <b>5.11</b> |                                    |                            |                    |                 |               |  |  |
| <b>6.1</b>  | 0,900 0,720 0,450                  | ●                          | ●                  |                 |               |  |  |
| <b>6.2</b>  | 0,900 0,720 0,450                  | ●                          | ●                  | ●               |               |  |  |
| <b>6.3</b>  | 0,900 0,720 0,450                  | ●                          | ●                  | ●               |               |  |  |
| <b>6.4</b>  |                                    |                            |                    |                 |               |  |  |
| <b>6.5</b>  |                                    |                            |                    |                 |               |  |  |

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| Assembly instructions | 90    |

## WNT \ Performance

Premium quality tools for high performance.

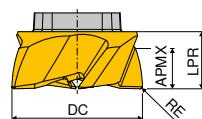
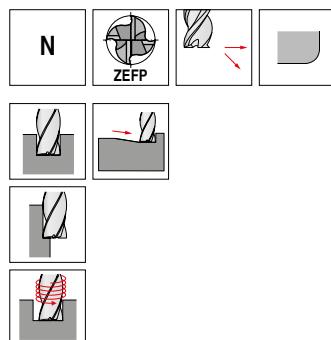
The premium quality tools from the **WNT Performance** product line have been designed for specific applications and are distinguished by their outstanding performance. If you make high demands on the performance of your production and want to achieve the very best results, we recommend the Premium tools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



Factory standard | Factory standard

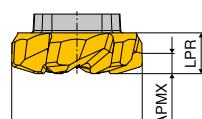
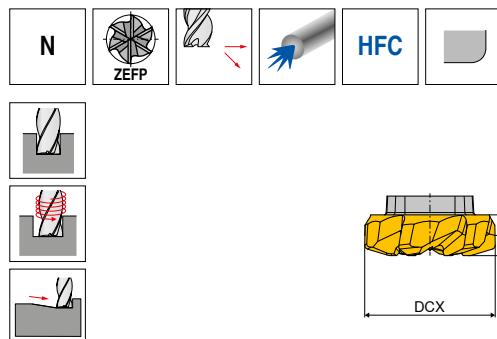
| NEW Article no. 53 805 ... |       | NEW Article no. 53 806 ... |       |
|----------------------------|-------|----------------------------|-------|
| 01205                      | 01205 | 01607                      | 01607 |
| 02008                      | 02008 | 02510                      | 02510 |

|                       |   |
|-----------------------|---|
| 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



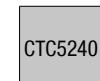
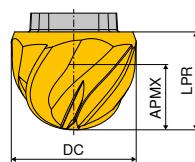
Factory standard | Factory standard

| NEW Article no. 53 801 ... |       | NEW Article no. 53 802 ... |       |
|----------------------------|-------|----------------------------|-------|
| 01202                      | 01202 | 01605                      | 01605 |
| 02005                      | 02005 | 02505                      | 02505 |

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

## MultiLock – Ball Nosed Cutter

▲ KLG = Coupling Size



DRAGONSKIN



DRAGONSKIN



| DC | KLG  | APMX | LPR | ZEFP |
|----|------|------|-----|------|
| mm |      | mm   | mm  |      |
| 12 | EL12 | 7,0  | 9   | 4    |
| 16 | EL16 | 9,5  | 12  | 4    |
| 20 | EL20 | 12,0 | 15  | 4    |
| 25 | EL25 | 16,0 | 19  | 4    |

Factory standard Factory standard

**NEW**  
Article no.  
**53 803 ...**

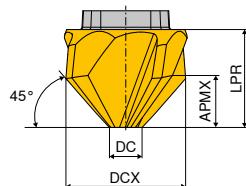
**NEW**  
Article no.  
**53 804 ...**

|       |       |
|-------|-------|
| 01200 | 01200 |
| 01600 | 01600 |
| 02000 | 02000 |
| 02500 | 02500 |

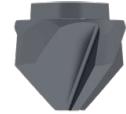
|                       |   |
|-----------------------|---|
| Steel                 | ● |
| Stainless steel       | ○ |
| Cast iron             | ● |
| Non ferrous metals    | ○ |
| Heat resistant alloys | ● |
| Hardened materials    |   |

## MultiLock – Deburring Cutter

▲ KLG = Coupling Size



DRAGONSKIN



| DCX | KLG  | APMX | DC | LPR | ZEFP |
|-----|------|------|----|-----|------|
| mm  |      | mm   | mm | mm  |      |
| 12  | EL12 | 4    | 4  | 8   | 4    |
| 16  | EL16 | 6    | 4  | 12  | 4    |

Factory standard

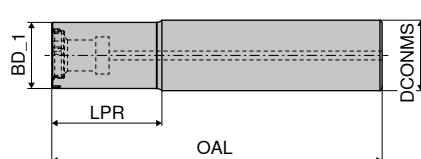
**NEW**  
Article no.  
**53 800 ...**

|       |
|-------|
| 01200 |
| 01600 |

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

## MultiLock – Holders

▲ KLG = Coupling Size



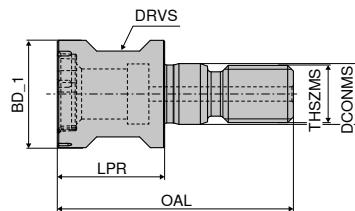
| KLG  | BD_1 | DCONMS | OAL | LPR |
|------|------|--------|-----|-----|
|      | mm   | mm     | mm  | mm  |
| EL12 | 11   | 12     | 66  | 20  |
| EL16 | 15   | 16     | 75  | 25  |
| EL20 | 19   | 20     | 77  | 25  |
| EL25 | 24   | 25     | 87  | 30  |

| Steel  | Steel  |
|--|--|
| A  | B  |
| <b>NEW</b><br>Article no.<br><b>84 050 ...</b> | <b>NEW</b><br>Article no.<br><b>84 051 ...</b> |
| 01200  | 01200  |
| 01600  | 01600  |
| 02000  | 02000  |
| 02500  | 02500  |

|                             |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                     |
|-----------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|---------------------|
|                             | Bit                              |                                  | Threaded bush                    |                                  | Cylindrical screw                |                                  | TORX® blade                      |                                  | Key D                            |                                  | Molykote                         |                                  | Clamping screw                   |                                  | Torque screw-driver |
| Spare parts                 | Article no.<br><b>80 398 ...</b> | Article no.<br><b>70 950 ...</b> | Article no.<br><b>70 950 ...</b> | Article no.<br><b>80 950 ...</b> | Article no.<br><b>80 950 ...</b> | Article no.<br><b>70 950 ...</b> | Article no.<br><b>80 950 ...</b> | Article no.<br><b>80 950 ...</b> |                     |
| for Article no.             |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                     |
| 84 051 01200 / 84 050 01200 | 03500                            | 42100                            | 42000                            | 054                              |                                  | 120                              |                                  | 303                              |                                  | 41900                            |                                  | 193                              |                                  |                                  |                     |
| 84 051 01600 / 84 050 01600 | 04500                            | 42400                            | 42300                            | 055                              |                                  | 121                              |                                  | 303                              |                                  | 42200                            |                                  | 193                              |                                  |                                  |                     |
| 84 051 02000 / 84 050 02000 | 04500                            | 42400                            | 42300                            | 055                              |                                  | 121                              |                                  | 303                              |                                  | 42200                            |                                  | 193                              |                                  |                                  |                     |
| 84 051 02500 / 84 050 02500 | 06000                            | 42700                            | 42600                            | 055                              |                                  | 121                              |                                  | 303                              |                                  | 42500                            |                                  | 193                              |                                  |                                  |                     |

## Screw-in adapter, type A

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

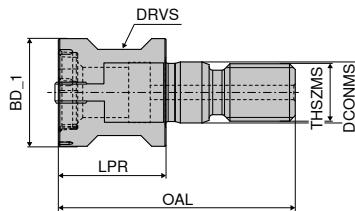


| KLG  | BD_1 | THSZMS | OAL | LPR | DCONMS | DRVS | NEW Article no. 84 052 ... |       |
|------|------|--------|-----|-----|--------|------|----------------------------|-------|
|      |      |        |     |     |        |      | mm                         | mm    |
| EL12 | 11   | M6     | 28  | 13  | 6,5    | 9    |                            | 01200 |
| EL16 | 15   | M8     | 33  | 14  | 8,5    | 12   |                            | 01600 |
| EL20 | 19   | M10    | 37  | 18  | 10,5   | 15   |                            | 02000 |
| EL25 | 24   | M12    | 42  | 20  | 12,5   | 17   |                            | 02500 |

|                 |                        |                        |                        |                        |                        |                        |                        |
|-----------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|                 |                        |                        |                        |                        |                        |                        |                        |
| Spare parts     | 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    | 03500                  | 42100                  | 054                    | 120                    | 303                    | 41900                  | 193                    |
| 84 052 01600    | 04500                  | 42400                  | 055                    | 121                    | 303                    | 42200                  | 193                    |
| 84 052 02000    | 04500                  | 42400                  | 055                    | 121                    | 303                    | 42200                  | 193                    |
| 84 052 02500    | 06000                  | 42700                  | 055                    | 121                    | 303                    | 42500                  | 193                    |

## Screw-in adapter, type B

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



| KLG  | BD_1 | THSZMS | OAL | LPR | DCONMS | DRVS | NEW Article no. 84 053 ... |       |
|------|------|--------|-----|-----|--------|------|----------------------------|-------|
|      |      |        |     |     |        |      | mm                         | mm    |
| EL12 | 11   | M6     | 28  | 13  | 6,5    | 9    |                            | 01200 |
| EL16 | 15   | M8     | 33  | 14  | 8,5    | 12   |                            | 01600 |
| EL20 | 20   | M10    | 37  | 18  | 10,5   | 15   |                            | 02000 |
| EL25 | 25   | M12    | 42  | 20  | 12,5   | 17   |                            | 02500 |

|                 |                        |                        |                        |                        |                        |                        |
|-----------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|                 |                        |                        |                        |                        |                        |                        |
| Spare parts     | 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 | 18600 | 18000 | 054 | 120 | 303 | 193 |
| 84 053 01600 | 18800 | 18100 | 055 | 121 | 303 | 193 |
| 84 053 02000 | 18700 | 18200 | 055 | 121 | 303 | 193 |
| 84 053 02500 | 18900 | 18300 | 055 | 121 | 303 | 193 |

## Material examples referring to the cutting data tables

| Index | Material                                      | Strength N/mm <sup>2</sup> / HB / HRC | Material number | Material designation      | Material number | Material designation      | Material number | Material designation      |
|-------|---|---------------------------------------|-----------------|---------------------------|-----------------|---------------------------|-----------------|---------------------------|
| P     | 1.1 General construction steel                | < 800 N/mm <sup>2</sup>               | 1.0402          | EN3B                      |                 |                           |                 |                           |
|       | 1.2 Free cutting steel                        | < 800 N/mm <sup>2</sup>               | 1.0711          | EN1A                      |                 |                           |                 |                           |
|       | 1.3 Hardened steel, non alloyed               | < 800 N/mm <sup>2</sup>               | 1.0401          | EN32C                     |                 |                           |                 |                           |
|       | 1.4 Alloyed hardened steel                    | < 1000 N/mm <sup>2</sup>              | 1.7325          | 25 CD4                    |                 |                           |                 |                           |
|       | 1.5 Tempering steel, unalloyed                | < 850 N/mm <sup>2</sup>               | 1.5752          | EN36                      | 1.0535          | EN9                       |                 |                           |
|       | 1.6 Tempering steel, unalloyed                | < 1000 N/mm <sup>2</sup>              | 1.6582          | EN24                      |                 |                           |                 |                           |
|       | 1.7 Tempering steel, alloyed                  | < 800 N/mm <sup>2</sup>               | 1.7225          | EN19                      |                 |                           |                 |                           |
|       | 1.8 Tempering steel, alloyed                  | < 1300 N/mm <sup>2</sup>              | 1.8515          | EN40B                     |                 |                           |                 |                           |
|       | 1.9 Steel castings                            | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 1.8509          | EN41B                     |                 |                           |                 |                           |
|       | 1.11 Nitriding steel                          | < 1200 N/mm <sup>2</sup>              | 1.1186          | EN8                       | 1.1160          | EN14A                     |                 |                           |
|       | 1.12 Roller bearing steel                     | < 1200 N/mm <sup>2</sup>              | 1.3505          | 534A99                    |                 |                           |                 |                           |
|       | 1.13 Spring steel                             | < 1200 N/mm <sup>2</sup>              |                 | EN45                      |                 | EN47                      |                 | EN43                      |
|       | 1.14 High-speed steel                         | < 1300 N/mm <sup>2</sup>              | 1.3343          | M2                        | 1.3249          | M34                       |                 |                           |
|       | 1.15 Cold working tool steel                  | < 1300 N/mm <sup>2</sup>              | 1.2379          | D2                        | 1.2311          | P20                       |                 |                           |
|       | 1.16 Hot working tool steel                   | < 1300 N/mm <sup>2</sup>              | 1.2344          | H13                       |                 |                           |                 |                           |
| M     | 2.1 Cast steel and sulphured stainless steel  | < 850 N/mm <sup>2</sup>               | 1.4581          | 318                       |                 |                           |                 |                           |
|       | 2.2 Stainless steel, ferritic                 | < 750 N/mm <sup>2</sup>               | 1.4000          | 403                       |                 |                           |                 |                           |
|       | 2.3 Stainless steel, martensitic              | < 900 N/mm <sup>2</sup>               | 1.4057          | EN57                      |                 |                           |                 |                           |
|       | 2.4 Stainless steel, ferritic / martensitic   | < 1100 N/mm <sup>2</sup>              | 1.4028          | EN56B                     |                 |                           |                 |                           |
|       | 2.5 Stainless steel, austenitic / ferritic    | < 850 N/mm <sup>2</sup>               | 1.4542          | 17-4PH                    |                 |                           |                 |                           |
|       | 2.6 Stainless steel, austenitic               | < 750 N/mm <sup>2</sup>               | 1.4305          | 303                       | 1.4401          | 316                       | 1.4301          | 304                       |
|       | 2.7 Heat resistant steel                      | < 1100 N/mm <sup>2</sup>              | 1.4876          | Incoloy 800               |                 |                           |                 |                           |
| K     | 3.1 Grey cast iron with lamellar graphite     | 100-350 N/mm <sup>2</sup>             | 0.6015          | Grade 150                 | 0.6020          | Grade 220                 | 0.6025          | Grade 260                 |
|       | 3.2 Grey cast iron with lamellar graphite     | 300-500 N/mm <sup>2</sup>             | 0.6030          | Grade 300                 | 0.6035          | Grade 350                 | 0.6040          | Grade 400                 |
|       | 3.3 Gray cast iron with spheroidal graphite   | 300-500 N/mm <sup>2</sup>             | 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/mm <sup>2</sup>             | 0.7060          | SG 600-3                  | 0.7070          | SG 700-2                  | 0.7080          | SG 800-2                  |
|       | 3.5 White malleable cast iron                 | 270-450 N/mm <sup>2</sup>             | 0.8035          | GTW-35                    | 0.8045          | GTW-45                    |                 |                           |
|       | 3.6 White malleable cast iron                 | 500-650 N/mm <sup>2</sup>             | 0.8055          | GTW-55                    | 0.8065          | GTW-65                    |                 |                           |
|       | 3.7 Black malleable cast iron                 | 300-450 N/mm <sup>2</sup>             | 0.8135          | GTS-35                    | 0.8145          | GTS-45                    |                 |                           |
|       | 3.8 Black malleable cast iron                 | 500-800 N/mm <sup>2</sup>             | 0.8155          | GTS-55                    | 0.8170          | GTS-70                    |                 |                           |
| N     | 4.1 Aluminium (non alloyed, low alloyed)      | < 350 N/mm <sup>2</sup>               | 3.0255          | 1050 A                    | 3.0275          | 1070 A                    | 3.0285          | 1080 A (A8)               |
|       | 4.2 Aluminium alloys < 0.5 % Si               | < 500 N/mm <sup>2</sup>               | 3.1325          | 2017 A (AU4G)             | 3.4335          | 7005 (AZ5G)               | 3.4365          | 7075 (AZ5GU)              |
|       | 4.3 Aluminium alloy 0.5-10 % Si               | < 400 N/mm <sup>2</sup>               | 3.2315          | A-G 51                    | 3.2373          | A-S9 G                    | 3.2151          | A-S 6 U4                  |
|       | 4.4 Aluminium alloys 10-15 % Si               | < 400 N/mm <sup>2</sup>               | 3.2581          | A-S12                     | 3.2583          | A-S12 U                   |                 |                           |
|       | 4.5 Aluminum alloys > 15 % Si                 | < 400 N/mm <sup>2</sup>               |                 | A-S18                     | A-S17 U4        |                           |                 |                           |
|       | 4.6 Copper (non alloyed, low alloyed)         | < 350 N/mm <sup>2</sup>               | 2.0040          | Cu-c1                     | 2.0060          | Cu-a1                     | 2.0090          | Cu-b1                     |
|       | 4.7 Copper wrought alloys                     | < 700 N/mm <sup>2</sup>               | 2.1247          | Cub2 (Beryllium 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/mm <sup>2</sup>               | 2.0331          | Cu Zn36 Pb1,5             | 2.0380          | Cu Zn39 Pb2 (Ms 56)       | 2.0410          | Cu Zn44 Pb2               |
| S     | 4.12 Long-chipping brass                      | < 600 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>               | 3.5812          | Mg A7 Z1                  | 3.5662          | Mg A9                     | 3.5105          | Mg Tr 22 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                      |
|       | 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)             |
| H     | 5.3 Nickel alloys                             | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4964          | Co Cr20 W15 Ni10          |                 | Co Cr20 Ni16 Mo7          |                 | Co Cr28 Mo 6              |
|       | 5.7 Heat resistant alloys                     | < 1300 N/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4851          | Ni Cr23Fe (Inconel 601)   | 2.4668          | Ni Cr19NbMo (Inconel 718) | 2.4602          | Ni Cr21Mo14 Hastelloy C22 |
|       | 5.9 Pure titanium                             | < 900 N/mm <sup>2</sup>               | 3.7025          | T35 (Titanium Grade 1)    | 3.7034          | T40 (Titanium Grade 2)    | 3.7064          | T60 (Titanium Grade 4)    |
|       | 5.10 Titanium alloys                          | < 700 N/mm <sup>2</sup>               |                 | T-A6-Nb7 (367)            |                 | T-A5-Sn2-Mo4-Cr4 (Ti17)   |                 | T-A3-V2,5 (Gr18)          |
|       | 5.11 Titanium alloys                          | < 1200 N/mm <sup>2</sup>              | 3.7165          | T-A6-V4 (Ta6V)            |                 | T-A4-3V-Mo2-Fe2 (SP700)   |                 | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
|       | 6.1   | < 45 HRC                              |                 |                           |                 |                           |                 |                           |
|       | 6.2   | 46-55 HRC                             |                 |                           |                 |                           |                 |                           |
|       | 6.3   | Tempered steel                        | 56-60 HRC       |                           |                 |                           |                 |                           |
|       | 6.4   |                                       | 61-65 HRC       |                           |                 |                           |                 |                           |
|       | 6.5   |                                       | 65-70 HRC       |                           |                 |                           |                 |                           |

## Cutting data standard values – MultiLock – Torus cutter

| Index                   | CTC5240                 | CTPX225 | Ø DC = 12 mm              |                      | Ø DC = 16 mm              |                      | Ø DC = 20 mm              |                      | Ø DC = 25 mm              |                      | Emulsion | Compressed air | MMS |  |  |  |
|-------------------------|-------------------------|---------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|----------------------|----------|----------------|-----|--|--|--|
|                         |                         |         | $a_e = 0,1-0,3 \times DC$ |                      | $a_e = 0,3-0,6 \times DC$ |                      | $a_e = 0,1-0,3 \times DC$ |                      | $a_e = 0,3-0,6 \times DC$ |                      |          |                |     |  |  |  |
|                         |                         |         | $a_p$ max. = 3 mm         |                      | $a_p$ max. = 4,5 mm       |                      | $a_p$ max. = 6 mm         |                      | $a_p$ max. = 8 mm         |                      |          |                |     |  |  |  |
| V <sub>c</sub><br>m/min | V <sub>c</sub><br>m/min |         | f <sub>z</sub><br>mm      | f <sub>z</sub><br>mm |          |                |     |  |  |  |
| 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

| Index | v <sub>c</sub><br>m/min | CCT5240 | CTPX225 | Ø DC = 12 mm                      |                                   |                                   | Ø DC = 16 mm                      |                                   |                                   | Ø DC = 20 mm                      |                                   |                                   | Ø DC = 25 mm                      |                                   |                                   | 1st choice | ○<br>suitable |
|-------|-------------------------|---------|---------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------|---------------|
|       |                         |         |         | a <sub>p</sub><br>0,1–0,2<br>x DC | a <sub>p</sub><br>0,3–0,4<br>x DC | a <sub>p</sub><br>0,6–1,0<br>x DC | a <sub>p</sub><br>0,1–0,2<br>x DC | a <sub>p</sub><br>0,3–0,4<br>x DC | a <sub>p</sub><br>0,6–1,0<br>x DC | a <sub>p</sub><br>0,1–0,2<br>x DC | a <sub>p</sub><br>0,3–0,4<br>x DC | a <sub>p</sub><br>0,6–1,0<br>x DC | a <sub>p</sub><br>0,1–0,2<br>x DC | a <sub>p</sub><br>0,3–0,4<br>x DC | a <sub>p</sub><br>0,6–1,0<br>x DC |            |               |
|       |                         |         |         | a <sub>p</sub> max. = 0,5 mm      |                                   |                                   | a <sub>p</sub> max. = 0,8 mm      |                                   |                                   | a <sub>p</sub> max. = 0,8 mm      |                                   |                                   | a <sub>p</sub> max. = 0,8 mm      |                                   |                                   |            |               |
| 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

|       |         | $\emptyset DC = 12\text{ mm}$ | $\emptyset DC = 16\text{ mm}$ | $\emptyset DC = 20\text{ mm}$ | $\emptyset DC = 25\text{ mm}$ | ●<br>1st choice              | ○<br>suitable                |                              |                              |                              |          |                |     |
|-------|---------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|----------|----------------|-----|
|       | CTC5240 | CTPX225                       | $a_s / a_p = 0,05 \times DC$  | $a_s / a_p = 0,05 \times DC$  | $a_s / a_p = 0,05 \times DC$  | $a_s / a_p = 0,05 \times DC$ | $f_z$<br>mm                  | $f_z$<br>mm                  | $f_z$<br>mm                  | $f_z$<br>mm                  | Emulsion | Compressed air | MMS |
| Index |         |                               | $v_c$<br>m/min                | $v_c$<br>m/min                | $a_s / a_p = 0,05 \times DC$  | $a_s / a_p = 0,05 \times DC$ | $a_s / a_p = 0,05 \times DC$ | $a_s / a_p = 0,05 \times DC$ | $a_s / a_p = 0,05 \times DC$ | $a_s / a_p = 0,05 \times DC$ |          |                |     |
| 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

| Index   | v <sub>c</sub><br>m/min          | f <sub>z</sub><br>mm | f <sub>z</sub><br>mm             | ●          |                                   | ○                                 |  |  |
|---------|----------------------------------|----------------------|----------------------------------|------------|-----------------------------------|-----------------------------------|--|--|
|         |                                  |                      |                                  | 1st choice |                                   | suitable                          |  |  |
|         |                                  |                      |                                  | Emulsion   | Compressed air                    | MMS                               |  |  |
| CTPX225 | $\varnothing DC = 12\text{ mm}$  |                      | $\varnothing DC = 16\text{ mm}$  |            | $a_e = 0,1\text{--}0,2 \times DC$ | $a_e = 0,1\text{--}0,2 \times DC$ |  |  |
|         | $a_p \text{ max.} = 4\text{ mm}$ |                      | $a_p \text{ max.} = 6\text{ mm}$ |            |                                   |                                   |  |  |
| 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     |                                  |                      |                                  |            |                                   |                                   |  |  |

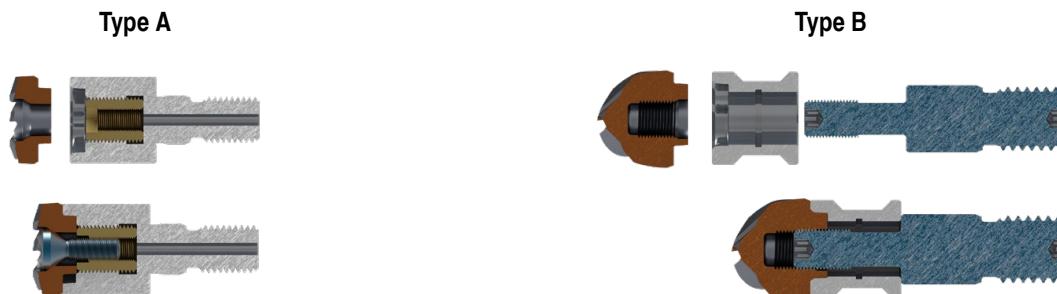
## Assembly instructions

### 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



- ▲ 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.

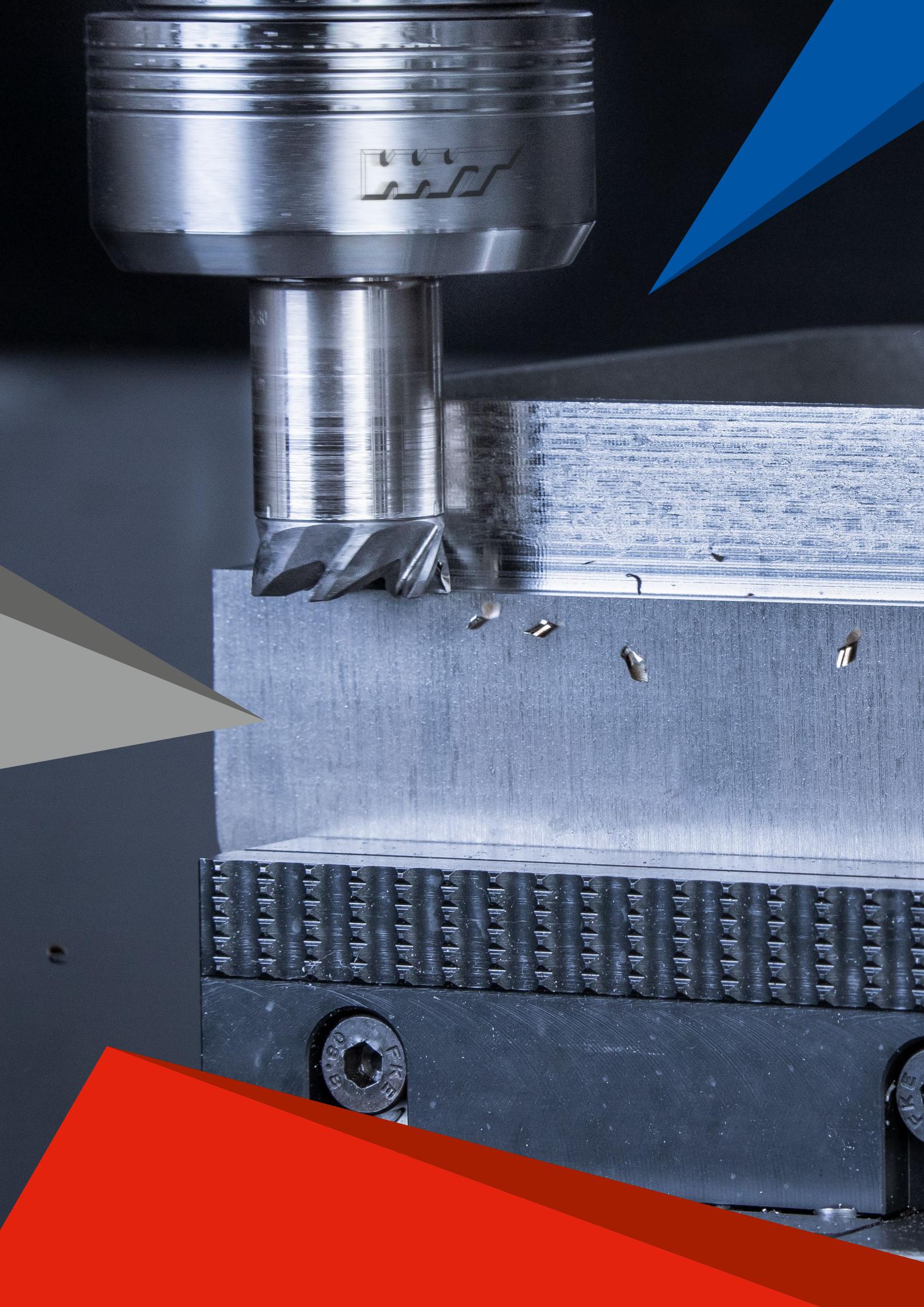
## Coatings

CTC5240

- ▲ TiB<sub>2</sub>-based coating
- ▲ HIT 43 GPa ~ 4300 HV0.05
- ▲ Friction value against steel 0.3
- ▲ Maximum application temperature 1000 °C

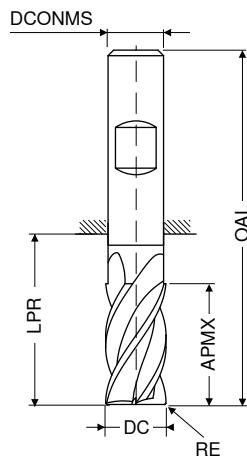
CTPX225

- ▲ AlTiN-based coating
- ▲ HIT 35 GPa ~ 3500 HV0.05
- ▲ Friction value against steel 0.5
- ▲ Maximum application temperature 1000 °C

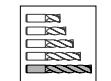


**CircularLine – End milling cutter**

▲ Chip breaker 0.9 x DC



DRAGOSKIN



Factory standard



NEW

Article no.  
53 593 ...

| DC <sub>e8</sub> | RE <sub>±0,05</sub> | APMX | LPR | OAL | DCONMS <sub>h6</sub> | ZEFP | Article no. |    |       |
|------------------|---------------------|------|-----|-----|----------------------|------|-------------|----|-------|
|                  |                     |      |     |     |                      |      | mm          | mm | mm    |
| 6,0              | 0,2                 | 31   | 39  | 75  | 6                    | 5    |             |    | 06402 |
| 6,0              | 1,0                 | 31   | 39  | 75  | 6                    | 5    |             |    | 06410 |
| 6,0              | 1,5                 | 31   | 39  | 75  | 6                    | 5    |             |    | 06415 |
| 8,0              | 0,2                 | 41   | 49  | 85  | 8                    | 5    |             |    | 08402 |
| 8,0              | 1,0                 | 41   | 49  | 85  | 8                    | 5    |             |    | 08410 |
| 8,0              | 1,5                 | 41   | 49  | 85  | 8                    | 5    |             |    | 08415 |
| 8,0              | 2,0                 | 41   | 49  | 85  | 8                    | 5    |             |    | 08420 |
| 10,0             | 0,2                 | 51   | 60  | 100 | 10                   | 5    |             |    | 10402 |
| 10,0             | 1,0                 | 51   | 60  | 100 | 10                   | 5    |             |    | 10410 |
| 10,0             | 1,5                 | 51   | 60  | 100 | 10                   | 5    |             |    | 10415 |
| 10,0             | 1,6                 | 51   | 60  | 100 | 10                   | 5    |             |    | 10416 |
| 10,0             | 2,0                 | 51   | 60  | 100 | 10                   | 5    |             |    | 10420 |
| 12,0             | 0,2                 | 61   | 70  | 115 | 12                   | 5    |             |    | 12402 |
| 12,0             | 1,0                 | 61   | 70  | 115 | 12                   | 5    |             |    | 12410 |
| 12,0             | 1,5                 | 61   | 70  | 115 | 12                   | 5    |             |    | 12415 |
| 12,0             | 1,6                 | 61   | 70  | 115 | 12                   | 5    |             |    | 12416 |
| 12,0             | 2,0                 | 61   | 70  | 115 | 12                   | 5    |             |    | 12420 |
| 12,0             | 3,0                 | 61   | 70  | 115 | 12                   | 5    |             |    | 12430 |
| 14,0             | 0,2                 | 71   | 81  | 126 | 14                   | 5    |             |    | 14402 |
| 14,0             | 1,0                 | 71   | 81  | 126 | 14                   | 5    |             |    | 14410 |
| 14,0             | 1,5                 | 71   | 81  | 126 | 14                   | 5    |             |    | 14415 |
| 14,0             | 1,6                 | 71   | 81  | 126 | 14                   | 5    |             |    | 14416 |
| 14,0             | 2,0                 | 71   | 81  | 126 | 14                   | 5    |             |    | 14420 |
| 14,0             | 3,0                 | 71   | 81  | 126 | 14                   | 5    |             |    | 14430 |
| 16,0             | 0,2                 | 81   | 92  | 140 | 16                   | 5    |             |    | 16402 |
| 16,0             | 1,0                 | 81   | 92  | 140 | 16                   | 5    |             |    | 16410 |
| 16,0             | 1,5                 | 81   | 92  | 140 | 16                   | 5    |             |    | 16415 |
| 16,0             | 1,6                 | 81   | 92  | 140 | 16                   | 5    |             |    | 16416 |
| 16,0             | 2,0                 | 81   | 92  | 140 | 16                   | 5    |             |    | 16420 |
| 16,0             | 3,0                 | 81   | 92  | 140 | 16                   | 5    |             |    | 16430 |
| 16,0             | 4,0                 | 81   | 92  | 140 | 16                   | 5    |             |    | 16440 |
| 18,0             | 0,2                 | 91   | 102 | 150 | 18                   | 5    |             |    | 18402 |
| 18,0             | 1,0                 | 91   | 102 | 150 | 18                   | 5    |             |    | 18410 |
| 18,0             | 1,5                 | 91   | 102 | 150 | 18                   | 5    |             |    | 18415 |
| 18,0             | 1,6                 | 91   | 102 | 150 | 18                   | 5    |             |    | 18416 |
| 18,0             | 2,0                 | 91   | 102 | 150 | 18                   | 5    |             |    | 18420 |
| 18,0             | 3,0                 | 91   | 102 | 150 | 18                   | 5    |             |    | 18430 |
| 18,0             | 4,0                 | 91   | 102 | 150 | 18                   | 5    |             |    | 18440 |
| 20,0             | 0,2                 | 102  | 113 | 163 | 20                   | 5    |             |    | 20402 |
| 20,0             | 1,0                 | 102  | 113 | 163 | 20                   | 5    |             |    | 20410 |
| 20,0             | 1,5                 | 102  | 113 | 163 | 20                   | 5    |             |    | 20415 |
| 20,0             | 1,6                 | 102  | 113 | 163 | 20                   | 5    |             |    | 20416 |
| 20,0             | 2,0                 | 102  | 113 | 163 | 20                   | 5    |             |    | 20420 |
| 20,0             | 3,0                 | 102  | 113 | 163 | 20                   | 5    |             |    | 20430 |
| 20,0             | 4,0                 | 102  | 113 | 163 | 20                   | 5    |             |    | 20440 |

Steel



Stainless steel



Cast iron



Non ferrous metals



Heat resistant alloys



Hardened materials

→ v<sub>c</sub>/f<sub>z</sub> Page 93–95

# Material examples referring to the cutting data tables

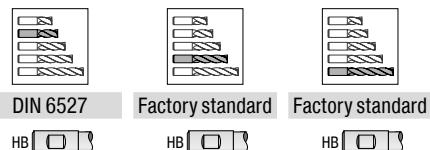
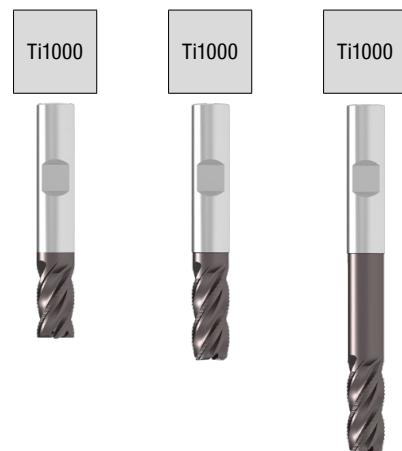
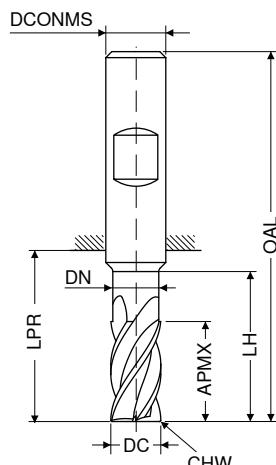
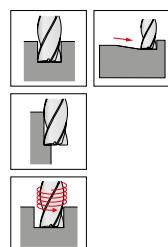
| Index | Material                                      | Strength N/mm <sup>2</sup> / HB / HRC | Material number | Material designation      | Material number | Material designation      | Material number | Material designation      |
|-------|---|---------------------------------------|-----------------|---------------------------|-----------------|---------------------------|-----------------|---------------------------|
| P     | 1.1 General construction steel                | < 800 N/mm <sup>2</sup>               | 1.0402          | EN3B                      |                 |                           |                 |                           |
|       | 1.2 Free cutting steel                        | < 800 N/mm <sup>2</sup>               | 1.0711          | EN1A                      |                 |                           |                 |                           |
|       | 1.3 Hardened steel, non alloyed               | < 800 N/mm <sup>2</sup>               | 1.0401          | EN32C                     |                 |                           |                 |                           |
|       | 1.4 Alloyed hardened steel                    | < 1000 N/mm <sup>2</sup>              | 1.7325          | 25 CD4                    |                 |                           |                 |                           |
|       | 1.5 Tempering steel, unalloyed                | < 850 N/mm <sup>2</sup>               | 1.5752          | EN36                      | 1.0535          | EN9                       |                 |                           |
|       | 1.6 Tempering steel, unalloyed                | < 1000 N/mm <sup>2</sup>              | 1.6582          | EN24                      |                 |                           |                 |                           |
|       | 1.7 Tempering steel, alloyed                  | < 800 N/mm <sup>2</sup>               | 1.7225          | EN19                      |                 |                           |                 |                           |
|       | 1.8 Tempering steel, alloyed                  | < 1300 N/mm <sup>2</sup>              | 1.8515          | EN40B                     |                 |                           |                 |                           |
|       | 1.9 Steel castings                            | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 1.8509          | EN41B                     |                 |                           |                 |                           |
|       | 1.11 Nitriding steel                          | < 1200 N/mm <sup>2</sup>              | 1.1186          | EN8                       | 1.1160          | EN14A                     |                 |                           |
|       | 1.12 Roller bearing steel                     | < 1200 N/mm <sup>2</sup>              | 1.3505          | 534A99                    |                 |                           |                 |                           |
|       | 1.13 Spring steel                             | < 1200 N/mm <sup>2</sup>              |                 | EN45                      |                 | EN47                      |                 | EN43                      |
|       | 1.14 High-speed steel                         | < 1300 N/mm <sup>2</sup>              | 1.3343          | M2                        | 1.3249          | M34                       |                 |                           |
|       | 1.15 Cold working tool steel                  | < 1300 N/mm <sup>2</sup>              | 1.2379          | D2                        | 1.2311          | P20                       |                 |                           |
|       | 1.16 Hot working tool steel                   | < 1300 N/mm <sup>2</sup>              | 1.2344          | H13                       |                 |                           |                 |                           |
| M     | 2.1 Cast steel and sulphured stainless steel  | < 850 N/mm <sup>2</sup>               | 1.4581          | 318                       |                 |                           |                 |                           |
|       | 2.2 Stainless steel, ferritic                 | < 750 N/mm <sup>2</sup>               | 1.4000          | 403                       |                 |                           |                 |                           |
|       | 2.3 Stainless steel, martensitic              | < 900 N/mm <sup>2</sup>               | 1.4057          | EN57                      |                 |                           |                 |                           |
|       | 2.4 Stainless steel, ferritic / martensitic   | < 1100 N/mm <sup>2</sup>              | 1.4028          | EN56B                     |                 |                           |                 |                           |
|       | 2.5 Stainless steel, austenitic / ferritic    | < 850 N/mm <sup>2</sup>               | 1.4542          | 17-4PH                    |                 |                           |                 |                           |
|       | 2.6 Stainless steel, austenitic               | < 750 N/mm <sup>2</sup>               | 1.4305          | 303                       | 1.4401          | 316                       | 1.4301          | 304                       |
|       | 2.7 Heat resistant steel                      | < 1100 N/mm <sup>2</sup>              | 1.4876          | Incoloy 800               |                 |                           |                 |                           |
| K     | 3.1 Grey cast iron with lamellar graphite     | 100-350 N/mm <sup>2</sup>             | 0.6015          | Grade 150                 | 0.6020          | Grade 220                 | 0.6025          | Grade 260                 |
|       | 3.2 Grey cast iron with lamellar graphite     | 300-500 N/mm <sup>2</sup>             | 0.6030          | Grade 300                 | 0.6035          | Grade 350                 | 0.6040          | Grade 400                 |
|       | 3.3 Gray cast iron with spheroidal graphite   | 300-500 N/mm <sup>2</sup>             | 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/mm <sup>2</sup>             | 0.7060          | SG 600-3                  | 0.7070          | SG 700-2                  | 0.7080          | SG 800-2                  |
|       | 3.5 White malleable cast iron                 | 270-450 N/mm <sup>2</sup>             | 0.8035          | GTW-35                    | 0.8045          | GTW-45                    |                 |                           |
|       | 3.6 White malleable cast iron                 | 500-650 N/mm <sup>2</sup>             | 0.8055          | GTW-55                    | 0.8065          | GTW-65                    |                 |                           |
|       | 3.7 Black malleable cast iron                 | 300-450 N/mm <sup>2</sup>             | 0.8135          | GTS-35                    | 0.8145          | GTS-45                    |                 |                           |
|       | 3.8 Black malleable cast iron                 | 500-800 N/mm <sup>2</sup>             | 0.8155          | GTS-55                    | 0.8170          | GTS-70                    |                 |                           |
| N     | 4.1 Aluminium (non alloyed, low alloyed)      | < 350 N/mm <sup>2</sup>               | 3.0255          | 1050 A                    | 3.0275          | 1070 A                    | 3.0285          | 1080 A (A8)               |
|       | 4.2 Aluminium alloys < 0.5 % Si               | < 500 N/mm <sup>2</sup>               | 3.1325          | 2017 A (AU4G)             | 3.4335          | 7005 (AZ5G)               | 3.4365          | 7075 (AZ5GU)              |
|       | 4.3 Aluminium alloy 0.5-10 % Si               | < 400 N/mm <sup>2</sup>               | 3.2315          | A-G 51                    | 3.2373          | A-S9 G                    | 3.2151          | A-S 6 U4                  |
|       | 4.4 Aluminium alloys 10-15 % Si               | < 400 N/mm <sup>2</sup>               | 3.2581          | A-S12                     | 3.2583          | A-S12 U                   |                 |                           |
|       | 4.5 Aluminum alloys > 15 % Si                 | < 400 N/mm <sup>2</sup>               |                 | A-S18                     | A-S17 U4        |                           |                 |                           |
|       | 4.6 Copper (non alloyed, low alloyed)         | < 350 N/mm <sup>2</sup>               | 2.0040          | Cu-c1                     | 2.0060          | Cu-a1                     | 2.0090          | Cu-b1                     |
|       | 4.7 Copper wrought alloys                     | < 700 N/mm <sup>2</sup>               | 2.1247          | Cub2 (Beryllium 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/mm <sup>2</sup>               | 2.0331          | Cu Zn36 Pb1,5             | 2.0380          | Cu Zn39 Pb2 (Ms 56)       | 2.0410          | Cu Zn44 Pb2               |
| S     | 4.12 Long-chipping brass                      | < 600 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>               | 3.5812          | Mg A7 Z1                  | 3.5662          | Mg A9                     | 3.5105          | Mg Tr 22 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                      |
|       | 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)             |
| H     | 5.3 Nickel alloys                             | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4964          | Co Cr20 W15 Ni10          |                 | Co Cr20 Ni16 Mo7          |                 | Co Cr28 Mo 6              |
|       | 5.7 Heat resistant alloys                     | < 1300 N/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4851          | Ni Cr23Fe (Inconel 601)   | 2.4668          | Ni Cr19NbMo (Inconel 718) | 2.4602          | Ni Cr21Mo14 Hastelloy C22 |
|       | 5.9 Pure titanium                             | < 900 N/mm <sup>2</sup>               | 3.7025          | T35 (Titanium Grade 1)    | 3.7034          | T40 (Titanium Grade 2)    | 3.7064          | T60 (Titanium Grade 4)    |
|       | 5.10 Titanium alloys                          | < 700 N/mm <sup>2</sup>               |                 | T-A6-Nb7 (367)            |                 | T-A5-Sn2-Mo4-Cr4 (Ti17)   |                 | T-A3-V2,5 (Gr18)          |
|       | 5.11 Titanium alloys                          | < 1200 N/mm <sup>2</sup>              | 3.7165          | T-A6-V4 (Ta6V)            |                 | T-A4-3V-Mo2-Fe2 (SP700)   |                 | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
|       | 6.1   | < 45 HRC                              |                 |                           |                 |                           |                 |                           |
|       | 6.2   | 46-55 HRC                             |                 |                           |                 |                           |                 |                           |
|       | 6.3   | Tempered steel                        | 56-60 HRC       |                           |                 |                           |                 |                           |
|       | 6.4   |                                       | 61-65 HRC       |                           |                 |                           |                 |                           |
|       | 6.5   |                                       | 65-70 HRC       |                           |                 |                           |                 |                           |

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

**i** Depth of cut corresponds to the flute length

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

## Rough milling cutter



| DC <sub>h10</sub> | APMX | DN   | LH  | LPR | OAL | DCONMS <sub>h6</sub> | CHW  | ZEFP | NEW Article no. 54 000 ... | NEW Article no. 54 015 ... | NEW Article no. 54 015 ... |
|-------------------|------|------|-----|-----|-----|----------------------|------|------|----------------------------|----------------------------|----------------------------|
| mm                | mm   | mm   | mm  | mm  | mm  | mm                   | mm   |      | 03100                      | 03200                      | 03400                      |
| 3                 | 5    |      |     | 14  | 50  | 6                    | 0,15 | 4    |                            |                            |                            |
| 3                 | 8    | 2,8  | 12  | 21  | 57  | 6                    | 0,15 | 4    |                            |                            |                            |
| 3                 | 8    | 2,8  | 15  | 34  | 70  | 6                    | 0,15 | 4    |                            |                            |                            |
| 4                 | 8    |      |     | 18  | 54  | 6                    | 0,15 | 4    | 04100                      |                            |                            |
| 4                 | 11   | 3,8  | 15  | 21  | 57  | 6                    | 0,15 | 4    |                            | 04200                      |                            |
| 4                 | 11   | 3,8  | 20  | 34  | 70  | 6                    | 0,15 | 4    |                            |                            | 04400                      |
| 5                 | 9    |      |     | 18  | 54  | 6                    | 0,15 | 4    | 05100                      |                            |                            |
| 5                 | 13   | 4,8  | 17  | 21  | 57  | 6                    | 0,15 | 4    |                            | 05200                      |                            |
| 5                 | 13   | 4,8  | 25  | 34  | 70  | 6                    | 0,15 | 4    |                            |                            | 05400                      |
| 6                 | 10   |      |     | 18  | 54  | 6                    | 0,15 | 4    | 06100                      |                            |                            |
| 6                 | 13   | 5,8  | 21  | 21  | 57  | 6                    | 0,15 | 4    |                            | 06200                      |                            |
| 6                 | 13   | 5,8  | 30  | 34  | 70  | 6                    | 0,15 | 4    |                            |                            | 06400                      |
| 8                 | 12   |      |     | 22  | 58  | 8                    | 0,25 | 4    | 08100                      |                            |                            |
| 8                 | 19   | 7,7  | 27  | 27  | 63  | 8                    | 0,25 | 4    |                            | 08200                      |                            |
| 8                 | 19   | 7,7  | 40  | 44  | 80  | 8                    | 0,25 | 4    |                            |                            | 08400                      |
| 10                | 14   |      |     | 26  | 66  | 10                   | 0,25 | 4    | 10100                      |                            |                            |
| 10                | 22   | 9,7  | 32  | 32  | 72  | 10                   | 0,25 | 4    |                            | 10200                      |                            |
| 10                | 22   | 9,7  | 50  | 54  | 94  | 10                   | 0,25 | 4    |                            |                            | 10400                      |
| 12                | 16   |      |     | 28  | 73  | 12                   | 0,35 | 4    | 12100                      |                            |                            |
| 12                | 26   | 11,6 | 38  | 38  | 83  | 12                   | 0,35 | 4    |                            | 12200                      |                            |
| 12                | 26   | 11,6 | 64  | 65  | 109 | 12                   | 0,35 | 4    |                            |                            | 12400                      |
| 16                | 22   |      |     | 34  | 82  | 16                   | 0,35 | 4    | 16100                      |                            |                            |
| 16                | 32   | 15,5 | 44  | 44  | 92  | 16                   | 0,35 | 4    |                            | 16200                      |                            |
| 16                | 32   | 15,5 | 80  | 84  | 132 | 16                   | 0,35 | 4    |                            |                            | 16400                      |
| 20                | 26   |      |     | 42  | 92  | 20                   | 0,35 | 4    | 20100                      |                            |                            |
| 20                | 38   | 19,5 | 54  | 54  | 104 | 20                   | 0,35 | 4    |                            | 20200                      |                            |
| 20                | 38   | 19,5 | 100 | 104 | 154 | 20                   | 0,35 | 4    |                            |                            | 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/mm <sup>2</sup> / HB / HRC | Material number | Material designation      | Material number | Material designation      | Material number | Material designation      |
|-------|---|---------------------------------------|-----------------|---------------------------|-----------------|---------------------------|-----------------|---------------------------|
| P     | 1.1 General construction steel                | < 800 N/mm <sup>2</sup>               | 1.0402          | EN3B                      |                 |                           |                 |                           |
|       | 1.2 Free cutting steel                        | < 800 N/mm <sup>2</sup>               | 1.0711          | EN1A                      |                 |                           |                 |                           |
|       | 1.3 Hardened steel, non alloyed               | < 800 N/mm <sup>2</sup>               | 1.0401          | EN32C                     |                 |                           |                 |                           |
|       | 1.4 Alloyed hardened steel                    | < 1000 N/mm <sup>2</sup>              | 1.7325          | 25 CD4                    |                 |                           |                 |                           |
|       | 1.5 Tempering steel, unalloyed                | < 850 N/mm <sup>2</sup>               | 1.5752          | EN36                      | 1.0535          | EN9                       |                 |                           |
|       | 1.6 Tempering steel, unalloyed                | < 1000 N/mm <sup>2</sup>              | 1.6582          | EN24                      |                 |                           |                 |                           |
|       | 1.7 Tempering steel, alloyed                  | < 800 N/mm <sup>2</sup>               | 1.7225          | EN19                      |                 |                           |                 |                           |
|       | 1.8 Tempering steel, alloyed                  | < 1300 N/mm <sup>2</sup>              | 1.8515          | EN40B                     |                 |                           |                 |                           |
|       | 1.9 Steel castings                            | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 1.8509          | EN41B                     |                 |                           |                 |                           |
|       | 1.11 Nitriding steel                          | < 1200 N/mm <sup>2</sup>              | 1.1186          | EN8                       | 1.1160          | EN14A                     |                 |                           |
|       | 1.12 Roller bearing steel                     | < 1200 N/mm <sup>2</sup>              | 1.3505          | 534A99                    |                 |                           |                 |                           |
|       | 1.13 Spring steel                             | < 1200 N/mm <sup>2</sup>              |                 | EN45                      |                 | EN47                      |                 | EN43                      |
|       | 1.14 High-speed steel                         | < 1300 N/mm <sup>2</sup>              | 1.3343          | M2                        | 1.3249          | M34                       |                 |                           |
|       | 1.15 Cold working tool steel                  | < 1300 N/mm <sup>2</sup>              | 1.2379          | D2                        | 1.2311          | P20                       |                 |                           |
|       | 1.16 Hot working tool steel                   | < 1300 N/mm <sup>2</sup>              | 1.2344          | H13                       |                 |                           |                 |                           |
| M     | 2.1 Cast steel and sulphured stainless steel  | < 850 N/mm <sup>2</sup>               | 1.4581          | 318                       |                 |                           |                 |                           |
|       | 2.2 Stainless steel, ferritic                 | < 750 N/mm <sup>2</sup>               | 1.4000          | 403                       |                 |                           |                 |                           |
|       | 2.3 Stainless steel, martensitic              | < 900 N/mm <sup>2</sup>               | 1.4057          | EN57                      |                 |                           |                 |                           |
|       | 2.4 Stainless steel, ferritic / martensitic   | < 1100 N/mm <sup>2</sup>              | 1.4028          | EN56B                     |                 |                           |                 |                           |
|       | 2.5 Stainless steel, austenitic / ferritic    | < 850 N/mm <sup>2</sup>               | 1.4542          | 17-4PH                    |                 |                           |                 |                           |
|       | 2.6 Stainless steel, austenitic               | < 750 N/mm <sup>2</sup>               | 1.4305          | 303                       | 1.4401          | 316                       | 1.4301          | 304                       |
|       | 2.7 Heat resistant steel                      | < 1100 N/mm <sup>2</sup>              | 1.4876          | Incoloy 800               |                 |                           |                 |                           |
| K     | 3.1 Grey cast iron with lamellar graphite     | 100–350 N/mm <sup>2</sup>             | 0.6015          | Grade 150                 | 0.6020          | Grade 220                 | 0.6025          | Grade 260                 |
|       | 3.2 Grey cast iron with lamellar graphite     | 300–500 N/mm <sup>2</sup>             | 0.6030          | Grade 300                 | 0.6035          | Grade 350                 | 0.6040          | Grade 400                 |
|       | 3.3 Gray cast iron with spheroidal graphite   | 300–500 N/mm <sup>2</sup>             | 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/mm <sup>2</sup>             | 0.7060          | SG 600-3                  | 0.7070          | SG 700-2                  | 0.7080          | SG 800-2                  |
|       | 3.5 White malleable cast iron                 | 270–450 N/mm <sup>2</sup>             | 0.8035          | GTW-35                    | 0.8045          | GTW-45                    |                 |                           |
|       | 3.6 White malleable cast iron                 | 500–650 N/mm <sup>2</sup>             | 0.8055          | GTW-55                    | 0.8065          | GTW-65                    |                 |                           |
|       | 3.7 Black malleable cast iron                 | 300–450 N/mm <sup>2</sup>             | 0.8135          | GTS-35                    | 0.8145          | GTS-45                    |                 |                           |
|       | 3.8 Black malleable cast iron                 | 500–800 N/mm <sup>2</sup>             | 0.8155          | GTS-55                    | 0.8170          | GTS-70                    |                 |                           |
| N     | 4.1 Aluminium (non alloyed, low alloyed)      | < 350 N/mm <sup>2</sup>               | 3.0255          | 1050 A                    | 3.0275          | 1070 A                    | 3.0285          | 1080 A (A8)               |
|       | 4.2 Aluminium alloys < 0.5 % Si               | < 500 N/mm <sup>2</sup>               | 3.1325          | 2017 A (AU4G)             | 3.4335          | 7005 (AZ5G)               | 3.4365          | 7075 (AZ5GU)              |
|       | 4.3 Aluminium alloy 0.5–10 % Si               | < 400 N/mm <sup>2</sup>               | 3.2315          | A-G 51                    | 3.2373          | A-S9 G                    | 3.2151          | A-S 6 U4                  |
|       | 4.4 Aluminium alloys 10–15 % Si               | < 400 N/mm <sup>2</sup>               | 3.2581          | A-S12                     | 3.2583          | A-S12 U                   |                 |                           |
|       | 4.5 Aluminum alloys > 15 % Si                 | < 400 N/mm <sup>2</sup>               |                 | A-S18                     | A-S17 U4        |                           |                 |                           |
|       | 4.6 Copper (non alloyed, low alloyed)         | < 350 N/mm <sup>2</sup>               | 2.0040          | Cu-c1                     | 2.0060          | Cu-a1                     | 2.0090          | Cu-b1                     |
|       | 4.7 Copper wrought alloys                     | < 700 N/mm <sup>2</sup>               | 2.1247          | Cub2 (Beryllium 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/mm <sup>2</sup>               | 2.0331          | Cu Zn36 Pb1,5             | 2.0380          | Cu Zn39 Pb2 (Ms 56)       | 2.0410          | Cu Zn44 Pb2               |
| S     | 4.12 Long-chipping brass                      | < 600 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>               | 3.5812          | Mg A7 Z1                  | 3.5662          | Mg A9                     | 3.5105          | Mg Tr 22 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                      |
|       | 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)             |
| H     | 5.3 Nickel alloys                             | < 850 N/mm <sup>2</sup>               | 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/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4964          | Co Cr20 W15 Ni10          |                 | Co Cr20 Ni16 Mo7          |                 | Co Cr28 Mo 6              |
|       | 5.7 Heat resistant alloys                     | < 1300 N/mm <sup>2</sup>              | 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/mm <sup>2</sup>              | 2.4851          | Ni Cr23Fe (Inconel 601)   | 2.4668          | Ni Cr19NbMo (Inconel 718) | 2.4602          | Ni Cr21Mo14 Hastelloy C22 |
|       | 5.9 Pure titanium                             | < 900 N/mm <sup>2</sup>               | 3.7025          | T35 (Titanium Grade 1)    | 3.7034          | T40 (Titanium Grade 2)    | 3.7064          | T60 (Titanium Grade 4)    |
|       | 5.10 Titanium alloys                          | < 700 N/mm <sup>2</sup>               |                 | T-A6-Nb7 (367)            |                 | T-A5-Sn2-Mo4-Cr4 (Ti17)   |                 | T-A3-V2,5 (Gr18)          |
|       | 5.11 Titanium alloys                          | < 1200 N/mm <sup>2</sup>              | 3.7165          | T-A6-V4 (Ta6V)            |                 | T-A4-3V-Mo2-Fe2 (SP700)   |                 | T-A5-Sn1-Zr1-V1-Mo (Gr32) |
|       | 6.1   | < 45 HRC                              |                 |                           |                 |                           |                 |                           |
|       | 6.2   | 46–55 HRC                             |                 |                           |                 |                           |                 |                           |
|       | 6.3   | Tempered steel                        | 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/extralong | short/long | extralong | 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            |                          |                          |
|------|-------|----------------|------------|-----------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|      |       |                |            |           | $a_e$<br>0,1–0,2<br>x DC | $a_e$<br>0,3–0,4<br>x DC | $a_e$<br>0,6–1,0<br>x DC | $a_e$<br>0,1–0,2<br>x DC | $a_e$<br>0,3–0,4<br>x DC | $a_e$<br>0,6–1,0<br>x DC | $a_e$<br>0,1–0,2<br>x DC | $a_e$<br>0,3–0,4<br>x DC | $a_e$<br>0,6–1,0<br>x DC | $a_e$<br>0,1–0,2<br>x DC | $a_e$<br>0,3–0,4<br>x DC | $a_e$<br>0,6–1,0<br>x DC | $a_e$<br>0,1–0,2<br>x DC | $a_e$<br>0,3–0,4<br>x DC | $a_e$<br>0,6–1,0<br>x DC |
|      |       |                |            |           | Index                    | $v_c$<br>m/min           | $a_p$ max x DC           | $a_p$ max x DC           | $f_z$<br>mm              |                          |                          | $f_z$<br>mm              |                          |                          | $f_z$<br>mm              |                          |                          | $f_z$<br>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</                  |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |

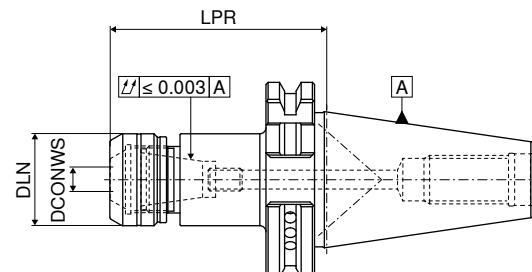
| Index       | $\emptyset DC = 10,0 \text{ mm}$ |                          |                          | $\emptyset DC = 12,0 \text{ mm}$ |                          |                          | $\emptyset DC = 16,0 \text{ mm}$ |                          |                          | $\emptyset DC = 20,0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

## 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



AD/B  
G 2,5 n<sub>max</sub> 25000

**NEW**

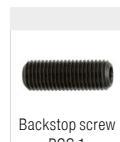
Article no.  
**82 700 ...**

| Adapter      | DCONWS | LPR | DLN | for collet  | Torque moment / Clamping force |       |
|--------------|--------|-----|-----|-------------|--------------------------------|-------|
|              |        |     |     |             | Nm                             |       |
| <b>SK 40</b> | 1 - 10 | 70  | 30  | 426E (ER16) | 40 / 2-70                      | 11079 |
| <b>SK 40</b> | 1 - 10 | 100 | 30  | 426E (ER16) | 40 / 2-70                      | 21079 |
| <b>SK 40</b> | 2 - 16 | 70  | 40  | 430E (ER25) | 80 / 10-160                    | 11679 |
| <b>SK 40</b> | 2 - 16 | 100 | 40  | 430E (ER25) | 80 / 10-160                    | 21679 |
| <b>SK 40</b> | 2 - 20 | 70  | 50  | 470E (ER32) | 125 / 15-250                   | 12079 |
| <b>SK 40</b> | 2 - 20 | 100 | 50  | 470E (ER32) | 125 / 15-250                   | 22079 |
| <b>SK 50</b> | 2 - 16 | 70  | 40  | 430E (ER25) | 80 / 10-160                    | 11678 |
| <b>SK 50</b> | 2 - 16 | 100 | 40  | 430E (ER25) | 80 / 10-160                    | 21678 |
| <b>SK 50</b> | 2 - 20 | 70  | 50  | 470E (ER32) | 125 / 15-250                   | 12078 |
| <b>SK 50</b> | 2 - 20 | 100 | 50  | 470E (ER32) | 125 / 15-250                   | 22078 |

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



Backstop screw  
PCC 2



Backstop screw  
PCC 1



Lock nut IK



Lock nut

### Spare parts

#### for collet

|             |         | Article no. | Article no. | Article no. | Article no. |
|-------------|---------|-------------|-------------|-------------|-------------|
| 426E (ER16) |         | 82 950 ...  | 82 950 ...  | 82 950 ...  | 82 950 ...  |
| 430E (ER25) | M18x1,5 | 00200       | M8x8        | 00300       | 11600       |
| 470E (ER32) | M18x1,5 | 00200       | M8x8        | 00300       | 12000       |

### Accessories



ER collet



Sealing ring



Roll key



Roll key head



Pull stud



Others

→ Chapter 16 in main catalogue

→ **103**

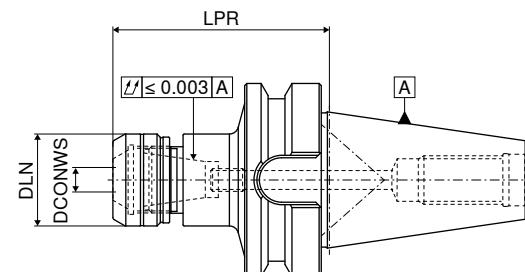
→ Chapter 16 in main catalogue

## 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



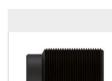
AD/B  
G 2,5 n<sub>max</sub> 25000

**NEW**

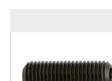
Article no.  
**82 700 ...**

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

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



Backstop screw  
PCC 2



Backstop screw  
PCC 1



Lock nut IK



Lock nut

### Spare parts

#### for collet

|             |         |       |        |       |       |       |
|-------------|---------|-------|--------|-------|-------|-------|
| 426E (ER16) | M18x1,5 | 00200 | M8X3,0 | 00100 | 11000 | 01000 |
| 430E (ER25) |         |       | M8x8   | 00300 | 11600 | 01600 |
| 470E (ER32) | M18x1,5 | 00200 | M8x8   | 00300 | 12000 | 02000 |

### Accessories



ER collet



Sealing ring



Roll key



Roll key head



Pull stud



Others

→ Chapter 16 in main catalogue

**→ 103**

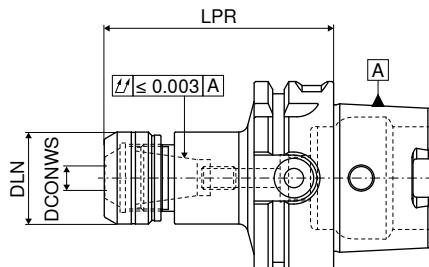
→ Chapter 16 in main catalogue

## 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



G 2,5 n<sub>max</sub> 25000

**NEW**

Article no.  
**82 700 ...**

| Adapter   | DCONWS | LPR | DLN | for collet  | Torque moment / Clamping force |    | Article no. |
|-----------|--------|-----|-----|-------------|--------------------------------|----|-------------|
|           |        |     |     |             | Nm                             | Nm |             |
| HSK-A 63  | 1 - 10 | 75  | 30  | 426E (ER16) | 40 / 2-70                      |    | 11057       |
| HSK-A 63  | 1 - 10 | 100 | 30  | 426E (ER16) | 40 / 2-70                      |    | 21057       |
| HSK-A 63  | 2 - 16 | 75  | 40  | 430E (ER25) | 80 / 10-160                    |    | 11657       |
| HSK-A 63  | 2 - 16 | 100 | 40  | 430E (ER25) | 80 / 10-160                    |    | 21657       |
| HSK-A 63  | 2 - 20 | 75  | 50  | 470E (ER32) | 125 / 15-250                   |    | 12057       |
| HSK-A 63  | 2 - 20 | 100 | 50  | 470E (ER32) | 125 / 15-250                   |    | 22057       |
| HSK-A 100 | 2 - 16 | 100 | 40  | 430E (ER25) | 80 / 10-160                    |    | 21655       |
| HSK-A 100 | 2 - 16 | 160 | 40  | 430E (ER25) | 80 / 10-160                    |    | 41655       |
| HSK-A 100 | 2 - 20 | 100 | 50  | 470E (ER32) | 125 / 15-250                   |    | 22055       |
| HSK-A 100 | 2 - 20 | 160 | 50  | 470E (ER32) | 125 / 15-250                   |    | 42055       |

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



Backstop screw  
PCC 2



Backstop screw  
PCC 1



Lock nut IK



Lock nut

### Spare parts

#### for collet

|             |         | Article no. | Article no. | Article no. | Article no. |
|-------------|---------|-------------|-------------|-------------|-------------|
| 426E (ER16) |         | 82 950 ...  | 82 950 ...  | 82 950 ...  | 82 950 ...  |
| 430E (ER25) | M18x1,5 | 00200       | M8x3,0      | 00100       | 11000       |
| 470E (ER32) | M18x1,5 | 00200       | M8x8        | 00300       | 11600       |

### Accessories



ER collet



Sealing ring



Roll key



Roll key head



Pull stud



Others

→ Chapter 16 in main catalogue

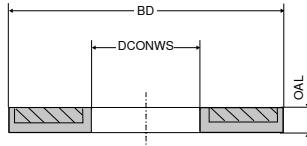
→ 103

→ 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

mm

3,0  
3,5  
4,0  
4,5  
5,0  
5,5  
6,0  
6,5  
7,0  
7,5  
8,0  
8,5  
9,0  
9,5  
10,0  
10,5  
11,0  
11,5  
12,0  
12,5  
13,0  
13,5  
14,0  
14,5  
15,0  
15,5  
16,0  
16,5  
17,0  
17,5  
18,0  
18,5  
19,0  
19,5  
20,0

BD = 13  
OAL = 4  
426E (ER16)

**NEW**  
Article no.  
**82 630 ...**

BD = 21  
OAL = 4  
430E (ER25)

**NEW**  
Article no.  
**82 631 ...**

BD = 27  
OAL = 4  
470E (ER32)

**NEW**  
Article no.  
**82 632 ...**

## Table of contents

|                                |         |
|--------------------------------|---------|
| 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**

### Single clamping vice

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



» High precision and force amplification

**H5G  
-Z**

**H5G  
-Z-S**

**ESG  
5**

### 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



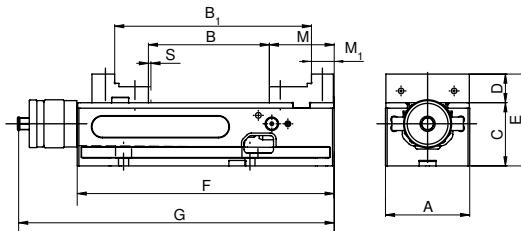
» Reduction in setup times

## 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.



NEW

Article no.

80 890 ...

12500

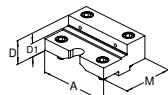
| A<br>mm | B<br>mm | B <sub>1</sub><br>mm | C <sub>-0.02</sub><br>mm | D<br>mm | E<br>mm | F<br>mm | G<br>mm | M<br>mm | M <sub>1</sub><br>mm | S<br>mm | Clamping force<br>kN | kg |
|---------|---------|----------------------|--------------------------|---------|---------|---------|---------|---------|----------------------|---------|----------------------|----|
| 125     | 0-212   | 96-307               | 100                      | 39      | 139     | 390     | 457     | 89      | 39                   | 3       | 4-40                 | 34 |

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

## System jaws overview

| Description | A | D | D <sub>1</sub> | M | price | Article no. | Type association |
|-------------|---|---|----------------|---|-------|-------------|------------------|
|-------------|---|---|----------------|---|-------|-------------|------------------|

### Combi reversible jaw plus, fixed

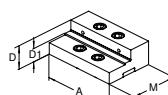


- ▲ For the extension of the clamping range
- ▲ Jaws hardened
- ▲ includes fixing bolts
- ▲ price per piece

|     |      |    |    |              |   |     |             |
|-----|------|----|----|--------------|---|-----|-------------|
| 125 | 39,8 | 22 | 88 | 80 890 35100 | ● | NCG | HSG / S / Z |
|-----|------|----|----|--------------|---|-----|-------------|

NEW

### Combi reversible jaw plus, movable

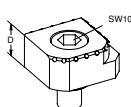


- ▲ For the extension of the clamping range
- ▲ Jaws hardened
- ▲ includes fixing bolts
- ▲ price per piece

|     |      |    |    |              |   |     |             |
|-----|------|----|----|--------------|---|-----|-------------|
| 125 | 39,8 | 22 | 82 | 80 890 35200 | ● | NCG | HSG / S / Z |
|-----|------|----|----|--------------|---|-----|-------------|

NEW

### 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

|    |              |   |     |             |
|----|--------------|---|-----|-------------|
| 18 | 80 890 35300 | ● | NCG | HSG / S / Z |
|----|--------------|---|-----|-------------|

NEW

**i** 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

|  |  |
|--|--|
| <b>H5G</b>   |  |
| Technical drawing showing side view and top view dimensions. Side view shows width B, height D, and length F. Top view shows height C and width A. |  |

**NEW**

**Article no.**  
**80 907 ...**

**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

|  |  |
|--|--|
| <b>H5G</b>   |  |
| Technical drawing showing side view and top view dimensions. Side view shows width B, height D, and length F. Top view shows height C and width A. |  |

**NEW**

**Article no.**  
**80 907 ...**

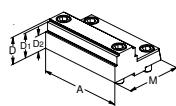
**22500**  
**22600**  
**22700**  
**22800**

**i** 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

| Description | A | D | D <sub>1</sub> | D <sub>2</sub> | M | price | Article no. | Type association |
|-------------|---|---|----------------|----------------|---|-------|-------------|------------------|
|-------------|---|---|----------------|----------------|---|-------|-------------|------------------|

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



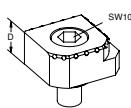
▲ Price per piece



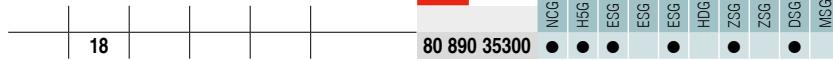
**NEW**  
80 898 35000

|     |             |       |       |          |       |       |       |       |       |
|-----|-------------|-------|-------|----------|-------|-------|-------|-------|-------|
| NCG | HSG / S / Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
| ●   |             |       |       |          |       |       |       |       |       |

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



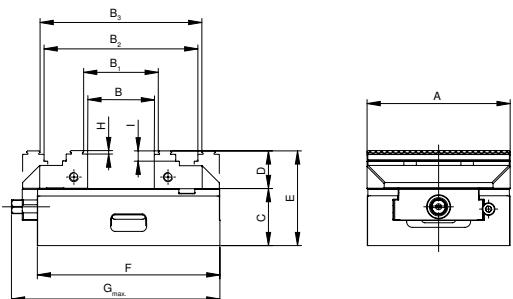
**NEW**  
80 890 35300

|     |             |       |       |          |       |       |       |       |       |
|-----|-------------|-------|-------|----------|-------|-------|-------|-------|-------|
| NCG | HSG / S / Z | ESG 4 | ESG 5 | ESG mini | HDG 2 | ZSG 4 | ZSG 3 | DSG 4 | MSG 2 |
| ●   | ●           | ●     | ●     | ●        |       | ●     | ●     | ●     |       |

**i** 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

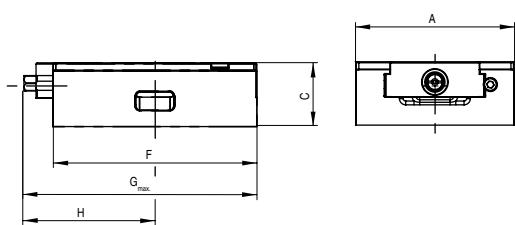
- ▲ New version of the sealed centric vice ZSG 4 as single vice, fixed jaw with transverse slot
- ▲ Identical dimensions and function as the ZSG 4
- ▲ Available in base body length F = 160 mm



| A<br>mm | B<br>mm | B <sub>1</sub><br>mm | B <sub>2</sub><br>mm | B <sub>3</sub><br>mm | C<br>mm | D<br>mm | E<br>mm | F<br>mm | G <sub>max</sub><br>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

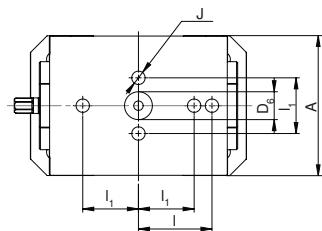


| A<br>mm | C <sub>±0,01</sub><br>mm | F<br>mm | G <sub>max.</sub><br>mm | H<br>mm | Clamping force<br>kN | kg  |
|---------|--------------------------|---------|-------------------------|---------|----------------------|-----|
| 125     | 50                       | 160     | 182,7                   | 102,7   | 35                   | 6,4 |

**NEW**  
Article no.  
**80 857 ...**  
12500

## ESG 5 underside dimensions

Base width 125 mm and length 160 mm

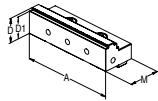


| A<br>mm | D <sub>6</sub> H6<br>mm | l <sub>1</sub> ±0,015<br>mm | l <sub>1</sub> ±0,015<br>mm | J H7<br>mm |
|---------|-------------------------|-----------------------------|-----------------------------|------------|
| 125     | 25                      | 66                          | 50                          | 12         |

## System jaws overview

| Description                     | A   | D  | D <sub>1</sub> | M  | price        | Article no. | Type association  |
|---------------------------------|-----|----|----------------|----|--------------|-------------|---|
| Indexable jaw, grip 3 mm, fixed | 125 | 33 | 30             | 66 | 80 857 30000 | NEW         | NCG<br>HGG / S / Z<br>● ESG 4<br>ESG 5<br>ESG mini<br>HGG 2<br>ZGG 4<br>ZGG 3<br>DSS 4<br>MSG 2 |

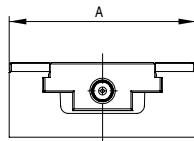
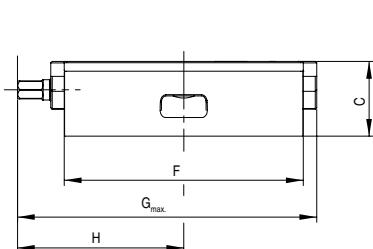
▲ Price per piece



**i** 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



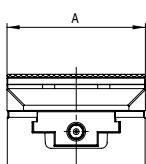
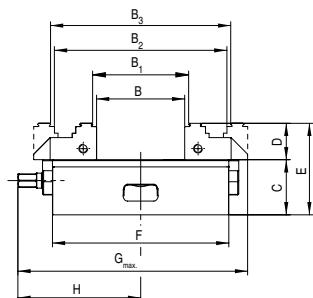
NEW

Article no.  
**80 878 ...**

12900

## Sealed Centric vice

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



NEW

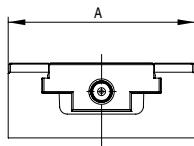
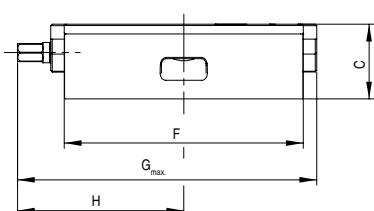
Article no.  
**80 878 ...**

12800

| A<br>mm | B<br>mm | B <sub>1</sub><br>mm | B <sub>2</sub><br>mm | B <sub>3</sub><br>mm | C<br>mm | D<br>mm | E<br>mm | F<br>mm | G <sub>max.</sub><br>mm | H<br>mm | Clamping force<br>kN | kg  |
|---------|---------|----------------------|----------------------|----------------------|---------|---------|---------|---------|-------------------------|---------|----------------------|-----|
| 125     | 0 - 155 | 8 - 162              | 77 - 218             | 84 - 225             | 50      | 33      | 83      | 235     | 272                     | 143,5   | 35                   | 9,5 |

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

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



| A<br>mm | C<br>mm | F<br>mm | G <sub>max.</sub><br>mm | H<br>mm | Clamping force<br>kN | kg |
|---------|---------|---------|-------------------------|---------|----------------------|----|
| 125     | 50      | 235     | 272                     | 143,5   | 35                   | 9  |

**NEW**Article no.  
**80 878 ...**

13000



WNT MNG



Schunk VERO-S / WNT - PNG



Lang Quick Point 96 x 96

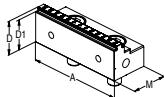


Lang Quick Point 52 x 52

## System jaws overview

| Description | Clamping Ø | A | D | D <sub>1</sub> | M | price | Article no. | Type association |
|-------------|------------|---|---|----------------|---|-------|-------------|------------------|
|-------------|------------|---|---|----------------|---|-------|-------------|------------------|

### Indexable jaw embossed profile

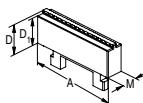


- ▲ Price per piece
- ▲ suitable for LANG embossed profile

|  |     |    |    |    |  |              |       |             |
|--|-----|----|----|----|--|--------------|-------|-------------|
|  | 80  | 28 | 25 | 40 |  | 80 878 31000 | NCG   | HSG / S / Z |
|  | 125 | 33 | 30 | 57 |  | 80 878 31100 | ESG 4 | ESG 5       |

NEW

### Centre jaw, grip 3 mm

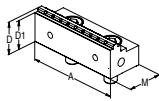


- ▲ price per piece

|  |     |    |    |    |  |              |       |             |
|--|-----|----|----|----|--|--------------|-------|-------------|
|  | 80  | 28 | 25 | 16 |  | 80 878 31200 | NCG   | HSG / S / Z |
|  | 125 | 33 | 30 | 16 |  | 80 878 31300 | ESG 4 | ESG 5       |

NEW

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

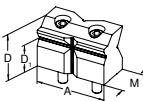


- ▲ Price per piece

|  |     |    |    |    |  |              |         |             |
|--|-----|----|----|----|--|--------------|---------|-------------|
|  | 80  | 28 | 25 | 40 |  | 80 878 31500 | NCG     | HSG / S / Z |
|  | 125 | 33 | 30 | 57 |  | 80 878 31600 | ESG 4   | ESG 5       |
|  | 160 | 50 | 47 | 81 |  | 80 878 31700 | ESGmini | ESGmini     |

NEW

### Prismatic jaw

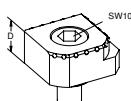


- ▲ Prism jaw with horizontal and vertical prism
- ▲ price per piece

|         |     |    |    |      |  |              |       |             |
|---------|-----|----|----|------|--|--------------|-------|-------------|
| 10 - 60 | 80  | 52 | 32 | 38,5 |  | 80 878 31800 | NCG   | HSG / S / Z |
| 10 - 80 | 125 | 67 | 42 | 57   |  | 80 878 31900 | ESG 4 | ESG 5       |

NEW

### 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

|  |  |    |  |  |  |              |     |             |
|--|--|----|--|--|--|--------------|-----|-------------|
|  |  | 18 |  |  |  | 80 890 35300 | NCG | HSG / S / Z |
|--|--|----|--|--|--|--------------|-----|-------------|

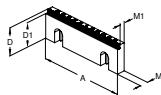
NEW

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

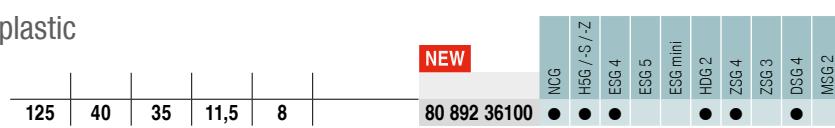
## General top jaws overview

| Description | A | D | D <sub>1</sub> | M | M <sub>1</sub> | price | Article no. | for width |
|-------------|---|---|----------------|---|----------------|-------|-------------|-----------|
|-------------|---|---|----------------|---|----------------|-------|-------------|-----------|

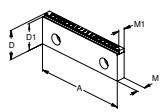
### Stepped jaw, grip 5 mm for aluminium and plastic



▲ Price per piece



### Stepped jaw embossed profile

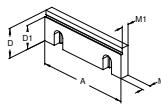


▲ Price per piece

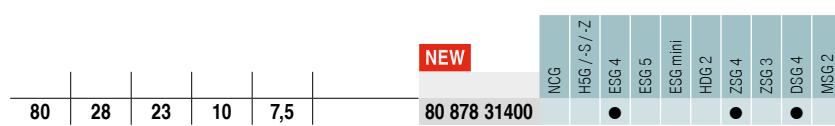
▲ suitable for LANG embossed profile



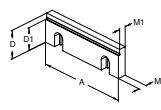
### Stepped jaw, coated 5 mm



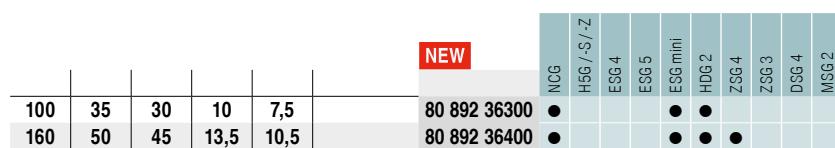
▲ Price per piece



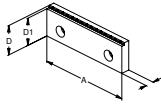
### Stepped jaw, coated 5 mm



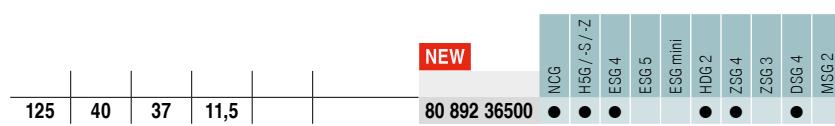
▲ Price per piece



### Stepped jaw, carbide, grip 3 mm



▲ price per piece

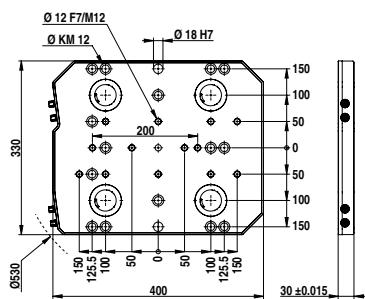


## MNG Zero Point System Overview

### 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**



**NEW**

Article no.  
**80 899 ...**

63000<sup>1)</sup>

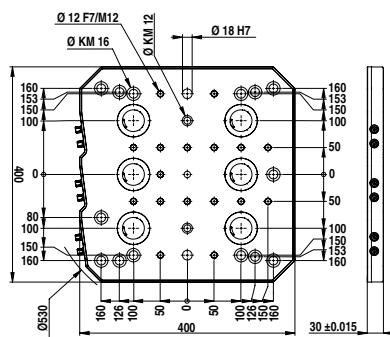
| Size       | kg |
|------------|----|
| 330x400 mm | 27 |

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**



**NEW**

Article no.  
**80 899 ...**

63100<sup>1)</sup>

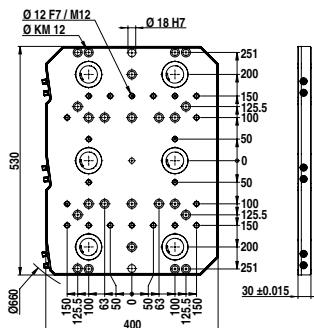
| Size       | kg |
|------------|----|
| 400x400 mm | 31 |

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



NEW

Article no.  
80 899 ...63200<sup>1)</sup>

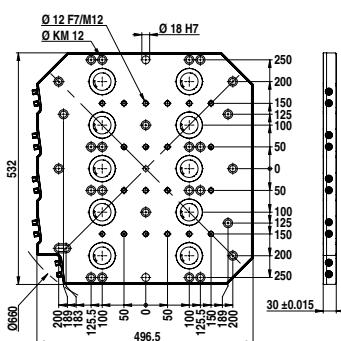
| Size       | kg |
|------------|----|
| 400x530 mm | 44 |

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



NEW

Article no.  
80 899 ...63300<sup>1)</sup>

| Size       | kg |
|------------|----|
| 497x532 mm | 51 |

1) Not ex-stock

## Centering Pin

MNG

**NEW**

Article no.  
**80 899 ...**

| D <sub>1</sub> n6<br>mm | D <sub>2</sub> h6<br>mm |       |
|-------------------------|-------------------------|-------|
| 12                      | 30                      | 61700 |
| 12                      | 32                      | 61800 |
| 12                      | 50                      | 61900 |

## Clamping Screw Set for T-slot for MNG

**Scope of supply:**

Clamping screw and T-Nuts

MNG

**NEW**

Article no.  
**80 899 ...**

| for slot width<br>mm | G   |       |
|----------------------|-----|-------|
| 14                   | M12 | 63500 |
| 16                   | M12 | 63600 |
| 18                   | M12 | 63700 |

## Alignment Pin

MNG



Article no.  
**80 899 ...**

| D <sub>1</sub> n6<br>mm | D <sub>2</sub> h6<br>mm |     |
|-------------------------|-------------------------|-----|
| 18                      | 14                      | 607 |
| 18                      | 18                      | 608 |
| 18                      | 20                      | 609 |
| 18                      | 22                      | 610 |





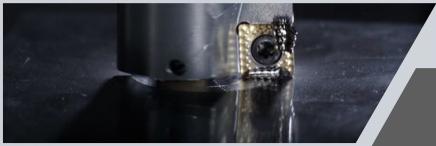
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