MIKRON TOOL

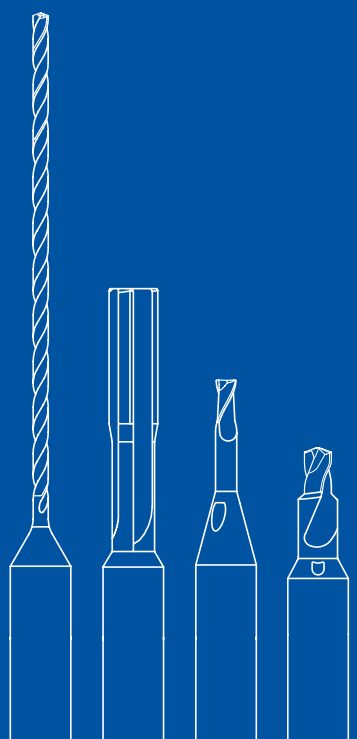
More than tools

# crazy about cool tools

## CUTTING SOLUTIONS

**2024 – 2027**





English - USA

**crazy about** cool tools

MIKRON TOOL

## WHY MIKRON TOOL


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CENTERING TOOLS 04

PILOT DRILLING AND SHORT DRILLING TOOLS 05

DRILLING TOOLS 06

MILLING TOOLS 07

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# crazy about cool challenges



## WE LOVE CHALLENGES

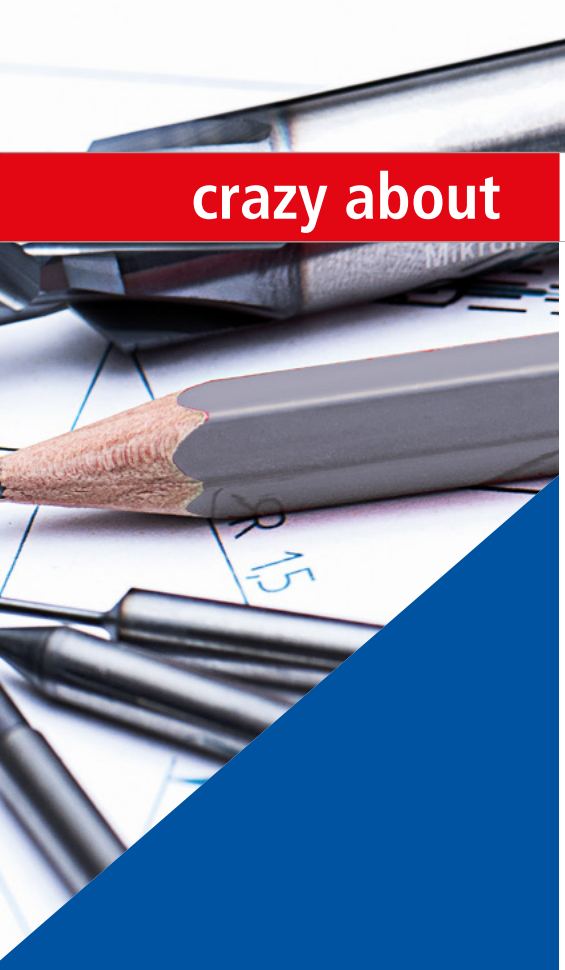
**Tools are our passion, small dimensions are our specialty and hard-to-machine materials are our challenge. The everyday life of Mikron Tool is built on these pillars.**

Mikron Tool emerged from the former tool department of the transfer-machine manufacturer Mikron SA Agno. The result is decades of experience in the development and production of cutting tools.

Started as an independent company with 25 employees in 1998, we are now a globally active tool supplier with our main office in Switzerland (Agno Ticino), a branch office with sales and manufacturing in Germany (Rottweil), and sales offices in the USA and China.

250 employees are working daily to satisfy the needs of our customers; a worldwide sales network with partner companies ensures world-wide customer support.


6 ±0,1
12 ±0,1



# crazy about small dimensions

## TOP PERFORMANCE IN SMALL DIMENSIONS

It is important to us that we are highly competent in everything we do. We make this possible by specializing in a core area. Our strength is machining in the small diameter range with a focus on difficult-to-machine materials. To this end, we always offer new, maximizing solutions to our customers.

Various awards for our trend-setting new developments in the drilling and milling sector prove that we are on the right track with our strategy.

Standardized tools at Mikron Tool means the highest performance, the best quality, and the highest precision directly from stock. Our product line includes tools for centering, drilling, milling, and deburring in the diameter range of 004" to 1/4" (0.1 mm to 6.35 mm).

Our customized tools range from those for centering and chamfering to those for drilling, milling, turning, reaming, and deburring all the way up to complex combination tools in the diameter range of .004" to 1.26" (0.1 mm to 32.0 mm).

Mikron Tool has extended its portfolio becoming NS Tool's main partner for USA.

- Milling tools from the Japanese producer **NS Tool** (https://us.ns-tool.com)

Interested? Request our corresponding catalogues.



# crazy about competence



## COMPETENCE INCLUDED

The Mikron Tool specialists have extensive knowledge and many years of experience in the use of tools with the most diverse types of machine tools, such as CNC machining centers, lathes, and transfer machines. They work together with the customer to define the ideal tool for each application.

When purchasing high-performance tools from Mikron Tool, customers don't just receive a standard tool, they get a complete service. This includes a machining strategy, cutting parameters, processes, and information on the clamping equipment, cooling, etc. It enables the customer to produce their parts with the highest performance and precision.

## OUR STRONG COMPETENCE:

- **Extensive machining knowledge**
  The tool engineers at Mikron Tool are specialists in designing tools and defining operating parameters.

- **Repeated precision in the µm range**
  State-of-the-art production equipment and measuring instruments guarantee tools with a precision of up to +/- .00002" (0.0005 mm). Our clearly defined and monitored manufacturing process allow 100% repeatability.

- **Top performance**
  High machining speed and high process reliability for outstanding results.

- **Materials which are difficult to machine**
  For years, we have been focused on routinely launching new and unique tools for the processing of materials which are traditionally difficult to machine.


YOU ARE IN MIKRON TOOL WEBSITE FOR EUROPE | CHANGE REGION
MIKRON TOOL
ENGLISH
PRIVATE AREA
MENU
TOOL FINDER
TOOL FINDER
FIND YOUR TOOL
QUICK FINDER
Search by article code
Search by product family
HOME / TOOL FINDER
TOOL FINDER
Search your product
NEW
Please insert your parameters and find your product.
MM INCH
Machining type
choose
Can't find what you need? Contact us!
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Mikron Tool Locations | Local Contacts | Privacy Policy | Cookie Policy

# crazy about online tools

**MIKRON TOOL ONLINE**

Mikron Tool is present online at **www.mikrontool.com** with an homepage.

The focus of the internet page is the customer. The topics are a variety of useful information on the company, its history, the services provided as well as worldwide contacts. Each product has its own detailed description with its characteristics and advantages together with numerous concrete application examples. Naturally all technical data is included.

**TOOL FINDER:**
The simple to operate Tool Finder helps to find the right tool quickly.

**Proceed as follows:**

- Chose the desired operation (e.g. drilling).
- Enter consecutively the corresponding diameter, service length and material.
- Now the Tool Finder proposes the best suitable tool for the required machining operation. At the same time important data for the machining process and for the ideal peripherals (machines, clamping and lubricating coolant) is provided.

If in spite of the large product offerings no suitable tool from stock is available, Mikron Tool can be reached directly from the Tool Finder in order to obtain a quotation for a customer specific tool.ability for outstanding results.

# crazy about innovation



**OVERVIEW NEW TOOLS** 14

**CRAZYDRILL COOLPILOT TITANIUM ATC** 16
High performance short and pilot drill up to 3 x d for alloyed titanium (ATC) with new cooling technology, geometry and coating

**CRAZYDRILL COOL TITANIUM ATC / PTC** 18
Two versions of high performance drill up to 10 x d for alloyed titanium (ATC) and pure titanium (PTC) with new cooling technology, geometry and coating

**CRAZYDRILL HEXALOBE FLAT** 20
New combined drill with 180° tip angle for drilling, chamfering and deburring your TORX® socket

**CRAZYMILL HEXALOBE COCR** 20
New micro end-mill for milling your TORX® socket in cobalt chrome

**CRAZYMILL COOL MICRO** 22
New 3 - 4 flutes square micro end-mill with integrated cooling in the diameter range from .008" to .039" (0.2 mm to 1.0 mm)

**CRAZYMILL COOL P&S CORNER RADIUS** 24
New 3 flutes corner radius end-mill with integrated cooling for plunge and slot milling

# NEW Overview new tools

## 7 NEW PRODUCTS

**Products**

| | | |
|---|---|---|
| CRAZYDRILL Coolpilot Titanium ATC | |  |
| CRAZYDRILL Cool Titanium ATC | |  |
| CRAZYDRILL Cool Titanium PTC | |  |
| CRAZYDRILL Hexalobe FLAT | |  |
| CRAZYMILL Hexalobe |  Hexalobe |  |
| CRAZYMILL Cool Micro |  Micro Square - Z3 / Z4 |  |
| CRAZYMILL Cool |  Plunge&Slot Corner radius - Z3 |  |

| ø - range [mm] \| [inch] | max. depth | Cooling Int. | Cooling Ext. | P Unalloyed and alloyed steel | M Stainless steel | K Cast iron | N Non ferrous metals | $S_1$ Super alloys | $S_2$ Alloyed titanium | $S_2$ Pure titanium | $S_3$ CrCo alloys | $H_1$ Hardened steel <55 HRC | $H_2$ Hardened steel ≥55 HRC | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 – 6.35<br>**.039" – 1/4"** | 3 x d<br>+ Chamfer 90° | ✔ | – | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ● | ⊠ | ⊠ | ⊠ | ⊠ | **16** |
| 1.0 – 6.35<br>**.039" – 1/4"** | 6 x d<br>10 x d | ✔ | – | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ● | ⊠ | ⊠ | ⊠ | ⊠ | **18** |
| 1.0 – 6.35<br>**.039" – 1/4"** | 3 x d<br>6 x d | ✔ | – | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ● | ⊠ | ⊠ | ⊠ | **18** |
| 0.9 – 3.8<br>**.035" – .150"** | variable<br>+ Chamfer 120° | – | ✔ | ⊠ | ● | ⊠ | ⊠ | ⊠ | ● | ● | ● | ⊠ | ⊠ | **20** |
| 0.2 – 1.0<br>**.008" – .039"**<br>(T4 – T30) | 3.5 x d<br>5 x d | – | ✔ | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ● | ⊠ | ⊠ | **20** |
| 0.2 – 1.0<br>**.008" – .039"** | 3 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **22** |
| 1.0 – 8.0<br>**.039" – .310"** | 2.5 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **24** |

# NEW CrazyDrill Coolpilot Titanium ATC



NEW

01

CRAZYDRILL Coolpilot Titanium ATC

## PILOT OR SHORT DRILL WITH INNOVATIVE THROUGH-TOOL COOLING



**What's new:** CrazyDrill Coolpilot Titanium ATC was developed as a pilot and short drill with an integrated cutting edge for 90° chamfer for titanium alloys. This makes it the ideal complement to CrazyDrill Cool Titanium ATC. Outstanding performance thanks to a new drop-shaped cooling channels for massive cooling. The new coating provides low adhesion to work materials and facilitates an efficient drilling process.

**The features:** Pilot drilling or short drilling up to 3 x d is executed in one step. The follow-up drill is optimally conducted through the pilot hole, thus guaranteeing a high degree of hole straightness. A 90° countersink can be added simultaneously due to the integrated cutting edge for chamfer. Reduced tool changes therefore result in shorter machining times.

Diameter range: .039" to 1/4" (1 mm to 6.35 mm)
Drilling depth: 3 x d
Countersink angle: 90°
Coating: eXedur SNP

For product details see page 162

# NEW CrazyDrill Cool Titanium ATC / PTC



NEW

01

CRAZYDRILL Cool Titanium

## FOR EACH TITANIUM ITS DRILL!



**What's new:** Mikron Tool introduces two new drills in the diameter range of .039" to 1/4" (1.0 mm to 6.35 mm). This drill has been specifically developed for:

- **CrazyDrill Cool Titanium ATC for titanium alloys**
- **CrazyDrill Cool Titanium PTC for pure titanium**

Previously unreached performance is now possible based on a new cutting edge geometry and a new coolant duct shape, which provide massive cooling of the cutting edges. The new high performance coating is wear resistant and assures continuous chip evacuation.

**The features:** These drills, which are perfectly matched to the respective titanium grades, achieve maximum drilling performance combined with high process reliability. It is now even possible to drill titanium alloys up to 10 x d in a single step without multiple pecking for chip removal. Thanks to the new cutting edge geometry and the flute profile optimal chip breaking and chip evacuation are guaranteed.

The newly conceived helical, drop shaped coolant ducts deliver the highest coolant effect (one to four times larger coolant quantity reaches the tip of the tool, compared to round shaped ducts). Hence better feed, speed and tool life are guaranteed.

Diameter range: .039" to 1/4" (1 mm to 6.35 mm)
Drilling depth: ATC - 6 x d, 10 x d; PTC - 3 x d, 6 x d
Coating: eXedur SNP

For product details see page 336

# NEW CrazyDrill Hexalobe Flat / CrazyMill Hexalobe CoCr



NEW

01

## THE NEW CONCEPT FOR MACHINING YOUR TORX® SOCKET

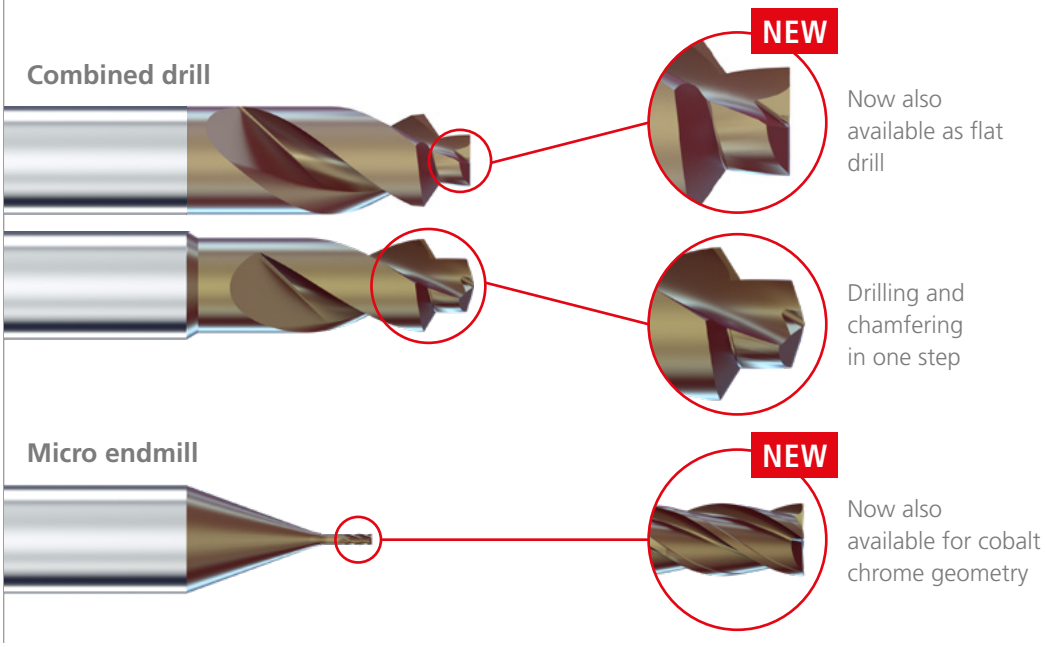
### New concept

- Drilling - Chamfering - Milling - Deburring: Four operations in three steps with two tools.
- High efficient machining in shorter time for titanium, stainless steel and cobalt chrome.

CRAZYDRILL Hexalobe FLAT

CRAZYDRILL Hexalobe

CRAZYMILL Hexalobe




### Performance features

- Highest stiffness
- New cutting geometry

### Your advantages

- Shorter milling process
- Highest profile precision
- Excellent surface quality
- Minimal burr

For product details see page 172 / 512

# NEW CrazyMill Cool Micro



NEW

CRAZYMILL Cool Micro

## THE NEW HIGH-PERFORMANCE MICRO-ENDMILL FOR DIFFICULT TO MACHINE MATERIALS

01



**What's new:** With CrazyMill Cool Micro, Mikron Tool is presenting its new high-performance micro milling cutter designed for roughing and finishing the most difficult-to-machine materials. The new CrazyMill Cool Micro Z3 / Z4 is the smallest with integrated cooling and the first with material-specific cutting edge geometries.

**The features:** Are available two versions of micro endmill in the diameters from .008' to .039' (0.2 mm to 1.0 mm) with a milling depth of up to 5 x d:

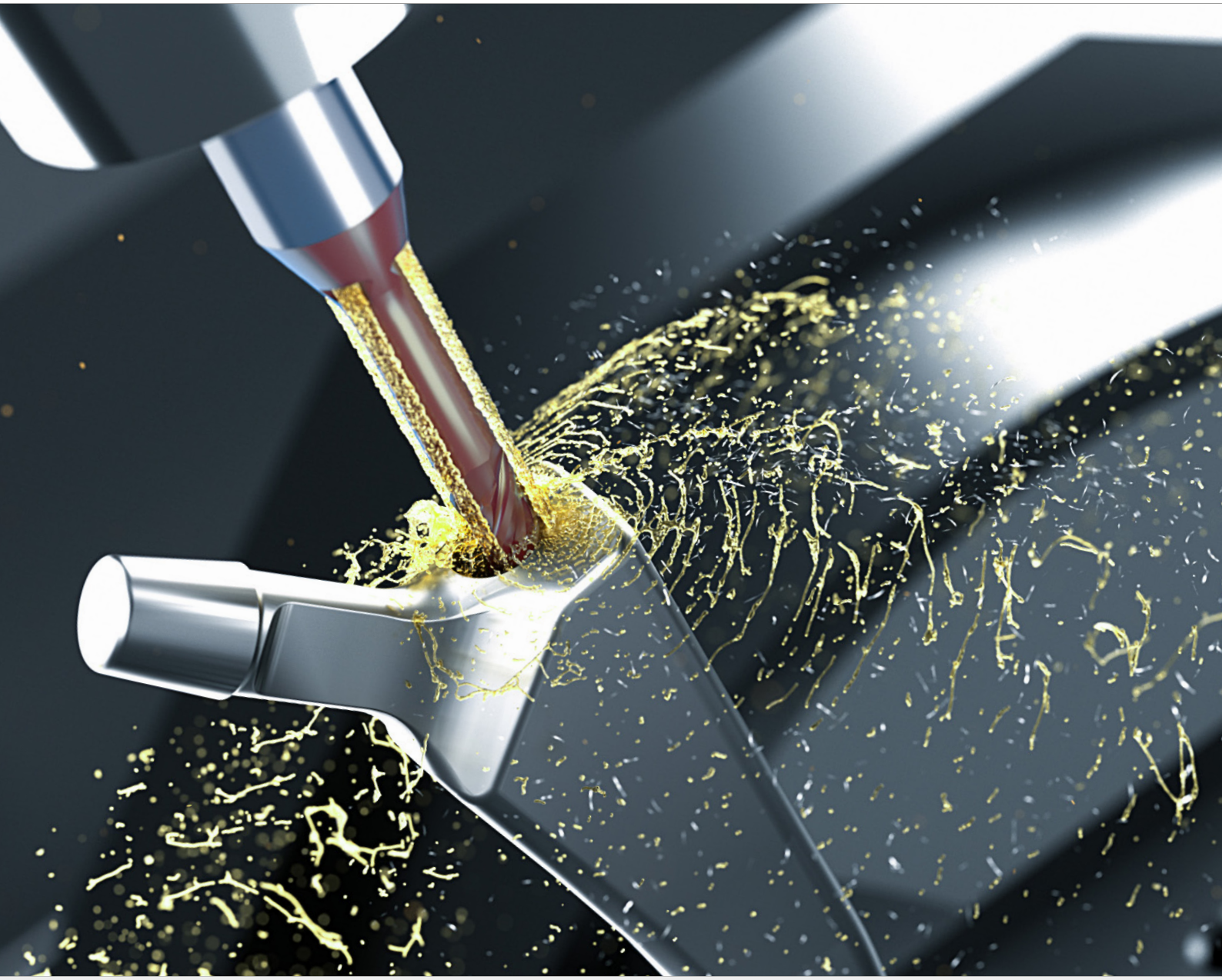
- **Geometry S** - specially developed for stainless steels, structural steels, non-ferrous metals and titanium alloys. It is characterized by a higher cutting capacity for materials with a specific cutting force of less than 2250 N/mm$^2$.
- **Geometry SX** - featuring a special cutting edge protection, is suitable for materials with a specific cutting force greater than 2250 N/mm$^2$ such as heat-resistant alloys and CoCr alloys.

Designed for high-performance materials, it offers a significant increase in performance and maximum process reliability compared to conventional standard products. Above all, it demonstrates its strengths in side and slot milling as well as in milling with spiral interpolation. The new features of this roughing and finishing cutter include not only the solid carbide, coating, and geometry, but especially the unique cooling system with cooling channels integrated in the shaft, which achieve constant and extensive cooling of the cutting edges

Diameter range: .008' to .039' (0.2 mm to 1.0 mm)
Milling depth: Type B – 3 x d; Type C – 5 x d
Coating: eXedur SNP
Number of flutes: 3 / 4

For product details see page 418

# NEW CrazyMill Cool P&S Corner radius



NEW

01

CRAZYMILL Cool

## PLUNGE MILL FOR SLOTS AND POCKETS IN MINIMAL SPACES



**What's new:** CrazyMill Cool P&S is now also available as corner radius version!
CrazyMill Cool P&S is a new 3-flute milling cutter from Mikron Tool, specially developed for the rough and finish milling of many materials, with emphasis on stainless steels, titanium, super alloys and CrCo alloys. With the capacity to plunge perpendicular into the material, this tool is well adapted for the milling of slots, pockets and sides in minimal spaces. An example of these application is the keyway that can be found in transmission shafts.

**The features:** A special cutting edge geometry provides a stable and vibration-free "Drilling" (perpendicular plunging). A correction in the center stabilizes the web (no breakout), reduces penetration force and helps increase tool life. Due to the specially designed chip space in the head of the tool, chips are evacuated into the flutes when plunging. The design of the flutes creates enough space for perfect chip evacuation and simultaneously guarantees robust stability for the lateral milling process.

In the shank, integrated ducts provide a constant and massive coolant flow instrumental for an efficient chip evacuation from the milling area. This concept is ideally suited to machine groves, slots and pockets since chips are flushed out even from tight and angled spaces. The surface quality improves significantly and reaches finishing quality when milling into solid material. Moreover, the cooling prevents an over-heating of the cutting edges and thus guarantee long tool life and significantly higher chip removal rates compared to conventional milling.

The CrazyMill Cool P&S impresses with its speed, output, performance as well as the high tool life and surface quality.

Diameter range: .039" to .315" (1 mm to 8 mm)
Milling depth: Type A – 2.5 x d, type C – 5 x d
Coating: eXedur SNP
Number of flutes: 3

For product details see page 526

# crazy about competence



# 02


TECHNICAL SUPPORT 28
At Mikron Tool included in the sales process is also comprehensive technical support

COMPREHENSIVE ENGINEERING 30
From the machining strategy of a work-piece to the perfect application of the tools. Mikron Tool delivers the best solution for the customer

WHERE THE FUTURE IS HAPPENING TODAY 32
From in-house testing to customer specific solutions

DEVELOPMENTS 34
Where the future is created

CRAZYSERVICE PRODUCTS 36
More than just a tool, a complete solution

TRAINING 38
Investment for the future

# Technical support



## MORE THAN JUST A TOOL CATALOG

**Many questions... competent advices**

Our experience shows that a customer is only satisfied when he has not just bought a good tool, but when the bottom-line is correct: included must be a good price-performance ratio together with professional and competent advice when buying the tool and the local support when tooling up the machine.

Good advice starts with questions, for instance:

- Which kind of material are you machining?
- Which coolant are you using?
- Which is the maximum spindle speed on your machine?

Then there are also questions regarding the desired or requested results:

- Which is the tolerance range of the bore?
- Which is the quantity of parts to be machined?

Competent advice is in demand and exactly here is the strength of the tool specialists at Mikron Tool. They have comprehensive knowledge on chip removal technology and a solid education in the use of their "crazy" tools on the most diverse machine tools like CNC Machining Centers, single- and multispindle automatic lathes or Transfer Machines. They are familiar with the necessary requirements regarding type of coolant, coolant pressure, fixturing and spindles and are thus qualified to create the best conditions to achieve an optimal result.

# Comprehensive engineering



## THE PARTNER FOR GREAT PROJECTS

**From the project to the finished tool**

The first contact with the customer happens often when he presents a work-piece which he wants to produce on his machine. At this point starts the challenge for Mikron Tool. Now is the moment to profit from the know-how of the specialist.

Each Sales Engineer understands the needs of the customer. He is able to pair the processes with the right tools, to apply them to the machine and to define the optimal cutting parameters. He is very familiar with carbides and coatings, with tool geometries and chips, he has experience with the most diverse materials to be machined.

**Competence at the service of machine builders**

Since decades Mikron Tool works in cooperation with Machine Tool builders, whenever top competence in all chip removal technologies is in demand.

Pre requisites for a high production process quality and profitability when producing precision components are optimal tools, which are perfectly attuned to the machining systems used. Factors like cycle time, maximum number of tools used, tolerance requirements, desired production output per days or week play all an important role. What Mikron Tool has to offer to machine builders goes from trials of different chip removal options to complete tooling layouts for a component production.

Your advantage: you profit from many years of experience in the segment of machine equipment plus from a large variety of innovative chip removal solutions.

# Where the future is happening today



## FROM IN-HOUSE TESTING TO THE CUSTOMERS SOLUTION

What began more than 10 years ago with a test machine for new developments is now a proud division of Mikron Tool and significant contributor to the success of the CrazyDrill, "the world's craziest small drill."

A team of 9 people, 4 engineers and 5 precision machinining specialists, are dedicated exclusively to technologically challenging projects.

- New products are developed here, new materials are tested here, and optimal cutting parameters are determined here.
- The customers are provided with important information how to optimize tool usage.
- Feasibility studies are performed and entire projects are developed on behalf of the customer.

Moreover, the center serves as a platform for internal and external training. Employees, sales partners and customers are provided with the technical expertise required to optimally use our products.

# Developments



## WHERE THE FUTURE IS CREATED

All of the new Mikron Tool products are developed at the Technology Center in Agno / Switzerland. It goes without saying that even crazy ideas are sometimes presented to us here.

Nothing is left to chance before a new tool hits the market. New geometries, new materials, and new coatings are tested in real application scenarios. It is not until the tools are considered outstanding and unique by our development engineers that they are given the "CrazyTool" name.

All of the parameters specified in the cutting-data tables result from practical tests. Based on real trials with the actual tool dimensions. This data guarantees optimal use with the corresponding materials.

The continuous optimization of the existing product line is one of the tasks of the development team. New discoveries in machining, new coatings, and new carbides grades are incorporated in product improvements to ensure that every Mikron Tool product is still up-to-date even years after its launch on the market.

# CrazyService Products



## MORE THAN JUST A TOOL FOR THE CUSTOMER

Efficient component production requires optimizing the entire production chain. This includes machine selection, coordinated speeds, the required coolant pressure of the internal coolant feed, suitable production equipment such as tool holders, part clamping, coolant, and the most appropriate tools. Identifying these factors requires extensive expertise and time. Businesses often lack the latter. Mikron Tool services can solve this problem. Mikron Tool has gained extensive knowledge by developing precision tools and has established itself as a one-stop solution for machining companies. As a result, we have been able to create various service packages tailored to the needs of our customers: from tool testing to optimizing or redefining a process through to prototype series.




### 1. TOOL EVALUATION

Determination of the best tools for an existing machining process or a new component.
Tool testing for machining a new material.




### 2. PROCESS DEFINITION

Analysis of critical operations and their optimization through using tools from our catalogue. We create a CAD-CAM simulation of the new manufacturing strategy. Machining tests are carried out as an option.



### 3. TOOL LIFE TEST

Tool testing for existing machining processes and establishment of their profitability.
Estimation of tool costs per produced part and identification of the most cost-effective tools to increase the savings potential.



### 4. PROCESS ENGINEERING

Customer-specific tools are used to optimize critical features or processes.
Validation through machining testing on the machine.
Reduce process and tooling costs.



### 5. TURNKEY SOLUTIONS & PROTOTYPING

Development of an entire process, including the production of a prototype or pilot series for product or process validation.

**Find out more!**

# Training



## INVEST IN THE FUTURE

An important task of the Technology Centers is the training of employees, sales partners, and customers. Internal and external courses on the most diverse topics are held here in specially equipped rooms.

On one hand, we provide technical training for sales partners. They are trained by Mikron Tool on technical solutions with the goal of ultimately being able to expertly advise our customers.

Another important function is the advanced training of our own employees. They must be able to provide technical advice to our customers at all times, and not only on the topic of tools. They must master all of the aspects of successful processing: Cooling, lubricants, tool holders, materials, etc.

This exchange of new technical possibilities and new knowledge is a tremendous gain for all participants.

Tool demonstrations in practical applications at the CNC machining centers are an integral component of every training course. This allows the theory learned to be immediately put into practice. What is more effective than seeing a tool in actual use with the ideal cutting parameters? What is more impressive than directly experiencing the limits of feasibility and thus see the broken tip of a drill fly into the air along with the chips?

# crazy about medical applications





# 03


| | |
|---|---|
| **MEDICAL TECHNOLOGY AND ITS APPLICATIONS** | **42** |
| APPLICATION EXAMPLE - HEMOSTATIC CLAMP | 46 |
| APPLICATIONS OVERVIEW | 47 |

# Medical technology and its applications



## IN MEDICAL TECHNOLOGY ARE QUALITY AND PRECISION A VITAL FACTOR

**Material**

Regarding the material used in medical tecnology some features are important: purity, durability and biocompatibility. For this reason mainly stainless steels, titanium or chrome-cobalt alloys are used in this field, each with its own features.

Mikron Tool is familiar with difficult-to-machine materials, because we have been developing tools for many years for machining these materials.

**Requirements**

When machining medical parts, special care must be taken to ensure burr-free, high surface quality and precision on machining.

Due the complexity to change the process and production condictions as well as the high requirements for a certification in medical field, the producion of a new parts requires from the beginning the best process with the right tools.

Mikron Tool not only offers the right tools, but also the technical know-how for an optimal solution.
In addition, we can define the optimal tools, develop prototypes, test and prove new processes in our technology center.

**Segments**

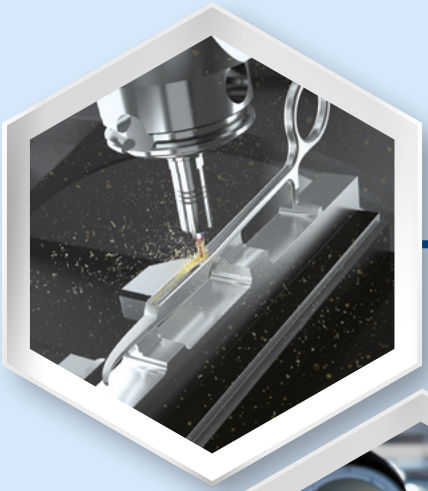
Where are tools of Mikron Tool used? More or less everywhere where machining takes place, be it from a machine center, a Swiss-type automatic lathes or based on 3D printing; be it for single part, for small or large series or for mass production.

Some of our experiences so far:

- **Ortho - Prothesis:** Bone plates for various parts of the body, hip and shoulder implants, bone screws.
- **Surgical instruments:** Surgical needles, catheters, phaco tips, endoscopes, arthroscopy devices.
- **Dental:** Dental implants, crowns, bridges

## Technology Solutions

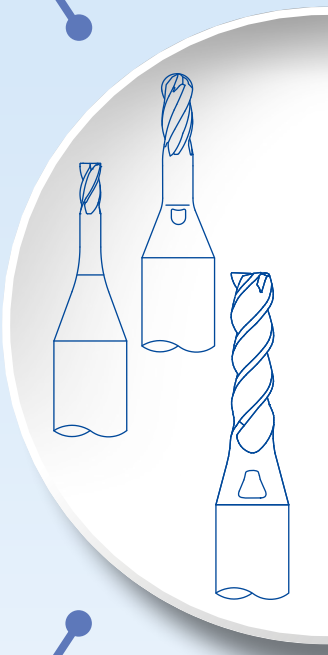
- Machining process reliability
- Cycle time reduction
- Excellent surface quality Ra<20 µin (0.5 µm)
- Tecnology service from tool to finished process
- Tools developped for a specific medical application



## Specialized technical team

- Specialized technical team with knowledge and experience in manufacturing medical components
- Technical support for the entire process chain





## Applications

- Trauma plates
- Bone screws
- Surgical instruments
- Dental



## Certificates

- **MSDS:** Tools and coating materia safety data sheets
- **Quality management system:** ISO 9001:2015
- **Environmental management system:** ISO 14001:2015
- **OHS management system:** ISO 45001:2018



## Technology Center

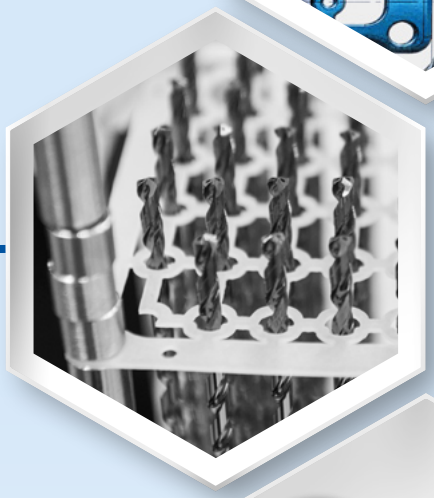
- Technical support
- Developments
- CrazyService Products
- Training





## Challenges

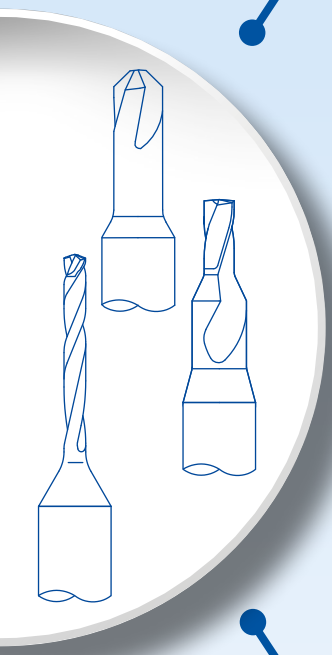
- Nearly burr free
- High surface quality
- Optimised productivity
- Improved process reliability



## Cutting tool technology

CRAZYTOOL by Mikron Tool

- **Repeatability:** Guaranteed technical features for each produced batch
- **Dimension:** Micro dimensions from diameter .004" (0.1 mm)
- **Engineering:** Tailored solutions for customer applications
- **Innovation:** Manufacturing strategies with revolutionary cutting geometries and patented cooling system






## Materials

- Stainless Steels
- Titanium and Titanium alloys
- Co-Cr alloys
- Plastics



## Swiss made

- Production and headquarter in Agno
- Quality and precision since 1998




## Machines for tool trials and customer projects

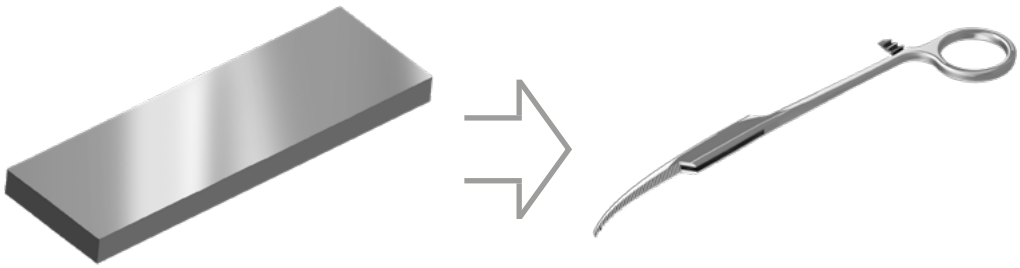
- High-Speed cutting 5-axis machining centers
- CNC swiss type automatic lathe
- Turn-mill machining center

# Application example - Hemostatic clamp

## TURNKEY SOLUTIONS & PROTOTYPES

### Hemostatic clamp

Mikron Tool has developed a turnkey solution, including developing a prototype, for this medical instrument to ensure efficient production while meeting the stringent quality requirements. The manufacturing strategy includes all the necessary information regarding machine, coolant, tool holder, CAD-CAM programming, and cutting tools.



### Blank material

- Dimensions: 5.12" x 2.17" x .47" (130 x 55 x 12 mm)
- Material: X5CrNiCuNb 16-4 / 1.4542 / ASTM 17-4 PH

### Machining

- Number of tools used: 10
- Number of process steps: 18
- Machine used: Vertical high speed machining center
- Coolant system: 1160 psi (80 bar) internal coolant with cutting oil (viscosity: 10 cSt)

### Your benefit

#### Cycle Time

- Initial customer cycle time: 60 min 45 s
- Optimized cycle time: 36 min 27 s

**40%** **Saving:** 24 min / part

**Find out more!**

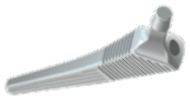
#### Quality

- Nearly burr free - no post finishing
- Surface quality: Ra = 9 µin (0.2 µm) / Rz = 24 µin (0.6 µm)

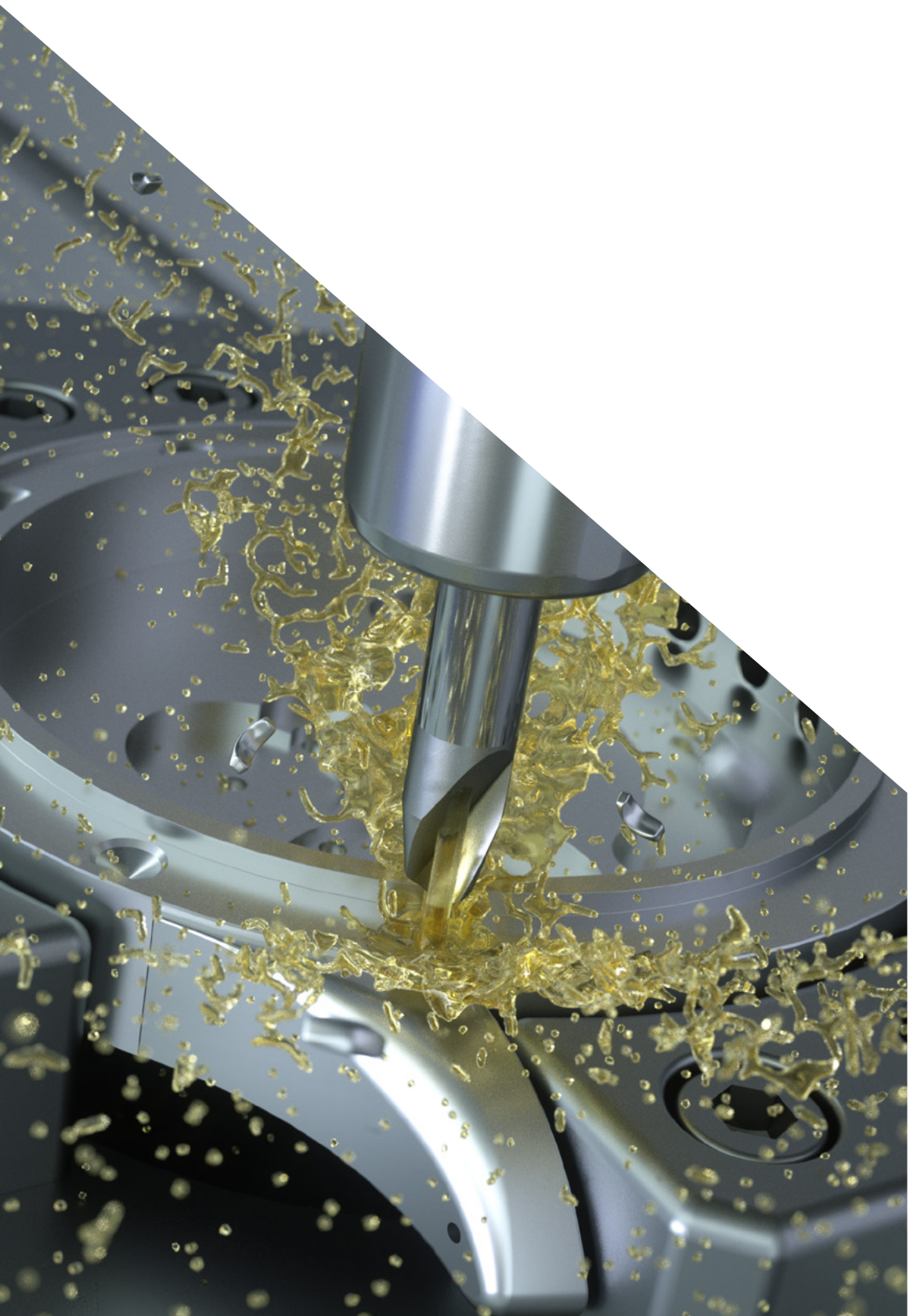
# Applications overview



## MORE APPLICATIONS IN MEDICAL FIELD

| Application | | M | $S_2$ | | $S_3$ |
|---|---|---|---|---|---|
| | | Stainless steel | Alloyed titanium | Pure titanium | CrCo alloys |
| Cervical bone plate |  | ✔ | ✔ | ✔ | |
| Volar distal radius plate |  | ✔ | ✔ | ✔ | |
| Proximal tibia plate |  | ✔ | ✔ | ✔ | |
| Hip stem |  | ✔ | ✔ | ✔ | |
| Gleniod base plate |  | ✔ | ✔ | | |
| Bone screw |  | ✔ | ✔ | | ✔ |
| Hemostatic clamp |  | ✔ | ✔ | | |
| Endoscopic forcep |  | ✔ | ✔ | | |
| Phaco tip |  | ✔ | ✔ | | |
| Nailing system |  | ✔ | | | |
| Dental abutment |  | ✔ | | | ✔ |
| Dental crown |  | ✔ | ✔ | | ✔ |

# crazy about centering



# CENTERING TOOLS

# 04


**OVERVIEW** **50**

CODIFICATION KEY 52

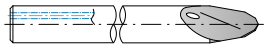
MIQUDRILL CENTRO 54
Ø 0.5 mm - 6.0 mm | **.020" – .236"**

CRAZYDRILL TWICENTER 66
Ø 0.3 mm - 10.0 mm | **.012" – .394"**

CUSTOMIZED CENTER DRILLS 82

# Overview

## CUTTING TOOL SOLUTIONS

| | |
|---|---|
| MIQUDRILL™ by Mikron Tool Centro |  |
| CRAZYDRILL™ by Mikron Tool Twicenter |  |
| **Customized center drills** |  |

RECOMMENDATION FOR USE

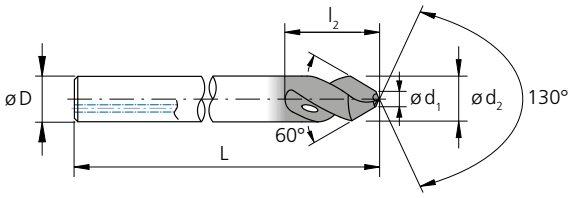
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



| ø - range [mm] \| [inch] | max. depth | Cooling | | P | M | K | N | $S_1$ | $S_2$ | $S_3$ | $H_1$ | $H_2$ | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Int. | Ext. | Unalloyed and alloyed steel | Stainless steel | Cast iron | Non ferrous metals | Super alloys | Titanium (pure and alloyed) | CrCo alloys | Hardened steel <55 HRC | Hardened steel ≥55 HRC | |
| 0.5 – 6.0 **.020" – .236"** | – | – | ✔ | ◐ | ○ | ◐ | ◐ | ⊠ | ◐ | ⊠ | ◐ | ⊠ | **54** |
| 0.3 – 10.0 **.012" – .394"** | – | ✔ | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **66** |
| 0.1 – 32.0 **.004" – 1.26"** | – | ✔ | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ● | **82** |

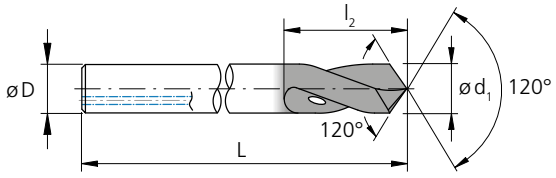
# Codification key

## ITEM NUMBER EASY TO UNDERSTAND



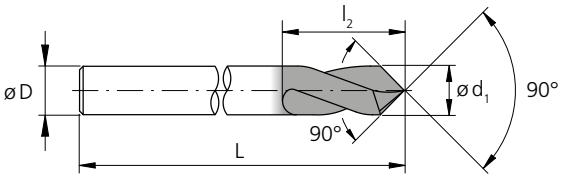

**2.CC.60100.60**

- **Division number**
  - 2 = Mikron Tool SA Agno
- **Family**
  - CrazyDrill Twicenter
- **Cutting diameter $d_1$**
  - 60 = Ø 6 mm (.236")
- **Second diameter $d_2$**
  - 100 = Ø 10 mm (.394")
- **Chamfer angle**
  - 60 = 60°
  - 90 = 90°




**2.CC.00400.120**

- **Division number**
  - 2 = Mikron Tool SA Agno
- **Family**
  - CrazyDrill Twicenter
- **Cutting diameter $d_1$**
  - 00400 = Ø 4 mm (.157")
- **Chamfer angle**
  - 120 = 120°




# 2.MC.090300.1

**Division number**
- 2 = Mikron Tool SA Agno

**Family**
- MiquDrill Centro

**Tip angle**
- 090 = 90°
- 120 = 120°

**Cutting diameter $d_1$**
- 300 = Ø 3 mm (.118")

**Coating**
- 1 = Coated
- 0 = Uncoated

# MiquDrill Centro



MIQUDRILL Centro

## TO START IN THE RIGHT POSITION



Centering and simultaneously creating a 90° or 120° chamfer, this is the challenge of MiquDrill Centro. Available from stock in the diameter range:

- from .020" to .236" (0.5 mm to 6.0 mm) - coated version (eXedur RIP)
- from .020" to .236" (0.5 mm to 6.0 mm) - uncoated version

This centering drill is the perfect solution for the production of small and medium batch sizes with process accuracy and highest quality. It centers perfectly even for the smallest drilling diameters from .004" (0.1 mm) and guarantees highest position accuracy for the follow-up drill, e.g. MiquDrill 200 / 210. MiquDrill Centro is universally applicable for steels (alloyed and unalloyed), cast iron, nonferrous metals and in the coated version also for hardened steel < 55 HRC.

**Regrinding:** This product is not suitable for regrinding.

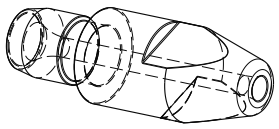
**Please note:** You couldn't find your suitable version of the MiquDrill Centro (diameter, length, cutting direction…)? Ask us about our customized versions!

MIQUDRILL by Mikron Tool Centro

# Features and benefits

## FITS EVERY APPLICATION

- **HIGH DEGREE OF PROCESS RELIABILITY** | due to higher quality
- **HIGH DEGREE OF PRECISION** | due to small tolerances
- **LOW PRODUCTION COSTS** | due to the low cost of tool



**COMPONENT**
Welding nozzle

**MATERIAL**
CuZn39Pb3 / 2.0401 / UNS 38500

**MACHINING**
- Centering and chamfering 120°
- d = 2.5 mm **| .098"**

**DRILLING TOOL**
Mikron Tool - MiquDrill Centro - coated

| DATA | MIKRON TOOL |
|---|---|
| Tool type | MiquDrill Centro<br>- Carbide<br>- Coated<br>- External cooling |
| Item number | 2.MC.120300.1 |
| Cutting data | $v_c$ = 50 m/min **| 164 SFM**<br>f = 0.08 mm/rev **| .0032 IPR** |

# Uncoated

- Chamfer 90° or 120°
- External cooling



Page 59

# Coated

- Chamfer 90° or 120°
- External cooling




Page 58

**1 | SOLID CARBIDE**
The use of a newest generation's solid carbide allows high machining feeds. For example, in spite of similar feed rates as HSS drills, due to its higher cutting speed, drilling with MiquDrill is considerably faster.

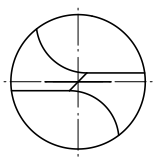
**2 | SHAFT**
The accurately ground shaft guarantees high concentricity and therefore highest position accuracy.

**3 | COATING**
The coated version of the drill is also adapted for difficult-to-machine materials and hardened steels < 55 HRC and reaches even a better tool life.

**4 | TIP ANGLE**
Optionally with 90° or 120° tip angle for drilling and simultaneously creating a correspondent chamfer.

**5 | POSITION ACCURACY**
Accurate centering for highest position accuracy of the follow-up hole in smallest diameter ranges (from .004" (0.1 mm)).

Tip drill

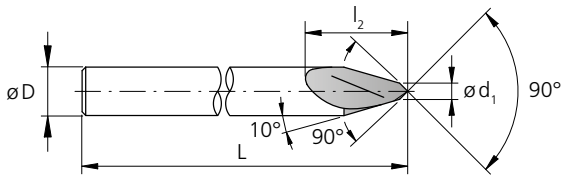


MIQUDRILL by Mikron Tool Centro

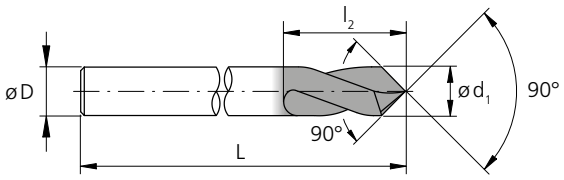
# MiquDrill Centro 90° / 120° - coated

Carbide | Z2 | eXedur RIP

90°




**Execution: $d_1$ = .020" and .039" (0.5 and 1.0 mm)**

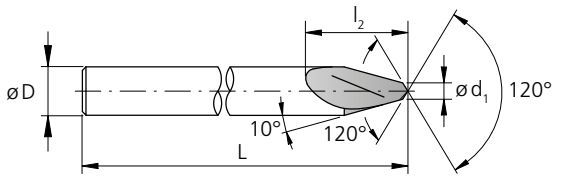



**Execution: $d_1$ = .079" to .236" (2.0 to 6.0 mm)**

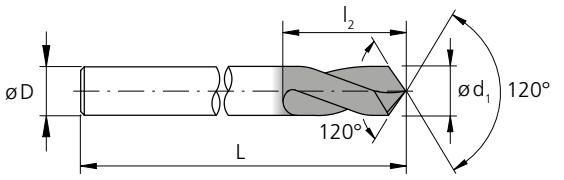
| $d_1$ [inch] | $d_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer | Item number | Availability |
|---|---|---|---|---|---|---|---|---|
| **.020** | 0.5 | 4.5 | 2 | **1.18** | 30 | 90° | 2.MC.090050.1 | ■ |
| **.039** | 1.0 | 4.5 | 2 | **1.18** | 30 | 90° | 2.MC.090100.1 | ■ |
| **.079** | 2.0 | 6.0 | 2 | **1.18** | 30 | 90° | 2.MC.090200.1 | ■ |
| **.118** | 3.0 | 8.0 | 3 | **1.57** | 40 | 90° | 2.MC.090300.1 | ■ |
| **.157** | 4.0 | 10.0 | 4 | **1.77** | 45 | 90° | 2.MC.090400.1 | ■ |
| **.197** | 5.0 | 12.0 | 5 | **1.97** | 50 | 90° | 2.MC.090500.1 | ■ |
| **.236** | 6.0 | 15.0 | 6 | **2.36** | 60 | 90° | 2.MC.090600.1 | ■ |

■ Stock item, packing unit of 3 pcs.

120°




**Execution: $d_1$ = .020" and .039" (0.5 and 1.0 mm)**

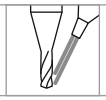



**Execution: $d_1$ = .079" to .236" (2.0 to 6.0 mm)**

| $d_1$ [inch] | $d_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer | Item number | Availability |
|---|---|---|---|---|---|---|---|---|
| **.020** | 0.5 | 4.5 | 2 | **1.18** | 30 | 120° | 2.MC.120050.1 | ■ |
| **.039** | 1.0 | 4.5 | 2 | **1.18** | 30 | 120° | 2.MC.120100.1 | ■ |
| **.079** | 2.0 | 6.0 | 2 | **1.18** | 30 | 120° | 2.MC.120200.1 | ■ |
| **.118** | 3.0 | 8.0 | 3 | **1.57** | 40 | 120° | 2.MC.120300.1 | ■ |
| **.157** | 4.0 | 10.0 | 4 | **1.77** | 45 | 120° | 2.MC.120400.1 | ■ |
| **.197** | 5.0 | 12.0 | 5 | **1.97** | 50 | 120° | 2.MC.120500.1 | ■ |
| **.236** | 6.0 | 15.0 | 6 | **2.36** | 60 | 120° | 2.MC.120600.1 | ■ |

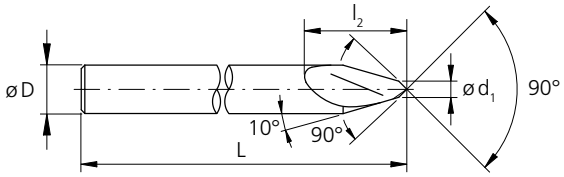
■ Stock item, packing unit of 3 pcs.

# MiquDrill Centro 90° / 120° - uncoated

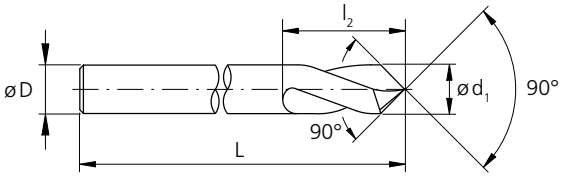
Carbide | Z2 |  | Uncoated



90°




**Execution: $d_1$ = .020" and .039" (0.5 and 1.0 mm)**

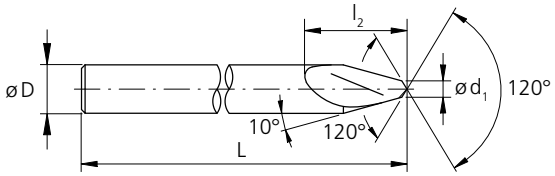



**Execution: $d_1$ = .079" to .236" (2.0 to 6.0 mm)**

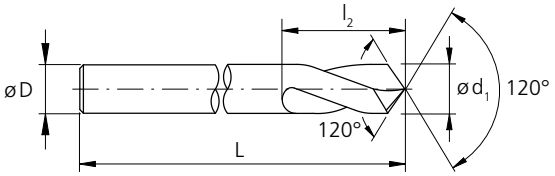
| $d_1$ [inch] | $d_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer | Item number | Availability |
|---|---|---|---|---|---|---|---|---|
| **.020** | 0.5 | 4.5 | 2 | **1.18** | 30 | 90° | 2.MC.090050.0 | ■ |
| **.039** | 1.0 | 4.5 | 2 | **1.18** | 30 | 90° | 2.MC.090100.0 | ■ |
| **.079** | 2.0 | 6.0 | 2 | **1.18** | 30 | 90° | 2.MC.090200.0 | ■ |
| **.118** | 3.0 | 8.0 | 3 | **1.57** | 40 | 90° | 2.MC.090300.0 | ■ |
| **.157** | 4.0 | 10.0 | 4 | **1.77** | 45 | 90° | 2.MC.090400.0 | ■ |
| **.197** | 5.0 | 12.0 | 5 | **1.97** | 50 | 90° | 2.MC.090500.0 | ■ |
| **.236** | 6.0 | 15.0 | 6 | **2.36** | 60 | 90° | 2.MC.090600.0 | ■ |

■ Stock item, packing unit of 3 pcs.

120°




**Execution: $d_1$ = .020" and .039" (0.5 and 1.0 mm)**




**Execution: $d_1$ = .079" to .236" (2.0 to 6.0 mm)**

| $d_1$ [inch] | $d_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer | Item number | Availability |
|---|---|---|---|---|---|---|---|---|
| **.020** | 0.5 | 4.5 | 2 | **1.18** | 30 | 120° | 2.MC.120050.0 | ■ |
| **.039** | 1.0 | 4.5 | 2 | **1.18** | 30 | 120° | 2.MC.120100.0 | ■ |
| **.079** | 2.0 | 6.0 | 2 | **1.18** | 30 | 120° | 2.MC.120200.0 | ■ |
| **.118** | 3.0 | 8.0 | 3 | **1.57** | 40 | 120° | 2.MC.120300.0 | ■ |
| **.157** | 4.0 | 10.0 | 4 | **1.77** | 45 | 120° | 2.MC.120400.0 | ■ |
| **.197** | 5.0 | 12.0 | 5 | **1.97** | 50 | 120° | 2.MC.120500.0 | ■ |
| **.236** | 6.0 | 15.0 | 6 | **2.36** | 60 | 120° | 2.MC.120600.0 | ■ |

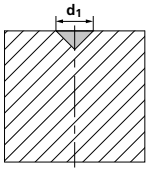
■ Stock item, packing unit of 3 pcs.

MIQUDRILL by Mikron Tool Centro

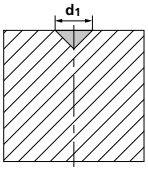
# MiquDrill Centro 90° / 120° - coated

## CENTERING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW





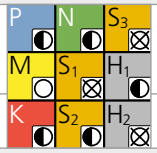

90°




120°

| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 20 – 80 \| **66 – 262** |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 20 – 80 \| **66 – 262** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 20 – 60 \| **66 – 197** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 20 – 80 \| **66 – 262** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 20 – 60 \| **66 – 197** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 20 – 50 \| **66 – 164** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 20 – 80 \| **66 – 262** |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 50 – 100 \| **164 – 328** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 50 – 100 \| **164 – 328** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 50 – 100 \| **164 – 328** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 50 – 100 \| **164 – 328** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 50 – 100 \| **164 – 328** |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 50 – 100 \| **164 – 328** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 20 – 50 \| **66 – 164** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 – 50 \| **66 – 164** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 – 50 \| **66 – 164** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

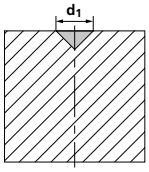
| Ød1 | 0.5 mm \| **.020"** | 1.0 mm \| **.039"** | 2.0 mm \| **.079"** | 3.0 mm \| **.118"** | 4.0 mm \| **.158"** | 5.0 mm \| **.197"** | 6.0 mm \| **.236"** |
|---|---|---|---|---|---|---|---|
| | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.150 \| **.0059** |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.150 \| **.0059** |
| | 0.020 \| **.0008** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.120 \| **.0047** | 0.130 \| **.0051** |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.150 \| **.0059** |
| | 0.020 \| **.0008** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.120 \| **.0047** | 0.130 \| **.0051** |
| | | | | | | | |
| | 0.020 \| **.0008** | 0.030 \| **.0012** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.080 \| **.0031** |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.150 \| **.0059** |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.150 \| **.0059** |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.150 \| **.0059** |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.150 \| **.0059** |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.150 \| **.0059** |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.150 \| **.0059** |
| | | | | | | | |
| | 0.020 \| **.0008** | 0.030 \| **.0012** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.080 \| **.0031** |
| | 0.020 \| **.0008** | 0.030 \| **.0012** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.080 \| **.0031** |
| | | | | | | | |
| | 0.020 \| **.0008** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0047** |
| | | | | | | | |

MIQUDRILL by Mikron Tool Centro

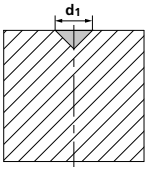
# MiquDrill Centro 90° / 120° - uncoated

## CENTERING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW





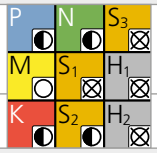

90°




120°

| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 20 – 50 \| **66 – 164** |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 20 – 50 \| **66 – 164** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 20 – 40 \| **66 – 131** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 20 – 50 \| **66 – 164** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 20 – 40 \| **66 – 131** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 15 – 25 \| **49 – 82** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 20 – 50 \| **66 – 164** |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 40 – 80 \| **131 – 262** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 40 – 80 \| **131 – 262** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 – 80 \| **131 – 262** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 – 80 \| **131 – 262** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 40 – 80 \| **131 – 262** |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 40 – 80 \| **131 – 262** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 15 – 25 \| **49 – 82** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 15 – 25 \| **49 – 82** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] **| [IPR]**

| | **Ød1** | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.5 mm **| .020"** | 1.0 mm **| .039"** | 2.0 mm **| .079"** | 3.0 mm **| .118"** | 4.0 mm **| .158"** | 5.0 mm **| .197"** | 6.0 mm **| .236"** |
| | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| | 0.030 **| .0012** | 0.050 **| .0020** | 0.060 **| .0024** | 0.080 **| .0031** | 0.100 **| .0039** | 0.150 **| .0059** | 0.150 **| .0059** |
| | 0.030 **| .0012** | 0.050 **| .0020** | 0.060 **| .0024** | 0.080 **| .0031** | 0.100 **| .0039** | 0.150 **| .0059** | 0.150 **| .0059** |
| | 0.020 **| .0008** | 0.030 **| .0012** | 0.040 **| .0016** | 0.060 **| .0024** | 0.080 **| .0031** | 0.120 **| .0047** | 0.130 **| .0051** |
| | 0.030 **| .0012** | 0.050 **| .0020** | 0.060 **| .0024** | 0.080 **| .0031** | 0.100 **| .0039** | 0.150 **| .0059** | 0.150 **| .0059** |
| | 0.020 **| .0008** | 0.030 **| .0012** | 0.040 **| .0016** | 0.060 **| .0024** | 0.080 **| .0031** | 0.120 **| .0047** | 0.130 **| .0051** |
| | | | | | | | | | | | | | |
| | 0.020 **| .0008** | 0.030 **| .0012** | 0.030 **| .0012** | 0.040 **| .0016** | 0.060 **| .0024** | 0.080 **| .0031** | 0.080 **| .0031** |
| | 0.030 **| .0012** | 0.050 **| .0020** | 0.060 **| .0024** | 0.080 **| .0031** | 0.100 **| .0039** | 0.150 **| .0059** | 0.150 **| .0059** |
| | 0.030 **| .0012** | 0.050 **| .0020** | 0.060 **| .0024** | 0.080 **| .0031** | 0.100 **| .0039** | 0.150 **| .0059** | 0.150 **| .0059** |
| | 0.030 **| .0012** | 0.050 **| .0020** | 0.060 **| .0024** | 0.080 **| .0031** | 0.100 **| .0039** | 0.150 **| .0059** | 0.150 **| .0059** |
| | 0.030 **| .0012** | 0.050 **| .0020** | 0.060 **| .0024** | 0.080 **| .0031** | 0.100 **| .0039** | 0.150 **| .0059** | 0.150 **| .0059** |
| | 0.030 **| .0012** | 0.050 **| .0020** | 0.060 **| .0024** | 0.080 **| .0031** | 0.100 **| .0039** | 0.150 **| .0059** | 0.150 **| .0059** |
| | 0.030 **| .0012** | 0.050 **| .0020** | 0.060 **| .0024** | 0.080 **| .0031** | 0.100 **| .0039** | 0.150 **| .0059** | 0.150 **| .0059** |
| | | | | | | | | | | | | | |
| | 0.020 **| .0008** | 0.030 **| .0012** | 0.030 **| .0012** | 0.040 **| .0016** | 0.060 **| .0024** | 0.080 **| .0031** | 0.080 **| .0031** |
| | 0.020 **| .0008** | 0.030 **| .0012** | 0.030 **| .0012** | 0.040 **| .0016** | 0.060 **| .0024** | 0.080 **| .0031** | 0.080 **| .0031** |
| | | | | | | | | | | | | | |
| | Recommended: MiquDrill Centro 90° / 120° - coated | | | | | | |
| | | | | | | | | | | | | | |



# Centering process MiquDrill Centro

## ACCURATE AND QUICK CENTERING AND CHAMFERING

### Coolant type, pressure and filtration

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

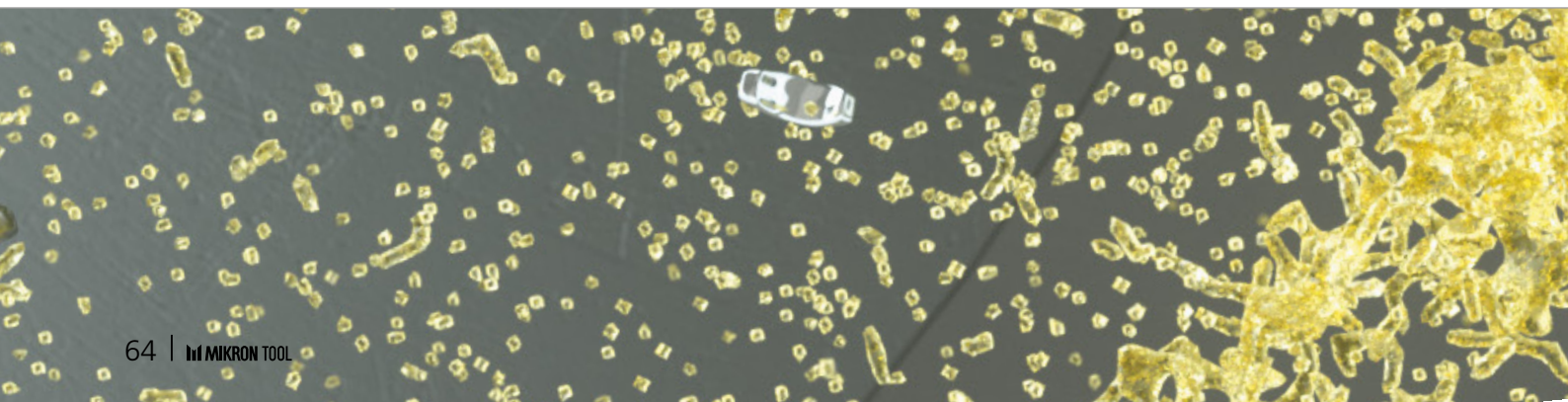
For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the coolant fluid is directed to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical Information".

### Center drilling is the base of drilling

Center drilling with MiquDrill Centro is the base of highly accurate drilling. The tool's sturdy construction and its accuracy guarantee highest position accuracy for the follow-up drill, e.g. MiquDrill 200 / 210. For centering and follow-up drilling with MiquDrill 200 / 210, we recommend the use of the same tip angle (120°). Thus higher process accuracy and tool life are assured.

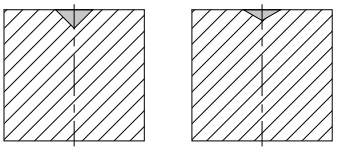


## CENTERING PROCESS

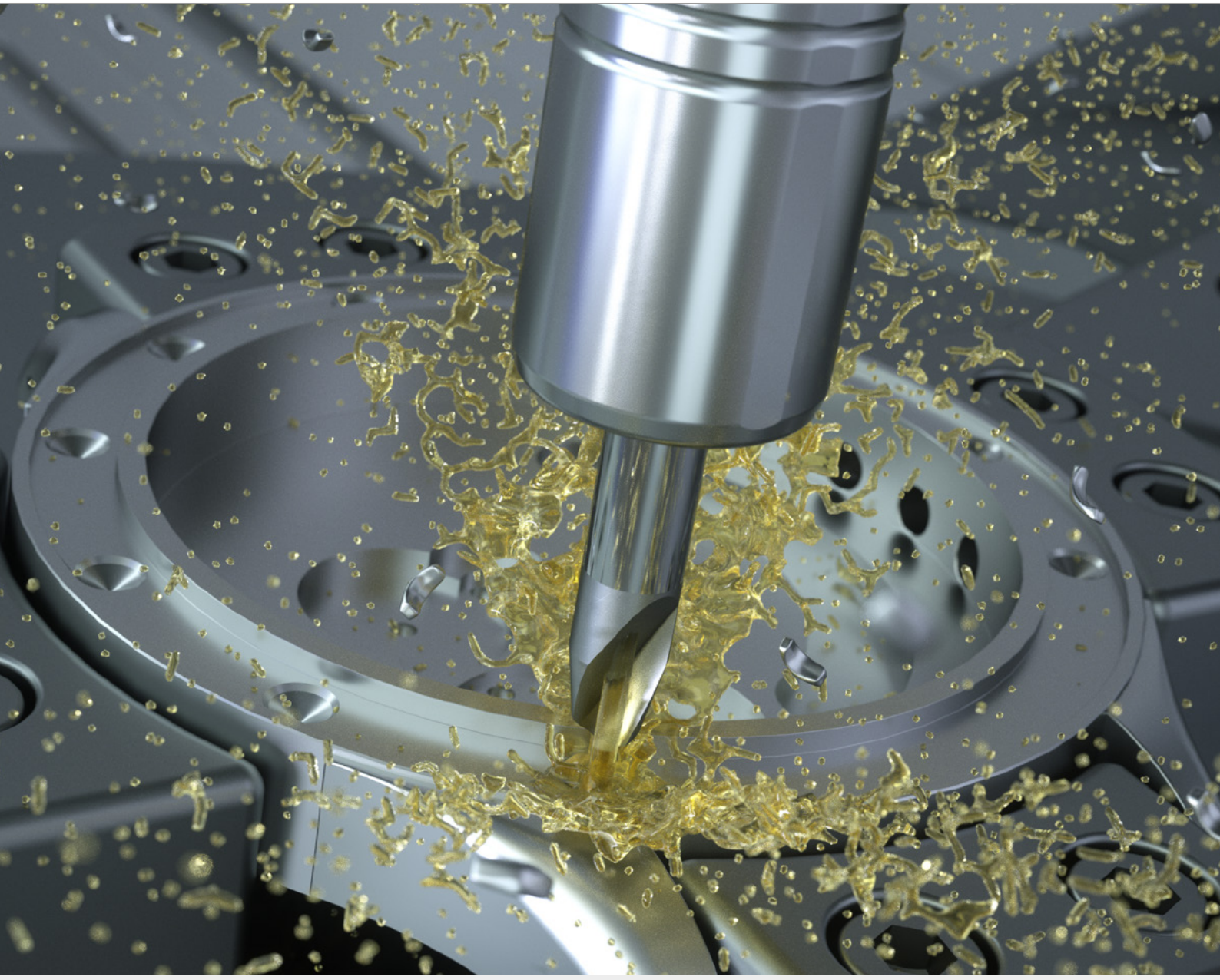
### Centering and chamfering in one step

**1 | CENTER DRILLING**

- With MiquDrill Centro in one step.

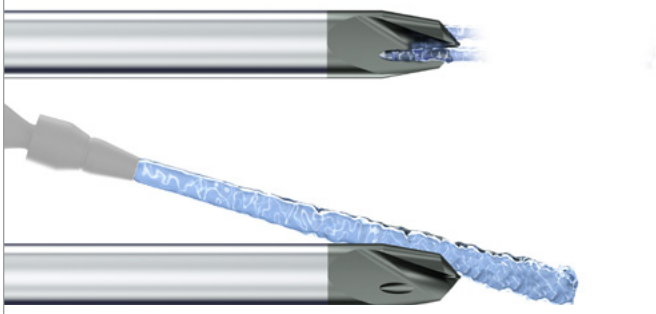


# CrazyDrill Twicenter



CRAZYDRILL Twicenter

## TWICE UNIQUE



With its CrazyDrill Twicenter, Mikron Tool is offering a center drill for difficult to machine materials to the highest standards in the diameter range of .012" to .236" (0.3 up to 6.0 mm) for centering and .039" to .394" (1.0 mm up to 10.0 mm) for chamfering.

The CrazyDrill Twicenter is an optimal solution for large high-quality batches of components or generally whenever challenging materials are involved, such as titanium and non-corrosive materials. It prepares the follow up drill, e.g., the CrazyDrill SST-Inox, with the highest degree of positioning accuracy.

This center drill has two unique features:

- Two straight cooling channels orienting the coolant to the tip and guarantee constant cooling and lubrication.This guarantees a long tool life. A remarkable advantage for materials with poor heat conductivity, such as stainless steels or titanium.

- The extremely short chisel edge and the "double tip" in chamfers of 60° and 90° with an additional tip angle of 130° ensure stability and good chip flow.

Even without an internal coolant supply (with external coolant supply), the CrazyDrill Twicenter is an outstanding center drill.

**Regrinding:** This product can be reground starting from Ø .039" (1 mm) for 60°/90° and from Ø .079" (2 mm) for 120°

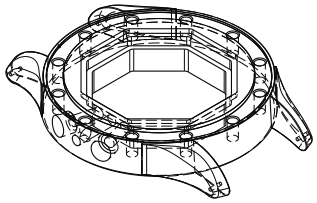
**Please note:** You couldn't find your suitable version of the CrazyDrill Twicenter (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYDRILL by Mikron Tool Twicenter

# Features and benefits

## EVEN CENTERING CAN BE COOL

- **SHORT MACHINING TIME** | centering + chamfering in one step
- **LONG TOOL LIFE** | due to efficient coolant
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to internal coolant
- **HIGH DEGREE OF PRECISION** | due to small tolerances



**COMPONENT**
Watch housing

**MATERIAL**
X2CrNiMo 18-14-3 / 1.4435 / AISI 316L

**MACHINING**
- Centering and chamfering 90°
- d1 = 0.5 mm **| .020"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Twicenter 90°

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Twicenter<br>- Carbide<br>- Coated<br>- Internal cooling |
| Item number | 2.CC.05014.90 |
| Cutting data | $v_c$ = 50 m/min **\| 164 SFM**<br>f = 0.09 mm/rev **\| .0035 IPR** |
| Tool life | 4'180 Holes |

# Type 60°

- Chamfer 60°
- Internal cooling



Page 72

# Type 90°

- Chamfer 90°
- Internal cooling



Page 72

# Type 120°

- Chamfer 120°
- Internal cooling




Page 73

**1 | SHAFT**
A sturdy carbide shaft guarantees high concentricity, high positioning accuracy, and thus top drilling precision.

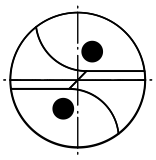
**2 | CARBIDE**
The use of latest generation of carbide grades allows highest machining speeds and feed.

**3 | COATING**
High-performance coating guarantees a long tool life.

**4 | INTEGRATED COOLING CHANNELS**
The through coolant delivers coolant through the flutes directly to the tool tip, providing optimal cooling performance and lubrication, even in places which are difficult to reach.

**5 | DOUBLE TIP**
The tip angle of 130° or 120° and a short chisel edge ensure high process reliability since less pressure is applied, and allows free chip flow.The secondary angle defines the desired chamfer (60° or 90°).

**6 | SHORT CHISEL EDGE**
Reduces the penetration force and the pressure on the tip. Reduces wear and cutting edge breakage.

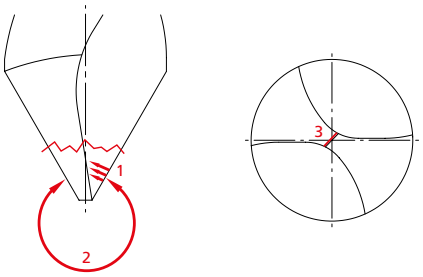
Point drill 

# Important features

## THE CENTER DRILL WITH TWICE THE ADVANTAGE

**The comparison:**

■ Traditional Centering

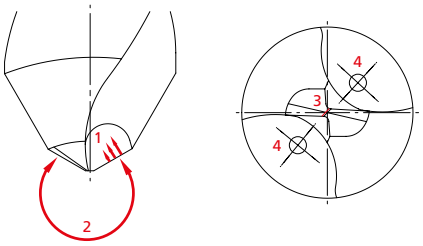



1 | Poor chip evacuation equals jamming risk.

2 | 60° / 90° tip angle results in insufficient cutting speed and high pressure on the tip: risk of breakage.

3 | Large web requires high penetration force and causes high pressure on the tip: risk of breakage.

■ Centering with CrazyDrill Twicenter



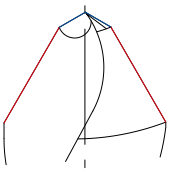

1 | 130° tip angle favors chip evacuation.

2 | 130° tip angle reduces the pressure on the tip.

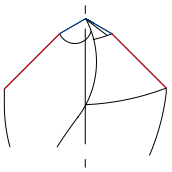
3 | Short web reduces penetration force on the tip.

4 | Through tool coolant supply guarantees optimal cooling and lubrication.

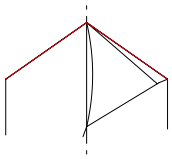
Integrated cooling channels in the shaft and a double angle on the tip make the CrazyDrill Twicenter unique. The optimal cooling orientation makes it perfect for mass production and materials which are difficult to be machined, such as stainless steels or titanium. The through coolant features remarcable benefits, even when machining occurs in difficult to reach locations.



- Chamfer 60°
- Tip angle 130°



- Chamfer 90°
- Tip angle 130°



- Chamfer / Tip angle 120°

The additional tip angle of 130° and the small chisel edge provide the center drill good stability and also ensure good chip flow. The second angle is used to create a 60° / 90° chamfer.

Thanks to the width of the angle in the 120° version, there is a single tip angle.

Even without an internal coolant supply (with external coolant supply), the CrazyDrill Twicenter is an outstanding center drill.

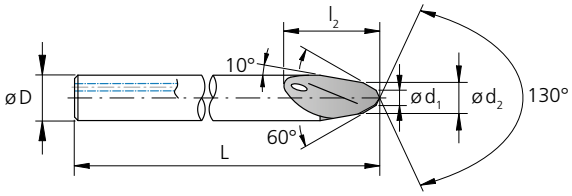
It is the perfect solution for the centering and chamfering of deep holes, e.g. with CrazyDrill SST-Inox.

CRAZYDRILL by Mikron Tool Twicenter

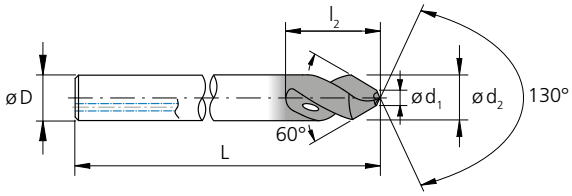
# CrazyDrill Twicenter 60° / 90°

Carbide | 130° | Z2 | eXedur RIP

60°




**Execution: $d_1$ = .012" to .039" (0.3 to 1.0 mm)**

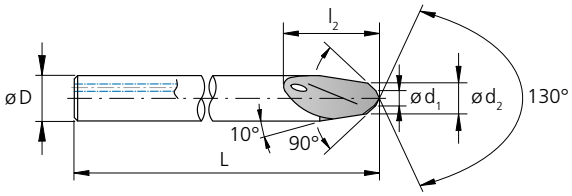



**Execution: $d_1$ = .059" to .236" (1.5 to 6.0 mm)**

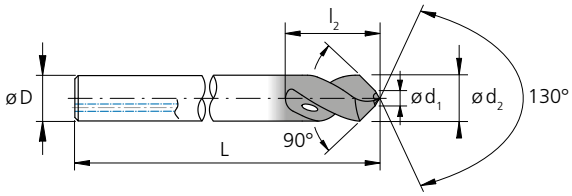
| $d_1$ [inch] | $d_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.012** | 0.3 | 1.0 | 6.4 | 3 | **1.57** | 40 | 60° | 2.CC.03010.60 | ■ |
| **.020** | 0.5 | 1.4 | 6.3 | 3 | **1.57** | 40 | 60° | 2.CC.05014.60 | ■ |
| **.039** | 1.0 | 2.0 | 6.3 | 3 | **1.57** | 40 | 60° | 2.CC.10020.60 | ■ |
| **.059** | 1.5 | 3.0 | 6.3 | 3 | **1.57** | 40 | 60° | 2.CC.15030.60 | ■ |
| **.079** | 2.0 | 4.0 | 8.0 | 4 | **1.97** | 50 | 60° | 2.CC.20040.60 | ■ |
| **.118** | 3.0 | 6.0 | 12.0 | 6 | **2.36** | 60 | 60° | 2.CC.30060.60 | ■ |
| **.157** | 4.0 | 8.0 | 16.0 | 8 | **2.76** | 70 | 60° | 2.CC.40080.60 | ■ |
| **.236** | 6.0 | 10.0 | 20.0 | 10 | **3.15** | 80 | 60° | 2.CC.60100.60 | ■ |

■ Stock item

90°




**Execution: $d_1$ = .012" to .039" (0.3 to 1.0 mm)**




**Execution: $d_1$ = .059" to .236" (1.5 to 6.0 mm)**

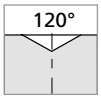
| $d_1$ [inch] | $d_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.012** | 0.3 | 1.0 | 6.4 | 3 | **1.57** | 40 | 90° | 2.CC.03010.90 | ■ |
| **.020** | 0.5 | 1.4 | 6.0 | 3 | **1.57** | 40 | 90° | 2.CC.05014.90 | ■ |
| **.039** | 1.0 | 2.0 | 6.2 | 3 | **1.57** | 40 | 90° | 2.CC.10020.90 | ■ |
| **.059** | 1.5 | 3.0 | 6.3 | 3 | **1.57** | 40 | 90° | 2.CC.15030.90 | ■ |
| **.079** | 2.0 | 4.0 | 8.0 | 4 | **1.97** | 50 | 90° | 2.CC.20040.90 | ■ |
| **.118** | 3.0 | 6.0 | 12.0 | 6 | **2.36** | 60 | 90° | 2.CC.30060.90 | ■ |
| **.157** | 4.0 | 8.0 | 16.0 | 8 | **2.76** | 70 | 90° | 2.CC.40080.90 | ■ |
| **.236** | 6.0 | 10.0 | 20.0 | 10 | **3.15** | 80 | 90° | 2.CC.60100.90 | ■ |

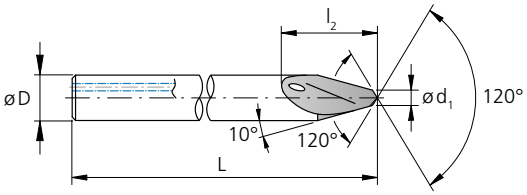
■ Stock item

# CrazyDrill Twicenter 120°

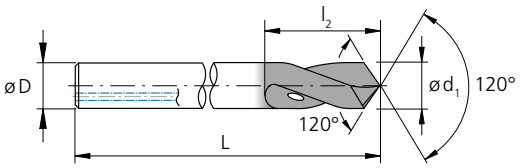
Carbide | 120° | Z2 | eXedur RIP






**Execution: $d_1$ = .020" to .078" (0.5 to 2.0 mm)**




**Execution: $d_1$ = .118" to .394" (3.0 to 10.0 mm)**

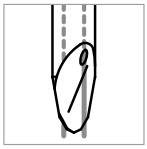
| $d_1$ [inch] | $d_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer | Item number | Availability |
|---|---|---|---|---|---|---|---|---|
| **.020** | 0.5 | 7.0 | 3 | **1.57** | 40 | 120° | 2.CC.00050.120 | ■ |
| **.039** | 1.0 | 6.15 | 3 | **1.57** | 40 | 120° | 2.CC.00100.120 | ■ |
| **.079** | 2.0 | 6.0 | 3 | **1.57** | 40 | 120° | 2.CC.00200.120 | ■ |
| **.118** | 3.0 | 8.0 | 3 | **1.57** | 40 | 120° | 2.CC.00300.120 | ■ |
| **.157** | 4.0 | 10.0 | 4 | **1.97** | 50 | 120° | 2.CC.00400.120 | ■ |
| **.236** | 6.0 | 15.0 | 6 | **2.36** | 60 | 120° | 2.CC.00600.120 | ■ |
| **.315** | 8.0 | 17.0 | 8 | **2.76** | 70 | 120° | 2.CC.00800.120 | ■ |
| **.394** | 10.0 | 21.0 | 10 | **3.15** | 80 | 120° | 2.CC.01000.120 | ■ |

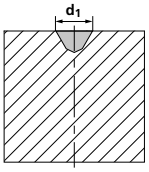
■ Stock item

CRAZYDRILL by Mikron Tool Twicenter

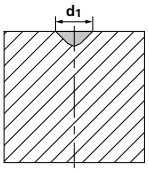
# CrazyDrill Twicenter 60° / 90°

## CENTERING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW






60°



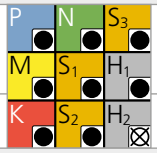

90°



**Note:**
In case of external cooling reduce $v_c$ and f of 20%

| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 120 \| **394** |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 80 \| **262** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| **197** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 50 \| **164** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| **197** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 50 \| **164** |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 50 \| **164** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 100 \| **328** |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 150 \| **492** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 \| **328** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 100 \| **328** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 80 \| **262** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 100 \| **328** |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 80 \| **262** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 10 – 30 \| **33 – 98** |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 25 \| **82** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 25 \| **82** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 40 – 50 \| **131 – 164** |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 40 \| **131** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

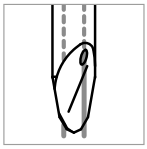
**Ød1**

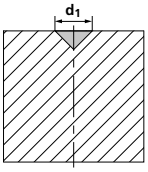
| 0.3 mm \| **.012"** | 0.5 mm \| **.020"** | 1.0 mm \| **.039"** | 1.5 mm \| **.059"** | 2.0 mm \| **.079"** | 3.0 mm \| **.118"** | 4.0 mm \| **.158"** | 6.0 mm \| **.236"** |
|---|---|---|---|---|---|---|---|
| **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| 0.012 \| **.0005** | 0.020 \| **.0008** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.240 \| **.0094** |
| 0.012 \| **.0005** | 0.020 \| **.0008** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.240 \| **.0094** |
| 0.009 \| **.0004** | 0.015 \| **.0006** | 0.030 \| **.0012** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.090 \| **.0035** | 0.120 \| **.0047** | 0.180 \| **.0071** |
| 0.007 \| **.0003** | 0.012 \| **.0005** | 0.025 \| **.0010** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.075 \| **.0030** | 0.100 \| **.0039** | 0.150 \| **.0059** |
| 0.009 \| **.0004** | 0.015 \| **.0006** | 0.030 \| **.0012** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.090 \| **.0035** | 0.120 \| **.0047** | 0.180 \| **.0071** |
| 0.009 \| **.0004** | 0.015 \| **.0006** | 0.030 \| **.0012** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.090 \| **.0035** | 0.120 \| **.0047** | 0.180 \| **.0071** |
| 0.007 \| **.0003** | 0.012 \| **.0005** | 0.025 \| **.0010** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.075 \| **.0030** | 0.100 \| **.0039** | 0.150 \| **.0059** |
| 0.009 \| **.0004** | 0.015 \| **.0006** | 0.030 \| **.0012** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.090 \| **.0035** | 0.120 \| **.0047** | 0.180 \| **.0071** |
| 0.015 \| **.0006** | 0.025 \| **.0010** | 0.050 \| **.0020** | 0.075 \| **.0030** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.200 \| **.0079** | 0.300 \| **.0118** |
| 0.015 \| **.0006** | 0.025 \| **.0010** | 0.050 \| **.0020** | 0.075 \| **.0030** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.200 \| **.0079** | 0.300 \| **.0118** |
| 0.015 \| **.0006** | 0.025 \| **.0010** | 0.050 \| **.0020** | 0.075 \| **.0030** | 0.100 \| **.0039** | 0.150 \| **.0059** | 0.200 \| **.0079** | 0.300 \| **.0118** |
| 0.009 \| **.0004** | 0.015 \| **.0006** | 0.030 \| **.0012** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.090 \| **.0035** | 0.120 \| **.0047** | 0.180 \| **.0071** |
| 0.009 \| **.0004** | 0.015 \| **.0006** | 0.030 \| **.0012** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.090 \| **.0035** | 0.120 \| **.0047** | 0.180 \| **.0071** |
| 0.009 \| **.0004** | 0.015 \| **.0006** | 0.030 \| **.0012** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.090 \| **.0035** | 0.120 \| **.0047** | 0.180 \| **.0071** |
| 0.007 \| **.0003** | 0.012 \| **.0005** | 0.025 \| **.0010** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.070 \| **.0028** | 0.090 \| **.0035** | 0.110 \| **.0043** |
| 0.007 \| **.0003** | 0.012 \| **.0005** | 0.025 \| **.0010** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.075 \| **.0030** | 0.100 \| **.0039** | 0.150 \| **.0059** |
| 0.009 \| **.0004** | 0.015 \| **.0006** | 0.030 \| **.0012** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.090 \| **.0035** | 0.120 \| **.0047** | 0.180 \| **.0071** |
| 0.007 \| **.0003** | 0.012 \| **.0005** | 0.025 \| **.0010** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.075 \| **.0030** | 0.100 \| **.0039** | 0.150 \| **.0059** |
| 0.007 \| **.0003** | 0.012 \| **.0005** | 0.025 \| **.0010** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.070 \| **.0028** | 0.080 \| **.0031** |

CRAZYDRILL by Mikron Tool Twicenter

# CrazyDrill Twicenter 120°

## CENTERING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW





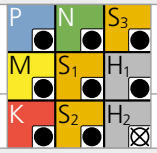

120°



**Note:**
In case of external cooling reduce $v_c$ and f of 20%

| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $V_c$ [m/min] \| [SFM] |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 120 \| **394** |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 80 \| **262** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| **197** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 50 \| **164** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| **197** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 50 \| **164** |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 50 \| **164** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 100 \| **328** |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 150 \| **492** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 \| **328** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 100 \| **328** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 80 \| **262** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 100 \| **328** |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 80 \| **262** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 10 – 30 \| **33 – 98** |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 25 \| **82** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 25 \| **82** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 40 – 50 \| **131 – 164** |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 40 \| **131** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| **Ød1** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.5 mm \| **.020"** | 1.0 mm \| **.039"** | 2.0 mm \| **.079"** | 3.0 mm \| **.118"** | 4.0 mm \| **.158"** | 6.0 mm \| **.236"** | 8.0 mm \| **.315"** | 10.0 mm \| **.394"** |
| **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| 0.020 \| **.0008** | 0.040 \| **.0016** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.150 \| **.0059** | 0.200 \| **.0079** | 0.250 \| **.0098** |
| 0.020 \| **.0008** | 0.040 \| **.0016** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.150 \| **.0059** | 0.200 \| **.0079** | 0.250 \| **.0098** |
| 0.015 \| **.0006** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.200 \| **.0079** |
| 0.012 \| **.0005** | 0.025 \| **.0010** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.150 \| **.0059** |
| 0.015 \| **.0006** | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.075 \| **.0030** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.200 \| **.0079** |
| 0.015 \| **.0006** | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.075 \| **.0030** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.200 \| **.0079** |
| 0.012 \| **.0005** | 0.025 \| **.0010** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.150 \| **.0059** |
| 0.015 \| **.0006** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.200 \| **.0079** |
| 0.020 \| **.0008** | 0.040 \| **.0016** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.150 \| **.0059** | 0.200 \| **.0079** | 0.250 \| **.0098** |
| 0.020 \| **.0008** | 0.040 \| **.0016** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.150 \| **.0059** | 0.200 \| **.0079** | 0.250 \| **.0098** |
| 0.020 \| **.0008** | 0.040 \| **.0016** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.150 \| **.0059** | 0.200 \| **.0079** | 0.250 \| **.0098** |
| 0.015 \| **.0006** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.200 \| **.0079** |
| 0.015 \| **.0006** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.200 \| **.0079** |
| 0.015 \| **.0006** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.200 \| **.0079** |
| 0.015 \| **.0006** | 0.025 \| **.0010** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.070 \| **.0028** | 0.090 \| **.0035** | 0.110 \| **.0043** |
| 0.020 \| **.0008** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.070 \| **.0028** | 0.090 \| **.0035** | 0.110 \| **.0043** | 0.130 \| **.0051** |
| 0.030 \| **.0012** | 0.040 \| **.0016** | 0.070 \| **.0028** | 0.090 \| **.0035** | 0.110 \| **.0043** | 0.140 \| **.0055** | 0.180 \| **.0071** | 0.220 \| **.0087** |
| 0.020 \| **.0008** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.060 \| **.0024** | 0.070 \| **.0028** | 0.090 \| **.0035** | 0.110 \| **.0043** | 0.130 \| **.0051** |
| 0.010 \| **.0004** | 0.020 \| **.0008** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.070 \| **.0028** | 0.080 \| **.0031** |



# Centering process CrazyDrill Twicenter

## QUICK AND ACCURATE CENTERING AND CHAMFERING

### Coolant type, pressure, filtration and flowrate

**Cooling with internal coolant supply**

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

Filter: The large cooling channels permit the use of a standard filter. Filter quality ≤ 0.050 mm (.0019").

Coolant pressure: At least 218 psi (15 bar) coolant pressure is required for the CrazyDrill Twicenter to achieve reliable drilling. High pressure is generally better for the cooling and flushing effect.

| | | | |
|---|---|---|---|
| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
| **Minimal pressure** | [bar] | 15 | 30 |
| | **[psi]** | **218** | **435** |

**Cooling with external coolant supply**

It must be noted that with external cooling the coolant is to be directed to the drill tip, where it cools and lubricates the drill perfectly and flushes away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical Information".

### Centering as the basis for drilling

The CrazyDrill Twicenter center drill offers the basis for high-precision drilling. The sturdy tool design and its performance enable the highest positioning accuracy for the subsequent drill.

The use of a centering tool for rough or irregular surfaces makes good sense even for tools with a high degree of self-centering capability, such as the CrazyDrill SST-Inox.

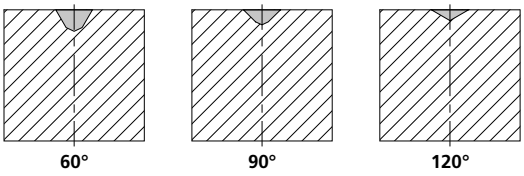
Using the internally cooled center drill with high-performance coating can greatly increase the tool life of the subsequent drill. A chamfer of 60°, 90° or 120° can be generated in the same process.

## CENTERING PROCESS

### Centering and chamfering in one step

**1 | CENTER DRILLING**

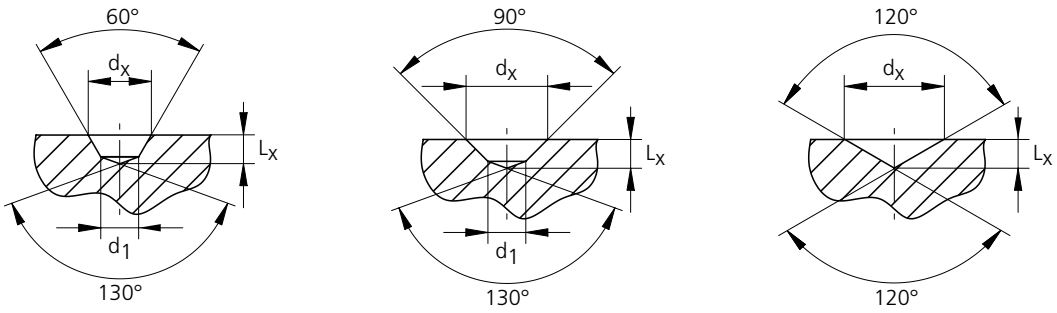
- Determine the desired cutting depth according to the drilling diameter and chamfer angle or chamfer width.
- Activate internal or external cooling.
- Drill in one step at the recommended feed speeds (see cutting data table).



CRAZYDRILL by Mikron Tool Twicenter

# Centering process CrazyDrill Twicenter

## QUICK AND ACCURATE CENTERING AND CHAMFERING




### Table for cutting depths

For 60° chamfer angle / 130° tip angle

| Ø $d_x$ | | $L_x$ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.CC.03010.60 Ød1 0.3 mm \| .012" | | 2.CC.05014.60 Ød1 0.5 mm \| .018" | | 2.CC.10020.60 Ød1 1.0 mm \| .039" | | 2.CC.15030.60 Ød1 1.5 mm \| .059" | | 2.CC.20040.60 Ød1 2.0 mm \| .079" | | 2.CC.30060.60 Ød1 3.0 mm \| .118" | | 2.CC.40080.60 Ød1 4.0 mm \| .158" | | 2.CC.60100.60 Ød1 6.0 mm \| .236" | |
| [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] |
| 0.4 | .016 | 0.16 | .0063 | | | | | | | | | | | | | | |
| 0.8 | .032 | 0.50 | .0196 | 0.38 | .0149 | | | | | | | | | | | | |
| 1.0 | .039 | | | 0.55 | .0216 | | | | | | | | | | | | |
| 1.5 | .059 | | | | | 0.67 | .0263 | | | | | | | | | | |
| 2.0 | .079 | | | | | | | 0.78 | .0307 | | | | | | | | |
| 2.5 | .098 | | | | | | | 1.22 | .0480 | 0.90 | .0354 | | | | | | |
| 3.0 | .118 | | | | | | | | | 1.33 | .0523 | | | | | | |
| 3.5 | .138 | | | | | | | | | 1.77 | .0696 | 1.13 | .0444 | | | | |
| 4.0 | .158 | | | | | | | | | | | 1.57 | .0618 | | | | |
| 5.0 | .197 | | | | | | | | | | | 2.43 | .0957 | 1.80 | .0709 | | |
| 6.0 | .236 | | | | | | | | | | | | | 2.66 | .1047 | | |
| 7.0 | .276 | | | | | | | | | | | | | 3.53 | .1389 | 2.26 | .0889 |
| 8.0 | .315 | | | | | | | | | | | | | | | 3.13 | .1232 |
| 9.0 | .354 | | | | | | | | | | | | | | | 4.00 | .1575 |

For 90° chamfer angle / 130° tip angle

| Ø $d_x$ | | $L_x$ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.CC.03010.90 Ød1 0.3 mm \| .012" | | 2.CC.05014.90 Ød1 0.5 mm \| .018" | | 2.CC.10020.90 Ød1 1.0 mm \| .039" | | 2.CC.15030.90 Ød1 1.5 mm \| .059" | | 2.CC.20040.90 Ød1 2.0 mm \| .079" | | 2.CC.30060.90 Ød1 3.0 mm \| .118" | | 2.CC.40080.90 Ød1 4.0 mm \| .158" | | 2.CC.60100.90 Ød1 6.0 mm \| .236" | |
| [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] |
| 0.4 | .016 | 0.12 | .0047 | | | | | | | | | | | | | | |
| 0.8 | .032 | 0.32 | .0126 | 0.27 | .0106 | | | | | | | | | | | | |
| 1.0 | .039 | | | 0.37 | .0145 | | | | | | | | | | | | |
| 1.5 | .059 | | | | | 0.48 | .0189 | | | | | | | | | | |
| 2.0 | .079 | | | | | | | 0.60 | .0236 | | | | | | | | |
| 2.5 | .098 | | | | | | | 0.85 | .0335 | 0.72 | .0283 | | | | | | |
| 3.0 | .118 | | | | | | | | | 0.97 | .0382 | | | | | | |
| 3.5 | .138 | | | | | | | | | 1.22 | .0480 | 0.95 | .0374 | | | | |
| 4.0 | .158 | | | | | | | | | | | 1.20 | .0472 | | | | |
| 5.0 | .197 | | | | | | | | | | | 1.70 | .0669 | 1.43 | .0563 | | |
| 6.0 | .236 | | | | | | | | | | | | | 1.93 | .0760 | | |
| 7.0 | .276 | | | | | | | | | | | | | 2.43 | .0957 | 1.90 | .0748 |
| 8.0 | .315 | | | | | | | | | | | | | | | 2.40 | .0945 |
| 9.0 | .354 | | | | | | | | | | | | | | | 2.90 | .1142 |

■ For 120° chamfer angle / 120° tip angle

| Ø $d_x$ | | $L_x$ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.CC.00050.120 Ød1 0.5 mm \| .018" | | 2.CC.00100.120 Ød1 1.0 mm \| .039" | | 2.CC.00200.120 Ød1 2.0 mm \| .079" | | 2.CC.00300.120 Ød1 3.0 mm \| .118" | | 2.CC.00400.120 Ød1 4.0 mm \| .158" | | 2.CC.00600.120 Ød1 6.0 mm \| .236" | | 2.CC.00800.120 Ød1 8.0 mm \| .315" | | 2.CC.01000.120 Ød1 10.0 mm \| .394" | |
| [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] |
| 0.4 | .016 | 0.12 | .0047 | | | | | | | | | | | | | | |
| 0.5 | .020 | 0.14 | .0055 | | | | | | | | | | | | | | |
| 0.8 | .032 | | | 0.23 | .0091 | | | | | | | | | | | | |
| 1.0 | .039 | | | 0.29 | .0114 | | | | | | | | | | | | |
| 1.5 | .059 | | | | | 0.43 | .0169 | | | | | | | | | | |
| 2.0 | .079 | | | | | 0.58 | .0228 | | | | | | | | | | |
| 2.5 | .098 | | | | | | | 0.72 | .0283 | | | | | | | | |
| 3.0 | .118 | | | | | | | 0.87 | .0343 | | | | | | | | |
| 3.5 | .138 | | | | | | | | | 1.01 | .0398 | | | | | | |
| 4.0 | .158 | | | | | | | | | 1.15 | .0453 | | | | | | |
| 5.0 | .197 | | | | | | | | | | | 1.44 | .0567 | | | | |
| 6.0 | .236 | | | | | | | | | | | 1.73 | .0681 | | | | |
| 7.0 | .276 | | | | | | | | | | | | | 2.02 | .0795 | | |
| 8.0 | .315 | | | | | | | | | | | | | 2.31 | .0909 | | |
| 9.0 | .354 | | | | | | | | | | | | | | | 2.60 | .1024 |
| 10.0 | .394 | | | | | | | | | | | | | | | 2.89 | .1138 |

## Formulas

■ For CrazyDrill Twicenter 60°

$$L_x = \frac{1}{2} \cdot \left[ \frac{d_1}{\tan(65°)} + \frac{(d_x - d_1)}{\tan(30°)} \right]$$

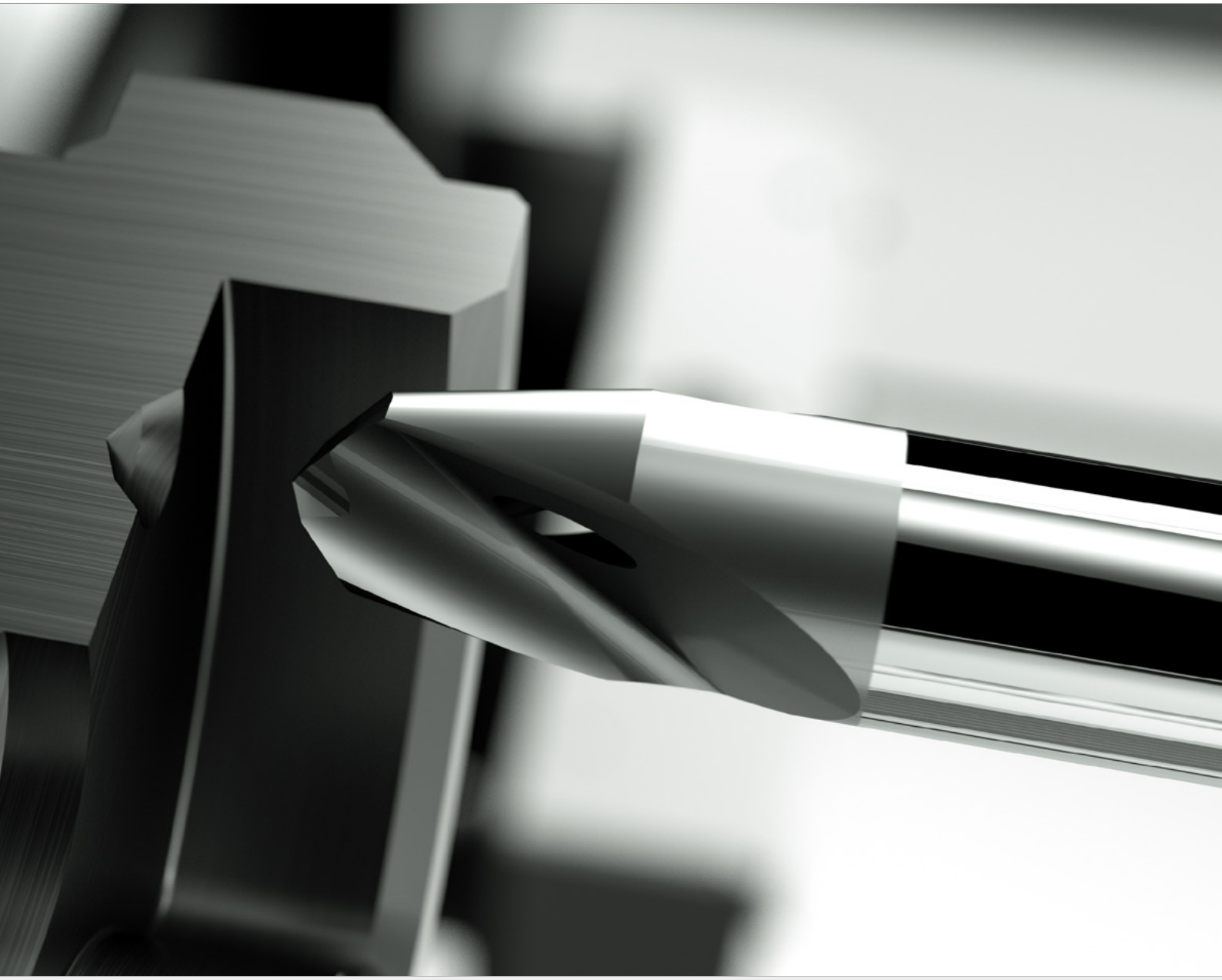
■ For CrazyDrill Twicenter 90°

$$L_x = \frac{1}{2} \cdot \left[ \frac{d_1}{\tan(65°)} + \frac{(d_x - d_1)}{\tan(45°)} \right]$$

■ For CrazyDrill Twicenter 120°

$$L_x = \frac{1}{2} \cdot \left[ \frac{d_x}{\tan(60°)} \right]$$

# Customized center drills



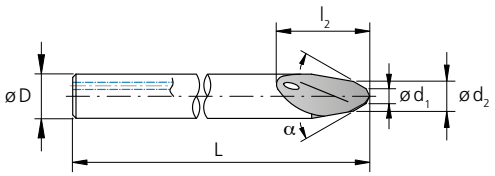
**Mikron Tool produces solid carbide center drills according to your needs and requirements and within the following range:**

### CHARACTERISTICS

- Diameter max: 1.26" (32.0 mm), larger as per specific request
- Maximum tool length: 12.99" ( 330 mm)
- Number of cutting edges: 1, 2 or 3
- Chamfer and point angle as per customer need
- Direction of rotation: right-hand cut or left-hand cut
- Material for the center drill: tungsten carbide, grade selection depending on application

### COATINGS

Many choices according to application




### COOLING

- Center drill with spiralized through coolant holes with outlet located on drill tip
- Center drill with through shank coolant channels with outlet located on shank
- Center drill for external coolant supply

### TYPE OF SHAFT

- Cylindrical as per DIN 6535 HA
- Cylindrical as per DIN 6535 HE (Whistle Notch)
- Cylindrical as per DIN 6535 HB (Weldon)
- Others on demand

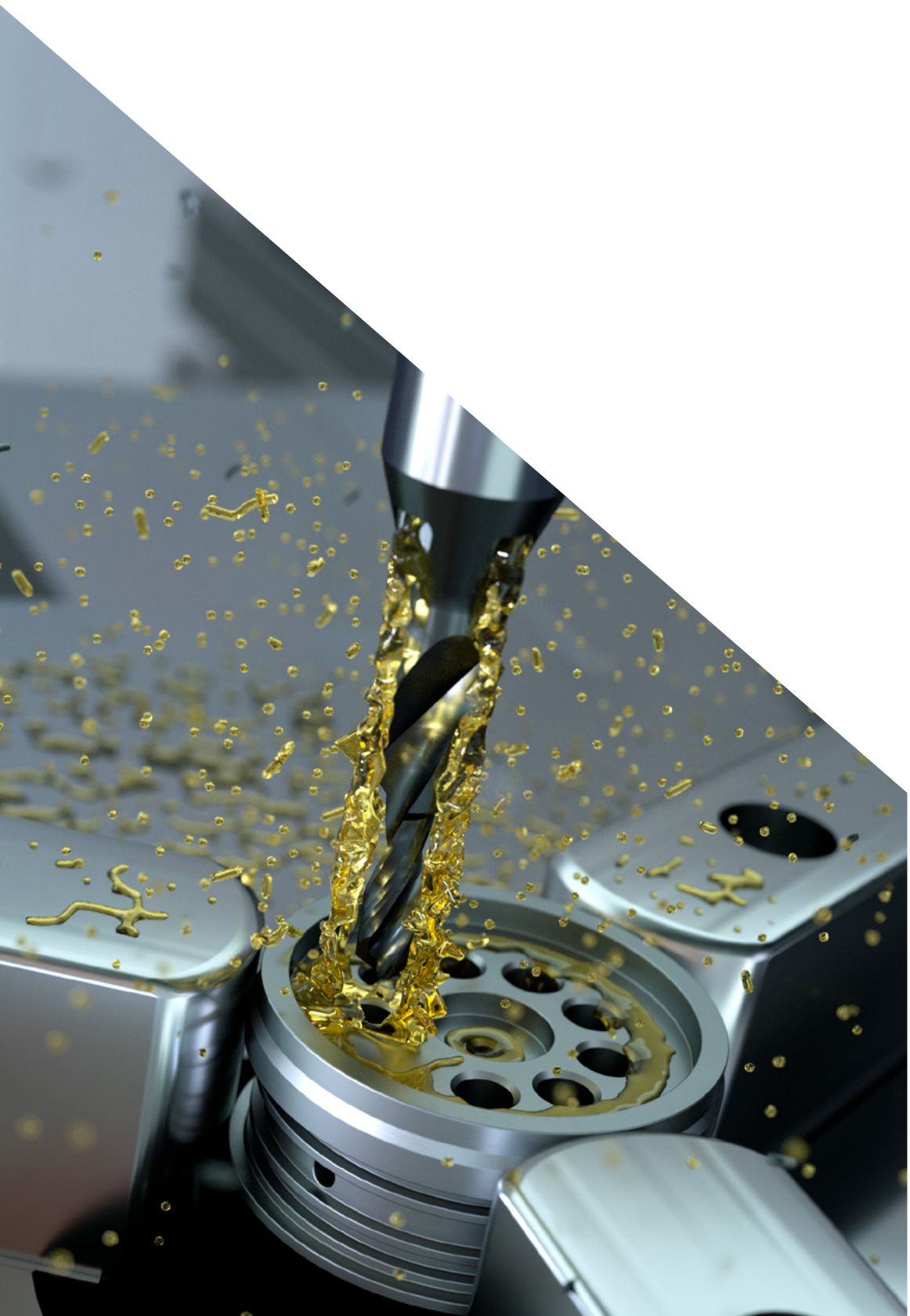
### MATERIAL TO BE MACHINED

Center drills for steel, corrosion-resistant steels, i.e. stainless steels, titanium / titanium alloys, super alloys, i.e. heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, centering drills for hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

### FINISHING

Cutting edge preparation, polishing of flutes

# crazy about pilot drilling



# PILOT DRILLING AND SHORT DRILLING TOOLS

05


**OVERVIEW** **86**

CODIFICATION KEY 88

MIQUDRILL 200 90
Depth up to 2.4 x d, Ø 0.1 mm - 1.5 mm | **.004" – .059"**

CRAZYDRILL FLEXPILOT 104
Depth 3 x d, Ø 0.1 mm - 2.0 mm | **.004" – .079"**

CRAZYDRILL PILOT SST-INOX 118
Depth 3 x d + 90° countersink, Ø 0.2 mm - 2.0 mm | **.008" – .079"**

CRAZYDRILL PILOT 128
Depth 2 x d + 90° countersink, Ø 0.4 mm - 6.35 mm | **1/64" – 1/4"**

CRAZYDRILL CROSSPILOT 140
Depth 2 x d, Ø 0.4 mm - 6.35 mm | **1/64" – 1/4"**

CRAZYDRILL COOLPILOT 152
Depth 3 x d + 90° countersink, Ø 1.0 mm - 6.35 mm | **.039" – 1/4"**

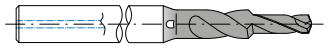
CRAZYDRILL COOLPILOT TITANIUM ATC 162
Depth 3 x d + 90° countersink, Ø 1.0 mm - 6.35 mm | **.039" – 1/4"**

CRAZYDRILL HEXALOBE 172
Pre-hole drilling (tip 140° - Flat 180°) + 120° chamfer,
Ø 0.9 mm - 3.8 mm | **.035" – .150"**

CUSTOMIZED SHORT / PILOT DRILLS 188

# Overview

## CUTTING TOOL SOLUTIONS

| | | |
|---|---|---|
| | MIQUDRILL 200 |  |
| | CRAZYDRILL Flexpilot |  |
| | CRAZYDRILL Pilot SST-Inox |  |
| | CRAZYDRILL Pilot |  |
| | CRAZYDRILL Crosspilot |  |
| | CRAZYDRILL Coolpilot |  |
| NEW | CRAZYDRILL Coolpilot Titanium ATC |  |
| NEW | CRAZYDRILL Hexalobe |  |
| | **Customized short / pilot drills** |  |

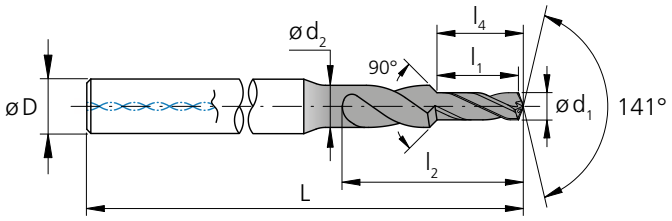
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



| ø - range [mm] \| [inch] | max. depth | Cooling Int. | Cooling Ext. | P Unalloyed and alloyed steel | M Stainless steel | K Cast iron | N Non ferrous metals | $S_1$ Super alloys | $S_2$ Alloyed titanium | $S_2$ Pure titanium | $S_3$ CrCo alloys | $H_1$ Hardened steel <55 HRC | $H_2$ Hardened steel ≥55 HRC | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 – 1.5<br>**.004" – .059"** | up to 2.4 x d | – | ✔ | ◐ | ⊠ | ◐ | ◐ | ⊠ | ⊠ | ⊠ | ⊠ | ◐ | ⊠ | **90** |
| 0.1 – 2.0<br>**.004" – .079"** | 3 x d | – | ✔ | ● | ⊠ | ● | ● | ⊠ | ● | ● | ⊠ | ⊠ | ⊠ | **104** |
| 0.2 – 2.0<br>**.008" – .079"** | 3 x d<br>+ Chamfer 90° | ✔ | ✔ | ⊠ | ● | ⊠ | ◐ | ● | ⊠ | ⊠ | ● | ⊠ | ⊠ | **118** |
| 0.4 – 6.35<br>**1/64" – 1/4"** | 2 x d<br>+ Chamfer 90° | – | ✔ | ● | ◐ | ● | ● | ⊠ | ● | ● | ⊠ | ● | ⊠ | **128** |
| 0.4 – 6.35<br>**1/64" – 1/4"** | 2 x d | – | ✔ | ● | ◐ | ● | ● | ⊠ | ● | ● | ⊠ | ● | ⊠ | **140** |
| 1.0 – 6.35<br>**.039" – 1/4"** | 3 x d<br>+ Chamfer 90° | ✔ | – | ⊠ | ● | ⊠ | ⊠ | ● | ⊠ | ⊠ | ● | ⊠ | ⊠ | **152** |
| 1.0 – 6.35<br>**.039" – 1/4"** | 3 x d<br>+ Chamfer 90° | ✔ | – | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ● | ⊠ | ⊠ | ⊠ | ⊠ | **162** |
| 0.9 – 3.8<br>**.035" – .150"** | variable<br>+ Chamfer 90° | – | ✔ | ⊠ | ● | ⊠ | ⊠ | ⊠ | ● | ● | ● | ⊠ | ⊠ | **172** |
| 0.1 – 32.0<br>**.004" – 1.26"** | as required | ✔ | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | **188** |

# Codification key

## ITEM NUMBER EASY TO UNDERSTAND




## 2.PD.01000.090.IC

**Division number**
- 2 = Mikron Tool SA Agno

**Pilot family**
- CrazyDrill Pilot
- CrazyDrill Crosspilot
- CrazyDrill Pilot SST-Inox
- CrazyDrill Coolpilot
- CrazyDrill Coolpilot Titanium

**Cutting diameter $d_1$**
- 01000 = Ø 1 mm (.039")

**Geometry and coolant information**
- IK = Stainless steel geometry with integrated coolant on the shaft
- IC = Stainless steel geometry with through-tool-cooling
- ATC = Alloyed titanium with through-tool-cooling

**Geometric features**
- 090 = 90° Chamfer angle
- 170 = 170° Tip angle

## 2.PFS.120.0

**Division number**
- 2 = Mikron Tool SA Agno

**Flexpilot family**
- PFS = CrazyDrill Flexpilot Steel
- PFT = CrazyDrill Flexpilot Titanium

**Coating**
- 1 = Coated
- 0 = Uncoated

**Cutting diameter $d_1$**
- 120 = Ø 1.2 mm (.047")

## 2.MD.200088.1

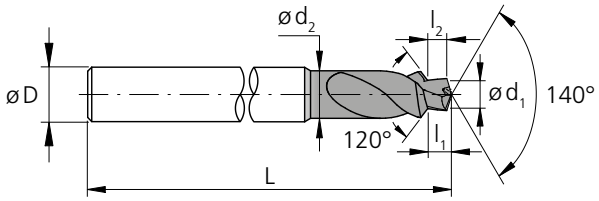
**Division number**
- 2 = Mikron Tool SA Agno

**Family**
- MiquDrill

**Tool type**
- 200 = Short drill

**Coating**
- 1 = Coated
- 0 = Uncoated

**Cutting diameter $d_1$**
- 088 = Ø 0.88 mm (.0346")




## 2.CD.007100.120.T

- **Division number**
  - 2 = Mikron Tool SA Agno
- **Family**
  - CrazyDrill
- **Approximate $l_2/d_1$ ratio**
  - 007 = 0.7
- **Geometry**
  - T = Titanium
  - I = Stainless steel
- **Chamfer angle**
  - 120 = 120°
- **Cutting diameter $d_1$**
  - 100 = Ø 1 mm (.039")

## 2.CDF.007100.120

- **Division number**
  - 2 = Mikron Tool SA Agno
- **Family**
  - CrazyDrill Hexalobe Flat
- **Approximate $l_2/d_1$ ratio**
  - 007 = 0.7
- **Chamfer angle**
  - 120 = 120°
- **Cutting diameter $d_1$**
  - 100 = Ø 1 mm (.039")

## 2.PD.F316.IK

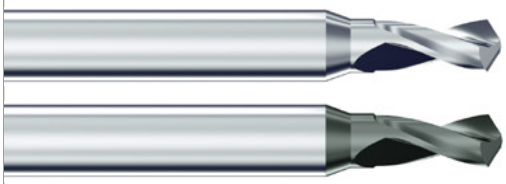
- **Division number**
  - 2 = Mikron Tool SA Agno
- **Family**
  - PD = Pilot family
  - PFS = Flexpilot Steel family
- **Cutting diameter in fractional inches $d_1$**
  - F316 = Ø 3/16"
- **Family feature**
  - 090 = CrazyDrill Pilot
  - 170 = CrazyDrill Crosspilot
  - IK = CrazyDrill Pilot SST-Inox
  - IC = CrazyDrill Coolpilot
  - 1 = CrazyDrill Flexpilot Steel Coated

# MiquDrill 200



MIQUDRILL 200

## GREAT AVAILABILITY IN SMALL DIMENSIONS



MiquDrill 200 is the ideal tool for the perfect execution of a short hole and also guarantees as pilot drill for MiquDrill 210 the accurate preparation of deeper follow-up holes. It is universally applicable for steel (alloyed and unalloyed), cast iron and nonferrous metals (e.g. aluminum with high silicium level). Available from stock in the diameter range:

- from .012" to .118" (0.3 mm to 3.0 mm) - coated version (eXedur RIP)
- from .004" to .118" (0.1 mm to 3.0 mm) - uncoated version

with the following increment:

- .0004" (0.01 mm) in the diameter range from .004" to .079" (0.1 mm to 2.0 mm)
- .0020" (0.05 mm) from .079" to .118" (2.0 mm to 3.0 mm)

Compared to uncoated version, "MiquDrill 200 coated" is the solution for higher requirements concerning tool life and/or shorter machining times, the machining of hardened steel < 55 HRC and also for difficult-to-machine materials.

The geometry of MiquDrill 200, the tool with good price / performance ratio, is especially designed for micro-machining with drilling depths between 1.4 and 2.4 x d. These depths are reached in one step.

This precision drill is the optimal solution for the production of small and medium batch sizes or a large range of variants. First class quality and process accuracy are assured

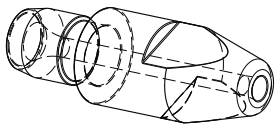
**Regrinding:** This product is not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the MiquDrill 200 (diameter, length, cutting direction…)? Ask us about our customized versions!

# Features and benefits

## FITS EVERY APPLICATION

- **HIGH DEGREE OF PROCESS RELIABILITY** | due to higher quality
- **HIGH DEGREE OF PRECISION** | due to small tolerances
- **LOW PRODUCTION COSTS** | due to the low cost of tool



**COMPONENT**
Welding nozzle

**MATERIAL**
CuZn39Pb3 / 2.0401 / UNS 38500

**MACHINING**
- Short drilling
- d1 = 0.5 mm **| .020"**
- Drilling depth 0.9 mm **| .035"**

**DRILLING TOOL**
Mikron Tool - MiquDrill 200 - coated

| DATA | MIKRON TOOL |
|---|---|
| Tool type | MiquDrill 200<br>- Carbide<br>- Coated<br>- External cooling |
| Item number | 2.MD.200050.1 |
| Cutting data | $v_c$ = 45 m/min **\| 148 SFM**<br>f = 0.008 mm/rev **\| .00031 IPR** |

## Uncoated

Drill with external cooling



Page 94

## Coated

Drill with external cooling




Page 94

**1 | SHANK**
The accurately ground shaft guarantees high concentricity and therefore highest position accuracy

**2 | SOLID CARBIDE**
The use of latest generation carbide grades allow highest machining speed and feed. For example, in spite of similar feed rates as HSS drills, due to its higher cutting speed, drilling with MiquDrill is considerably faster.

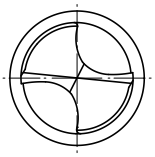
**3 | COATING**
The coated version of the drill is also adapted for difficult-to-machine materials and hardened steels < 55 HRC and reaches even a better tool life.

**4 | HELICAL FLUTE**
The geometry of the helical flute guarantees an optimal chip flow.

**5 | TIP GEOMETRY**
The geometry of the universal drill is an excellent solution for micro-machining. High process accuracy and productivity are guaranteed.

**6 | DIAMETER RANGE AND INCREMENTS**
Readily available from stock starting of diameters from .0039" (0.1 mm) with increments of .0004" ( 0.01 mm).

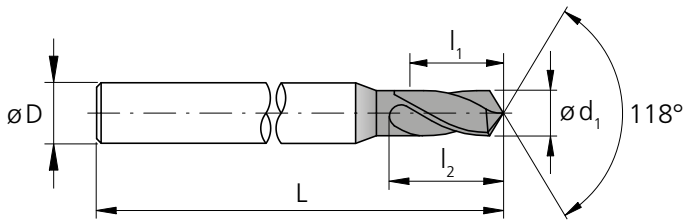
Drill tip



# MiquDrill 200 - coated / uncoated

## DRILLING WITH EXTERNAL COOLING

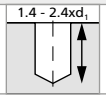
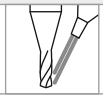



| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0039** | 0.10 | **.006** | 0.15 | 0.3 | 1.0 | **1.18** | 30 | 2.MD.200010 | - | .0 | ◪ |
| **.0043** | 0.11 | **.011** | 0.27 | 0.4 | 1.0 | **1.18** | 30 | 2.MD.200011 | - | .0 | ◪ |
| **.0047** | 0.12 | **.010** | 0.26 | 0.4 | 1.0 | **1.18** | 30 | 2.MD.200012 | - | .0 | ◪ |
| **.0051** | 0.13 | **.010** | 0.25 | 0.4 | 1.0 | **1.18** | 30 | 2.MD.200013 | - | .0 | ◪ |
| **.0055** | 0.14 | **.009** | 0.24 | 0.4 | 1.0 | **1.18** | 30 | 2.MD.200014 | - | .0 | ◪ |
| **.0059** | 0.15 | **.009** | 0.23 | 0.4 | 1.0 | **1.18** | 30 | 2.MD.200015 | - | .0 | ◪ |
| **.0063** | 0.16 | **.013** | 0.34 | 0.5 | 1.0 | **1.18** | 30 | 2.MD.200016 | - | .0 | ◪ |
| **.0067** | 0.17 | **.013** | 0.33 | 0.5 | 1.0 | **1.18** | 30 | 2.MD.200017 | - | .0 | ◪ |
| **.0071** | 0.18 | **.013** | 0.32 | 0.5 | 1.0 | **1.18** | 30 | 2.MD.200018 | - | .0 | ◪ |
| **.0075** | 0.19 | **.012** | 0.31 | 0.5 | 1.0 | **1.18** | 30 | 2.MD.200019 | - | .0 | ◪ |
| **.0079** | 0.20 | **.012** | 0.30 | 0.5 | 1.0 | **1.18** | 30 | 2.MD.200020 | - | .0 | ◪ |
| **.0083** | 0.21 | **.017** | 0.44 | 0.7 | 1.0 | **1.18** | 30 | 2.MD.200021 | - | .0 | ◪ |
| **.0087** | 0.22 | **.017** | 0.43 | 0.7 | 1.0 | **1.18** | 30 | 2.MD.200022 | - | .0 | ◪ |
| **.0091** | 0.23 | **.017** | 0.42 | 0.7 | 1.0 | **1.18** | 30 | 2.MD.200023 | - | .0 | ◪ |
| **.0094** | 0.24 | **.016** | 0.41 | 0.7 | 1.0 | **1.18** | 30 | 2.MD.200024 | - | .0 | ◪ |
| **.0098** | 0.25 | **.016** | 0.40 | 0.7 | 1.0 | **1.18** | 30 | 2.MD.200025 | - | .0 | ◪ |
| **.0102** | 0.26 | **.019** | 0.49 | 0.8 | 1.0 | **1.18** | 30 | 2.MD.200026 | - | .0 | ◪ |
| **.0106** | 0.27 | **.019** | 0.48 | 0.8 | 1.0 | **1.18** | 30 | 2.MD.200027 | - | .0 | ◪ |
| **.0110** | 0.28 | **.019** | 0.47 | 0.8 | 1.0 | **1.18** | 30 | 2.MD.200028 | - | .0 | ◪ |
| **.0114** | 0.29 | **.018** | 0.46 | 0.8 | 1.0 | **1.18** | 30 | 2.MD.200029 | - | .0 | ◪ |
| **.0118** | 0.30 | **.018** | 0.45 | 0.8 | 1.0 | **1.18** | 30 | 2.MD.200030 | .1 | .0 | ■ |
| **.0122** | 0.31 | **.023** | 0.59 | 0.9 | 1.0 | **1.18** | 30 | 2.MD.200031 | .1 | .0 | ■ |
| **.0126** | 0.32 | **.023** | 0.58 | 0.9 | 1.0 | **1.18** | 30 | 2.MD.200032 | .1 | .0 | ■ |
| **.0130** | 0.33 | **.022** | 0.57 | 0.9 | 1.0 | **1.18** | 30 | 2.MD.200033 | .1 | .0 | ■ |
| **.0134** | 0.34 | **.022** | 0.56 | 0.9 | 1.0 | **1.18** | 30 | 2.MD.200034 | .1 | .0 | ■ |
| **.0138** | 0.35 | **.022** | 0.55 | 0.9 | 1.0 | **1.18** | 30 | 2.MD.200035 | .1 | .0 | ■ |
| **.0142** | 0.36 | **.025** | 0.64 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.200036 | .1 | .0 | ■ |
| **.0146** | 0.37 | **.025** | 0.63 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.200037 | .1 | .0 | ■ |
| **.0150** | 0.38 | **.024** | 0.62 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.200038 | .1 | .0 | ■ |
| **.0154** | 0.39 | **.024** | 0.61 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.200039 | .1 | .0 | ■ |
| **.0157** | 0.40 | **.024** | 0.60 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.200040 | .1 | .0 | ■ |
| **.0161** | 0.41 | **.029** | 0.74 | 1.2 | 1.0 | **1.18** | 30 | 2.MD.200041 | .1 | .0 | ■ |
| **.0165** | 0.42 | **.029** | 0.73 | 1.2 | 1.0 | **1.18** | 30 | 2.MD.200042 | .1 | .0 | ■ |
| **.0169** | 0.43 | **.028** | 0.72 | 1.2 | 1.0 | **1.18** | 30 | 2.MD.200043 | .1 | .0 | ■ |
| **.0173** | 0.44 | **.028** | 0.71 | 1.2 | 1.0 | **1.18** | 30 | 2.MD.200044 | .1 | .0 | ■ |
| **.0177** | 0.45 | **.028** | 0.70 | 1.2 | 1.0 | **1.18** | 30 | 2.MD.200045 | .1 | .0 | ■ |

| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0181** | 0.46 | **.033** | 0.84 | 1.3 | 1.0 | **1.18** | 30 | 2.MD.200046 | .1 | .0 | ■ |
| **.0185** | 0.47 | **.033** | 0.83 | 1.3 | 1.0 | **1.18** | 30 | 2.MD.200047 | .1 | .0 | ■ |
| **.0189** | 0.48 | **.032** | 0.82 | 1.3 | 1.0 | **1.18** | 30 | 2.MD.200048 | .1 | .0 | ■ |
| **.0193** | 0.49 | **.032** | 0.81 | 1.3 | 1.0 | **1.18** | 30 | 2.MD.200049 | .1 | .0 | ■ |
| **.0197** | 0.50 | **.035** | 0.90 | 1.4 | 1.0 | **1.18** | 30 | 2.MD.200050 | .1 | .0 | ■ |
| **.0201** | 0.51 | **.035** | 0.89 | 1.4 | 1.0 | **1.18** | 30 | 2.MD.200051 | .1 | .0 | ■ |
| **.0205** | 0.52 | **.035** | 0.88 | 1.4 | 1.0 | **1.18** | 30 | 2.MD.200052 | .1 | .0 | ■ |
| **.0209** | 0.53 | **.034** | 0.87 | 1.4 | 1.0 | **1.18** | 30 | 2.MD.200053 | .1 | .0 | ■ |
| **.0213** | 0.54 | **.034** | 0.86 | 1.4 | 1.0 | **1.18** | 30 | 2.MD.200054 | .1 | .0 | ■ |
| **.0217** | 0.55 | **.033** | 0.85 | 1.4 | 1.0 | **1.18** | 30 | 2.MD.200055 | .1 | .0 | ■ |
| **.0220** | 0.56 | **.037** | 0.94 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.200056 | .1 | .0 | ■ |
| **.0224** | 0.57 | **.037** | 0.93 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.200057 | .1 | .0 | ■ |
| **.0228** | 0.58 | **.036** | 0.92 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.200058 | .1 | .0 | ■ |
| **.0232** | 0.59 | **.036** | 0.91 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.200059 | .1 | .0 | ■ |
| **.0236** | 0.60 | **.035** | 0.90 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.200060 | .1 | .0 | ■ |
| **.0240** | 0.61 | **.039** | 0.99 | 1.6 | 1.0 | **1.18** | 30 | 2.MD.200061 | .1 | .0 | ■ |
| **.0244** | 0.62 | **.039** | 0.98 | 1.6 | 1.0 | **1.18** | 30 | 2.MD.200062 | .1 | .0 | ■ |
| **.0248** | 0.63 | **.038** | 0.97 | 1.6 | 1.0 | **1.18** | 30 | 2.MD.200063 | .1 | .0 | ■ |
| **.0252** | 0.64 | **.038** | 0.96 | 1.6 | 1.0 | **1.18** | 30 | 2.MD.200064 | .1 | .0 | ■ |
| **.0256** | 0.65 | **.037** | 0.95 | 1.6 | 1.0 | **1.18** | 30 | 2.MD.200065 | .1 | .0 | ■ |
| **.0260** | 0.66 | **.045** | 1.14 | 1.8 | 1.0 | **1.18** | 30 | 2.MD.200066 | .1 | .0 | ■ |
| **.0264** | 0.67 | **.044** | 1.13 | 1.8 | 1.0 | **1.18** | 30 | 2.MD.200067 | .1 | .0 | ■ |
| **.0268** | 0.68 | **.044** | 1.12 | 1.8 | 1.0 | **1.18** | 30 | 2.MD.200068 | .1 | .0 | ■ |
| **.0272** | 0.69 | **.044** | 1.11 | 1.8 | 1.0 | **1.18** | 30 | 2.MD.200069 | .1 | .0 | ■ |
| **.0276** | 0.70 | **.043** | 1.10 | 1.8 | 1.0 | **1.18** | 30 | 2.MD.200070 | .1 | .0 | ■ |
| **.0280** | 0.71 | **.047** | 1.19 | 1.9 | 1.0 | **1.18** | 30 | 2.MD.200071 | .1 | .0 | ■ |
| **.0283** | 0.72 | **.046** | 1.18 | 1.9 | 1.0 | **1.18** | 30 | 2.MD.200072 | .1 | .0 | ■ |
| **.0287** | 0.73 | **.046** | 1.17 | 1.9 | 1.0 | **1.18** | 30 | 2.MD.200073 | .1 | .0 | ■ |
| **.0291** | 0.74 | **.046** | 1.16 | 1.9 | 1.0 | **1.18** | 30 | 2.MD.200074 | .1 | .0 | ■ |
| **.0295** | 0.75 | **.045** | 1.15 | 1.9 | 1.0 | **1.18** | 30 | 2.MD.200075 | .1 | .0 | ■ |
| **.0299** | 0.76 | **.049** | 1.24 | 2.0 | 1.0 | **1.18** | 30 | 2.MD.200076 | .1 | .0 | ■ |
| **.0303** | 0.77 | **.048** | 1.23 | 2.0 | 1.0 | **1.18** | 30 | 2.MD.200077 | .1 | .0 | ■ |
| **.0307** | 0.78 | **.048** | 1.22 | 2.0 | 1.0 | **1.18** | 30 | 2.MD.200078 | .1 | .0 | ■ |
| **.0311** | 0.79 | **.048** | 1.21 | 2.0 | 1.0 | **1.18** | 30 | 2.MD.200079 | .1 | .0 | ■ |
| **.0315** | 0.80 | **.047** | 1.20 | 2.0 | 1.5 | **1.18** | 30 | 2.MD.200080 | .1 | .0 | ■ |
| **.0319** | 0.81 | **.051** | 1.29 | 2.1 | 1.5 | **1.18** | 30 | 2.MD.200081 | .1 | .0 | ■ |

■ Stock item, packing unit of 5 pcs.
◪ Stock item only in uncoated version, packing unit of 5 pcs.

| Carbide |  |  | Z2 |  |
|---|---|---|---|---|



| | | |
|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
| Tolerance | **0 - .00016"** | 0 - 0.004 mm |



| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0323** | 0.82 | **.050** | 1.28 | 2.1 | 1.5 | **1.18** | 30 | 2.MD.200082 | .1 | .0 | ■ |
| **.0327** | 0.83 | **.050** | 1.27 | 2.1 | 1.5 | **1.18** | 30 | 2.MD.200083 | .1 | .0 | ■ |
| **.0331** | 0.84 | **.050** | 1.26 | 2.1 | 1.5 | **1.18** | 30 | 2.MD.200084 | .1 | .0 | ■ |
| **.0335** | 0.85 | **.049** | 1.25 | 2.1 | 1.5 | **1.18** | 30 | 2.MD.200085 | .1 | .0 | ■ |
| **.0339** | 0.86 | **.057** | 1.44 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200086 | .1 | .0 | ■ |
| **.0343** | 0.87 | **.056** | 1.43 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200087 | .1 | .0 | ■ |
| **.0346** | 0.88 | **.056** | 1.42 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200088 | .1 | .0 | ■ |
| **.0350** | 0.89 | **.056** | 1.41 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200089 | .1 | .0 | ■ |
| **.0354** | 0.90 | **.055** | 1.40 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200090 | .1 | .0 | ■ |
| **.0358** | 0.91 | **.055** | 1.39 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200091 | .1 | .0 | ■ |
| **.0362** | 0.92 | **.054** | 1.38 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200092 | .1 | .0 | ■ |
| **.0366** | 0.93 | **.054** | 1.37 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200093 | .1 | .0 | ■ |
| **.0370** | 0.94 | **.054** | 1.36 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200094 | .1 | .0 | ■ |
| **.0374** | 0.95 | **.053** | 1.35 | 2.3 | 1.5 | **1.18** | 30 | 2.MD.200095 | .1 | .0 | ■ |
| **.0378** | 0.96 | **.061** | 1.54 | 2.5 | 1.5 | **1.18** | 30 | 2.MD.200096 | .1 | .0 | ■ |
| **.0382** | 0.97 | **.060** | 1.53 | 2.5 | 1.5 | **1.18** | 30 | 2.MD.200097 | .1 | .0 | ■ |
| **.0386** | 0.98 | **.060** | 1.52 | 2.5 | 1.5 | **1.18** | 30 | 2.MD.200098 | .1 | .0 | ■ |
| **.0390** | 0.99 | **.059** | 1.51 | 2.5 | 1.5 | **1.18** | 30 | 2.MD.200099 | .1 | .0 | ■ |
| **.0394** | 1.00 | **.059** | 1.50 | 2.5 | 1.5 | **1.18** | 30 | 2.MD.200100 | .1 | .0 | ■ |
| **.0398** | 1.01 | **.063** | 1.59 | 2.6 | 1.5 | **1.18** | 30 | 2.MD.200101 | .1 | .0 | ■ |
| **.0402** | 1.02 | **.062** | 1.58 | 2.6 | 1.5 | **1.18** | 30 | 2.MD.200102 | .1 | .0 | ■ |
| **.0406** | 1.03 | **.062** | 1.57 | 2.6 | 1.5 | **1.18** | 30 | 2.MD.200103 | .1 | .0 | ■ |
| **.0409** | 1.04 | **.061** | 1.56 | 2.6 | 1.5 | **1.18** | 30 | 2.MD.200104 | .1 | .0 | ■ |
| **.0413** | 1.05 | **.061** | 1.55 | 2.6 | 1.5 | **1.18** | 30 | 2.MD.200105 | .1 | .0 | ■ |
| **.0417** | 1.06 | **.069** | 1.74 | 2.8 | 1.5 | **1.18** | 30 | 2.MD.200106 | .1 | .0 | ■ |
| **.0421** | 1.07 | **.068** | 1.73 | 2.8 | 1.5 | **1.18** | 30 | 2.MD.200107 | .1 | .0 | ■ |
| **.0425** | 1.08 | **.068** | 1.72 | 2.8 | 1.5 | **1.18** | 30 | 2.MD.200108 | .1 | .0 | ■ |
| **.0429** | 1.09 | **.067** | 1.71 | 2.8 | 1.5 | **1.18** | 30 | 2.MD.200109 | .1 | .0 | ■ |
| **.0433** | 1.10 | **.067** | 1.70 | 2.8 | 1.5 | **1.18** | 30 | 2.MD.200110 | .1 | .0 | ■ |
| **.0437** | 1.11 | **.074** | 1.89 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200111 | .1 | .0 | ■ |
| **.0441** | 1.12 | **.074** | 1.88 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200112 | .1 | .0 | ■ |
| **.0445** | 1.13 | **.074** | 1.87 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200113 | .1 | .0 | ■ |
| **.0449** | 1.14 | **.073** | 1.86 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200114 | .1 | .0 | ■ |
| **.0453** | 1.15 | **.073** | 1.85 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200115 | .1 | .0 | ■ |
| **.0457** | 1.16 | **.072** | 1.84 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200116 | .1 | .0 | ■ |
| **.0461** | 1.17 | **.072** | 1.83 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200117 | .1 | .0 | ■ |

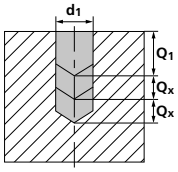
| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0465** | 1.18 | **.072** | 1.82 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200118 | .1 | .0 | ■ |
| **.0469** | 1.19 | **.071** | 1.81 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200119 | .1 | .0 | ■ |
| **.0472** | 1.20 | **.071** | 1.80 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200120 | .1 | .0 | ■ |
| **.0476** | 1.21 | **.070** | 1.79 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200121 | .1 | .0 | ■ |
| **.0480** | 1.22 | **.070** | 1.78 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200122 | .1 | .0 | ■ |
| **.0484** | 1.23 | **.070** | 1.77 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200123 | .1 | .0 | ■ |
| **.0488** | 1.24 | **.069** | 1.76 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200124 | .1 | .0 | ■ |
| **.0492** | 1.25 | **.069** | 1.75 | 3.0 | 1.5 | **1.18** | 30 | 2.MD.200125 | .1 | .0 | ■ |
| **.0496** | 1.26 | **.080** | 2.04 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200126 | .1 | .0 | ■ |
| **.0500** | 1.27 | **.080** | 2.03 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200127 | .1 | .0 | ■ |
| **.0504** | 1.28 | **.080** | 2.02 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200128 | .1 | .0 | ■ |
| **.0508** | 1.29 | **.079** | 2.01 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200129 | .1 | .0 | ■ |
| **.0512** | 1.30 | **.079** | 2.00 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200130 | .1 | .0 | ■ |
| **.0516** | 1.31 | **.078** | 1.99 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200131 | .1 | .0 | ■ |
| **.0520** | 1.32 | **.078** | 1.98 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200132 | .1 | .0 | ■ |
| **.0524** | 1.33 | **.078** | 1.97 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200133 | .1 | .0 | ■ |
| **.0528** | 1.34 | **.077** | 1.96 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200134 | .1 | .0 | ■ |
| **.0531** | 1.35 | **.077** | 1.95 | 3.3 | 1.5 | **1.18** | 30 | 2.MD.200135 | .1 | .0 | ■ |
| **.0535** | 1.36 | **.084** | 2.14 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200136 | .1 | .0 | ■ |
| **.0539** | 1.37 | **.084** | 2.13 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200137 | .1 | .0 | ■ |
| **.0543** | 1.38 | **.083** | 2.12 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200138 | .1 | .0 | ■ |
| **.0547** | 1.39 | **.083** | 2.11 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200139 | .1 | .0 | ■ |
| **.0551** | 1.40 | **.083** | 2.10 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200140 | .1 | .0 | ■ |
| **.0555** | 1.41 | **.082** | 2.09 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200141 | .1 | .0 | ■ |
| **.0559** | 1.42 | **.082** | 2.08 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200142 | .1 | .0 | ■ |
| **.0563** | 1.43 | **.081** | 2.07 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200143 | .1 | .0 | ■ |
| **.0567** | 1.44 | **.081** | 2.06 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200144 | .1 | .0 | ■ |
| **.0571** | 1.45 | **.081** | 2.05 | 3.5 | 1.5 | **1.18** | 30 | 2.MD.200145 | .1 | .0 | ■ |
| **.0575** | 1.46 | **.092** | 2.34 | 3.8 | 1.5 | **1.18** | 30 | 2.MD.200146 | .1 | .0 | ■ |
| **.0579** | 1.47 | **.092** | 2.33 | 3.8 | 1.5 | **1.18** | 30 | 2.MD.200147 | .1 | .0 | ■ |
| **.0583** | 1.48 | **.091** | 2.32 | 3.8 | 1.5 | **1.18** | 30 | 2.MD.200148 | .1 | .0 | ■ |
| **.0587** | 1.49 | **.091** | 2.31 | 3.8 | 1.5 | **1.18** | 30 | 2.MD.200149 | .1 | .0 | ■ |
| **.0591** | 1.50 | **.091** | 2.30 | 3.8 | 2.0 | **1.50** | 38 | 2.MD.200150 | .1 | .0 | ■ |

| Complementary products | |
|---|---|
| MiquDrill 210 | p.200 |

# MiquDrill 200 - coated

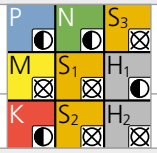
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 40–70 \| **131 – 230** | see $l_1$ | - |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 30–40 \| **98 – 131** | see $l_1$ | - |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 30–60 \| **98 – 197** | see $l_1$ | - |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 30–70 \| **98 – 230** | see $l_1$ | - |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 80–150 \| **262 – 492** | see $l_1$ | - |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60–100 \| **197 – 328** | see $l_1$ | - |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40–70 \| **131 – 230** | see $l_1$ | - |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40–70 \| **131 – 230** | see $l_1$ | - |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 40–150 \| **131 – 492** | see $l_1$ | - |
| | | 2.102 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 30–40 \| **98 – 131** | see $l_1$ | - |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20–40 \| **66 – 131** | 0.5xd1 | 0.5xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



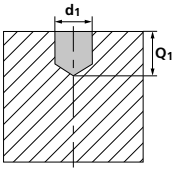



| | **f** [mm/rev] **\| [IPR]** | | |
|---|---|---|---|
| | **Ød1** | | |
| | 0.3–0.6 mm **\| .012"–.024"** | 0.6–1.0 mm **\| .024"–.039"** | 1.0–1.5 mm **\| .039"–.059"** |
| | **f** | **f** | **f** |
| | 0.009 **\| .00035** | 0.016 **\| .00063** | 0.023 **\| .00091** |
| | 0.007 **\| .00028** | 0.011 **\| .00043** | 0.015 **\| .00059** |
| | 0.004 **\| .00016** | 0.009 **\| .00035** | 0.014 **\| .00055** |
| | | | |
| | | | |
| | | | |
| | | | |
| | 0.007 **\| .00028** | 0.013 **\| .00051** | 0.023 **\| .00091** |
| | 0.010 **\| .00039** | 0.023 **\| .00091** | 0.038 **\| .00150** |
| | 0.008 **\| .00031** | 0.019 **\| .00075** | 0.030 **\| .00118** |
| | 0.008 **\| .00031** | 0.014 **\| .00055** | 0.023 **\| .00091** |
| | 0.008 **\| .00031** | 0.014 **\| .00055** | 0.023 **\| .00091** |
| | 0.008 **\| .00031** | 0.017 **\| .00067** | 0.030 **\| .00118** |
| | 0.007 **\| .00028** | 0.011 **\| .00043** | 0.015 **\| .00059** |
| | | | |
| | | | |
| | | | |
| | | | |
| | 0.003 **\| .00012** | 0.004 **\| .00016** | 0.007 **\| .00028** |
| | | | |

# MiquDrill 200 - uncoated

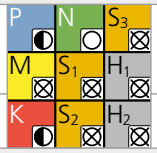
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] | $Q_1$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 30–60 \| **98 – 197** | see $l_1$ |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 25–40 \| **82 – 131** | see $l_1$ |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 25–40 \| **82 – 131** | see $l_1$ |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 25–60 \| **82 – 197** | see $l_1$ |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 50–100 \| **164 – 328** | see $l_1$ |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 40–80 \| **82 – 262** | see $l_1$ |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 30–50 \| **98 – 164** | see $l_1$ |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 30–50 \| **98 – 164** | see $l_1$ |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 30–80 \| **98 – 262** | see $l_1$ |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 25–40 \| **82 – 131** | see $l_1$ |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

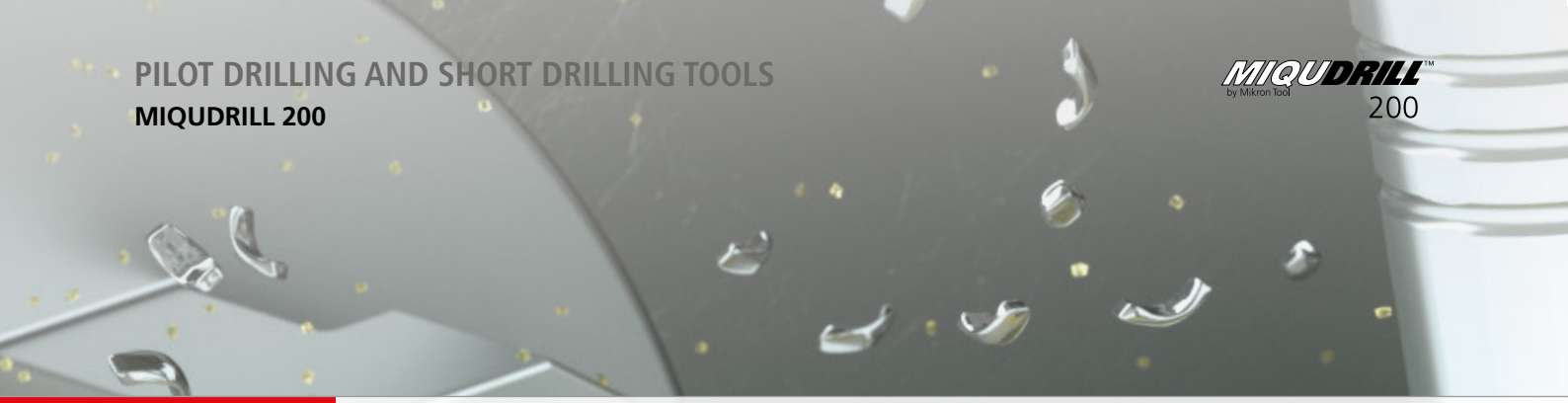
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| | **Ød1** | | | |
|---|---|---|---|---|
| | 0.1–0.3 mm | **.004"–.012"** | 0.3–0.6 mm | **.012"–.024"** | 0.6–1.0 mm | **.024"–.039"** | 1.0–1.5 mm | **.039"–.059"** |
| | **f** | | **f** | | **f** | | **f** | |
| | 0.003 | **.00012** | 0.009 | **.00035** | 0.016 | **.00063** | 0.023 | **.00091** |
| | 0.003 | **.00012** | 0.007 | **.00028** | 0.011 | **.00043** | 0.015 | **.00059** |
| | 0.002 | **.00008** | 0.004 | **.00016** | 0.009 | **.00035** | 0.014 | **.00055** |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | 0.003 | **.00012** | 0.007 | **.00028** | 0.013 | **.00051** | 0.023 | **.00091** |
| | 0.006 | **.00024** | 0.010 | **.00039** | 0.023 | **.00091** | 0.038 | **.00150** |
| | 0.005 | **.00020** | 0.008 | **.00031** | 0.019 | **.00075** | 0.030 | **.00118** |
| | 0.004 | **.00016** | 0.008 | **.00031** | 0.014 | **.00055** | 0.023 | **.00091** |
| | 0.004 | **.00016** | 0.008 | **.00031** | 0.014 | **.00055** | 0.023 | **.00091** |
| | 0.005 | **.00020** | 0.008 | **.00031** | 0.017 | **.00067** | 0.030 | **.00118** |
| | 0.003 | **.00012** | 0.007 | **.00028** | 0.011 | **.00043** | 0.015 | **.00059** |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | Recommended: MiquDrill 200 - coated | | | | | | | |
| | | | | | | | | |



# Drilling process MiquDrill 200

## ACCURATE AND QUICK DRILLING FROM 1.4 TO 2.4 X D

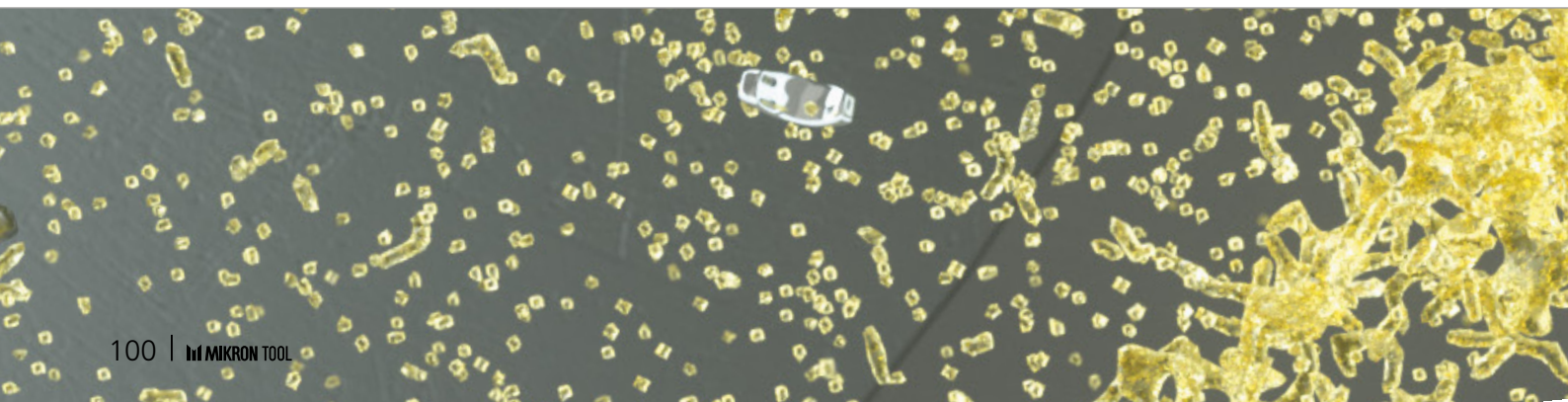
### Coolant type, pressure, filtration and flowrate

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the coolant fluid is addressed directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical information".



**MiquDrill 200**

MiquDrill 200 offers accurate short drilling and a stable machining process. It is also perfect as pilot drill for MiquDrill 210.

The tool's sturdy construction and its performances assure a maximal position accuracy and perpendicularity and straightness for the follow-up hole.

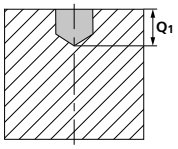
The use of MiquDrill 200 as pilot drill contributes to a higher tool life of the follow-up drill MiquDrill 210.

# Drilling process MiquDrill 200

## DRILLING IN ONE STEP (ALL MATERIALS WITH THE EXCEPTION OF HARDENED STEEL)

### 1 | PILOT DRILLING OR SHORT DRILLING

- With MiquDrill 200 up to maximum drilling depth $Q_1$ in one step (see cutting data table).




Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

## DRILLING ACCORDING DIN 66025 / PAL (DEPENDING ON MATERIAL, SEE CUTTING DATA CHART)

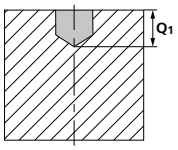
**Drilling according DIN 66025 / PAL**

G83 deep-drilling cycle with chip break and chip removal (pecks)

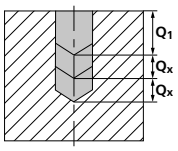
Q = depth of the respective peck

**1 | PILOT DRILLING OR SHORT DRILLING**

- With MiquDrill 200 up to maximum drilling depth $Q_1$ (see cutting data table) in one step, afterwards remove chips.




- Additional pecks Qx according to cutting data table, afterwards remove chips.




Note:

Between pecks, take the drill completely out from the hole.

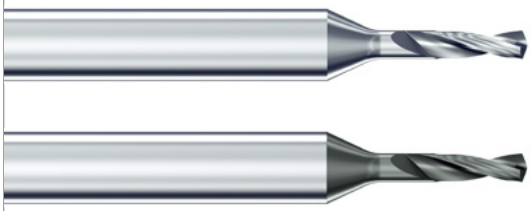
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# CrazyDrill Flexpilot



CRAZYDRILL Flexpilot

## SHORT AND PRECISE: THE PREPARATION OF DEEP HOLES



Mikron Tool offers with CrazyDrill Flexpilot a pilot drill for the preparation of deep-hole drilling with CrazyDrill Flex. With drilling depths up to 3 x d this drill is also adapted for micro-short drilling.

The diameter range from .004" to 079" (0.1 to 2.0 mm) corresponds to the deep-hole drills of the CrazyDrill Flex family with versions for:

- **CrazyDrill Flexpilot Steel - coated / uncoated:** Steels, cast iron, aluminum alloys, brass and bronze.
- **CrazyDrill Flexpilot Titanium - uncoated:** Long-chip materials as titanium, titanium alloys and copper.

With CrazyDrill Flexpilot centering and pilot drilling up to 3 x d is done in one single step. The follow-up drill is guided cylindrically in the pilot hole, therefore high straightness of the follow-up drilling is assured.

Optimally matched diameter tolerances and tip angles guarantee accurate deep-hole drilling without measurable transition from pilot to follow-up hole, assure process reliability and increase also substantially tool life of the follow-up drill.

The special high-performance geometry of CrazyDrill Flexpilot ensures high cutting speed, the optimal coating high wear resistance.

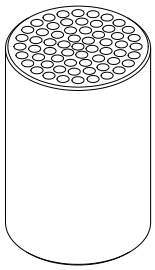
**Regrinding:** This product is not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the CrazyDrill Flexpilot (diameter, length, cutting direction…)? Ask us about our customized versions!

# Features and benefits

## THE IDEAL COMPLEMENT TO CRAZYDRILL FLEX STEEL / TITANIUM

- **SHORT MACHINING TIME** | due to the high cutting speed
- **LONG TOOL LIFE** | up to 2 times longer
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to a new cutting geometry
- **HIGH DEGREE OF PRECISION** | due to small tolerances



**COMPONENT**
Filter

**MATERIAL**
100Cr6 / 1.3505 / AISI 52100

**MACHINING**
- Pilot drilling
- d = 1 mm **| .039"**
- Drilling depth 3 mm **| .118"**

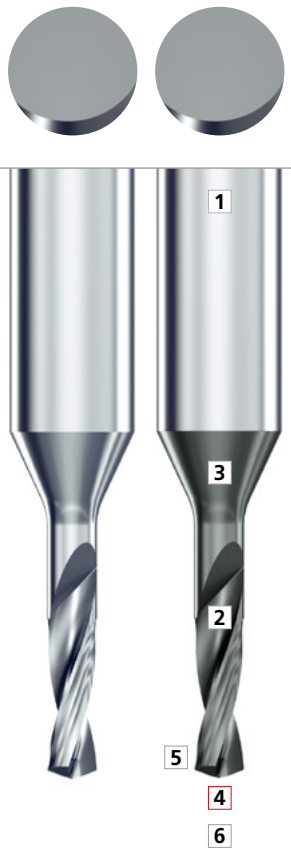
**DRILLING TOOL**
Mikron Tool - CrazyDrill Flexpilot Steel - coated

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Flexpilot<br>- Carbide<br>- Coated<br>- External cooling |
| Item number | 2.PFS.100.1 |
| Cutting data | $v_c$ = 40 m/min **\| 131 SFM**<br>f = 0.042 mm/rev **\| .0017 IPR** |

## Steel

- Coated / Uncoated
- External cooling

- Ø .008" - .079" (0.2 - 2.0mm) - coated
  Ø .004" - .047" (0.1 - 1.2mm) - uncoated




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## Titanium

- Uncoated
- External cooling

- Ø .004" - .047" (0.1 - 1.2mm) - uncoated




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**1 | SHANK**
The reinforced solid carbide shaft guarantees stability, high concentricity and therefore highest drilling accuracy.

**2 | HELICAL FLUTE**
The geometry of the flutes is adapted to the materials to be machined (steel or long-chip materials as titanium or copper). Thus guarantees good chip breakage and quick chip evacuation.

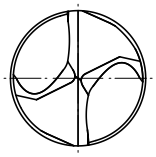
**3 | COATING**
Depending on the version, the drills are coated with eXedur RIP. Especially developed for highest performance, this coating is wear and heat resistant, avoids nesting of chips and ensures chip evacuation. The result is a long tool life.

**4 | TIP GEOMETRY**
Thanks to the innovative drill point geometry, only a reduced penetration force is necessary for drilling (feed force reduction up to 50%), therefore low heat development and best position accuracy. Highest cutting speed is possible.

**5 | CUTTING EDGE PROTECTION / CUTTING GEOMETRY**
The solid carbide drill has a special cutting geometry. This permits quick drilling without damaging the cutting edges.

**6 | DIAMETER RANGE**
Adapted to the diameters of the CrazyDrill Flex family, each deep-hole drill has the proper pilot drill.

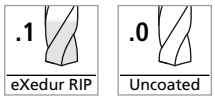
Drill tip

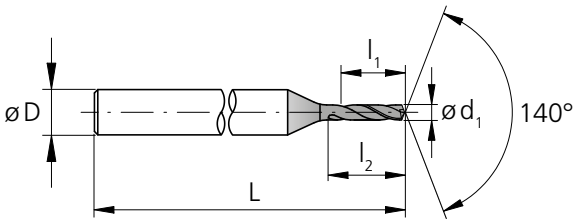


CRAZYDRILL by Mikron Tool Flexpilot STEEL

# Steel - 3 x d - coated / uncoated

## DRILLING WITH EXTERNAL COOLING

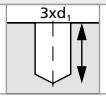
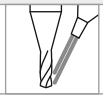



| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0039 | 0.10 | .012 | 0.30 | 0.5 | 3 | 1.57 | 40 | 2.PFS.010 | - | .0 | ◪ |
| | .0043 | 0.11 | .013 | 0.33 | 0.6 | 3 | 1.57 | 40 | 2.PFS.011 | - | .0 | Δ |
| | .0047 | 0.12 | .014 | 0.36 | 0.6 | 3 | 1.57 | 40 | 2.PFS.012 | - | .0 | Δ |
| | .0051 | 0.13 | .015 | 0.39 | 0.7 | 3 | 1.57 | 40 | 2.PFS.013 | - | .0 | Δ |
| | .0055 | 0.14 | .017 | 0.42 | 0.7 | 3 | 1.57 | 40 | 2.PFS.014 | - | .0 | Δ |
| | .0059 | 0.15 | .018 | 0.45 | 0.8 | 3 | 1.57 | 40 | 2.PFS.015 | - | .0 | ◪ |
| | .0063 | 0.16 | .019 | 0.48 | 0.8 | 3 | 1.57 | 40 | 2.PFS.016 | - | .0 | Δ |
| | .0067 | 0.17 | .020 | 0.51 | 0.9 | 3 | 1.57 | 40 | 2.PFS.017 | - | .0 | Δ |
| | .0071 | 0.18 | .021 | 0.54 | 0.9 | 3 | 1.57 | 40 | 2.PFS.018 | - | .0 | Δ |
| | .0075 | 0.19 | .022 | 0.57 | 1.0 | 3 | 1.57 | 40 | 2.PFS.019 | - | .0 | Δ |
| | .0079 | 0.20 | .024 | 0.60 | 1.0 | 3 | 1.57 | 40 | 2.PFS.020 | .1 | .0 | ■ |
| | .0083 | 0.21 | .025 | 0.63 | 1.1 | 3 | 1.57 | 40 | 2.PFS.021 | .1 | .0 | Δ |
| | .0087 | 0.22 | .026 | 0.66 | 1.1 | 3 | 1.57 | 40 | 2.PFS.022 | .1 | .0 | Δ |
| | .0091 | 0.23 | .027 | 0.69 | 1.2 | 3 | 1.57 | 40 | 2.PFS.023 | .1 | .0 | Δ |
| | .0094 | 0.24 | .028 | 0.72 | 1.2 | 3 | 1.57 | 40 | 2.PFS.024 | .1 | .0 | Δ |
| | .0098 | 0.25 | .030 | 0.75 | 1.3 | 3 | 1.57 | 40 | 2.PFS.025 | .1 | .0 | ■ |
| | .0102 | 0.26 | .031 | 0.78 | 1.3 | 3 | 1.57 | 40 | 2.PFS.026 | .1 | .0 | Δ |
| | .0106 | 0.27 | .032 | 0.81 | 1.4 | 3 | 1.57 | 40 | 2.PFS.027 | .1 | .0 | Δ |
| | .0110 | 0.28 | .033 | 0.84 | 1.4 | 3 | 1.57 | 40 | 2.PFS.028 | .1 | .0 | Δ |
| | .0114 | 0.29 | .034 | 0.87 | 1.5 | 3 | 1.57 | 40 | 2.PFS.029 | .1 | .0 | Δ |
| | .0118 | 0.30 | .035 | 0.90 | 1.5 | 3 | 1.57 | 40 | 2.PFS.030 | .1 | .0 | ■ |
| | .0122 | 0.31 | .037 | 0.93 | 1.6 | 3 | 1.57 | 40 | 2.PFS.031 | .1 | .0 | Δ |
| | .0126 | 0.32 | .038 | 0.96 | 1.6 | 3 | 1.57 | 40 | 2.PFS.032 | .1 | .0 | Δ |
| | .0130 | 0.33 | .039 | 0.99 | 1.7 | 3 | 1.57 | 40 | 2.PFS.033 | .1 | .0 | Δ |
| | .0134 | 0.34 | .040 | 1.02 | 1.7 | 3 | 1.57 | 40 | 2.PFS.034 | .1 | .0 | Δ |
| | .0138 | 0.35 | .041 | 1.05 | 1.8 | 3 | 1.57 | 40 | 2.PFS.035 | .1 | .0 | ■ |
| | .0142 | 0.36 | .043 | 1.08 | 1.8 | 3 | 1.57 | 40 | 2.PFS.036 | .1 | .0 | Δ |
| | .0146 | 0.37 | .044 | 1.11 | 1.9 | 3 | 1.57 | 40 | 2.PFS.037 | .1 | .0 | Δ |
| | .0150 | 0.38 | .045 | 1.14 | 1.9 | 3 | 1.57 | 40 | 2.PFS.038 | .1 | .0 | Δ |
| | .0154 | 0.39 | .046 | 1.17 | 2.0 | 3 | 1.57 | 40 | 2.PFS.039 | .1 | .0 | Δ |
| 1/64 | .0156 | 0.396 | .047 | 1.20 | 2.0 | 3 | 1.57 | 40 | 2.PFS.F164 | .1 | - | ◪ |
| | .0157 | 0.40 | .047 | 1.20 | 2.0 | 3 | 1.57 | 40 | 2.PFS.040 | .1 | - | ◪ |
| | .0161 | 0.41 | .048 | 1.23 | 2.1 | 3 | 1.57 | 40 | 2.PFS.041 | .1 | .0 | ■ |

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0165 | 0.42 | .050 | 1.26 | 2.1 | 3 | 1.57 | 40 | 2.PFS.042 | .1 | .0 | Δ |
| | .0169 | 0.43 | .051 | 1.29 | 2.2 | 3 | 1.57 | 40 | 2.PFS.043 | .1 | .0 | Δ |
| | .0173 | 0.44 | .052 | 1.32 | 2.2 | 3 | 1.57 | 40 | 2.PFS.044 | .1 | .0 | Δ |
| | .0177 | 0.45 | .053 | 1.35 | 2.3 | 3 | 1.57 | 40 | 2.PFS.045 | .1 | .0 | ■ |
| | .0181 | 0.46 | .054 | 1.38 | 2.3 | 3 | 1.57 | 40 | 2.PFS.046 | .1 | .0 | Δ |
| | .0185 | 0.47 | .056 | 1.41 | 2.4 | 3 | 1.57 | 40 | 2.PFS.047 | .1 | .0 | Δ |
| | .0189 | 0.48 | .057 | 1.44 | 2.4 | 3 | 1.57 | 40 | 2.PFS.048 | .1 | .0 | Δ |
| | .0193 | 0.49 | .058 | 1.47 | 2.5 | 3 | 1.57 | 40 | 2.PFS.049 | .1 | .0 | Δ |
| | .0197 | 0.50 | .059 | 1.50 | 2.5 | 3 | 1.57 | 40 | 2.PFS.050 | .1 | .0 | ■ |
| | .0201 | 0.51 | .060 | 1.53 | 2.6 | 3 | 1.57 | 40 | 2.PFS.051 | .1 | .0 | Δ |
| | .0205 | 0.52 | .061 | 1.56 | 2.6 | 3 | 1.57 | 40 | 2.PFS.052 | .1 | .0 | Δ |
| | .0209 | 0.53 | .063 | 1.59 | 2.7 | 3 | 1.57 | 40 | 2.PFS.053 | .1 | .0 | Δ |
| | .0213 | 0.54 | .064 | 1.62 | 2.7 | 3 | 1.57 | 40 | 2.PFS.054 | .1 | .0 | Δ |
| | .0217 | 0.55 | .065 | 1.65 | 2.8 | 3 | 1.57 | 40 | 2.PFS.055 | .1 | .0 | ■ |
| | .0220 | 0.56 | .066 | 1.68 | 2.8 | 3 | 1.57 | 40 | 2.PFS.056 | .1 | .0 | Δ |
| | .0224 | 0.57 | .067 | 1.71 | 2.9 | 3 | 1.57 | 40 | 2.PFS.057 | .1 | .0 | Δ |
| | .0228 | 0.58 | .069 | 1.74 | 2.9 | 3 | 1.57 | 40 | 2.PFS.058 | .1 | .0 | Δ |
| | .0232 | 0.59 | .070 | 1.77 | 3.0 | 3 | 1.57 | 40 | 2.PFS.059 | .1 | .0 | Δ |
| | .0236 | 0.60 | .071 | 1.80 | 3.0 | 3 | 1.57 | 40 | 2.PFS.060 | .1 | .0 | ■ |
| | .0240 | 0.61 | .072 | 1.83 | 3.1 | 3 | 1.57 | 40 | 2.PFS.061 | .1 | .0 | Δ |
| | .0244 | 0.62 | .073 | 1.86 | 3.1 | 3 | 1.57 | 40 | 2.PFS.062 | .1 | .0 | Δ |
| | .0248 | 0.63 | .074 | 1.89 | 3.2 | 3 | 1.57 | 40 | 2.PFS.063 | .1 | .0 | Δ |
| | .0252 | 0.64 | .076 | 1.92 | 3.2 | 3 | 1.57 | 40 | 2.PFS.064 | .1 | .0 | Δ |
| | .0256 | 0.65 | .077 | 1.95 | 3.3 | 3 | 1.57 | 40 | 2.PFS.065 | .1 | .0 | ■ |
| | .0260 | 0.66 | .078 | 1.98 | 3.3 | 3 | 1.57 | 40 | 2.PFS.066 | .1 | .0 | Δ |
| | .0264 | 0.67 | .079 | 2.01 | 3.4 | 3 | 1.57 | 40 | 2.PFS.067 | .1 | .0 | Δ |
| | .0268 | 0.68 | .080 | 2.04 | 3.4 | 3 | 1.57 | 40 | 2.PFS.068 | .1 | .0 | Δ |
| | .0272 | 0.69 | .081 | 2.07 | 3.5 | 3 | 1.57 | 40 | 2.PFS.069 | .1 | .0 | Δ |
| | .0276 | 0.70 | .083 | 2.10 | 3.5 | 3 | 1.57 | 40 | 2.PFS.070 | .1 | .0 | ■ |
| | .0280 | 0.71 | .084 | 2.13 | 3.6 | 3 | 1.57 | 40 | 2.PFS.071 | .1 | .0 | Δ |
| | .0283 | 0.72 | .085 | 2.16 | 3.6 | 3 | 1.57 | 40 | 2.PFS.072 | .1 | .0 | Δ |
| | .0287 | 0.73 | .086 | 2.19 | 3.7 | 3 | 1.57 | 40 | 2.PFS.073 | .1 | .0 | Δ |
| | .0291 | 0.74 | .087 | 2.22 | 3.7 | 3 | 1.57 | 40 | 2.PFS.074 | .1 | .0 | Δ |

■ Stock item
◪ Stock item only in one version
Δ Delivery term upon request, minumum purchase order quantity 5 pcs.

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
|---|---|---|
| Tolerance | **+ .00012"**<br>**0** | + 0.003 mm<br>0 |



| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0295** | 0.75 | **.089** | 2.25 | 3.8 | 3 | **1.57** | 40 | 2.PFS.075 | .1 | .0 | ■ |
| | **.0299** | 0.76 | **.090** | 2.28 | 3.8 | 3 | **1.57** | 40 | 2.PFS.076 | .1 | .0 | Δ |
| | **.0303** | 0.77 | **.091** | 2.31 | 3.9 | 3 | **1.57** | 40 | 2.PFS.077 | .1 | .0 | Δ |
| | **.0307** | 0.78 | **.092** | 2.34 | 3.9 | 3 | **1.57** | 40 | 2.PFS.078 | .1 | .0 | Δ |
| | **.0311** | 0.79 | **.093** | 2.37 | 4.0 | 3 | **1.57** | 40 | 2.PFS.079 | .1 | .0 | Δ |
| **1/32** | **.0312** | 0.793 | **.094** | 2.40 | 4.0 | 3 | **1.57** | 40 | 2.PFS.F132 | .1 | - | ◪ |
| | **.0315** | 0.80 | **.094** | 2.40 | 4.0 | 3 | **1.57** | 40 | 2.PFS.080 | .1 | .0 | ■ |
| | **.0319** | 0.81 | **.096** | 2.43 | 4.1 | 3 | **1.57** | 40 | 2.PFS.081 | .1 | .0 | Δ |
| | **.0323** | 0.82 | **.097** | 2.46 | 4.1 | 3 | **1.57** | 40 | 2.PFS.082 | .1 | .0 | Δ |
| | **.0327** | 0.83 | **.098** | 2.49 | 4.2 | 3 | **1.57** | 40 | 2.PFS.083 | .1 | .0 | Δ |
| | **.0331** | 0.84 | **.099** | 2.52 | 4.2 | 3 | **1.57** | 40 | 2.PFS.084 | .1 | .0 | Δ |
| | **.0335** | 0.85 | **.100** | 2.55 | 4.3 | 3 | **1.57** | 40 | 2.PFS.085 | .1 | .0 | ■ |
| | **.0339** | 0.86 | **.102** | 2.58 | 4.3 | 3 | **1.57** | 40 | 2.PFS.086 | .1 | .0 | Δ |
| | **.0343** | 0.87 | **.103** | 2.61 | 4.4 | 3 | **1.57** | 40 | 2.PFS.087 | .1 | .0 | Δ |
| | **.0346** | 0.88 | **.104** | 2.64 | 4.4 | 3 | **1.57** | 40 | 2.PFS.088 | .1 | .0 | Δ |
| | **.0350** | 0.89 | **.105** | 2.67 | 4.5 | 3 | **1.57** | 40 | 2.PFS.089 | .1 | .0 | Δ |
| | **.0354** | 0.90 | **.106** | 2.70 | 4.5 | 3 | **1.57** | 40 | 2.PFS.090 | .1 | .0 | ■ |
| | **.0358** | 0.91 | **.107** | 2.73 | 4.6 | 3 | **1.57** | 40 | 2.PFS.091 | .1 | .0 | Δ |
| | **.0362** | 0.92 | **.109** | 2.76 | 4.6 | 3 | **1.57** | 40 | 2.PFS.092 | .1 | .0 | Δ |
| | **.0366** | 0.93 | **.110** | 2.79 | 4.7 | 3 | **1.57** | 40 | 2.PFS.093 | .1 | .0 | Δ |
| | **.0370** | 0.94 | **.111** | 2.82 | 4.7 | 3 | **1.57** | 40 | 2.PFS.094 | .1 | .0 | Δ |
| | **.0374** | 0.95 | **.112** | 2.85 | 4.8 | 3 | **1.57** | 40 | 2.PFS.095 | .1 | .0 | ■ |
| | **.0378** | 0.96 | **.113** | 2.88 | 4.8 | 3 | **1.57** | 40 | 2.PFS.096 | .1 | .0 | Δ |
| | **.0382** | 0.97 | **.115** | 2.91 | 4.9 | 3 | **1.57** | 40 | 2.PFS.097 | .1 | .0 | Δ |
| | **.0386** | 0.98 | **.116** | 2.94 | 4.9 | 3 | **1.57** | 40 | 2.PFS.098 | .1 | .0 | Δ |
| | **.0390** | 0.99 | **.117** | 2.97 | 5.0 | 3 | **1.57** | 40 | 2.PFS.099 | .1 | .0 | Δ |
| | **.0394** | 1.00 | **.118** | 3.00 | 5.0 | 3 | **1.57** | 40 | 2.PFS.100 | .1 | .0 | ■ |
| | **.0398** | 1.01 | **.119** | 3.03 | 5.1 | 3 | **1.57** | 40 | 2.PFS.101 | .1 | .0 | Δ |
| | **.0402** | 1.02 | **.120** | 3.06 | 5.1 | 3 | **1.57** | 40 | 2.PFS.102 | .1 | .0 | Δ |
| | **.0406** | 1.03 | **.122** | 3.09 | 5.2 | 3 | **1.57** | 40 | 2.PFS.103 | .1 | .0 | Δ |
| | **.0409** | 1.04 | **.123** | 3.12 | 5.2 | 3 | **1.57** | 40 | 2.PFS.104 | .1 | .0 | Δ |
| | **.0413** | 1.05 | **.124** | 3.15 | 5.3 | 3 | **1.57** | 40 | 2.PFS.105 | .1 | .0 | ■ |
| | **.0417** | 1.06 | **.125** | 3.18 | 5.3 | 3 | **1.57** | 40 | 2.PFS.106 | .1 | .0 | Δ |

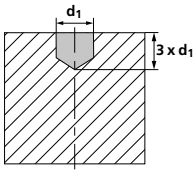
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0421** | 1.07 | **.126** | 3.21 | 5.4 | 3 | **1.57** | 40 | 2.PFS.107 | .1 | .0 | Δ |
| | **.0425** | 1.08 | **.128** | 3.24 | 5.4 | 3 | **1.57** | 40 | 2.PFS.108 | .1 | .0 | Δ |
| | **.0429** | 1.09 | **.129** | 3.27 | 5.5 | 3 | **1.57** | 40 | 2.PFS.109 | .1 | .0 | Δ |
| | **.0433** | 1.10 | **.130** | 3.30 | 5.5 | 3 | **1.57** | 40 | 2.PFS.110 | .1 | .0 | ■ |
| | **.0437** | 1.11 | **.131** | 3.33 | 5.6 | 3 | **1.57** | 40 | 2.PFS.111 | .1 | .0 | Δ |
| | **.0441** | 1.12 | **.132** | 3.36 | 5.6 | 3 | **1.57** | 40 | 2.PFS.112 | .1 | .0 | Δ |
| | **.0445** | 1.13 | **.133** | 3.39 | 5.7 | 3 | **1.57** | 40 | 2.PFS.113 | .1 | .0 | Δ |
| | **.0449** | 1.14 | **.135** | 3.42 | 5.7 | 3 | **1.57** | 40 | 2.PFS.114 | .1 | .0 | Δ |
| | **.0453** | 1.15 | **.136** | 3.45 | 5.8 | 3 | **1.57** | 40 | 2.PFS.115 | .1 | .0 | ■ |
| | **.0457** | 1.16 | **.137** | 3.48 | 5.8 | 3 | **1.57** | 40 | 2.PFS.116 | .1 | .0 | Δ |
| | **.0461** | 1.17 | **.138** | 3.51 | 5.9 | 3 | **1.57** | 40 | 2.PFS.117 | .1 | .0 | Δ |
| | **.0465** | 1.18 | **.139** | 3.54 | 5.9 | 3 | **1.57** | 40 | 2.PFS.118 | .1 | .0 | Δ |
| | **.0469** | 1.19 | **.141** | 3.57 | 6.0 | 3 | **1.57** | 40 | 2.PFS.119 | .1 | .0 | Δ |
| | **.0472** | 1.20 | **.142** | 3.60 | 6.0 | 3 | **1.57** | 40 | 2.PFS.120 | .1 | .0 | ■ |
| | **.0492** | 1.25 | **.148** | 3.75 | 6.3 | 3 | **1.57** | 40 | 2.PFS.125 | .1 | - | ◪ |
| | **.0512** | 1.30 | **.154** | 3.90 | 6.5 | 3 | **1.57** | 40 | 2.PFS.130 | .1 | - | ◪ |
| | **.0531** | 1.35 | **.159** | 4.05 | 6.8 | 3 | **1.57** | 40 | 2.PFS.135 | .1 | - | ◪ |
| | **.0551** | 1.40 | **.165** | 4.20 | 7.0 | 3 | **1.57** | 40 | 2.PFS.140 | .1 | - | ◪ |
| | **.0571** | 1.45 | **.171** | 4.35 | 7.3 | 3 | **1.57** | 40 | 2.PFS.145 | .1 | - | ◪ |
| | **.0591** | 1.50 | **.177** | 4.50 | 7.5 | 3 | **1.57** | 40 | 2.PFS.150 | .1 | - | ◪ |
| | **.0610** | 1.55 | **.183** | 4.65 | 7.8 | 3 | **1.57** | 40 | 2.PFS.155 | .1 | - | ◪ |
| **1/16** | **.0625** | 1.587 | **.189** | 4.80 | 8.0 | 3 | **1.57** | 40 | 2.PFS.F116 | .1 | - | ◪ |
| | **.0630** | 1.60 | **.189** | 4.80 | 8.0 | 3 | **1.57** | 40 | 2.PFS.160 | .1 | - | ◪ |
| | **.0650** | 1.65 | **.195** | 4.95 | 8.3 | 3 | **1.57** | 40 | 2.PFS.165 | .1 | - | ◪ |
| | **.0669** | 1.70 | **.201** | 5.10 | 8.5 | 3 | **1.57** | 40 | 2.PFS.170 | .1 | - | ◪ |
| | **.0689** | 1.75 | **.207** | 5.25 | 8.8 | 3 | **1.57** | 40 | 2.PFS.175 | .1 | - | ◪ |
| | **.0709** | 1.80 | **.213** | 5.40 | 9.0 | 3 | **1.57** | 40 | 2.PFS.180 | .1 | - | ◪ |
| | **.0728** | 1.85 | **.219** | 5.55 | 9.3 | 3 | **1.57** | 40 | 2.PFS.185 | .1 | - | ◪ |
| | **.0748** | 1.90 | **.224** | 5.70 | 9.5 | 3 | **1.57** | 40 | 2.PFS.190 | .1 | - | ◪ |
| | **.0768** | 1.95 | **.230** | 5.85 | 9.8 | 3 | **1.57** | 40 | 2.PFS.195 | .1 | - | ◪ |
| | **.0787** | 2.00 | **.236** | 6.00 | 10.0 | 3 | **1.57** | 40 | 2.PFS.200 | .1 | - | ◪ |

Complementary products
CrazyDrill Flex Steel p.370

# Steel - 3 x d - coated / uncoated

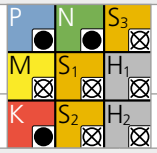
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 5 \| 16 | 40 \| 131 | 40 \| 131 | 60 \| 197 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 5 \| 16 | 25 \| 82 | 25 \| 82 | 50 \| 164 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 35 \| 115 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 5 \| 16 | 40 \| 131 | 5 \| 164 | 100 \| 328 |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | 40 \| 131 | 80 \| 262 |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 120 \| 394 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 5 \| 16 | 40 \| 131 | 50 \| 164 | 80 \| 262 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 100 \| 328 |
| | | 2.102 | CuSn6 | UNS C51900 | | | 40 \| 131 | 60 \| 197 |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 40 \| 131 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





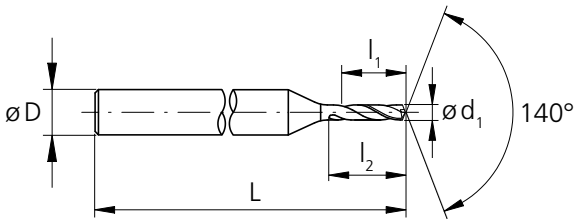

**f** [mm/rev] **| [IPR]**

| 0.1 mm **| .004"** | 0.2 mm **| .008"** | 0.3 mm **| .012"** | **Ød1** 0.4 mm **| .016"** | 0.6 mm **| .024"** | **1/32"** 0.8 mm **| .032"** | 1.0–1.2 mm **| .039"–.047"** | **1/16"** 1.5–2.0 mm **| .059"–.079"** |
|---|---|---|---|---|---|---|---|---|
| **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| 0.002<br>**.00008** | 0.005<br>**.0002** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** |
| 0.002<br>**.00008** | 0.003 – 0.005<br>**.00012 – .00020** | 0.008 – 0.010<br>**.0003 – .0004** | 0.012 – 0.015<br>**.0005 – .0006** | 0.020 – 0.025<br>**.0008 – .0010** | 0.035<br>**.0014** | 0.050<br>**.0020** | 0.070<br>**.0028** |
| 0.0005<br>**.00002** | 0.004<br>**.00016** | 0.008<br>**.0003** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.025<br>**.0010** | 0.040<br>**.0016** | 0.060<br>**.0024** |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 0.002<br>**.00008** | 0.005<br>**.0002** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.020<br>**.0008** | 0.035<br>**.0014** | 0.050<br>**.0020** | 0.070<br>**.0028** |
| 0.003<br>**.00012** | 0.015<br>**.0006** | 0.040<br>**.0016** | 0.050<br>**.0020** | 0.080<br>**.0031** | 0.100<br>**.0039** | 0.120<br>**.0047** | 0.150<br>**.0059** |
| 0.003<br>**.00012** | 0.015<br>**.0006** | 0.040<br>**.0016** | 0.050<br>**.0020** | 0.080<br>**.0031** | 0.100<br>**.0039** | 0.120<br>**.0047** | 0.150<br>**.0059** |
| Recommended: CrazyDrill Flexpilot Titanium | | | | | | | |
| | | | | | | | |
| 0.004<br>**.00016** | 0.010<br>**.0004** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.100<br>**.0039** | 0.120<br>**.0047** |
| 0.002<br>**.00008** | 0.004<br>**.00016** | 0.006<br>**.0002** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.025<br>**.0010** | 0.040<br>**.0016** | 0.060<br>**.0024** |
| | | | | | | | |
| Recommended: CrazyDrill Flexpilot Titanium | | | | | | | |
| Recommended: CrazyDrill Flexpilot Titanium | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

CRAZYDRILL by Mikron Tool Flexpilot TITANIUM

# Titanium - 3 x d

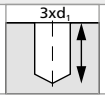
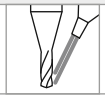
## DRILLING WITH EXTERNAL COOLING




| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.0039** | 0.10 | **.012** | 0.30 | 0.5 | 3 | **1.57** | 40 | 2.PFT.010.0 | ■ |
| **.0043** | 0.11 | **.013** | 0.33 | 0.6 | 3 | **1.57** | 40 | 2.PFT.011.0 | Δ |
| **.0047** | 0.12 | **.014** | 0.36 | 0.6 | 3 | **1.57** | 40 | 2.PFT.012.0 | Δ |
| **.0051** | 0.13 | **.015** | 0.39 | 0.7 | 3 | **1.57** | 40 | 2.PFT.013.0 | Δ |
| **.0055** | 0.14 | **.017** | 0.42 | 0.7 | 3 | **1.57** | 40 | 2.PFT.014.0 | Δ |
| **.0059** | 0.15 | **.018** | 0.45 | 0.8 | 3 | **1.57** | 40 | 2.PFT.015.0 | ■ |
| **.0063** | 0.16 | **.019** | 0.48 | 0.8 | 3 | **1.57** | 40 | 2.PFT.016.0 | Δ |
| **.0067** | 0.17 | **.020** | 0.51 | 0.9 | 3 | **1.57** | 40 | 2.PFT.017.0 | Δ |
| **.0071** | 0.18 | **.021** | 0.54 | 0.9 | 3 | **1.57** | 40 | 2.PFT.018.0 | Δ |
| **.0075** | 0.19 | **.022** | 0.57 | 1.0 | 3 | **1.57** | 40 | 2.PFT.019.0 | Δ |
| **.0079** | 0.20 | **.024** | 0.60 | 1.0 | 3 | **1.57** | 40 | 2.PFT.020.0 | ■ |
| **.0083** | 0.21 | **.025** | 0.63 | 1.1 | 3 | **1.57** | 40 | 2.PFT.021.0 | Δ |
| **.0087** | 0.22 | **.026** | 0.66 | 1.1 | 3 | **1.57** | 40 | 2.PFT.022.0 | Δ |
| **.0091** | 0.23 | **.027** | 0.69 | 1.2 | 3 | **1.57** | 40 | 2.PFT.023.0 | Δ |
| **.0094** | 0.24 | **.028** | 0.72 | 1.2 | 3 | **1.57** | 40 | 2.PFT.024.0 | Δ |
| **.0098** | 0.25 | **.030** | 0.75 | 1.3 | 3 | **1.57** | 40 | 2.PFT.025.0 | ■ |
| **.0102** | 0.26 | **.031** | 0.78 | 1.3 | 3 | **1.57** | 40 | 2.PFT.026.0 | Δ |
| **.0106** | 0.27 | **.032** | 0.81 | 1.4 | 3 | **1.57** | 40 | 2.PFT.027.0 | Δ |
| **.0110** | 0.28 | **.033** | 0.84 | 1.4 | 3 | **1.57** | 40 | 2.PFT.028.0 | Δ |
| **.0114** | 0.29 | **.034** | 0.87 | 1.5 | 3 | **1.57** | 40 | 2.PFT.029.0 | Δ |
| **.0118** | 0.30 | **.035** | 0.90 | 1.5 | 3 | **1.57** | 40 | 2.PFT.030.0 | ■ |
| **.0122** | 0.31 | **.037** | 0.93 | 1.6 | 3 | **1.57** | 40 | 2.PFT.031.0 | Δ |
| **.0126** | 0.32 | **.038** | 0.96 | 1.6 | 3 | **1.57** | 40 | 2.PFT.032.0 | Δ |
| **.0130** | 0.33 | **.039** | 0.99 | 1.7 | 3 | **1.57** | 40 | 2.PFT.033.0 | Δ |
| **.0134** | 0.34 | **.040** | 1.02 | 1.7 | 3 | **1.57** | 40 | 2.PFT.034.0 | Δ |
| **.0138** | 0.35 | **.041** | 1.05 | 1.8 | 3 | **1.57** | 40 | 2.PFT.035.0 | ■ |
| **.0142** | 0.36 | **.043** | 1.08 | 1.8 | 3 | **1.57** | 40 | 2.PFT.036.0 | Δ |
| **.0146** | 0.37 | **.044** | 1.11 | 1.9 | 3 | **1.57** | 40 | 2.PFT.037.0 | Δ |
| **.0150** | 0.38 | **.045** | 1.14 | 1.9 | 3 | **1.57** | 40 | 2.PFT.038.0 | Δ |
| **.0154** | 0.39 | **.046** | 1.17 | 2.0 | 3 | **1.57** | 40 | 2.PFT.039.0 | Δ |
| **.0157** | 0.40 | **.047** | 1.20 | 2.0 | 3 | **1.57** | 40 | 2.PFT.040.0 | ■ |
| **.0161** | 0.41 | **.048** | 1.23 | 2.1 | 3 | **1.57** | 40 | 2.PFT.041.0 | Δ |

| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.0165** | 0.42 | **.050** | 1.26 | 2.1 | 3 | **1.57** | 40 | 2.PFT.042.0 | Δ |
| **.0169** | 0.43 | **.051** | 1.29 | 2.2 | 3 | **1.57** | 40 | 2.PFT.043.0 | Δ |
| **.0173** | 0.44 | **.052** | 1.32 | 2.2 | 3 | **1.57** | 40 | 2.PFT.044.0 | Δ |
| **.0177** | 0.45 | **.053** | 1.35 | 2.3 | 3 | **1.57** | 40 | 2.PFT.045.0 | ■ |
| **.0181** | 0.46 | **.054** | 1.38 | 2.3 | 3 | **1.57** | 40 | 2.PFT.046.0 | Δ |
| **.0185** | 0.47 | **.056** | 1.41 | 2.4 | 3 | **1.57** | 40 | 2.PFT.047.0 | Δ |
| **.0189** | 0.48 | **.057** | 1.44 | 2.4 | 3 | **1.57** | 40 | 2.PFT.048.0 | Δ |
| **.0193** | 0.49 | **.058** | 1.47 | 2.5 | 3 | **1.57** | 40 | 2.PFT.049.0 | Δ |
| **.0197** | 0.50 | **.059** | 1.50 | 2.5 | 3 | **1.57** | 40 | 2.PFT.050.0 | ■ |
| **.0201** | 0.51 | **.060** | 1.53 | 2.6 | 3 | **1.57** | 40 | 2.PFT.051.0 | Δ |
| **.0205** | 0.52 | **.061** | 1.56 | 2.6 | 3 | **1.57** | 40 | 2.PFT.052.0 | Δ |
| **.0209** | 0.53 | **.063** | 1.59 | 2.7 | 3 | **1.57** | 40 | 2.PFT.053.0 | Δ |
| **.0213** | 0.54 | **.064** | 1.62 | 2.7 | 3 | **1.57** | 40 | 2.PFT.054.0 | Δ |
| **.0217** | 0.55 | **.065** | 1.65 | 2.8 | 3 | **1.57** | 40 | 2.PFT.055.0 | ■ |
| **.0220** | 0.56 | **.066** | 1.68 | 2.8 | 3 | **1.57** | 40 | 2.PFT.056.0 | Δ |
| **.0224** | 0.57 | **.067** | 1.71 | 2.9 | 3 | **1.57** | 40 | 2.PFT.057.0 | Δ |
| **.0228** | 0.58 | **.069** | 1.74 | 2.9 | 3 | **1.57** | 40 | 2.PFT.058.0 | Δ |
| **.0232** | 0.59 | **.070** | 1.77 | 3.0 | 3 | **1.57** | 40 | 2.PFT.059.0 | Δ |
| **.0236** | 0.60 | **.071** | 1.80 | 3.0 | 3 | **1.57** | 40 | 2.PFT.060.0 | ■ |
| **.0240** | 0.61 | **.072** | 1.83 | 3.1 | 3 | **1.57** | 40 | 2.PFT.061.0 | Δ |
| **.0244** | 0.62 | **.073** | 1.86 | 3.1 | 3 | **1.57** | 40 | 2.PFT.062.0 | Δ |
| **.0248** | 0.63 | **.074** | 1.89 | 3.2 | 3 | **1.57** | 40 | 2.PFT.063.0 | Δ |
| **.0252** | 0.64 | **.076** | 1.92 | 3.2 | 3 | **1.57** | 40 | 2.PFT.064.0 | Δ |
| **.0256** | 0.65 | **.077** | 1.95 | 3.3 | 3 | **1.57** | 40 | 2.PFT.065.0 | ■ |
| **.0260** | 0.66 | **.078** | 1.98 | 3.3 | 3 | **1.57** | 40 | 2.PFT.066.0 | Δ |
| **.0264** | 0.67 | **.079** | 2.01 | 3.4 | 3 | **1.57** | 40 | 2.PFT.067.0 | Δ |
| **.0268** | 0.68 | **.080** | 2.04 | 3.4 | 3 | **1.57** | 40 | 2.PFT.068.0 | Δ |
| **.0272** | 0.69 | **.081** | 2.07 | 3.5 | 3 | **1.57** | 40 | 2.PFT.069.0 | Δ |
| **.0276** | 0.70 | **.083** | 2.10 | 3.5 | 3 | **1.57** | 40 | 2.PFT.070.0 | ■ |
| **.0280** | 0.71 | **.084** | 2.13 | 3.6 | 3 | **1.57** | 40 | 2.PFT.071.0 | Δ |
| **.0283** | 0.72 | **.085** | 2.16 | 3.6 | 3 | **1.57** | 40 | 2.PFT.072.0 | Δ |
| **.0287** | 0.73 | **.086** | 2.19 | 3.7 | 3 | **1.57** | 40 | 2.PFT.073.0 | Δ |

■ Stock item
Δ Delivery term upon request, minumum purchase order quantity 5 pcs.

| Carbide |   |   | Z2 |  | Uncoated |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
| Tolerance | **+ .00012"**<br>**0** | + 0.003 mm<br>0 |



| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.0291** | 0.74 | **.087** | 2.22 | 3.7 | 3 | **1.57** | 40 | 2.PFT.074.0 | Δ |
| **.0295** | 0.75 | **.089** | 2.25 | 3.8 | 3 | **1.57** | 40 | 2.PFT.075.0 | ■ |
| **.0299** | 0.76 | **.090** | 2.28 | 3.8 | 3 | **1.57** | 40 | 2.PFT.076.0 | Δ |
| **.0303** | 0.77 | **.091** | 2.31 | 3.9 | 3 | **1.57** | 40 | 2.PFT.077.0 | Δ |
| **.0307** | 0.78 | **.092** | 2.34 | 3.9 | 3 | **1.57** | 40 | 2.PFT.078.0 | Δ |
| **.0311** | 0.79 | **.093** | 2.37 | 4.0 | 3 | **1.57** | 40 | 2.PFT.079.0 | Δ |
| **.0315** | 0.80 | **.094** | 2.40 | 4.0 | 3 | **1.57** | 40 | 2.PFT.080.0 | ■ |
| **.0319** | 0.81 | **.096** | 2.43 | 4.1 | 3 | **1.57** | 40 | 2.PFT.081.0 | Δ |
| **.0323** | 0.82 | **.097** | 2.46 | 4.1 | 3 | **1.57** | 40 | 2.PFT.082.0 | Δ |
| **.0327** | 0.83 | **.098** | 2.49 | 4.2 | 3 | **1.57** | 40 | 2.PFT.083.0 | Δ |
| **.0331** | 0.84 | **.099** | 2.52 | 4.2 | 3 | **1.57** | 40 | 2.PFT.084.0 | Δ |
| **.0335** | 0.85 | **.100** | 2.55 | 4.3 | 3 | **1.57** | 40 | 2.PFT.085.0 | ■ |
| **.0339** | 0.86 | **.102** | 2.58 | 4.3 | 3 | **1.57** | 40 | 2.PFT.086.0 | Δ |
| **.0343** | 0.87 | **.103** | 2.61 | 4.4 | 3 | **1.57** | 40 | 2.PFT.087.0 | Δ |
| **.0346** | 0.88 | **.104** | 2.64 | 4.4 | 3 | **1.57** | 40 | 2.PFT.088.0 | Δ |
| **.0350** | 0.89 | **.105** | 2.67 | 4.5 | 3 | **1.57** | 40 | 2.PFT.089.0 | Δ |
| **.0354** | 0.90 | **.106** | 2.70 | 4.5 | 3 | **1.57** | 40 | 2.PFT.090.0 | ■ |
| **.0358** | 0.91 | **.107** | 2.73 | 4.6 | 3 | **1.57** | 40 | 2.PFT.091.0 | Δ |
| **.0362** | 0.92 | **.109** | 2.76 | 4.6 | 3 | **1.57** | 40 | 2.PFT.092.0 | Δ |
| **.0366** | 0.93 | **.110** | 2.79 | 4.7 | 3 | **1.57** | 40 | 2.PFT.093.0 | Δ |
| **.0370** | 0.94 | **.111** | 2.82 | 4.7 | 3 | **1.57** | 40 | 2.PFT.094.0 | Δ |
| **.0374** | 0.95 | **.112** | 2.85 | 4.8 | 3 | **1.57** | 40 | 2.PFT.095.0 | ■ |
| **.0378** | 0.96 | **.113** | 2.88 | 4.8 | 3 | **1.57** | 40 | 2.PFT.096.0 | Δ |
| **.0382** | 0.97 | **.115** | 2.91 | 4.9 | 3 | **1.57** | 40 | 2.PFT.097.0 | Δ |
| **.0386** | 0.98 | **.116** | 2.94 | 4.9 | 3 | **1.57** | 40 | 2.PFT.098.0 | Δ |
| **.0390** | 0.99 | **.117** | 2.97 | 5.0 | 3 | **1.57** | 40 | 2.PFT.099.0 | Δ |
| **.0394** | 1.00 | **.118** | 3.00 | 5.0 | 3 | **1.57** | 40 | 2.PFT.100.0 | ■ |
| **.0398** | 1.01 | **.119** | 3.03 | 5.1 | 3 | **1.57** | 40 | 2.PFT.101.0 | Δ |
| **.0402** | 1.02 | **.120** | 3.06 | 5.1 | 3 | **1.57** | 40 | 2.PFT.102.0 | Δ |
| **.0406** | 1.03 | **.122** | 3.09 | 5.2 | 3 | **1.57** | 40 | 2.PFT.103.0 | Δ |
| **.0409** | 1.04 | **.123** | 3.12 | 5.2 | 3 | **1.57** | 40 | 2.PFT.104.0 | Δ |
| **.0413** | 1.05 | **.124** | 3.15 | 5.3 | 3 | **1.57** | 40 | 2.PFT.105.0 | ■ |

| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.0417** | 1.06 | **.125** | 3.18 | 5.3 | 3 | **1.57** | 40 | 2.PFT.106.0 | Δ |
| **.0421** | 1.07 | **.126** | 3.21 | 5.4 | 3 | **1.57** | 40 | 2.PFT.107.0 | Δ |
| **.0425** | 1.08 | **.128** | 3.24 | 5.4 | 3 | **1.57** | 40 | 2.PFT.108.0 | Δ |
| **.0429** | 1.09 | **.129** | 3.27 | 5.5 | 3 | **1.57** | 40 | 2.PFT.109.0 | Δ |
| **.0433** | 1.10 | **.130** | 3.30 | 5.5 | 3 | **1.57** | 40 | 2.PFT.110.0 | ■ |
| **.0437** | 1.11 | **.131** | 3.33 | 5.6 | 3 | **1.57** | 40 | 2.PFT.111.0 | Δ |
| **.0441** | 1.12 | **.132** | 3.36 | 5.6 | 3 | **1.57** | 40 | 2.PFT.112.0 | Δ |
| **.0445** | 1.13 | **.133** | 3.39 | 5.7 | 3 | **1.57** | 40 | 2.PFT.113.0 | Δ |
| **.0449** | 1.14 | **.135** | 3.42 | 5.7 | 3 | **1.57** | 40 | 2.PFT.114.0 | Δ |
| **.0453** | 1.15 | **.136** | 3.45 | 5.8 | 3 | **1.57** | 40 | 2.PFT.115.0 | ■ |
| **.0457** | 1.16 | **.137** | 3.48 | 5.8 | 3 | **1.57** | 40 | 2.PFT.116.0 | Δ |
| **.0461** | 1.17 | **.138** | 3.51 | 5.9 | 3 | **1.57** | 40 | 2.PFT.117.0 | Δ |
| **.0465** | 1.18 | **.139** | 3.54 | 5.9 | 3 | **1.57** | 40 | 2.PFT.118.0 | Δ |
| **.0469** | 1.19 | **.141** | 3.57 | 6.0 | 3 | **1.57** | 40 | 2.PFT.119.0 | Δ |
| **.0472** | 1.20 | **.142** | 3.60 | 6.0 | 3 | **1.57** | 40 | 2.PFT.120.0 | ■ |

Complementary products

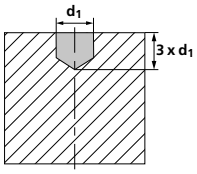
CrazyDrill Flex Titanium p.388

CRAZYDRILL by Mikron Tool Flexpilot TITANIUM

# Titanium - 3 x d

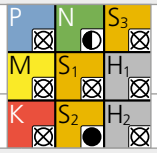
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | | |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 5 \| **16** | 40 \| **131** | 20 \| **66** | 40 \| **131** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 5 \| **16** | 20 \| **66** | 20 \| **66** | 30 \| **98** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 5 \| **16** | 20 \| **66** | 20 \| **66** | 40 \| **131** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

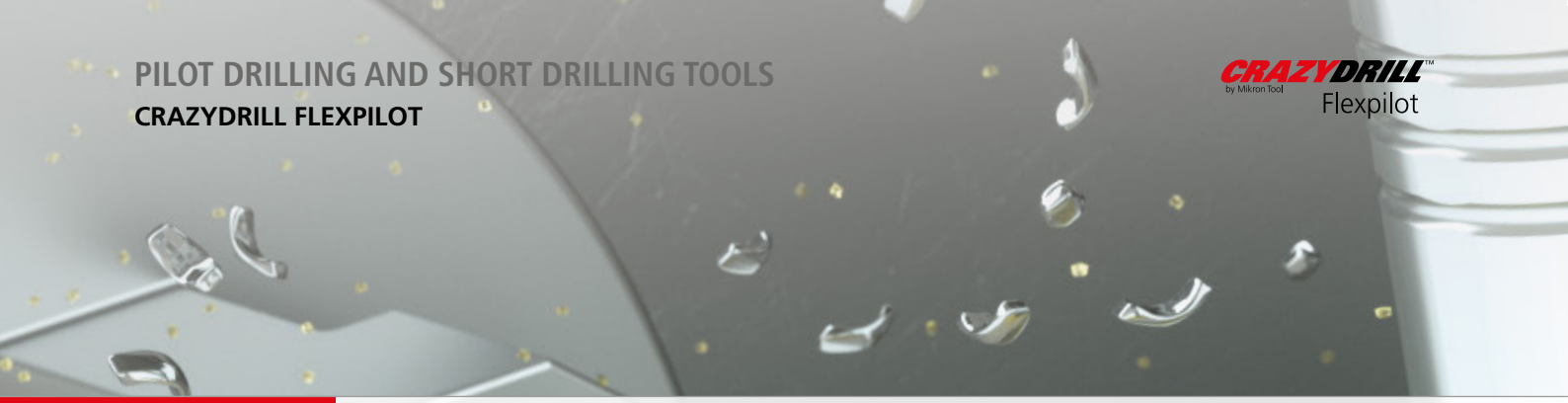
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| Ød1 | | | | | | |
|---|---|---|---|---|---|---|
| 0.1 mm \| **.004"** | 0.2 mm \| **.008"** | 0.3 mm \| **.012"** | 0.4 mm \| **.016"** | 0.6 mm \| **.024"** | 0.8 mm \| **.032"** | 1.0–1.2 mm \| **.039"–.047"** |
| **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| Recommended: CrazyDrill Flexpilot Steel | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Recommended: CrazyDrill Flexpilot Steel | | | | | | |
| Recommended: CrazyDrill Flexpilot Steel | | | | | | |
| 0.005 **.00020** | 0.010 **.00039** | 0.015 **.00059** | 0.020 **.00079** | 0.030 **.00118** | 0.040 **.00157** | 0.060 **.00236** |
| Recommended: CrazyDrill Flexpilot Steel | | | | | | |
| | | | | | | |
| 0.001 **.00004** | 0.002 **.00008** | 0.003 **.00012** | 0.004 **.00016** | 0.006 **.00024** | 0.008 **.00031** | 0.012 **.00047** |
| 0.002 **.00006** | 0.003 **.00012** | 0.005 **.00018** | 0.006 **.00024** | 0.009 **.00035** | 0.012 **.00047** | 0.018 **.00071** |
| | | | | | | |
| | | | | | | |
| | | | | | | |



# Drilling process CrazyDrill Flexpilot

## SHORT DRILLING UP TO 3 X D

### Coolant type, pressure and filtration

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling medium is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

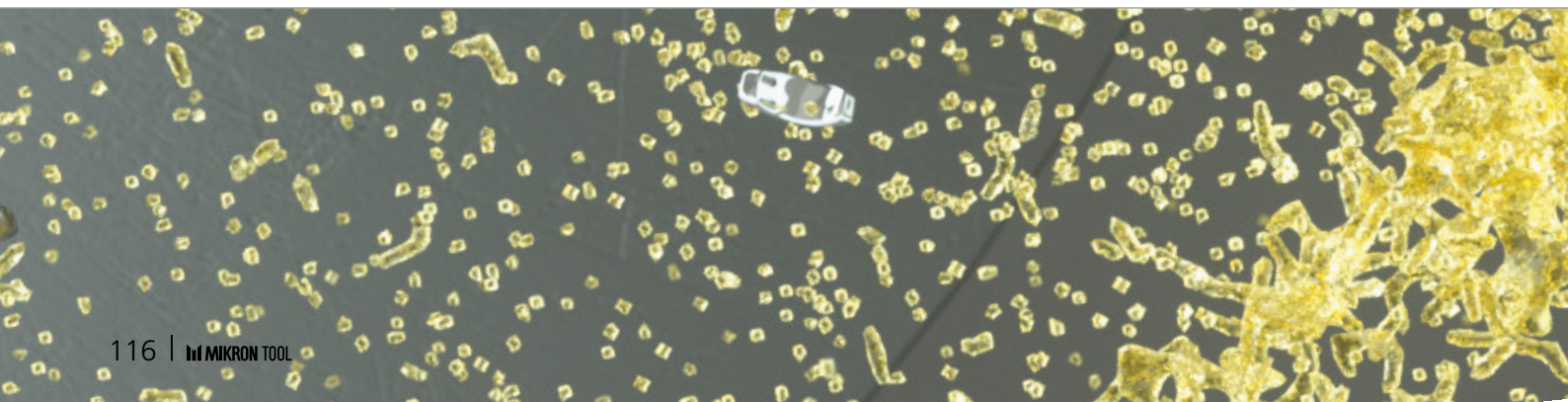
For detailed indications for tool holders see chapter "Technical information".

### Pilot drilling and short drilling

Pilot drilling with CrazyDrill Flexpilot is the perfect preparation for accurate drilling (position and alignment accuracy) and stable machining process.

Drilling quality (position and alignment accuracy) and stable machining process are assured due to matched diameters of the tools.

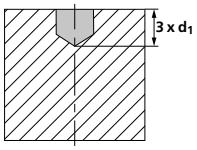
CrazyDrill Flexpilot not only is the perfect preparation of deep follow-up holes with CrazyDrill Flex. Concurrently it is a short drill for highly precise and quick drilling up to 3 x d.



## DRILLING PROCESS

### 1 | PILOT DRILLING OR SHORT DRILLING

- Drilling in one step with recommended cutting speed and feed rate (see cutting data table).




Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

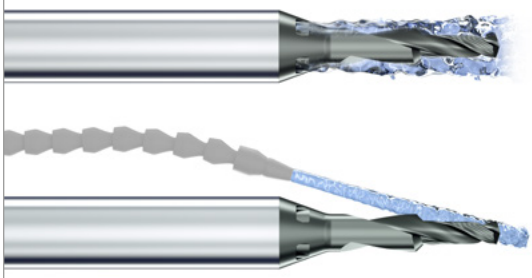
PATENTED

# CrazyDrill Pilot SST-Inox



CRAZYDRILL Pilot SST-Inox

## THE MICRO PILOT OR SHORT DRILL FOR STAINLESS STEEL, HRSA AND CR-CO ALLOYS



With CrazyDrill Pilot SST-Inox, Mikron Tool introduces a pilot and short drill for stainless steels, heat-resistant and CrCo alloys in the diameter range of .008" to .079" (0.2 mm to 2.0 mm) and for drilling depths of up to 3 x d. All short drills are coated, have integrated cooling, a cutting edge for 90° chamfer and a digressive helical flute.

What is special about this drill are the integrated cooling channels, which ensure an efficient coolant jet starting from 15 bar (218 psi), flush away the chips from the drill and keep the temperature under control. The result is significantly longer tool life.

Even without an integrated coolant supply (with external coolant supply), the CrazyDrill Pilot SST-Inox is an outstanding pilot drill.

This is the perfect preparation for the deep and precise drilling with CrazyDrill SST-Inox and CrazyDrill Flex SST-Inox. The digressive helical flute, the cooling channels, the coating and the possibility of adding a 90° countersink make it an extremely efficient pilot or short drill.

**Regrinding:** This product is not suitable for regrinding.

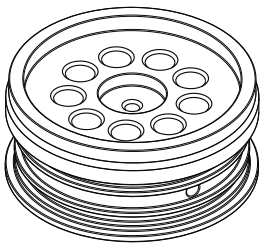
**Please note:** You couldn't find your suitable version of the CrazyDrill Pilot SST-Inox (diameter, length, cutting direction…)? Ask us about our customized versions!

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# Features and benefits

## EFFICIENT PILOT OR SHORT DRILLING IN STAINLESS STEEL

- **SHORT MACHINING TIME** | drilling 3 x d + 90° countersink in one step
- **LONG TOOL LIFE** | due to innovative cooling concept
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to a new cutting geometry
- **HIGH DEGREE OF PRECISION** | due to tight tolerances



**COMPONENT**
Injection component - automotive

**MATERIAL**
X5CrNi 18-10 / 1.4301 / AISI 304

**MACHINING**
- Pilot drilling and chamfering 90°
- d = 0.9 mm **| .035"**
- Drilling depth 2.9 mm **| .114"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Pilot SST-Inox

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Pilot SST-Inox<br>- Carbide<br>- Coated<br>- Integrated cooling |
| Item number | 2.PD.00900.090.IK |
| Cutting data | $v_c$ = 40 m/min **\| 131 SFM**<br>f = 0.030 mm/rev **\| .0012 IPR** |

# CrazyDrill Pilot SST-Inox

- Coated
- External cooling

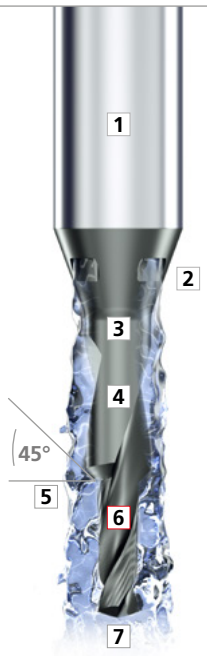




Page 122

- Coated
- Integrated cooling




Page 122

**1 | SHANK**
The robust solid carbide shank guarantees stable vibration-free machining.

**2 | NEW COOLING CONCEPT**
The integrated cooling channels guarantee regular and significant cooling of the cutting edges starting from 15 bar (218 psi). The result is greater process reliability and higher productivity. This tool can also be used with external coolant supply.

**3 | CARBIDE**
Due to the high degree of toughness and thermal shock resistance, the carbide developed for SST-Inox products perfectly meets the requirements for the machining of stainless steels, heat-resistant and CrCo alloys.

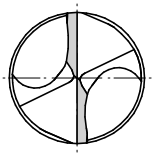
**4 | COATING**
The high-performance eXedur RIP coating provides thermal and wear protection against heat and abrasion. Extremely smooth and consistent coating exhibits low adhesion to work materials and prevents from cutting edge chipping. The result is a long tool life even in the smallest diameter sizes.

**5 | CUTTING EDGE FOR 90° CHAMFER**
A 90° countersink can be placed simultaneously with the drilling.

**6 | DIGRESSIVE HELICAL FLUTE - PATENTED**
The digressive helical flute with a new and patented geometry guarantees a high degree of tool stability. The front part ensures good chip breaking, while the rear ensures rapid chip removal.

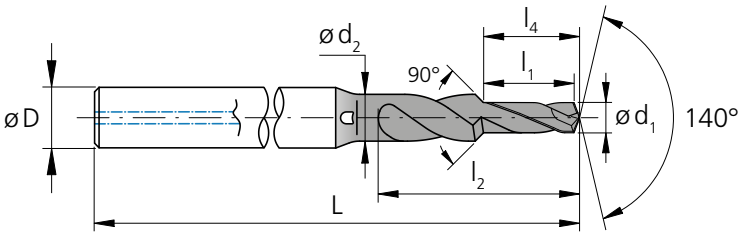
**7 | TIP GEOMETRY**
The tip geometry is developed for stainless, acid-resistant and heat-resistant steels:
- High degree of cutting edge stability
- Self-centering
- Short chips

Drill tip



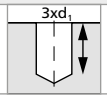
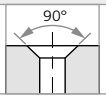
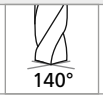
# CrazyDrill Pilot SST-Inox - 3 x d - 90° countersink

## DRILLING WITH INTEGRATED COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | $l_4$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0079** | 0.20 | **.024** | 0.60 | 0.50 | 1.7 | 0.63 | 3 | **1.77** | 45 | 2.PD.00200.090.IK | ■ |
| | **.0098** | 0.25 | **.030** | 0.75 | 0.50 | 2.1 | 0.79 | 3 | **1.77** | 45 | 2.PD.00250.090.IK | ■ |
| | **.0118** | 0.30 | **.035** | 0.90 | 0.60 | 2.5 | 0.95 | 3 | **1.77** | 45 | 2.PD.00300.090.IK | ■ |
| | **.0138** | 0.35 | **.041** | 1.05 | 0.70 | 2.8 | 1.11 | 3 | **1.77** | 45 | 2.PD.00350.090.IK | ■ |
| **1/64** | **.0156** | 0.396 | **.047** | 1.20 | 0.80 | 3.2 | 1.26 | 3 | **1.77** | 45 | 2.PD.F164.IK | ■ |
| | **.0157** | 0.40 | **.047** | 1.20 | 0.80 | 3.2 | 1.26 | 3 | **1.77** | 45 | 2.PD.00400.090.IK | ■ |
| | **.0177** | 0.45 | **.053** | 1.35 | 0.90 | 3.6 | 1.42 | 3 | **1.77** | 45 | 2.PD.00450.090.IK | ■ |
| | **.0197** | 0.50 | **.059** | 1.50 | 1.00 | 4.0 | 1.58 | 3 | **1.89** | 48 | 2.PD.00500.090.IK | ■ |
| | **.0217** | 0.55 | **.065** | 1.65 | 1.00 | 4.4 | 1.74 | 3 | **1.89** | 48 | 2.PD.00550.090.IK | ■ |
| | **.0236** | 0.60 | **.071** | 1.80 | 1.10 | 4.7 | 1.90 | 3 | **1.89** | 48 | 2.PD.00600.090.IK | ■ |
| | **.0256** | 0.65 | **.077** | 1.95 | 1.10 | 5.1 | 2.05 | 3 | **1.89** | 48 | 2.PD.00650.090.IK | ■ |
| | **.0276** | 0.70 | **.083** | 2.10 | 1.30 | 5.5 | 2.21 | 4 | **2.05** | 52 | 2.PD.00700.090.IK | ■ |
| | **.0295** | 0.75 | **.089** | 2.25 | 1.40 | 5.8 | 2.37 | 4 | **2.05** | 52 | 2.PD.00750.090.IK | ■ |
| **1/32** | **.0312** | 0.793 | **.094** | 2.40 | 1.40 | 6.2 | 2.53 | 4 | **2.05** | 52 | 2.PD.F132.IK | ■ |
| | **.0315** | 0.80 | **.094** | 2.40 | 1.40 | 6.2 | 2.53 | 4 | **2.05** | 52 | 2.PD.00800.090.IK | ■ |
| | **.0335** | 0.85 | **.100** | 2.55 | 1.50 | 6.5 | 2.68 | 4 | **2.05** | 52 | 2.PD.00850.090.IK | ■ |
| | **.0354** | 0.90 | **.106** | 2.70 | 1.50 | 6.9 | 2.84 | 4 | **2.05** | 52 | 2.PD.00900.090.IK | ■ |
| | **.0374** | 0.95 | **.112** | 2.85 | 1.50 | 7.2 | 3.00 | 4 | **2.05** | 52 | 2.PD.00950.090.IK | ■ |
| | **.0394** | 1.00 | **.118** | 3.00 | 1.70 | 7.5 | 3.16 | 4 | **2.17** | 55 | 2.PD.01000.090.IK | ■ |
| | **.0413** | 1.05 | **.124** | 3.15 | 1.70 | 7.9 | 3.32 | 4 | **2.17** | 55 | 2.PD.01050.090.IK | ■ |

■ Stock item

| Carbide |   |   |   | Z2 |  |   |
|---|---|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
| Tolerance | **+ .00024"**<br>**+ .00008"** | + 0.006 mm<br>+ 0.002 mm |



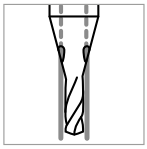
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | $l_4$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0433** | 1.10 | **.130** | 3.30 | 1.70 | 8.2 | 3.47 | 4 | **2.17** | 55 | 2.PD.01100.090.IK | ■ |
| | **.0453** | 1.15 | **.136** | 3.45 | 1.80 | 8.5 | 3.63 | 4 | **2.17** | 55 | 2.PD.01150.090.IK | ■ |
| | **.0472** | 1.20 | **.142** | 3.60 | 1.80 | 8.8 | 3.79 | 4 | **2.17** | 55 | 2.PD.01200.090.IK | ■ |
| | **.0492** | 1.25 | **.148** | 3.75 | 2.00 | 9.2 | 3.95 | 4 | **2.17** | 55 | 2.PD.01250.090.IK | ■ |
| | **.0512** | 1.30 | **.154** | 3.90 | 2.00 | 9.5 | 4.11 | 4 | **2.17** | 55 | 2.PD.01300.090.IK | ■ |
| | **.0531** | 1.35 | **.159** | 4.05 | 2.00 | 9.8 | 4.26 | 4 | **2.17** | 55 | 2.PD.01350.090.IK | ■ |
| | **.0551** | 1.40 | **.165** | 4.20 | 2.25 | 10.1 | 4.42 | 4 | **2.17** | 55 | 2.PD.01400.090.IK | ■ |
| | **.0571** | 1.45 | **.171** | 4.35 | 2.25 | 10.4 | 4.58 | 4 | **2.17** | 55 | 2.PD.01450.090.IK | ■ |
| | **.0591** | 1.50 | **.177** | 4.50 | 2.25 | 10.7 | 4.74 | 4 | **2.17** | 55 | 2.PD.01500.090.IK | ■ |
| | **.0610** | 1.55 | **.183** | 4.65 | 2.25 | 10.9 | 4.89 | 4 | **2.17** | 55 | 2.PD.01550.090.IK | ■ |
| **1/16** | **.0625** | 1.587 | **.189** | 4.80 | 2.25 | 11.2 | 5.05 | 4 | **2.17** | 55 | 2.PD.F116.IK | ■ |
| | **.0630** | 1.60 | **.189** | 4.80 | 2.25 | 11.2 | 5.05 | 4 | **2.17** | 55 | 2.PD.01600.090.IK | ■ |
| | **.0650** | 1.65 | **.195** | 4.95 | 2.25 | 11.5 | 5.21 | 4 | **2.17** | 55 | 2.PD.01650.090.IK | ■ |
| | **.0669** | 1.70 | **.201** | 5.10 | 2.60 | 11.8 | 5.37 | 6 | **2.17** | 55 | 2.PD.01700.090.IK | ■ |
| | **.0689** | 1.75 | **.207** | 5.25 | 2.60 | 12.0 | 5.53 | 6 | **2.17** | 55 | 2.PD.01750.090.IK | ■ |
| | **.0709** | 1.80 | **.213** | 5.40 | 2.60 | 12.3 | 5.68 | 6 | **2.17** | 55 | 2.PD.01800.090.IK | ■ |
| | **.0728** | 1.85 | **.219** | 5.55 | 2.60 | 12.6 | 5.84 | 6 | **2.17** | 55 | 2.PD.01850.090.IK | ■ |
| | **.0748** | 1.90 | **.224** | 5.70 | 2.60 | 12.8 | 6.00 | 6 | **2.17** | 55 | 2.PD.01900.090.IK | ■ |
| | **.0768** | 1.95 | **.230** | 5.85 | 2.60 | 13.1 | 6.16 | 6 | **2.17** | 55 | 2.PD.01950.090.IK | ■ |
| | **.0787** | 2.00 | **.236** | 6.00 | 3.10 | 13.3 | 6.32 | 6 | **2.17** | 55 | 2.PD.02000.090.IK | ■ |

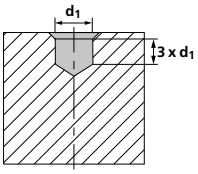
Complementary products


| | |
|---|---|
| CrazyDrill SST-Inox | p.246 |
| CrazyDrill Flex SST-Inox | p.396 |

# CrazyDrill Pilot SST-Inox - 3 x d - 90° countersink

## DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW



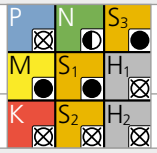





**Note:**
In case of external cooling reduce $v_c$ and f of 20%

| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 35 – 50 \| **115 – 164** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 35 – 50 \| **115 – 164** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 35 – 50 \| **115 – 164** |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 30 – 45 \| **98 – 148** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 – 100 \| **131 – 328** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 – 100 \| **131 – 328** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 15 – 30 \| **49 – 98** |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 40 – 50 \| **131 – 164** |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| Ød1 | 0.2 mm \| .008" | 1/64" 0.5 mm \| .020" | 1/32" 0.8 mm \| .032" | 1.0 mm \| .039" | 1.2 mm \| .047" | 1.4 mm \| .055" | 1/16" 1.6 mm \| .063" | 1.8 mm \| .071" | 2.0 mm \| .079" |
|---|---|---|---|---|---|---|---|---|---|
| | f | f | f | f | f | f | f | f | f |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.055 \| .0022 | 0.060 \| .0024 | 0.070 \| .0028 |
| | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.060 \| .0024 | 0.070 \| .0028 | 0.075 \| .0030 | 0.080 \| .0031 | 0.100 \| .0039 |
| | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.055 \| .0022 | 0.060 \| .0024 | 0.070 \| .0028 |
| | 0.010 \| .0004 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.050 \| .0020 | 0.055 \| .0022 | 0.060 \| .0024 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.160 \| .0063 | 0.180 \| .0071 |
| | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.160 \| .0063 | 0.180 \| .0071 |
| | | | | | | | | | |
| | | | | | | | | | |
| | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.022 \| .0009 | 0.025 \| .0010 | 0.035 \| .0014 | 0.037 \| .0015 | 0.045 \| .0018 | 0.055 \| .0022 |
| | | | | | | | | | |
| | | | | | | | | | |
| | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.060 \| .0024 | 0.070 \| .0028 | 0.075 \| .0030 | 0.080 \| .0031 | 0.100 \| .0039 |
| | | | | | | | | | |
| | | | | | | | | | |

# Drilling process CrazyDrill Pilot SST-Inox

## SHORT DRILLING 3 X D AND 90° COUNTERSINK

### Coolant type, pressure and filtration

#### Coolant type

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

**Filtration:** The large cooling channels permit the use of a standard filter. Filter quality ≤ .0019" (0.050 mm).

**Coolant pressure**: At least 15 bar (218 psi) coolant pressure is required for the CrazyDrill Pilot SST-Inox to achieve reliable drilling. High pressure is generally better for the cooling and flushing effect.

| | | | |
|---|---|---|---|
| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
| **Minimal pressure** | [bar] | 15 | 30 |
| | **[psi]** | **218** | **435** |

#### Cooling with external coolant supply

For tools with external cooling must be ensured that the coolant fluid is addressed directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical information".

### Pilot drilling and short drilling

Pilot drilling with CrazyDrill Pilot SST-Inox is the perfect preparation for accurate drilling (position and alignment accuracy) and stable machining process for deep holes drilling with CrazyDrill SST-Inox and CrazyDrill Flex SST-Inox.

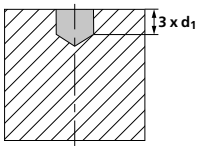
Drilling quality (position and alignment accuracy, no measurable transition from pilot to follow-up hole) and stable machining process are assured due to matched diameters of the tools.

CrazyDrill Pilot SST-Inox not only is the perfect preparation of deep follow-up holes. Concurrently it is a short drill for highly precise and quick drilling up to 3 x d + 90° countersink.

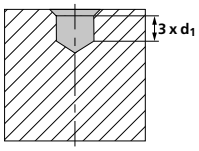
## DRILLING PROCESS

### 1 | PILOT DRILLING OR SHORT DRILLING

- Turn on internal or external coolant.
- Drilling in one step with recommended cutting speed and feed rate (see cutting data table).

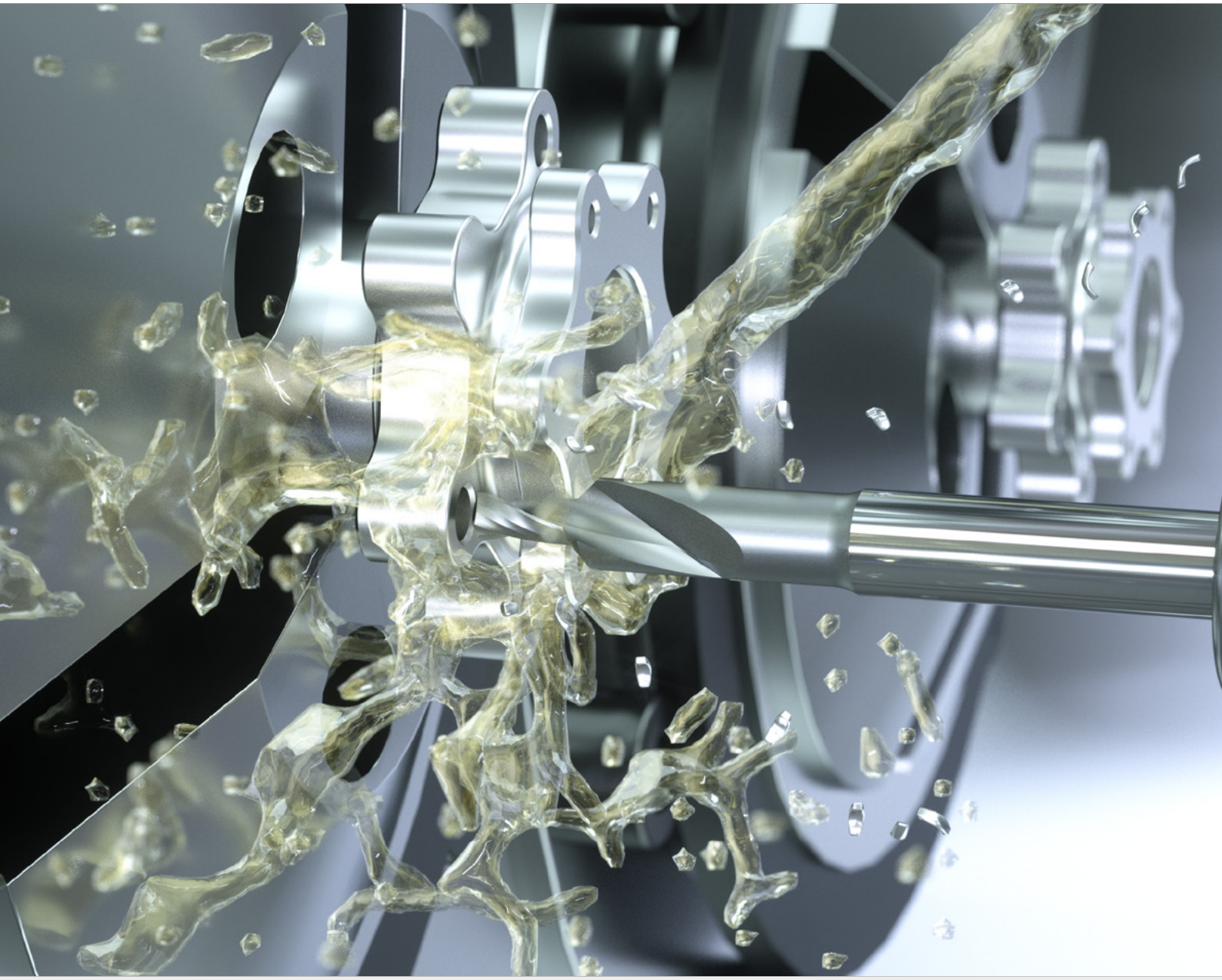



- If needed, after the desired cutting depth of 3 x d is reached, a chamfer angle of 90° can be realized.




Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# CrazyDrill Pilot



CRAZYDRILL Pilot

## AN UNIVERSAL PILOT DRILL / SHORT DRILL



Mikron Tool offers with CrazyDrill Pilot a short drill, respectively pilot drill including countersinking. It's not only useful for short drilling but it's also a perfect drilling preparation for highly precise position accuracy and straightness when deep-hole drilling above 6 x d.

The drill is available from stock in diameters of .016" to 1/4" (0.4 mm to 6.35 mm) and for a maximum drilling depth up to 2 x d. All short drills are coated and have a chamfer angle of 90°.

With CrazyDrill Pilot centering and pilot drilling up to 2 x d is done in one single step. The follow-up drill is guided cylindrically in the pilot hole, therefore high straightness of the follow-up drilling is assured. Furthermore, with the same tool can be realized directly a chamfer of 90° at the hole. This way tool change positions can be saved and shorter cycle times are possible. The digressive helical flute assures constant cutting conditions from drilling to countersinking.

Optimally matched diameter tolerances and tip angles guarantee accurate deep-hole drilling without measurable transition from pilot to follow-up hole, assure process reliability and increase also substantially tool life of the follow-up drill. The special high-performance geometry of CrazyDrill Pilot ensures high cutting speed, the optimal coating results in high wear resistance.

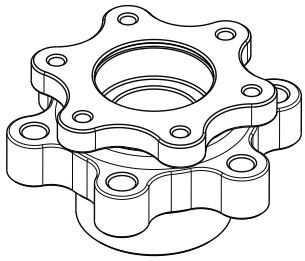
**Regrinding:** This product can be reground starting from Ø .055" (1.4 mm).

**Please note:** You couldn't find your suitable version of the CrazyDrill Pilot (diameter, length, cutting direction…)? Ask us about our customized versions!

# Features and benefits

## CENTERING AND PILOT HOLE DRILLING IN ONE STEP

- **SHORT MACHINING TIME** | drilling 2 x d +90° countersink with one tool
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to robust tool design
- **HIGH DEGREE OF PRECISION** | due to small tolerances that prevent the deviations



**COMPONENT**
wheel hub

**MATERIAL**
AlMg 1 SiCu / 3.3211 / ASTM B211

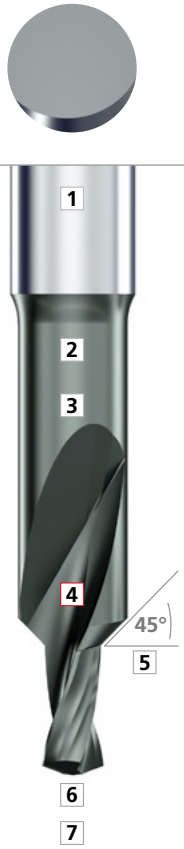
**MACHINING**
- Short drilling and chamfering 90°
- d = 3 mm **| .118"**
- Drilling depth 6.2 mm **| .244"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Pilot

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Pilot<br>- Carbide<br>- Coated<br>- External cooling |
| Item number | 2.PD.03000.090 |
| Cutting data | $v_c$ = 160 m/min **\| 525 SFM**<br>f = 0.16 mm/rev **\| .0063 IPR** |

# CrazyDrill Pilot

- Coated
- Drill with external cooling




**1 | SHANK**
The reinforced solid carbide shaft guarantees stability, high concentricity and therefore highest drilling accuracy.

**2 | SOLID CARBIDE**
A special solid carbide assures high machining speed

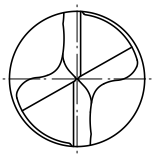
**3 | COATING**
Optimal coating protects the solid carbide drill from wear and increases its tool life.

**4 | DEGRESSIVE HELICAL FLUTE**
For optimal and constant cutting conditions from drilling to chamfering of 90°. The result: Higher process reliability and tool life.

**5 | 90° CHAMFER**
Enables a chamfer of 90° in one single operation step.

**6 | DRILL TIP GEOMETRY**
High cutting speed and feed rates thanks to special drill tip geometry. Tip angle of 140° and mutually adapted tolerance increase tool life of follow-up drill.

**7 | DIAMETER RANGE**
Matched to the dimensions of the CrazyDrill family, each deep-hole drill has the adapted pilot drill. Due to matched tolerances no measurable transition from pilot to follow-up hole.

Drill tip 

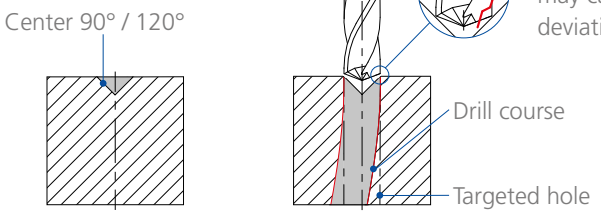
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# Ideal preparation for deep holes

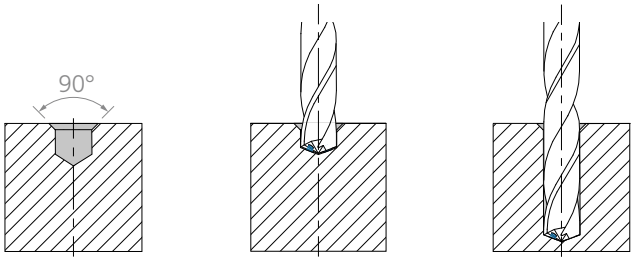


## PROCESS COMPARISON

■ Conventional




■ Mikron Tool




**STEP 1**
CrazyDrill Pilot

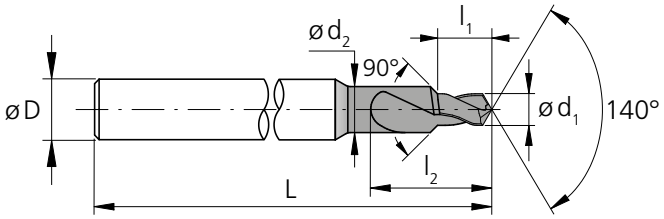
**STEP 2**
Drill guided
in pilot hole

**STEP 3**
Drilling of deep holes without noticeable
diameter difference between pilot hole and bore

CRAZYDRILL by Mikron Tool Pilot

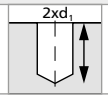
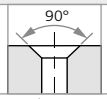
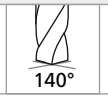
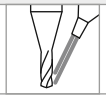
# CrazyDrill Pilot - 2 x d - 90° coutersink

## DRILLING WITH EXTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1/64** | **.0156** | 0.396 | **.0312** | 0.79 | 1.00 | 2.8 | 4 | **1.83** | 46.5 | 2.PD.F164.090 | ■ |
| | **.0157** | 0.40 | **.0315** | 0.80 | 1.00 | 2.8 | 4 | **1.83** | 46.5 | 2.PD.00400.090 | ■ |
| | **.0177** | 0.45 | **.0354** | 0.90 | 1.00 | 2.9 | 4 | **1.83** | 46.5 | 2.PD.00450.090 | ■ |
| | **.0197** | 0.50 | **.0394** | 1.00 | 1.20 | 3.4 | 4 | **1.85** | 47.0 | 2.PD.00500.090 | ■ |
| | **.0217** | 0.55 | **.0433** | 1.10 | 1.20 | 3.5 | 4 | **1.85** | 47.0 | 2.PD.00550.090 | ■ |
| | **.0236** | 0.60 | **.0472** | 1.20 | 1.50 | 4.2 | 4 | **1.89** | 48.0 | 2.PD.00600.090 | ■ |
| | **.0256** | 0.65 | **.0512** | 1.30 | 1.50 | 4.3 | 4 | **1.89** | 48.0 | 2.PD.00650.090 | ■ |
| | **.0276** | 0.70 | **.0551** | 1.40 | 1.75 | 4.9 | 4 | **1.93** | 49.0 | 2.PD.00700.090 | ■ |
| | **.0295** | 0.75 | **.0591** | 1.50 | 1.75 | 5.0 | 4 | **1.93** | 49.0 | 2.PD.00750.090 | ■ |
| **1/32** | **.0312** | 0.793 | **.0624** | 1.59 | 2.00 | 5.6 | 4 | **1.93** | 49.0 | 2.PD.F132.090 | ■ |
| | **.0315** | 0.80 | **.0630** | 1.60 | 2.00 | 5.6 | 4 | **1.93** | 49.0 | 2.PD.00800.090 | ■ |
| | **.0335** | 0.85 | **.0669** | 1.70 | 2.00 | 5.7 | 4 | **1.93** | 49.0 | 2.PD.00850.090 | ■ |
| | **.0354** | 0.90 | **.0709** | 1.80 | 2.00 | 5.8 | 4 | **1.93** | 49.0 | 2.PD.00900.090 | ■ |
| | **.0374** | 0.95 | **.0748** | 1.90 | 2.00 | 5.9 | 4 | **1.93** | 49.0 | 2.PD.00950.090 | ■ |
| | **.0394** | 1.00 | **.0787** | 2.00 | 2.50 | 7.0 | 4 | **2.01** | 51.0 | 2.PD.01000.090 | ■ |
| | **.0413** | 1.05 | **.0827** | 2.10 | 2.50 | 7.1 | 4 | **2.01** | 51.0 | 2.PD.01050.090 | ■ |
| | **.0433** | 1.10 | **.0866** | 2.20 | 2.50 | 7.2 | 4 | **2.01** | 51.0 | 2.PD.01100.090 | ■ |
| | **.0453** | 1.15 | **.0906** | 2.30 | 2.50 | 7.3 | 4 | **2.01** | 51.0 | 2.PD.01150.090 | ■ |
| | **.0472** | 1.20 | **.0945** | 2.40 | 2.50 | 7.4 | 4 | **2.01** | 51.0 | 2.PD.01200.090 | ■ |
| | **.0492** | 1.25 | **.0984** | 2.50 | 2.50 | 7.5 | 4 | **2.01** | 51.0 | 2.PD.01250.090 | ■ |
| | **.0512** | 1.30 | **.1024** | 2.60 | 2.50 | 7.6 | 4 | **2.01** | 51.0 | 2.PD.01300.090 | ■ |
| | **.0531** | 1.35 | **.1063** | 2.70 | 2.50 | 7.7 | 4 | **2.01** | 51.0 | 2.PD.01350.090 | ■ |
| | **.0551** | 1.40 | **.1102** | 2.80 | 2.50 | 7.8 | 4 | **2.01** | 51.0 | 2.PD.01400.090 | ■ |
| | **.0571** | 1.45 | **.1142** | 2.90 | 2.50 | 7.9 | 4 | **2.01** | 51.0 | 2.PD.01450.090 | ■ |
| | **.0591** | 1.50 | **.1181** | 3.00 | 3.00 | 9.0 | 4 | **2.09** | 53.0 | 2.PD.01500.090 | ■ |
| | **.0610** | 1.55 | **.1220** | 3.10 | 3.00 | 9.1 | 4 | **2.09** | 53.0 | 2.PD.01550.090 | ■ |
| **1/16** | **.0625** | 1.587 | **.1250** | 3.17 | 3.00 | 9.2 | 4 | **2.09** | 53.0 | 2.PD.F116.090 | ■ |
| | **.0630** | 1.60 | **.1260** | 3.20 | 3.00 | 9.2 | 4 | **2.09** | 53.0 | 2.PD.01600.090 | ■ |
| | **.0650** | 1.65 | **.1299** | 3.30 | 3.00 | 9.3 | 4 | **2.09** | 53.0 | 2.PD.01650.090 | ■ |
| | **.0669** | 1.70 | **.1339** | 3.40 | 3.00 | 9.4 | 4 | **2.09** | 53.0 | 2.PD.01700.090 | ■ |
| | **.0689** | 1.75 | **.1378** | 3.50 | 3.00 | 9.5 | 4 | **2.09** | 53.0 | 2.PD.01750.090 | ■ |
| | **.0709** | 1.80 | **.1417** | 3.60 | 3.00 | 9.6 | 4 | **2.09** | 53.0 | 2.PD.01800.090 | ■ |
| | **.0728** | 1.85 | **.1457** | 3.70 | 3.00 | 9.7 | 4 | **2.09** | 53.0 | 2.PD.01850.090 | ■ |
| | **.0748** | 1.90 | **.1496** | 3.80 | 3.00 | 9.8 | 4 | **2.09** | 53.0 | 2.PD.01900.090 | ■ |
| | **.0768** | 1.95 | **.1535** | 3.90 | 3.00 | 9.9 | 4 | **2.09** | 53.0 | 2.PD.01950.090 | ■ |
| | **.0787** | 2.00 | **.1575** | 4.00 | 3.50 | 11.0 | 4 | **2.17** | 55.0 | 2.PD.02000.090 | ■ |
| | **.0807** | 2.05 | **.1614** | 4.10 | 3.50 | 11.1 | 4 | **2.17** | 55.0 | 2.PD.02050.090 | ■ |
| | **.0827** | 2.10 | **.1654** | 4.20 | 3.50 | 11.2 | 4 | **2.17** | 55.0 | 2.PD.02100.090 | ■ |
| | **.0846** | 2.15 | **.1693** | 4.30 | 3.50 | 11.3 | 4 | **2.17** | 55.0 | 2.PD.02150.090 | ■ |
| | **.0866** | 2.20 | **.1732** | 4.40 | 3.50 | 11.4 | 4 | **2.17** | 55.0 | 2.PD.02200.090 | ■ |
| | **.0886** | 2.25 | **.1772** | 4.50 | 3.50 | 11.5 | 4 | **2.17** | 55.0 | 2.PD.02250.090 | ■ |
| | **.0906** | 2.30 | **.1811** | 4.60 | 3.50 | 11.6 | 4 | **2.17** | 55.0 | 2.PD.02300.090 | ■ |
| | **.0925** | 2.35 | **.1850** | 4.70 | 3.50 | 11.7 | 4 | **2.17** | 55.0 | 2.PD.02350.090 | ■ |
| **3/32** | **.0937** | 2.381 | **.1875** | 4.76 | 3.50 | 11.8 | 4 | **2.17** | 55.0 | 2.PD.F332.090 | ■ |
| | **.0945** | 2.40 | **.1890** | 4.80 | 3.50 | 11.8 | 4 | **2.17** | 55.0 | 2.PD.02400.090 | ■ |
| | **.0965** | 2.45 | **.1929** | 4.90 | 3.50 | 11.9 | 4 | **2.17** | 55.0 | 2.PD.02450.090 | ■ |
| | **.0984** | 2.50 | **.1969** | 5.00 | 3.80 | 12.6 | 4 | **2.24** | 57.0 | 2.PD.02500.090 | ■ |

■ Stock item

Carbide |  |  |  | Z2 |  | 

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | | **.240" - .394"** (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | **+ .00024"**<br>**+ .00008"** | + 0.006 mm<br>+ 0.002 mm | **+ .00035"**<br>**+ .00016"** | + 0.009 mm<br>+ 0.004 mm | **+ .00047"**<br>**+ .00024"** | + 0.012 mm<br>+ 0.006 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.1004** | 2.55 | **.2008** | 5.10 | 3.80 | 12.7 | 4 | **2.24** | 57.0 | 2.PD.02550.090 | ■ |
| | **.1024** | 2.60 | **.2047** | 5.20 | 3.80 | 12.8 | 4 | **2.24** | 57.0 | 2.PD.02600.090 | ■ |
| | **.1043** | 2.65 | **.2087** | 5.30 | 3.80 | 12.9 | 4 | **2.24** | 57.0 | 2.PD.02650.090 | ■ |
| | **.1063** | 2.70 | **.2126** | 5.40 | 3.80 | 13.0 | 4 | **2.24** | 57.0 | 2.PD.02700.090 | ■ |
| | **.1083** | 2.75 | **.2165** | 5.50 | 3.80 | 13.1 | 4 | **2.24** | 57.0 | 2.PD.02750.090 | ■ |
| | **.1102** | 2.80 | **.2205** | 5.60 | 3.80 | 13.2 | 4 | **2.24** | 57.0 | 2.PD.02800.090 | ■ |
| | **.1122** | 2.85 | **.2244** | 5.70 | 3.80 | 13.3 | 4 | **2.24** | 57.0 | 2.PD.02850.090 | ■ |
| | **.1142** | 2.90 | **.2283** | 5.80 | 3.80 | 13.4 | 4 | **2.24** | 57.0 | 2.PD.02900.090 | ■ |
| | **.1161** | 2.95 | **.2323** | 5.90 | 3.80 | 13.5 | 4 | **2.24** | 57.0 | 2.PD.02950.090 | ■ |
| | **.1181** | 3.00 | **.2362** | 6.00 | 3.80 | 13.6 | 4 | **2.24** | 57.0 | 2.PD.03000.090 | ■ |
| | **.1201** | 3.05 | **.2402** | 6.10 | 4.50 | 15.1 | 6 | **2.40** | 61.0 | 2.PD.03050.090 | ■ |
| | **.1220** | 3.10 | **.2441** | 6.20 | 4.50 | 15.2 | 6 | **2.40** | 61.0 | 2.PD.03100.090 | ■ |
| | **.1240** | 3.15 | **.2480** | 6.30 | 4.50 | 15.3 | 6 | **2.40** | 61.0 | 2.PD.03150.090 | ■ |
| **1/8** | **.1250** | 3.175 | **.2500** | 6.35 | 4.50 | 15.4 | 6 | **2.40** | 61.0 | 2.PD.F18.090 | ■ |
| | **.1260** | 3.20 | **.2520** | 6.40 | 4.50 | 15.4 | 6 | **2.40** | 61.0 | 2.PD.03200.090 | ■ |
| | **.1280** | 3.25 | **.2559** | 6.50 | 4.50 | 15.5 | 6 | **2.40** | 61.0 | 2.PD.03250.090 | ■ |
| | **.1299** | 3.30 | **.2598** | 6.60 | 4.50 | 15.6 | 6 | **2.40** | 61.0 | 2.PD.03300.090 | ■ |
| | **.1319** | 3.35 | **.2638** | 6.70 | 4.50 | 15.7 | 6 | **2.40** | 61.0 | 2.PD.03350.090 | ■ |
| | **.1339** | 3.40 | **.2677** | 6.80 | 4.50 | 15.8 | 6 | **2.40** | 61.0 | 2.PD.03400.090 | ■ |
| | **.1358** | 3.45 | **.2717** | 6.90 | 4.50 | 15.9 | 6 | **2.40** | 61.0 | 2.PD.03450.090 | ■ |
| | **.1378** | 3.50 | **.2756** | 7.00 | 4.50 | 16.0 | 6 | **2.40** | 61.0 | 2.PD.03500.090 | ■ |
| | **.1398** | 3.55 | **.2795** | 7.10 | 5.30 | 17.7 | 6 | **2.52** | 64.0 | 2.PD.03550.090 | ■ |
| | **.1417** | 3.60 | **.2835** | 7.20 | 5.30 | 17.8 | 6 | **2.52** | 64.0 | 2.PD.03600.090 | ■ |
| | **.1437** | 3.65 | **.2874** | 7.30 | 5.30 | 17.9 | 6 | **2.52** | 64.0 | 2.PD.03650.090 | ■ |
| | **.1457** | 3.70 | **.2913** | 7.40 | 5.30 | 18.0 | 6 | **2.52** | 64.0 | 2.PD.03700.090 | ■ |
| | **.1476** | 3.75 | **.2953** | 7.50 | 5.30 | 18.1 | 6 | **2.52** | 64.0 | 2.PD.03750.090 | ■ |
| | **.1496** | 3.80 | **.2992** | 7.60 | 5.30 | 18.2 | 6 | **2.52** | 64.0 | 2.PD.03800.090 | ■ |
| | **.1516** | 3.85 | **.3031** | 7.70 | 5.30 | 18.3 | 6 | **2.52** | 64.0 | 2.PD.03850.090 | ■ |
| | **.1535** | 3.90 | **.3071** | 7.80 | 5.30 | 18.4 | 6 | **2.52** | 64.0 | 2.PD.03900.090 | ■ |
| | **.1555** | 3.95 | **.3110** | 7.90 | 5.30 | 18.5 | 6 | **2.52** | 64.0 | 2.PD.03950.090 | ■ |
| **5/32** | **.1562** | 3.968 | **.3124** | 7.94 | 5.30 | 18.6 | 6 | **2.52** | 64.0 | 2.PD.F532.090 | ■ |
| | **.1575** | 4.00 | **.3150** | 8.00 | 5.30 | 18.6 | 6 | **2.52** | 64.0 | 2.PD.04000.090 | ■ |
| | **.1614** | 4.10 | **.3228** | 8.20 | 6.00 | 20.2 | 6 | **2.76** | 70.0 | 2.PD.04100.090 | ■ |
| | **.1654** | 4.20 | **.3307** | 8.40 | 6.00 | 20.4 | 6 | **2.76** | 70.0 | 2.PD.04200.090 | ■ |
| | **.1693** | 4.30 | **.3386** | 8.60 | 6.00 | 20.6 | 6 | **2.76** | 70.0 | 2.PD.04300.090 | ■ |
| | **.1732** | 4.40 | **.3465** | 8.80 | 6.00 | 20.8 | 6 | **2.76** | 70.0 | 2.PD.04400.090 | ■ |
| | **.1772** | 4.50 | **.3543** | 9.00 | 6.00 | 21.0 | 6 | **2.76** | 70.0 | 2.PD.04500.090 | ■ |
| | **.1811** | 4.60 | **.3622** | 9.20 | 6.00 | 21.2 | 6 | **2.76** | 70.0 | 2.PD.04600.090 | ■ |
| | **.1850** | 4.70 | **.3701** | 9.40 | 6.00 | 21.4 | 6 | **2.76** | 70.0 | 2.PD.04700.090 | ■ |
| **3/16** | **.1875** | 4.762 | **.3750** | 9.52 | 6.00 | 21.6 | 6 | **2.76** | 70.0 | 2.PD.F316.090 | ■ |
| | **.1890** | 4.80 | **.3780** | 9.60 | 6.00 | 21.6 | 6 | **2.76** | 70.0 | 2.PD.04800.090 | ■ |
| | **.1929** | 4.90 | **.3858** | 9.80 | 6.00 | 21.8 | 6 | **2.76** | 70.0 | 2.PD.04900.090 | ■ |
| | **.1969** | 5.00 | **.3937** | 10.00 | 6.00 | 22.0 | 6 | **2.76** | 70.0 | 2.PD.05000.090 | ■ |
| | **.2008** | 5.10 | **.4016** | 10.20 | 8.00 | 26.2 | 8 | **3.15** | 80.0 | 2.PD.05100.090 | ■ |
| | **.2047** | 5.20 | **.4094** | 10.40 | 8.00 | 26.4 | 8 | **3.15** | 80.0 | 2.PD.05200.090 | ■ |
| | **.2087** | 5.30 | **.4173** | 10.60 | 8.00 | 26.6 | 8 | **3.15** | 80.0 | 2.PD.05300.090 | ■ |
| | **.2126** | 5.40 | **.4252** | 10.80 | 8.00 | 26.8 | 8 | **3.15** | 80.0 | 2.PD.05400.090 | ■ |
| | **.2165** | 5.50 | **.4331** | 11.00 | 8.00 | 27.0 | 8 | **3.15** | 80.0 | 2.PD.05500.090 | ■ |
| **7/32** | **.2189** | 5.560 | **.4378** | 11.12 | 8.00 | 27.2 | 8 | **3.15** | 80.0 | 2.PD.F732.090 | ■ |
| | **.2205** | 5.60 | **.4409** | 11.20 | 8.00 | 27.2 | 8 | **3.15** | 80.0 | 2.PD.05600.090 | ■ |
| | **.2244** | 5.70 | **.4488** | 11.40 | 8.00 | 27.4 | 8 | **3.15** | 80.0 | 2.PD.05700.090 | ■ |
| | **.2283** | 5.80 | **.4567** | 11.60 | 8.00 | 27.6 | 8 | **3.15** | 80.0 | 2.PD.05800.090 | ■ |
| | **.2323** | 5.90 | **.4646** | 11.80 | 8.00 | 27.8 | 8 | **3.15** | 80.0 | 2.PD.05900.090 | ■ |
| | **.2362** | 6.00 | **.4724** | 12.00 | 8.00 | 28.0 | 8 | **3.15** | 80.0 | 2.PD.06000.090 | ■ |
| **1/4** | **.2500** | 6.350 | **.5000** | 12.70 | 8.00 | 28.7 | 8 | **3.15** | 80.0 | 2.PD.F14.090 | ■ |

Complementary products

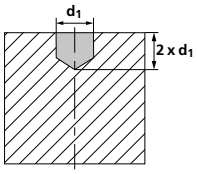
| | |
|---|---|
| CrazyDrill Steel | p.218 |
| CrazyDrill Alu | p.230 |
| CrazyDrill Cool | p.260 |
| CrazyDrill Cool XL | p.286 |

CRAZYDRILL by Mikron Tool Pilot

# CrazyDrill Pilot - 2 x d - 90° coutersink

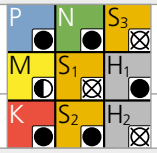
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 32 – 64 \| **105 – 210** |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 32 – 64 \| **105 – 210** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 24 – 48 \| **79 – 158** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 20 – 40 \| **66 – 131** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 24 – 48 \| **79 – 158** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 16 – 32 \| **53 – 105** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 40 – 80 \| **131 – 263** |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 80 – 160 \| **263 – 525** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 64 – 120 \| **210 – 394** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 – 80 \| **131 – 263** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 – 80 \| **131 – 263** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 56 – 120 \| **184 – 394** |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 32 – 56 \| **105 – 184** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 10 – 32 \| **32 – 105** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 10 – 44 \| **32 – 144** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 16 – 32 \| **53 – 105** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

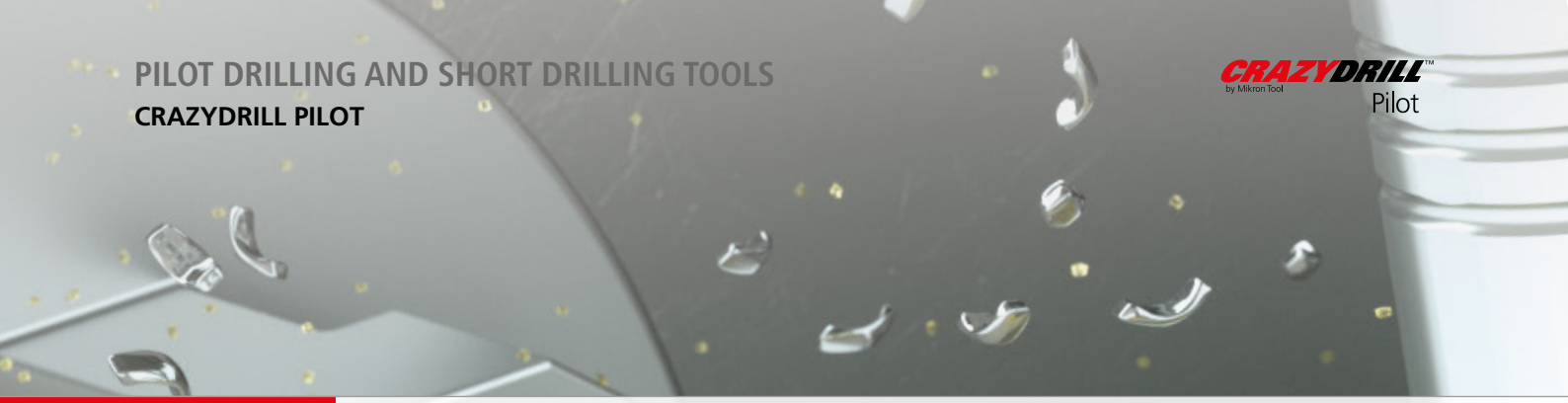
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| Ød1 | 1/64" 0.4 mm \| .016" f | 1/32" 0.8 mm \| .032" f | 1.0 mm \| .039" f | 1/16" 1.5 mm \| .059" f | 2.0 mm \| .079" f | 3/32" 2.5 mm \| .098" f | 1/8" 3.0 mm \| .118" f | 5/32" 4.0 mm \| .158" f | 3/16" - 7/32" 5.0 mm \| .197" f | 1/4" 6.0 mm \| .236" f |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.008 \| .00031 | 0.044 \| .0017 | 0.064 \| .0025 | 0.112 \| .0044 | 0.144 \| .0057 | 0.168 \| .0066 | 0.192 \| .0076 | 0.224 \| .0088 | 0.248 \| .0098 | 0.272 \| .0107 |
| | 0.008 \| .00031 | 0.044 \| .0017 | 0.064 \| .0025 | 0.096 \| .0038 | 0.120 \| .0047 | 0.136 \| .0054 | 0.152 \| .0060 | 0.176 \| .0069 | 0.192 \| .0076 | 0.208 \| .0082 |
| | 0.008 \| .00031 | 0.016 \| .0006 | 0.040 \| .0016 | 0.064 \| .0025 | 0.088 \| .0035 | 0.104 \| .0041 | 0.120 \| .0047 | 0.144 \| .0057 | 0.160 \| .0063 | 0.176 \| .0069 |
| | 0.008 \| .00031 | 0.009 \| .00035 | 0.024 \| .0009 | 0.048 \| .0019 | 0.064 \| .0025 | 0.072 \| .0028 | 0.080 \| .0031 | 0.096 \| .0038 | 0.104 \| .0041 | 0.112 \| .0044 |
| | 0.008 \| .00031 | 0.016 \| .0006 | 0.040 \| .0016 | 0.064 \| .0025 | 0.088 \| .0035 | 0.104 \| .0041 | 0.120 \| .0047 | 0.144 \| .0057 | 0.160 \| .0063 | 0.176 \| .0069 |
| | | | | | | | | | | |
| | 0.008 \| .00031 | 0.009 \| .00035 | 0.016 \| .0006 | 0.040 \| .0016 | 0.056 \| .0022 | 0.064 \| .0025 | 0.072 \| .0028 | 0.088 \| .0035 | 0.096 \| .0038 | 0.104 \| .0041 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | 0.008 \| .00031 | 0.040 \| .0016 | 0.064 \| .0025 | 0.096 \| .0038 | 0.120 \| .0047 | 0.120 \| .0047 | 0.120 \| .0047 | 0.160 \| .0063 | 0.160 \| .0063 | 0.160 \| .0063 |
| | 0.008 \| .00031 | 0.040 \| .0016 | 0.080 \| .0031 | 0.096 \| .0038 | 0.120 \| .0047 | 0.160 \| .0063 | 0.160 \| .0063 | 0.200 \| .0079 | 0.200 \| .0079 | 0.200 \| .0079 |
| | 0.012 \| .0005 | 0.064 \| .0025 | 0.088 \| .0035 | 0.128 \| .0050 | 0.160 \| .0063 | 0.200 \| .0079 | 0.200 \| .0079 | 0.224 \| .0088 | 0.224 \| .0088 | 0.224 \| .0088 |
| | 0.012 \| .0005 | 0.024 \| .0009 | 0.048 \| .0019 | 0.064 \| .0025 | 0.080 \| .0031 | 0.112 \| .0044 | 0.128 \| .0050 | 0.144 \| .0057 | 0.160 \| .0063 | 0.176 \| .0069 |
| | 0.016 \| .0006 | 0.032 \| .0013 | 0.064 \| .0025 | 0.080 \| .0031 | 0.096 \| .0038 | 0.128 \| .0050 | 0.144 \| .0057 | 0.160 \| .0063 | 0.176 \| .0069 | 0.192 \| .0076 |
| | 0.012 \| .0005 | 0.048 \| .0019 | 0.080 \| .0031 | 0.096 \| .0038 | 0.120 \| .0047 | 0.160 \| .0063 | 0.160 \| .0063 | 0.200 \| .0079 | 0.200 \| .0079 | 0.200 \| .0079 |
| | 0.008 \| .00031 | 0.040 \| .0016 | 0.064 \| .0025 | 0.080 \| .0031 | 0.096 \| .0038 | 0.120 \| .0047 | 0.120 \| .0047 | 0.160 \| .0063 | 0.160 \| .0063 | 0.160 \| .0063 |
| | | | | | | | | | | |
| | 0.008 \| .00031 | 0.024 \| .0009 | 0.032 \| .0013 | 0.048 \| .0019 | 0.056 \| .0022 | 0.064 \| .0025 | 0.064 \| .0025 | 0.080 \| .0031 | 0.080 \| .0031 | 0.096 \| .0038 |
| | 0.008 \| .00031 | 0.064 \| .0025 | 0.072 \| .0028 | 0.088 \| .0035 | 0.096 \| .0038 | 0.100 \| .0039 | 0.104 \| .0041 | 0.112 \| .0044 | 0.120 \| .0047 | 0.120 \| .0047 |
| | | | | | | | | | | |
| | 0.008 \| .00031 | 0.006 \| .00024 | 0.008 \| .00031 | 0.012 \| .0005 | 0.016 \| .0006 | 0.020 \| .0008 | 0.024 \| .0009 | 0.032 \| .0013 | 0.040 \| .0016 | 0.048 \| .0019 |
| | | | | | | | | | | |



# Drilling process CrazyDrill Pilot

## SHORT DRILLING UP TO 2 X D WITH 90° COUNTERSINK

### Coolant type, pressure and filtration flowrate

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling medium is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

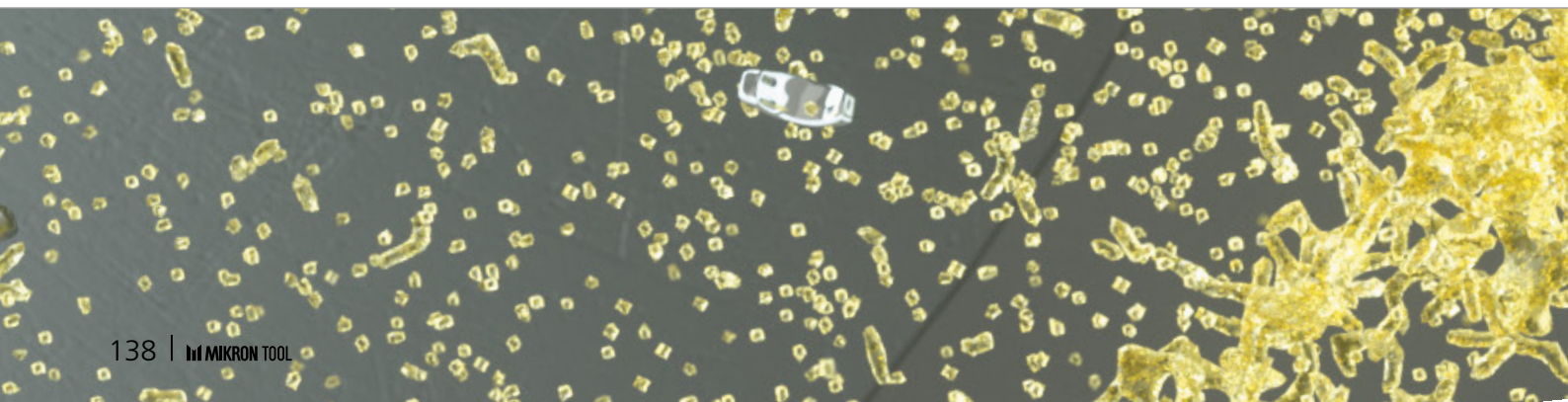
For detailed indications for tool holders see chapter "Technical information".

### Pilot drilling and short drilling

Pilot drilling with CrazyDrill Pilot is the perfect preparation for accurate drilling (position and alignment accuracy) and stable machining process.

Drilling quality (position and alignment accuracy, no measurable transition from pilot to follow-up hole) and stable machining process are assured due to matched diameters of the tools.

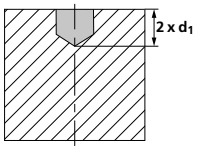
CrazyDrill Pilot not only is the perfect preparation of deep follow-up holes. Concurrently it is a short drill for highly precise and quick drilling up to 2 x d + 90° countersink.



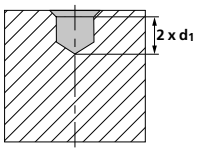
## DRILLING PROCESS

### 1 | PILOT DRILLING OR SHORT DRILLING

- Drilling in one step with recommended cutting speed and feed rate (see cutting data table).

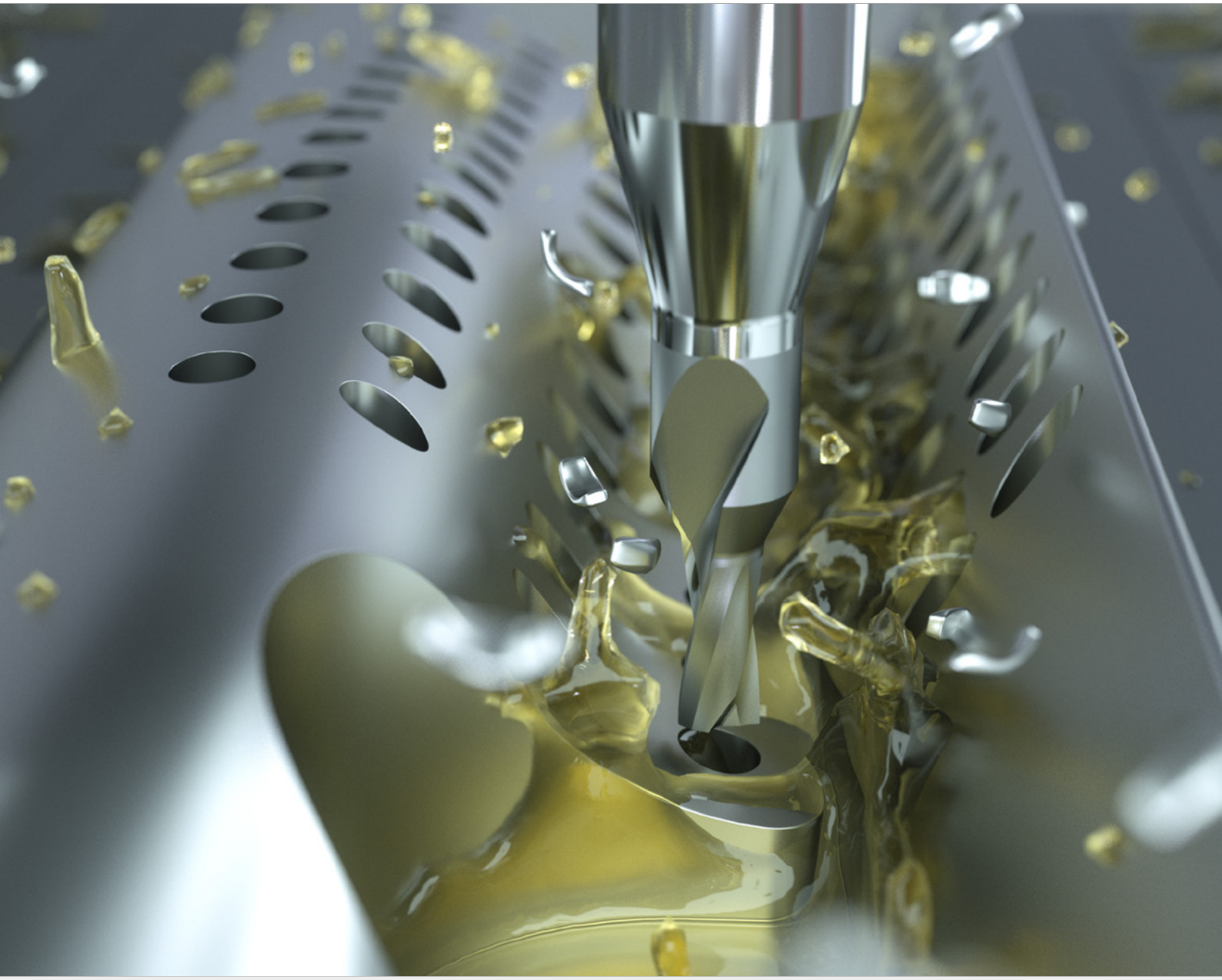



- If needed, after the desired cutting depth of 2 x d is reached, a chamfer angle of 90° can be realized.




Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# CrazyDrill Crosspilot



CRAZYDRILL Crosspilot

## A PILOT DRILL FOR INCLINED SURFACES UP TO 60°



Mikron Tool offers with CrazyDrill Crosspilot a coated solid carbide pilot drill for direct drilling on inclined surfaces up to a maximum inclined angle of 60°. The drill is available from stock in diameters of .016" to 1/4" (0.4 mm to 6.35 mm).

Producing pilot holes directly on inclined surfaces, means to reduce the three steps needed up to now "milling – centering – drilling" to two steps "pilot drilling – drilling".

The compact and sturdy design of CrazyDrill Crosspilot provides good position accuracy. The drill with a 170° tip angle affords the follow-up drill a perfect centering and cylindrical guidance. Highest degree of precision and straightness is assured. Perfectly matched diameter tolerances guarantee accurate deep hole drilling on inclined surfaces.

**Regrinding:** This product can be reground starting from Ø .055" (1.4 mm).

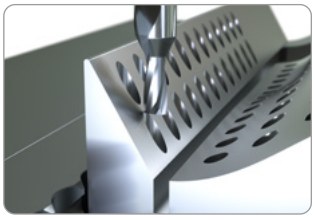
**Please note:** You couldn't find your suitable version of the CrazyDrill Crosspilot (diameter, length, cutting direction…)? Ask us about our customized versions!

# Features and benefits

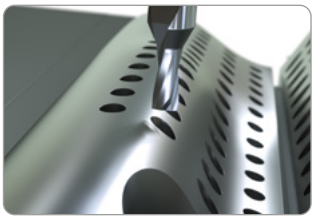
## DRILLING ON INCLINED, CONVEX AND CONCAVE SURFACES

- **SHORT MACHINING TIME** | pilot hole directly on inclined surfaces
- **HIGH PROCESS RELIABILITY** | due to an innovative tool design
- **HIGH DEGREE OF PRECISION** | due to small tolerances
- **LOW PRODUCTION COSTS** | savings of one tool: two instead of three work steps

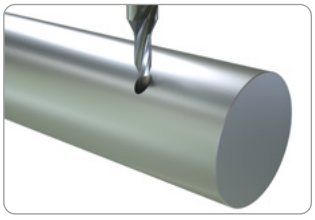
**CrazyDrill Crosspilot is used for:**



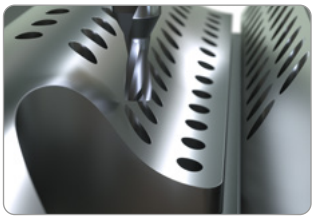
Inclined holes with angle up to 60° on flat surfaces.



Inclined holes with angle up to 60° on convex surfaces.



Eccentric holes on convex surfaces.



Inclined holes with angle up to 60° on concave surfaces.

# CrazyDrill Crosspilot

- Coated
- External cooling




**1 | SHAFT**
The reinforced shaft with its sturdy design counteracts lateral forces and guarantees highest position.

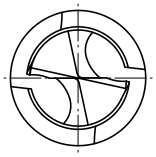
**2 | SOLID CARBIDE**
A special solid carbide assures high drilling speed.

**3 | COATING**
An optimal coating protects the solid carbide drill from wear and increases its tool life.

**4 | GUIDING MARGINS**
No lateral catching due to guiding margins and therefore higher process reliability.

**5 | TIP ANGLE GEOMETRY**
The special tip angle geometry of 170° minimizes radial forces and enables drilling up to a maximum inclined angle of 60°. Concurrently, the geometry assures a good centering and prevents cutting edge breakage of the follow-up drill.

Drill tip



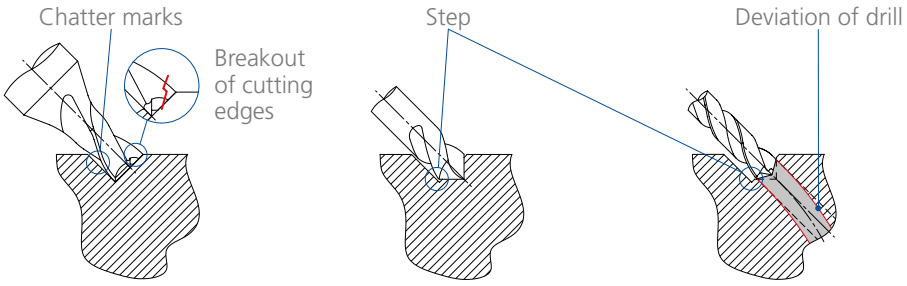
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# Features

## PERFECT FOR HOLES ON INCLINED SURFACES

**The comparison**

■ Machining of inclined holes with traditional method




**Step 1:** flat milling
**Tool:** Milling cutter

**Step 2:** centering
**Tool:** NC spot drill

**Step 3:** flat milling
**Tool:** Twist drill

■ Inclined hole, performed with CrazyDrill Crosspilot



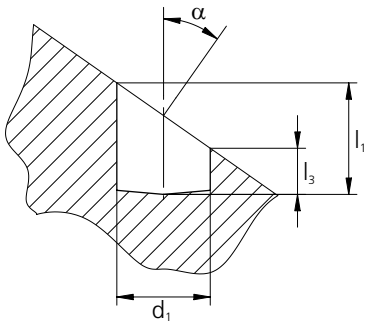
**Step 1:** inclined spot drilling with Mikron Tool pilot drill
**Tool:** CrazyDrill Crosspilot

**Step 2:** long, inclined hole
**Tool:** Twist drill

The coated solid carbide drill for steel, stainless steel materials, titanium and nonferrous metals is an unique specialist for holes on inclined, convex and concave surfaces. It produces pilot holes directly in surfaces with up to a maximum inclined angle of 60°. CrazyDrill Crosspilot reduces by one operation the traditional centering process.

The compact and sturdy design of CrazyDrill Crosspilot provides good position accuracy, its geometry is designed for extreme applications. Its 170° tip angle affords good centering, reduction of radial forces and prevents cutting edge breakage of the follow-up drill. Pilot drilling with CrazyDrill Crosspilot assures a cylindrical guidance of the follow-up drill. The result: process reliability, highest position and alignment accuracy.

**The formula:** $l_3 = 2 \times d_1 - d_1 \times \tan(\alpha)$




The example:
Inclination angle 35°, bore diameter .079" (2 mm).

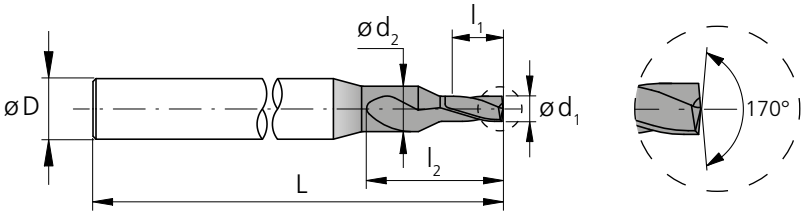
$l_3 = 2 \times .079" - .079" \times (\tan 35°) = .102"$ (2.6 mm)

With an inclination angle of 35° and a depth of .158" (4 mm) (2 x $d_1$) on long side, the hole depth on the short side becomes .102" (2.6 mm) (1.3 x $d_1$).

CRAZYDRILL by Mikron Tool Crosspilot

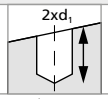
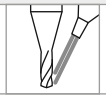
# CrazyDrill Crosspilot - 2 x d (nominal)

## DRILLING WITH EXTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1/64** | **.0156** | 0.396 | **.031** | 0.8 | 1.0 | 2.6 | 4 | **1.97** | 50 | 2.PD.F164.170 | ■ |
| | **.0157** | 0.40 | **.031** | 0.8 | 1.0 | 2.6 | 4 | **1.97** | 50 | 2.PD.00400.170 | ■ |
| | **.0177** | 0.45 | **.035** | 0.9 | 1.0 | 2.8 | 4 | **1.97** | 50 | 2.PD.00450.170 | ■ |
| | **.0197** | 0.50 | **.039** | 1.0 | 1.2 | 3.2 | 4 | **1.97** | 50 | 2.PD.00500.170 | ■ |
| | **.0217** | 0.55 | **.043** | 1.1 | 1.2 | 3.3 | 4 | **1.97** | 50 | 2.PD.00550.170 | ■ |
| | **.0236** | 0.60 | **.047** | 1.2 | 1.5 | 4.0 | 4 | **1.97** | 50 | 2.PD.00600.170 | ■ |
| | **.0256** | 0.65 | **.051** | 1.3 | 1.5 | 4.1 | 4 | **1.97** | 50 | 2.PD.00650.170 | ■ |
| | **.0276** | 0.70 | **.055** | 1.4 | 1.5 | 4.2 | 4 | **1.97** | 50 | 2.PD.00700.170 | ■ |
| | **.0295** | 0.75 | **.059** | 1.5 | 1.5 | 4.3 | 4 | **1.97** | 50 | 2.PD.00750.170 | ■ |
| **1/32** | **.0312** | 0.793 | **.063** | 1.6 | 1.7 | 4.8 | 4 | **1.97** | 50 | 2.PD.F132.170 | ■ |
| | **.0315** | 0.80 | **.063** | 1.6 | 1.7 | 4.8 | 4 | **1.97** | 50 | 2.PD.00800.170 | ■ |
| | **.0335** | 0.85 | **.067** | 1.7 | 1.7 | 4.9 | 4 | **1.97** | 50 | 2.PD.00850.170 | ■ |
| | **.0354** | 0.90 | **.071** | 1.8 | 1.7 | 5.0 | 4 | **1.97** | 50 | 2.PD.00900.170 | ■ |
| | **.0374** | 0.95 | **.075** | 1.9 | 1.7 | 5.1 | 4 | **1.97** | 50 | 2.PD.00950.170 | ■ |
| | **.0394** | 1.00 | **.079** | 2.0 | 2.0 | 5.7 | 4 | **2.17** | 55 | 2.PD.01000.170 | ■ |
| | **.0413** | 1.05 | **.083** | 2.1 | 2.0 | 5.8 | 4 | **2.17** | 55 | 2.PD.01050.170 | ■ |
| | **.0433** | 1.10 | **.087** | 2.2 | 2.0 | 6.0 | 4 | **2.17** | 55 | 2.PD.01100.170 | ■ |
| | **.0453** | 1.15 | **.091** | 2.3 | 2.0 | 6.1 | 4 | **2.17** | 55 | 2.PD.01150.170 | ■ |
| | **.0472** | 1.20 | **.094** | 2.4 | 2.0 | 6.2 | 4 | **2.17** | 55 | 2.PD.01200.170 | ■ |
| | **.0492** | 1.25 | **.098** | 2.5 | 2.5 | 7.2 | 4 | **2.17** | 55 | 2.PD.01250.170 | ■ |
| | **.0512** | 1.30 | **.102** | 2.6 | 2.5 | 7.3 | 4 | **2.17** | 55 | 2.PD.01300.170 | ■ |
| | **.0531** | 1.35 | **.106** | 2.7 | 2.5 | 7.4 | 4 | **2.17** | 55 | 2.PD.01350.170 | ■ |
| | **.0551** | 1.40 | **.110** | 2.8 | 2.5 | 7.5 | 4 | **2.17** | 55 | 2.PD.01400.170 | ■ |
| | **.0571** | 1.45 | **.114** | 2.9 | 2.5 | 7.6 | 4 | **2.17** | 55 | 2.PD.01450.170 | ■ |
| | **.0591** | 1.50 | **.118** | 3.0 | 3.0 | 8.6 | 4 | **2.17** | 55 | 2.PD.01500.170 | ■ |
| | **.0610** | 1.55 | **.122** | 3.1 | 3.0 | 8.7 | 4 | **2.17** | 55 | 2.PD.01550.170 | ■ |
| **1/16** | **.0625** | 1.587 | **.126** | 3.2 | 3.0 | 8.8 | 4 | **2.17** | 55 | 2.PD.F116.170 | ■ |
| | **.0630** | 1.60 | **.126** | 3.2 | 3.0 | 8.8 | 4 | **2.17** | 55 | 2.PD.01600.170 | ■ |
| | **.0650** | 1.65 | **.130** | 3.3 | 3.0 | 8.9 | 4 | **2.17** | 55 | 2.PD.01650.170 | ■ |
| | **.0669** | 1.70 | **.134** | 3.4 | 3.0 | 9.1 | 4 | **2.17** | 55 | 2.PD.01700.170 | ■ |
| | **.0689** | 1.75 | **.138** | 3.5 | 3.0 | 9.2 | 4 | **2.17** | 55 | 2.PD.01750.170 | ■ |
| | **.0709** | 1.80 | **.142** | 3.6 | 3.5 | 10.1 | 4 | **2.17** | 55 | 2.PD.01800.170 | ■ |
| | **.0728** | 1.85 | **.146** | 3.7 | 3.5 | 10.3 | 4 | **2.17** | 55 | 2.PD.01850.170 | ■ |
| | **.0748** | 1.90 | **.150** | 3.8 | 3.5 | 10.4 | 4 | **2.17** | 55 | 2.PD.01900.170 | ■ |
| | **.0768** | 1.95 | **.154** | 3.9 | 3.5 | 10.5 | 4 | **2.17** | 55 | 2.PD.01950.170 | ■ |
| | **.0787** | 2.00 | **.157** | 4.0 | 3.5 | 10.6 | 6 | **2.56** | 65 | 2.PD.02000.170 | ■ |
| | **.0807** | 2.05 | **.161** | 4.1 | 3.5 | 10.7 | 6 | **2.56** | 65 | 2.PD.02050.170 | ■ |
| | **.0827** | 2.10 | **.165** | 4.2 | 3.5 | 10.8 | 6 | **2.56** | 65 | 2.PD.02100.170 | ■ |
| | **.0846** | 2.15 | **.169** | 4.3 | 3.5 | 10.9 | 6 | **2.56** | 65 | 2.PD.02150.170 | ■ |
| | **.0866** | 2.20 | **.173** | 4.4 | 4.5 | 12.8 | 6 | **2.56** | 65 | 2.PD.02200.170 | ■ |
| | **.0886** | 2.25 | **.177** | 4.5 | 4.5 | 12.9 | 6 | **2.56** | 65 | 2.PD.02250.170 | ■ |
| | **.0906** | 2.30 | **.181** | 4.6 | 4.5 | 13.0 | 6 | **2.56** | 65 | 2.PD.02300.170 | ■ |
| | **.0925** | 2.35 | **.185** | 4.7 | 4.5 | 13.1 | 6 | **2.56** | 65 | 2.PD.02350.170 | ■ |
| **3/32** | **.0937** | 2.381 | **.189** | 4.8 | 4.5 | 13.2 | 6 | **2.56** | 65 | 2.PD.F332.170 | ■ |
| | **.0945** | 2.40 | **.189** | 4.8 | 4.5 | 13.2 | 6 | **2.56** | 65 | 2.PD.02400.170 | ■ |
| | **.0965** | 2.45 | **.193** | 4.9 | 4.5 | 13.4 | 6 | **2.56** | 65 | 2.PD.02450.170 | ■ |
| | **.0984** | 2.50 | **.197** | 5.0 | 4.5 | 13.5 | 6 | **2.56** | 65 | 2.PD.02500.170 | ■ |

■ Stock item

Carbide |  |  | Z2 |  | 

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | | **.240" - .394"** (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | **+ .00024"**<br>**0** | + 0.006 mm<br>0 | **+ .00035"**<br>**+ .00004"** | + 0.009 mm<br>+ 0.001 mm | **+ .00039"**<br>**+ .00004"** | + 0.010 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.1004** | 2.55 | **.201** | 5.1 | 4.5 | 13.6 | 6 | **2.56** | 65 | 2.PD.02550.170 | ■ |
| | **.1024** | 2.60 | **.205** | 5.2 | 4.5 | 13.7 | 6 | **2.56** | 65 | 2.PD.02600.170 | ■ |
| | **.1043** | 2.65 | **.209** | 5.3 | 5.0 | 14.7 | 6 | **2.56** | 65 | 2.PD.02650.170 | ■ |
| | **.1063** | 2.70 | **.213** | 5.4 | 5.0 | 14.8 | 6 | **2.56** | 65 | 2.PD.02700.170 | ■ |
| | **.1083** | 2.75 | **.217** | 5.5 | 5.0 | 14.9 | 6 | **2.56** | 65 | 2.PD.02750.170 | ■ |
| | **.1102** | 2.80 | **.220** | 5.6 | 5.0 | 15.0 | 6 | **2.56** | 65 | 2.PD.02800.170 | ■ |
| | **.1122** | 2.85 | **.224** | 5.7 | 5.0 | 15.1 | 6 | **2.56** | 65 | 2.PD.02850.170 | ■ |
| | **.1142** | 2.90 | **.228** | 5.8 | 5.0 | 15.2 | 6 | **2.56** | 65 | 2.PD.02900.170 | ■ |
| | **.1161** | 2.95 | **.232** | 5.9 | 5.0 | 15.4 | 6 | **2.56** | 65 | 2.PD.02950.170 | ■ |
| | **.1181** | 3.00 | **.236** | 6.0 | 6.0 | 17.2 | 6 | **2.76** | 70 | 2.PD.03000.170 | ■ |
| | **.1201** | 3.05 | **.240** | 6.1 | 6.0 | 17.3 | 6 | **2.76** | 70 | 2.PD.03050.170 | ■ |
| | **.1220** | 3.10 | **.244** | 6.2 | 6.0 | 17.4 | 6 | **2.76** | 70 | 2.PD.03100.170 | ■ |
| | **.1240** | 3.15 | **.248** | 6.3 | 6.0 | 17.5 | 6 | **2.76** | 70 | 2.PD.03150.170 | ■ |
| **1/8** | **.1250** | 3.175 | **.252** | 6.4 | 6.0 | 17.7 | 6 | **2.76** | 70 | 2.PD.F18.170 | ■ |
| | **.1260** | 3.20 | **.252** | 6.4 | 6.0 | 17.7 | 6 | **2.76** | 70 | 2.PD.03200.170 | ■ |
| | **.1280** | 3.25 | **.256** | 6.5 | 6.0 | 17.8 | 6 | **2.76** | 70 | 2.PD.03250.170 | ■ |
| | **.1299** | 3.30 | **.260** | 6.6 | 6.0 | 17.9 | 6 | **2.76** | 70 | 2.PD.03300.170 | ■ |
| | **.1319** | 3.35 | **.264** | 6.7 | 6.0 | 18.0 | 6 | **2.76** | 70 | 2.PD.03350.170 | ■ |
| | **.1339** | 3.40 | **.268** | 6.8 | 6.0 | 18.1 | 6 | **2.76** | 70 | 2.PD.03400.170 | ■ |
| | **.1358** | 3.45 | **.272** | 6.9 | 6.0 | 18.2 | 6 | **2.76** | 70 | 2.PD.03450.170 | ■ |
| | **.1378** | 3.50 | **.276** | 7.0 | 6.0 | 18.3 | 6 | **2.76** | 70 | 2.PD.03500.170 | ■ |
| | **.1398** | 3.55 | **.280** | 7.1 | 6.0 | 18.4 | 6 | **2.76** | 70 | 2.PD.03550.170 | ■ |
| | **.1417** | 3.60 | **.283** | 7.2 | 6.0 | 18.6 | 6 | **2.76** | 70 | 2.PD.03600.170 | ■ |
| | **.1437** | 3.65 | **.287** | 7.3 | 6.0 | 18.7 | 6 | **2.76** | 70 | 2.PD.03650.170 | ■ |
| | **.1457** | 3.70 | **.291** | 7.4 | 6.0 | 18.8 | 6 | **2.76** | 70 | 2.PD.03700.170 | ■ |
| | **.1476** | 3.75 | **.295** | 7.5 | 6.0 | 18.9 | 6 | **2.76** | 70 | 2.PD.03750.170 | ■ |
| | **.1496** | 3.80 | **.299** | 7.6 | 6.0 | 19.0 | 6 | **2.76** | 70 | 2.PD.03800.170 | ■ |
| | **.1516** | 3.85 | **.303** | 7.7 | 6.0 | 19.1 | 6 | **2.76** | 70 | 2.PD.03850.170 | ■ |
| | **.1535** | 3.90 | **.307** | 7.8 | 6.0 | 19.2 | 6 | **2.76** | 70 | 2.PD.03900.170 | ■ |
| | **.1555** | 3.95 | **.311** | 7.9 | 6.0 | 19.4 | 6 | **2.76** | 70 | 2.PD.03950.170 | ■ |
| **5/32** | **.1562** | 3.968 | **.315** | 8.0 | 6.0 | 19.5 | 6 | **2.76** | 70 | 2.PD.F532.170 | ■ |
| | **.1575** | 4.00 | **.315** | 8.0 | 6.0 | 19.5 | 6 | **2.76** | 70 | 2.PD.04000.170 | ■ |
| | **.1614** | 4.10 | **.323** | 8.2 | 6.0 | 21.3 | 6 | **2.76** | 70 | 2.PD.04100.170 | ■ |
| | **.1654** | 4.20 | **.331** | 8.4 | 6.0 | 21.4 | 6 | **2.76** | 70 | 2.PD.04200.170 | ■ |
| | **.1693** | 4.30 | **.339** | 8.6 | 6.0 | 21.6 | 6 | **2.76** | 70 | 2.PD.04300.170 | ■ |
| | **.1732** | 4.40 | **.346** | 8.8 | 6.0 | 21.7 | 6 | **2.76** | 70 | 2.PD.04400.170 | ■ |
| | **.1772** | 4.50 | **.354** | 9.0 | 8.0 | 27.0 | 8 | **3.15** | 80 | 2.PD.04500.170 | ■ |
| | **.1811** | 4.60 | **.362** | 9.2 | 8.0 | 27.1 | 8 | **3.15** | 80 | 2.PD.04600.170 | ■ |
| | **.1850** | 4.70 | **.370** | 9.4 | 8.0 | 27.3 | 8 | **3.15** | 80 | 2.PD.04700.170 | ■ |
| **3/16** | **.1875** | 4.762 | **.378** | 9.6 | 8.0 | 27.4 | 8 | **3.15** | 80 | 2.PD.F316.170 | ■ |
| | **.1890** | 4.80 | **.378** | 9.6 | 8.0 | 27.4 | 8 | **3.15** | 80 | 2.PD.04800.170 | ■ |
| | **.1929** | 4.90 | **.386** | 9.8 | 8.0 | 27.6 | 8 | **3.15** | 80 | 2.PD.04900.170 | ■ |
| | **.1969** | 5.00 | **.394** | 10.0 | 8.0 | 27.7 | 8 | **3.15** | 80 | 2.PD.05000.170 | ■ |
| | **.2008** | 5.10 | **.402** | 10.2 | 8.0 | 27.9 | 8 | **3.15** | 80 | 2.PD.05100.170 | ■ |
| | **.2047** | 5.20 | **.409** | 10.4 | 8.0 | 28.0 | 8 | **3.15** | 80 | 2.PD.05200.170 | ■ |
| | **.2087** | 5.30 | **.417** | 10.6 | 8.0 | 28.1 | 8 | **3.15** | 80 | 2.PD.05300.170 | ■ |
| | **.2126** | 5.40 | **.425** | 10.8 | 8.0 | 28.3 | 8 | **3.15** | 80 | 2.PD.05400.170 | ■ |
| | **.2165** | 5.50 | **.433** | 11.0 | 8.0 | 28.4 | 8 | **3.15** | 80 | 2.PD.05500.170 | ■ |
| **7/32** | **.2189** | 5.560 | **.441** | 11.2 | 8.0 | 28.6 | 8 | **3.15** | 80 | 2.PD.F732.170 | ■ |
| | **.2205** | 5.60 | **.441** | 11.2 | 8.0 | 28.6 | 8 | **3.15** | 80 | 2.PD.05600.170 | ■ |
| | **.2244** | 5.70 | **.449** | 11.4 | 8.0 | 28.7 | 8 | **3.15** | 80 | 2.PD.05700.170 | ■ |
| | **.2283** | 5.80 | **.457** | 11.6 | 8.0 | 28.9 | 8 | **3.15** | 80 | 2.PD.05800.170 | ■ |
| | **.2323** | 5.90 | **.465** | 11.8 | 8.0 | 29.0 | 8 | **3.15** | 80 | 2.PD.05900.170 | ■ |
| | **.2362** | 6.00 | **.472** | 12.0 | 8.0 | 29.1 | 8 | **3.15** | 80 | 2.PD.06000.170 | ■ |
| **1/4** | **.2500** | 6.350 | **.500** | 12.7 | 8.0 | 29.6 | 8 | **3.15** | 80 | 2.PD.F14.170 | ■ |

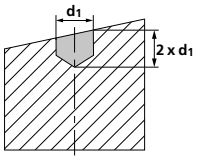
Complementary products
All "CrazyDrill" family

CRAZYDRILL by Mikron Tool Crosspilot

# CrazyDrill Crosspilot - 2 x d (nominal)

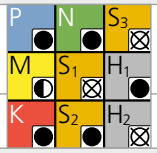
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 80 \| **262** |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| **197** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 50 \| **164** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 40 \| **131** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 50 \| **164** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 30 \| **98** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 80 \| **262** |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 125 \| **410** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 125 \| **410** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 80 \| **262** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 80 \| **262** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 100 \| **328** |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 80 \| **262** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 25 \| **82** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 25 \| **82** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 \| **66** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

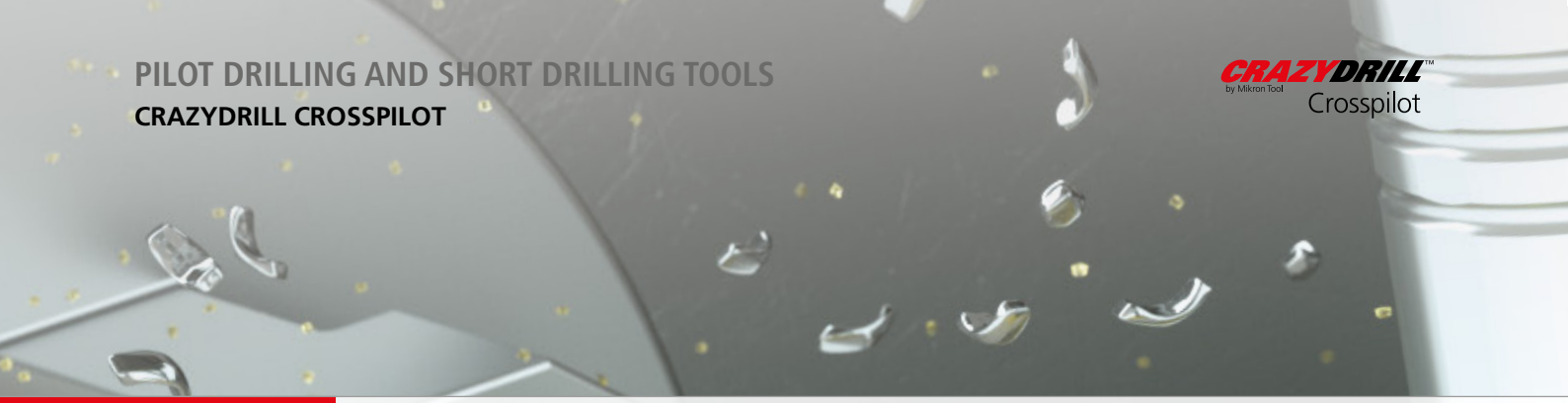
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| Ød1 | 1/64" 0.4 mm \| .016" f | 1/32" 0.8 mm \| .032" f | 1.0 mm \| .039" f | 1/16" 1.5 mm \| .059" f | 2.0 mm \| .079" f | 1/8" 3.0 mm \| .118" f | 5/32" 4.0 mm \| .158" f | 3/16" - 7/32" 5.0 mm \| .197" f | 1/4" 6.0 mm \| .236" f |
|---|---|---|---|---|---|---|---|---|---|
| | 0.005 \| .00020 | 0.011 \| .00043 | 0.013 \| .0005 | 0.020 \| .0008 | 0.027 \| .0011 | 0.040 \| .0016 | 0.053 \| .0021 | 0.067 \| .0026 | 0.080 \| .0031 |
| | 0.004 \| .00016 | 0.008 \| .00031 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | 0.004 \| .00016 | 0.008 \| .00031 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | 0.002 \| .00008 | 0.004 \| .00016 | 0.005 \| .0002 | 0.008 \| .0003 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 |
| | 0.004 \| .00016 | 0.008 \| .00031 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | | | | | | | | | |
| | 0.002 \| .00008 | 0.004 \| .00016 | 0.005 \| .0002 | 0.008 \| .0003 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 0.004 \| .00016 | 0.008 \| .00031 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | 0.008 \| .00031 | 0.016 \| .00063 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 |
| | 0.008 \| .00031 | 0.016 \| .00063 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 |
| | 0.004 \| .00016 | 0.008 \| .00031 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | 0.004 \| .00016 | 0.008 \| .00031 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | 0.008 \| .00031 | 0.016 \| .00063 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 |
| | 0.004 \| .00016 | 0.008 \| .00031 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | | | | | | | | | |
| | 0.004 \| .00016 | 0.008 \| .00031 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | 0.004 \| .00016 | 0.008 \| .00031 | 0.010 \| .0004 | 0.015 \| .0006 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | | | | | | | | | |
| | 0.001 \| .00004 | 0.003 \| .00012 | 0.003 \| .00012 | 0.005 \| .00020 | 0.007 \| .00028 | 0.010 \| .0004 | 0.013 \| .0005 | 0.017 \| .0007 | 0.020 \| .0008 |
| | | | | | | | | | |



# Drilling process CrazyDrill Crosspilot

## SHORT DRILLING ON INCLINED SURFACES UP TO 60°

### Coolant type, pressure, filtration and flowrate

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling medium is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

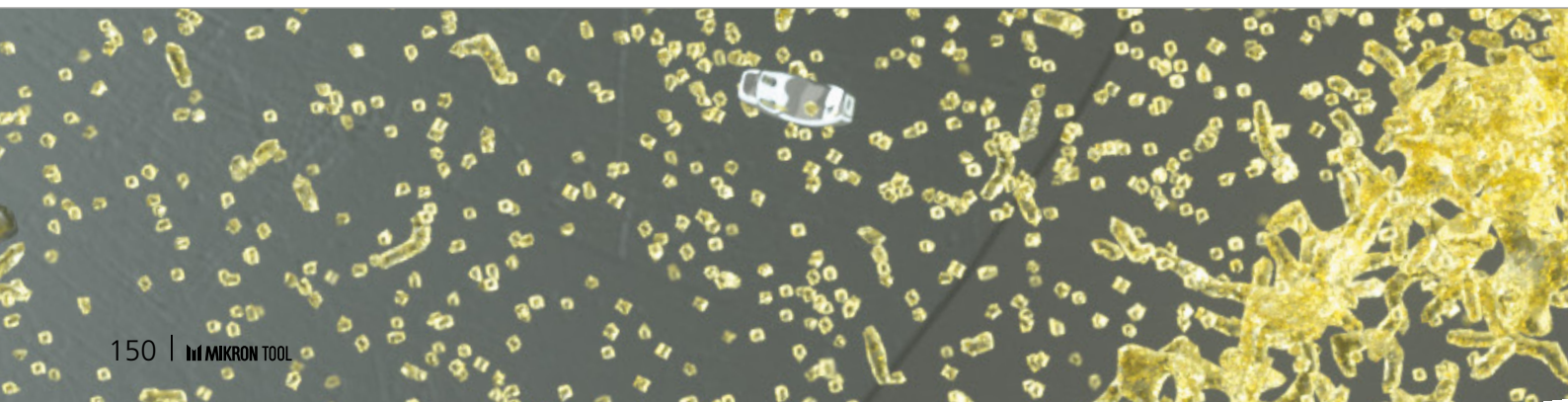
For detailed indications for tool holders see chapter "Technical information".

### Pilot drilling and short drilling

CrazyDrill Crosspilot, combined with deep hole drills of the CrazyDrill family, is the perfect solution when drilling on inclined, concave or convex surfaces.

Drilling quality (position and alignment accuracy) and stable machining process are assured due to matched diameter tolerances of the tools.

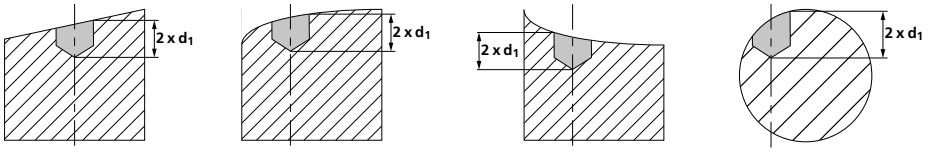
CrazyDrill Crosspilot not only is the perfect preparation of deep follow-up holes. Concurrently it is a short drill for highly precise and quick drilling on concave, convex and inclined surfaces up to a maximum inclined angle of 60°.



## DRILLING PROCESS

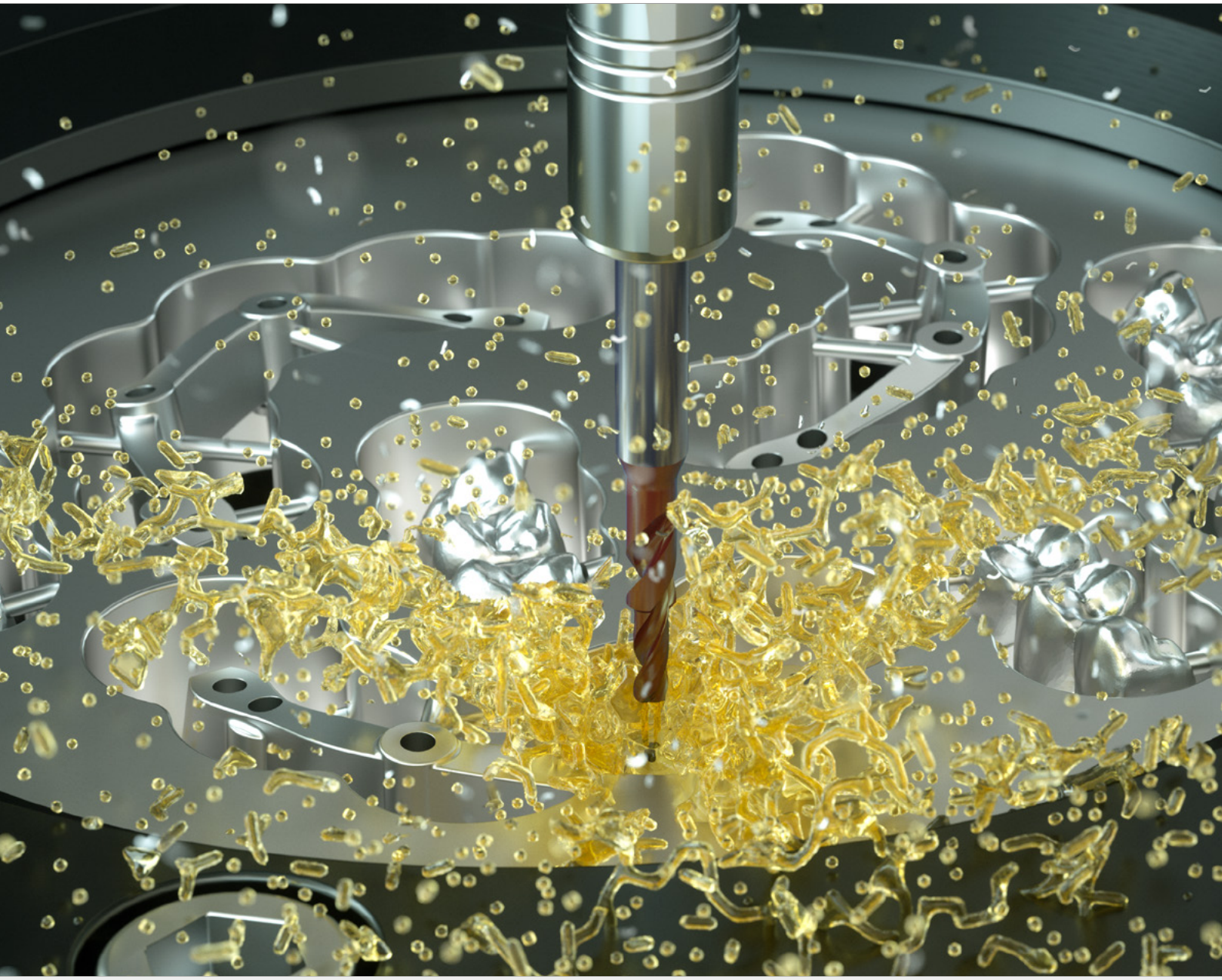
### 1 | PILOT DRILLING OR SHORT DRILLING

- Drilling in one step with recommended cutting speed and feed rate (see cutting data table).




Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# CrazyDrill Coolpilot



CRAZYDRILL Coolpilot

## PILOT OR SHORT DRILL WITH INNOVATIVE THROUGH-TOOL COOLING





CrazyDrill Coolpilot was developed as a pilot and short drill with an integrated cutting edge for 90° chamfer for stainless steels, heat-resistant and CrCo alloys in the diameter range of .039" to 1/4" (1.0 mm to 6.35 mm) and for a drilling depth of up to 3 x d. This makes it the ideal complement to CrazyDrill Cool SST-Inox. It has helical drop-shaped cooling channels up to the cutting edges as well as a chip breaker flute profile. The new, copper-red coating provides low adhesion to work materials and facilitates an efficient drilling process.

The new features are the tip geometry, the shape of the cooling channels, which allow up to four times more flowrate, the flute profile for perfect chip breaking and the coating. CrazyDrill Coolpilot is the perfect starter drill for deep drilling with CrazyDrill Cool SST-Inox.

The follow-up drill is optimally guided through the pilot hole, thus guaranteeing a high degree of hole straightness. A 90° countersink can be added simultaneously due to the integrated cutting edge for chamfer. Reduced tool changes therefore result in shorter machining times.

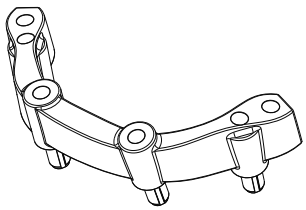
**Regrinding:** This product can be reground starting from Ø .055" (1.4 mm).

**Please note:** You couldn't find your suitable version of the CrazyDrill Coolpilot (diameter, length, cutting direction…)? Ask us about our customized versions!

# Features and benefits

## FOR A PROCESS RELIABLE, PRECISE AND FAST PILOT DRILLING

- **SHORT MACHINING TIME** | drilling 3 x d + 90° countersink with one tool
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to greater coolant flow
- **HIGH DEGREE OF PRECISION** | due to double margin



**COMPONENT**
Pontic (dental)

**MATERIAL**
CrCoMo28 / ASTM F1537

**MACHINING**
- Short drilling and chamfering 90°
- d = 4 mm **| .158"**
- drilling depth 12.1 mm **| .476"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Coolpilot

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Coolpilot<br>- Carbide<br>- Coated<br>- Internal cooling |
| Item number | 2.PD.04000.090.IC |
| Cutting data | $v_c$ = 70 m/min **\| 230 SFM**<br>f = 0.12 mm/rev **\| .0047 IPR** |

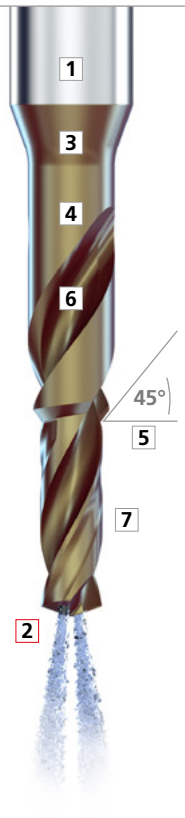
# CrazyDrill Coolpilot

- Coated
- Through-tool cooling










Page 156

**1 | SHANK**
The reinforced solid carbide shank guarantees stability, high degree of concentricity and hence maximum drilling precision.

**2 | NEW: WITH COOLING CHANNELS**
Due to a newly designed shape of helical cooling channels, up to four times more coolant volume reaches the drill tip. The result is continuous and efficient chip removal as well as constant and substantial cooling of cutting edges. A Powerchamber additionally guarantees sufficiently strong coolant flow for smaller diameters of up to Ø .116" (2.95 mm).

**3 | CARBIDE**
A specially developed micro-grain solid carbide allows machining at high speeds.

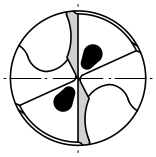
**4 | NEW COATING**
The high-performance coating eXedur SNP is heat-resistant and wear-resistant, prevents build up edges and promotes uniform chip flushing. The result is long tool life.

**5 | 90° CHAMFER CUTTING EDGE**
A 90° countersink can be placed simultaneously with the drilling.

**6 | NEW CHIP FLUTE PROFILE**
Divided into two areas:
- **Front chip flute area:** a special chip breaker shape ensures compact, short and curved chips.
- **Rear chip flute area:** an extended flute shape ensures perfect chip removal.

**7 | DOUBLE GUIDING MARGIN**
The narrow guiding chamfer ensures the highest degree of precision (straightness) and surface quality.

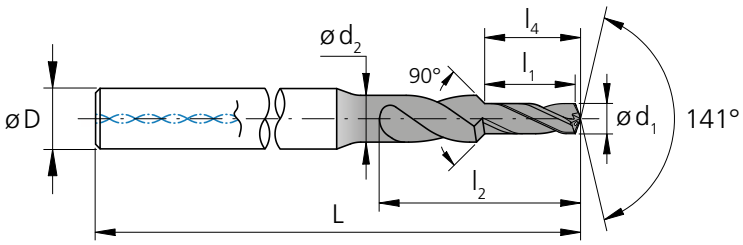
Drill tip



CRAZYDRILL by Mikron Tool Coolpilot

# CrazyDrill Coolpilot - 3 x d - 90° countersink

## DRILLING WITH THROUGH-TOOL COOLING




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | d2 [mm] | l2 [mm] | l4 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.1181** | 3.00 | 1.60 | 6.5 | 3.20 | 4 | **1.97** | 50 | 2.PD.01000.090.IC | ■ |
| | **.0413** | 1.05 | **.1240** | 3.15 | 1.60 | 6.8 | 3.30 | 4 | **1.97** | 50 | 2.PD.01050.090.IC | ■ |
| | **.0433** | 1.10 | **.1299** | 3.30 | 1.60 | 7.1 | 3.50 | 4 | **1.97** | 50 | 2.PD.01100.090.IC | ■ |
| | **.0453** | 1.15 | **.1358** | 3.45 | 1.60 | 7.5 | 3.60 | 4 | **1.97** | 50 | 2.PD.01150.090.IC | ■ |
| | **.0472** | 1.20 | **.1417** | 3.60 | 1.90 | 7.8 | 3.80 | 4 | **1.97** | 50 | 2.PD.01200.090.IC | ■ |
| | **.0492** | 1.25 | **.1476** | 3.75 | 1.90 | 8.1 | 4.00 | 4 | **1.97** | 50 | 2.PD.01250.090.IC | ■ |
| | **.0512** | 1.30 | **.1535** | 3.90 | 1.90 | 8.4 | 4.10 | 4 | **1.97** | 50 | 2.PD.01300.090.IC | ■ |
| | **.0531** | 1.35 | **.1594** | 4.05 | 1.90 | 8.8 | 4.30 | 4 | **1.97** | 50 | 2.PD.01350.090.IC | ■ |
| | **.0551** | 1.40 | **.1654** | 4.20 | 1.90 | 9.1 | 4.40 | 4 | **1.97** | 50 | 2.PD.01400.090.IC | ■ |
| | **.0571** | 1.45 | **.1713** | 4.35 | 2.25 | 10.4 | 4.60 | 4 | **1.97** | 50 | 2.PD.01450.090.IC | ■ |
| | **.0591** | 1.50 | **.1772** | 4.50 | 2.25 | 10.7 | 4.70 | 4 | **1.97** | 50 | 2.PD.01500.090.IC | ■ |
| | **.0610** | 1.55 | **.1831** | 4.65 | 2.25 | 10.9 | 4.90 | 4 | **1.97** | 50 | 2.PD.01550.090.IC | ■ |
| **1/16** | **.0625** | 1.587 | **.1874** | 4.76 | 2.25 | 11.2 | 5.10 | 4 | **1.97** | 50 | 2.PD.F116.IC | ■ |
| | **.0630** | 1.60 | **.1890** | 4.80 | 2.25 | 11.2 | 5.10 | 4 | **1.97** | 50 | 2.PD.01600.090.IC | ■ |
| | **.0650** | 1.65 | **.1949** | 4.95 | 2.25 | 11.5 | 5.20 | 4 | **1.97** | 50 | 2.PD.01650.090.IC | ■ |
| | **.0669** | 1.70 | **.2008** | 5.10 | 2.60 | 11.8 | 5.40 | 4 | **2.09** | 53 | 2.PD.01700.090.IC | ■ |
| | **.0689** | 1.75 | **.2067** | 5.25 | 2.60 | 12.1 | 5.50 | 4 | **2.09** | 53 | 2.PD.01750.090.IC | ■ |
| | **.0709** | 1.80 | **.2126** | 5.40 | 2.60 | 12.3 | 5.70 | 4 | **2.09** | 53 | 2.PD.01800.090.IC | ■ |
| | **.0728** | 1.85 | **.2185** | 5.55 | 2.60 | 12.6 | 5.80 | 4 | **2.09** | 53 | 2.PD.01850.090.IC | ■ |
| | **.0748** | 1.90 | **.2244** | 5.70 | 2.60 | 12.8 | 6.00 | 4 | **2.09** | 53 | 2.PD.01900.090.IC | ■ |
| | **.0768** | 1.95 | **.2303** | 5.85 | 2.60 | 13.1 | 6.20 | 4 | **2.09** | 53 | 2.PD.01950.090.IC | ■ |
| | **.0787** | 2.00 | **.2362** | 6.00 | 3.10 | 13.3 | 6.30 | 4 | **2.17** | 55 | 2.PD.02000.090.IC | ■ |
| | **.0807** | 2.05 | **.2421** | 6.15 | 3.10 | 13.6 | 6.50 | 4 | **2.17** | 55 | 2.PD.02050.090.IC | ■ |
| | **.0827** | 2.10 | **.2480** | 6.30 | 3.10 | 13.9 | 6.60 | 4 | **2.17** | 55 | 2.PD.02100.090.IC | ■ |
| | **.0846** | 2.15 | **.2539** | 6.45 | 3.10 | 14.1 | 6.80 | 4 | **2.17** | 55 | 2.PD.02150.090.IC | ■ |
| | **.0866** | 2.20 | **.2598** | 6.60 | 3.10 | 14.4 | 7.00 | 4 | **2.17** | 55 | 2.PD.02200.090.IC | ■ |
| | **.0886** | 2.25 | **.2657** | 6.75 | 3.10 | 14.7 | 7.10 | 4 | **2.17** | 55 | 2.PD.02250.090.IC | ■ |
| | **.0906** | 2.30 | **.2717** | 6.90 | 3.50 | 14.9 | 7.30 | 4 | **2.24** | 57 | 2.PD.02300.090.IC | ■ |
| | **.0925** | 2.35 | **.2776** | 7.05 | 3.50 | 15.2 | 7.40 | 4 | **2.24** | 57 | 2.PD.02350.090.IC | ■ |
| **3/32** | **.0937** | 2.381 | **.2812** | 7.14 | 3.50 | 15.6 | 7.60 | 4 | **2.24** | 57 | 2.PD.F332.IC | ■ |
| | **.0945** | 2.40 | **.2835** | 7.20 | 3.50 | 15.6 | 7.60 | 4 | **2.24** | 57 | 2.PD.02400.090.IC | ■ |
| | **.0965** | 2.45 | **.2894** | 7.35 | 3.50 | 15.9 | 7.70 | 4 | **2.24** | 57 | 2.PD.02450.090.IC | ■ |
| | **.0984** | 2.50 | **.2953** | 7.50 | 3.50 | 16.2 | 7.90 | 4 | **2.24** | 57 | 2.PD.02500.090.IC | ■ |
| | **.1004** | 2.55 | **.3012** | 7.65 | 3.50 | 16.5 | 8.10 | 4 | **2.24** | 57 | 2.PD.02550.090.IC | ■ |
| | **.1024** | 2.60 | **.3071** | 7.80 | 4.00 | 16.9 | 8.20 | 4 | **2.24** | 57 | 2.PD.02600.090.IC | ■ |
| | **.1043** | 2.65 | **.3130** | 7.95 | 4.00 | 17.2 | 8.40 | 4 | **2.24** | 57 | 2.PD.02650.090.IC | ■ |
| | **.1063** | 2.70 | **.3189** | 8.10 | 4.00 | 17.5 | 8.50 | 4 | **2.24** | 57 | 2.PD.02700.090.IC | ■ |
| | **.1083** | 2.75 | **.3248** | 8.25 | 4.00 | 17.8 | 8.70 | 4 | **2.24** | 57 | 2.PD.02750.090.IC | ■ |
| | **.1102** | 2.80 | **.3307** | 8.40 | 4.00 | 18.2 | 8.80 | 4 | **2.24** | 57 | 2.PD.02800.090.IC | ■ |
| | **.1122** | 2.85 | **.3366** | 8.55 | 4.00 | 18.5 | 9.00 | 4 | **2.24** | 57 | 2.PD.02850.090.IC | ■ |
| | **.1142** | 2.90 | **.3425** | 8.70 | 4.00 | 18.8 | 9.20 | 4 | **2.24** | 57 | 2.PD.02900.090.IC | ■ |

■ Stock item

Carbide | 3xd1 | 90° | 141° | Z2 | eXedur SNP

| Ø $d_1$ | .004" - .118" (0.1 - 3.0 mm) | | .120" - .236" (3.05 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | + .00024"<br>+ .00008" | + 0.006 mm<br>+ 0.002 mm | + .00035"<br>+ .00016" | + 0.009 mm<br>+ 0.004 mm | + .00047"<br>+ .00024" | + 0.012 mm<br>+ 0.006 mm |

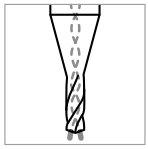
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | $l_4$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.1161** | 2.95 | **.3484** | 8.85 | 4.00 | 19.1 | 9.30 | 4 | **2.24** | 57 | 2.PD.02950.090.IC | ■ |
| | **.1181** | 3.00 | **.3543** | 9.00 | 4.70 | 19.5 | 9.50 | 6 | **2.56** | 65 | 2.PD.03000.090.IC | ■ |
| | **.1201** | 3.05 | **.3602** | 9.15 | 4.70 | 19.8 | 9.60 | 6 | **2.56** | 65 | 2.PD.03050.090.IC | ■ |
| | **.1220** | 3.10 | **.3661** | 9.30 | 4.70 | 20.1 | 9.80 | 6 | **2.56** | 65 | 2.PD.03100.090.IC | ■ |
| | **.1240** | 3.15 | **.3720** | 9.45 | 4.70 | 20.4 | 10.00 | 6 | **2.56** | 65 | 2.PD.03150.090.IC | ■ |
| **1/8** | **.1250** | 3.175 | **.3750** | 9.53 | 4.70 | 20.8 | 10.10 | 6 | **2.56** | 65 | 2.PD.F18.IC | ■ |
| | **.1260** | 3.20 | **.3780** | 9.60 | 4.70 | 20.8 | 10.10 | 6 | **2.56** | 65 | 2.PD.03200.090.IC | ■ |
| | **.1280** | 3.25 | **.3839** | 9.75 | 4.70 | 21.1 | 10.30 | 6 | **2.56** | 65 | 2.PD.03250.090.IC | ■ |
| | **.1299** | 3.30 | **.3898** | 9.90 | 4.70 | 21.4 | 10.40 | 6 | **2.56** | 65 | 2.PD.03300.090.IC | ■ |
| | **.1319** | 3.35 | **.3957** | 10.05 | 4.70 | 21.7 | 10.60 | 6 | **2.56** | 65 | 2.PD.03350.090.IC | ■ |
| | **.1339** | 3.40 | **.4016** | 10.20 | 4.70 | 22.1 | 10.70 | 6 | **2.56** | 65 | 2.PD.03400.090.IC | ■ |
| | **.1358** | 3.45 | **.4075** | 10.35 | 4.70 | 22.4 | 10.90 | 6 | **2.56** | 65 | 2.PD.03450.090.IC | ■ |
| | **.1378** | 3.50 | **.4134** | 10.50 | 5.40 | 22.7 | 11.10 | 6 | **2.68** | 68 | 2.PD.03500.090.IC | ■ |
| | **.1398** | 3.55 | **.4193** | 10.65 | 5.40 | 23.0 | 11.20 | 6 | **2.68** | 68 | 2.PD.03550.090.IC | ■ |
| | **.1417** | 3.60 | **.4252** | 10.80 | 5.40 | 23.4 | 11.40 | 6 | **2.68** | 68 | 2.PD.03600.090.IC | ■ |
| | **.1437** | 3.65 | **.4311** | 10.95 | 5.40 | 23.7 | 11.50 | 6 | **2.68** | 68 | 2.PD.03650.090.IC | ■ |
| | **.1457** | 3.70 | **.4370** | 11.10 | 5.40 | 24.0 | 11.70 | 6 | **2.68** | 68 | 2.PD.03700.090.IC | ■ |
| | **.1476** | 3.75 | **.4429** | 11.25 | 5.40 | 24.3 | 11.80 | 6 | **2.68** | 68 | 2.PD.03750.090.IC | ■ |
| | **.1496** | 3.80 | **.4488** | 11.40 | 5.40 | 24.7 | 12.00 | 6 | **2.68** | 68 | 2.PD.03800.090.IC | ■ |
| | **.1516** | 3.85 | **.4547** | 11.55 | 5.40 | 25.0 | 12.20 | 6 | **2.68** | 68 | 2.PD.03850.090.IC | ■ |
| | **.1535** | 3.90 | **.4606** | 11.70 | 5.40 | 25.3 | 12.30 | 6 | **2.68** | 68 | 2.PD.03900.090.IC | ■ |
| | **.1555** | 3.95 | **.4665** | 11.85 | 5.40 | 25.6 | 12.50 | 6 | **2.68** | 68 | 2.PD.03950.090.IC | ■ |
| **5/32** | **.1562** | 3.968 | **.4687** | 11.90 | 5.40 | 26.0 | 12.60 | 6 | **2.68** | 68 | 2.PD.F532.IC | ■ |
| | **.1575** | 4.00 | **.4724** | 12.00 | 5.40 | 26.0 | 12.60 | 6 | **2.68** | 68 | 2.PD.04000.090.IC | ■ |
| | **.1614** | 4.10 | **.4843** | 12.30 | 6.00 | 26.6 | 12.90 | 6 | **2.83** | 72 | 2.PD.04100.090.IC | ■ |
| | **.1654** | 4.20 | **.4961** | 12.60 | 6.00 | 27.2 | 13.30 | 6 | **2.83** | 72 | 2.PD.04200.090.IC | ■ |
| | **.1693** | 4.30 | **.5079** | 12.90 | 6.00 | 27.9 | 13.60 | 6 | **2.83** | 72 | 2.PD.04300.090.IC | ■ |
| | **.1732** | 4.40 | **.5197** | 13.20 | 6.00 | 28.5 | 13.90 | 6 | **2.83** | 72 | 2.PD.04400.090.IC | ■ |
| | **.1772** | 4.50 | **.5315** | 13.50 | 6.00 | 29.2 | 14.20 | 6 | **2.83** | 72 | 2.PD.04500.090.IC | ■ |
| | **.1811** | 4.60 | **.5433** | 13.80 | 6.00 | 29.8 | 14.50 | 6 | **2.83** | 72 | 2.PD.04600.090.IC | ■ |
| | **.1850** | 4.70 | **.5551** | 14.10 | 7.00 | 30.5 | 14.80 | 8 | **2.95** | 75 | 2.PD.04700.090.IC | ■ |
| **3/16** | **.1875** | 4.762 | **.5624** | 14.29 | 7.00 | 31.1 | 15.20 | 8 | **2.95** | 75 | 2.PD.F316.IC | ■ |
| | **.1890** | 4.80 | **.5669** | 14.40 | 7.00 | 31.1 | 15.20 | 8 | **2.95** | 75 | 2.PD.04800.090.IC | ■ |
| | **.1929** | 4.90 | **.5787** | 14.70 | 7.00 | 31.8 | 15.50 | 8 | **2.95** | 75 | 2.PD.04900.090.IC | ■ |
| | **.1969** | 5.00 | **.5906** | 15.00 | 7.00 | 32.4 | 15.80 | 8 | **2.95** | 75 | 2.PD.05000.090.IC | ■ |
| | **.2008** | 5.10 | **.6024** | 15.30 | 7.50 | 33.1 | 16.10 | 8 | **2.95** | 75 | 2.PD.05100.090.IC | ■ |
| | **.2047** | 5.20 | **.6142** | 15.60 | 7.50 | 33.7 | 16.40 | 8 | **2.95** | 75 | 2.PD.05200.090.IC | ■ |
| | **.2087** | 5.30 | **.6260** | 15.90 | 7.50 | 34.4 | 16.70 | 8 | **2.95** | 75 | 2.PD.05300.090.IC | ■ |
| | **.2126** | 5.40 | **.6378** | 16.20 | 8.00 | 35.0 | 17.10 | 8 | **3.15** | 80 | 2.PD.05400.090.IC | ■ |
| | **.2165** | 5.50 | **.6496** | 16.50 | 8.00 | 35.7 | 17.40 | 8 | **3.15** | 80 | 2.PD.05500.090.IC | ■ |
| **7/32** | **.2189** | 5.560 | **.6567** | 16.68 | 8.00 | 36.3 | 17.70 | 8 | **3.15** | 80 | 2.PD.F732.IC | ■ |
| | **.2205** | 5.60 | **.6614** | 16.80 | 8.00 | 36.3 | 17.70 | 8 | **3.15** | 80 | 2.PD.05600.090.IC | ■ |
| | **.2244** | 5.70 | **.6732** | 17.10 | 8.00 | 37.0 | 18.00 | 8 | **3.15** | 80 | 2.PD.05700.090.IC | ■ |
| | **.2283** | 5.80 | **.6850** | 17.40 | 8.00 | 37.6 | 18.30 | 8 | **3.15** | 80 | 2.PD.05800.090.IC | ■ |
| | **.2323** | 5.90 | **.6968** | 17.70 | 8.00 | 38.3 | 18.60 | 8 | **3.15** | 80 | 2.PD.05900.090.IC | ■ |
| | **.2362** | 6.00 | **.7087** | 18.00 | 8.00 | 38.9 | 18.90 | 8 | **3.15** | 80 | 2.PD.06000.090.IC | ■ |
| **1/4** | **.2500** | 6.350 | **.7500** | 19.05 | 8.00 | 41.2 | 20.05 | 8 | **3.15** | 80 | 2.PD.F14.IC | ■ |

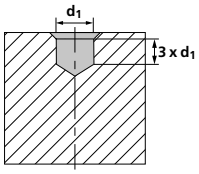
Complementary products
CrazyDrill Cool SST-Inox p.316

CRAZYDRILL by Mikron Tool Coolpilot

# CrazyDrill Coolpilot - 3 x d - 90° countersink

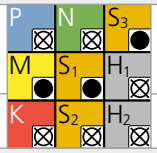
## DRILLING WITH THROUGH-TOOL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Low | Mid | High |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 30 \| **98** | 40 \| **131** | 50 \| **164** |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 50 \| **164** | 70 \| **230** | 90 \| **295** |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

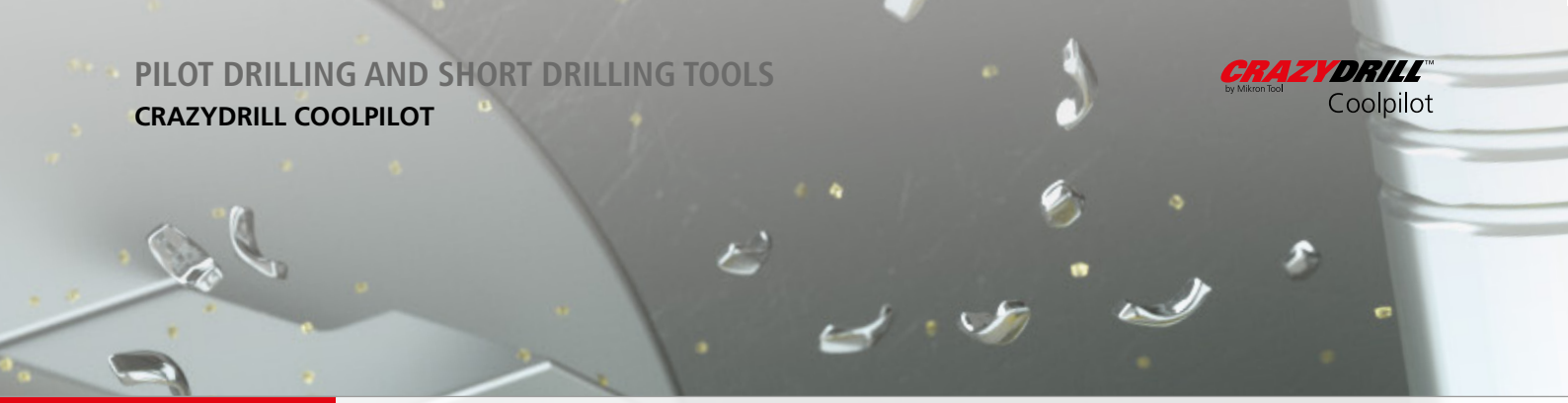
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| Ød1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 mm \| **.039"** | | | 1.25 mm \| **.049"** | | | **1/16"** 1.5 mm \| **.059"** | | | **3/32"** 2.0 mm \| **.079"** | | | 2.5 mm \| **.098"** | | | **1/8"** 3.0 mm \| **.118"** | | | **5/32"** 4.0 mm \| **.158"** | | | **3/16" - 7/32"** 5.0 mm \| **.197"** | | | **1/4"** 6.0 mm \| **.236"** | | |
| Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High |
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| 0.010<br>**.0004** | 0.020<br>**.0008** | 0.030<br>**.0012** | 0.013<br>**.0005** | 0.025<br>**.0010** | 0.038<br>**.0015** | 0.015<br>**.0006** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.020<br>**.0008** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.025<br>**.0010** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.030<br>**.0012** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.040<br>**.0016** | 0.080<br>**.0031** | 0.120<br>**.0047** | 0.050<br>**.0020** | 0.100<br>**.0039** | 0.150<br>**.0059** | 0.060<br>**.0024** | 0.120<br>**.0047** | 0.180<br>**.0071** |
| 0.030<br>**.0012** | 0.040<br>**.0016** | 0.050<br>**.0020** | 0.038<br>**.0015** | 0.050<br>**.0020** | 0.063<br>**.0025** | 0.045<br>**.0018** | 0.060<br>**.0024** | 0.075<br>**.0030** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.100<br>**.0039** | 0.075<br>**.0030** | 0.100<br>**.0039** | 0.125<br>**.0049** | 0.090<br>**.0035** | 0.120<br>**.0047** | 0.150<br>**.0059** | 0.120<br>**.0047** | 0.160<br>**.0063** | 0.200<br>**.0079** | 0.150<br>**.0059** | 0.200<br>**.0079** | 0.250<br>**.0098** | 0.180<br>**.0071** | 0.240<br>**.0094** | 0.300<br>**.0118** |
| 0.020<br>**.0008** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.025<br>**.0010** | 0.038<br>**.0015** | 0.050<br>**.0020** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.060<br>**.0024** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.100<br>**.0039** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.120<br>**.0047** | 0.080<br>**.0031** | 0.120<br>**.0047** | 0.160<br>**.0063** | 0.100<br>**.0039** | 0.150<br>**.0059** | 0.200<br>**.0079** | 0.120<br>**.0047** | 0.180<br>**.0071** | 0.240<br>**.0094** |
| 0.020<br>**.0008** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.025<br>**.0010** | 0.038<br>**.0015** | 0.050<br>**.0020** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.060<br>**.0024** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.100<br>**.0039** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.120<br>**.0047** | 0.080<br>**.0031** | 0.120<br>**.0047** | 0.160<br>**.0063** | 0.100<br>**.0039** | 0.150<br>**.0059** | 0.200<br>**.0079** | 0.120<br>**.0047** | 0.180<br>**.0071** | 0.240<br>**.0094** |
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| 0.010<br>**.0004** | 0.015<br>**.0006** | 0.020<br>**.0008** | 0.013<br>**.0005** | 0.019<br>**.0007** | 0.025<br>**.0010** | 0.015<br>**.0006** | 0.023<br>**.0009** | 0.030<br>**.0012** | 0.020<br>**.0008** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.025<br>**.0010** | 0.038<br>**.0015** | 0.050<br>**.0020** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.060<br>**.0024** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.100<br>**.0039** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.120<br>**.0047** |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.020<br>**.0008** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.025<br>**.0010** | 0.038<br>**.0015** | 0.050<br>**.0020** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.060<br>**.0024** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.100<br>**.0039** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.120<br>**.0047** | 0.080<br>**.0031** | 0.120<br>**.0047** | 0.160<br>**.0063** | 0.100<br>**.0039** | 0.150<br>**.0059** | 0.200<br>**.0079** | 0.120<br>**.0047** | 0.180<br>**.0071** | 0.240<br>**.0094** |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |



# Drilling process CrazyDrill Coolpilot

## SHORT DRILLING 3 X D AND 90° COUNTERSINK

### Coolant type, pressure and filtration

#### Coolant type

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

**Filtration:** Good filter quality is very important when using through coolant drills. Dirt particles or residual chips can clog the coolant holes and consequently reduce dramatically the flowrate.
The following filter qualities must be adhered especially in small diameters:

- Drill with Ø < .078" (2 mm) filter quality ≤ .0004" (0.010 mm).
- Drill with Ø < .118" (3 mm) filter quality ≤ .0008" (0.020 mm).
- Drill with Ø < 1/4" (6.35 mm) filter quality ≤ .0020" (0.050 mm).

**Coolant pressure**: At least the coolant pressure mentioned in the chart is required for the CrazyDrill Coolpilot to achieve reliable drilling. High pressure is generally better for the cooling and flushing effect.

| **Ø $d_1$ Tool** | [mm] **\| [inch]** | 1.0 mm - 2.0 mm **\| .039" - .079"** | 2.0 mm - 4.0 mm **\| .079" - .156"** | 4.0 mm - 6.35 mm **\| .156" - 1/4"** |
|---|---|---|---|---|
| **Minimal pressure** | [bar] | 40 | 30 | 25 |
| | **[psi]** | **580** | **435** | **363** |

### Tool holders

For detailed indications for tool holders see chapter "Technical information".

### Pilot drilling and short drilling

Pilot drilling with CrazyDrill Coolpilot is the perfect preparation for accurate drilling (position and alignment accuracy) and stable machining process.

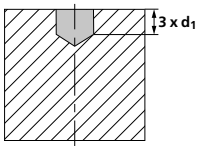
Drilling quality (position and alignment accuracy, no measurable transition from pilot to follow-up hole) and stable machining process are assured due to matched diameters of the tools.

CrazyDrill Coolpilot not only is the perfect preparation of deep follow-up holes. Concurrently it is a short drill for highly precise and quick drilling up to 3 x d + 90° countersink.

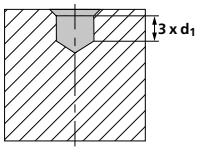
## DRILLING PROCESS

### 1 | PILOT DRILLING OR SHORT DRILLING

- Turn on internal coolant.
- Drilling in one step with recommended cutting speed and feed rate (see cutting data table).




- If needed, after the desired cutting depth of 3 x d is reached, a chamfer angle of 90° can be realized.




Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# NEW CrazyDrill Coolpilot Titanium ATC



NEW

CRAZYDRILL Coolpilot Titanium ATC

## PILOT OR SHORT DRILL WITH INNOVATIVE THROUGH-TOOL COOLING





CrazyDrill Coolpilot Titanium ATC was developed as a pilot and short drill with an integrated cutting edge for 90° chamfer for titanium alloys in the diameter range of .039" to 1/4" (1.0 mm to 6.35 mm) and for a drilling depth of up to 3 x d. This makes it the ideal complement to CrazyDrill Cool Titanium ATC. It has helical drop-shaped cooling channels up to the cutting edges as well as a chip breaker flute profile. The new, copper-red coating provides low adhesion to work materials and facilitates an efficient drilling process.

The new features are the tip geometry, the shape of the cooling channels, which allow up to four times more flowrate, the flute profile for perfect chip breaking and the coating. CrazyDrill Coolpilot Titanium ATC is the perfect starter drill for deep drilling with CrazyDrill Cool Titanium ATC.

The follow-up drill is optimally guided through the pilot hole, thus guaranteeing a high degree of hole straightness. A 90° countersink can be added simultaneously due to the integrated cutting edge for chamfer. Reduced tool changes therefore result in shorter machining times.

**Regrinding:** This product can be reground starting from Ø .055" (1.4 mm).

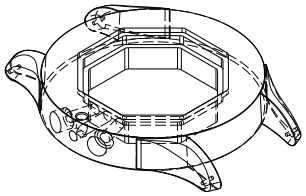
**Please note:** You couldn't find your suitable version of the CrazyDrill Coolpilot Titanium ATC (diameter, length, cutting direction…)? Ask us about our customized versions!

NEW

# Features and benefits

## FOR A PROCESS RELIABLE, PRECISE AND FAST PILOT DRILLING

- **SHORT MACHINING TIME** | drilling 3 x d + 90° countersink with one tool
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to greater coolant flow
- **HIGH DEGREE OF PRECISION** | innovative flute and tip geometry



**COMPONENT**
Watch housing

**MATERIAL**
Ti Gr.5 / TiAl6V4 / 3.7165 / ASTM B348

**MACHINING**
- Drilling
- d = 2 mm **| .079"**
- Drilling depth 6 mm **| .236"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Coolpilot Titanium ATC

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Coolpilot Titanium ATC<br>- Carbide<br>- Coated<br>- Integrated cooling |
| Item number | 2.PD.02000.ATC |
| Cutting data | $v_c$ = 40 m/min **\| 131 SFM**<br>f = 0.040 mm/rev **\| .00157 IPR** |

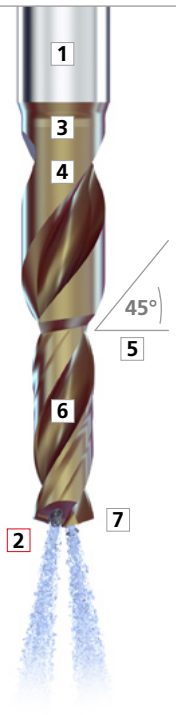
# CrazyDrill Coolpilot Titanium ATC

- Coated
- Through-tool cooling










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NEW

**1 | SHANK**
The reinforced solid carbide shank guarantees stability, high degree of concentricity and hence maximum drilling precision.

**2 | NEW: WITH COOLING CHANNELS**
Due to a newly designed shape of helical cooling channels, up to four times more coolant volume reaches the drill tip. The result is continuous and efficient chip removal as well as constant and substantial cooling of cutting edges. A Powerchamber additionally guarantees sufficiently strong coolant flow for smaller diameters of up to Ø .116" (2.95 mm).

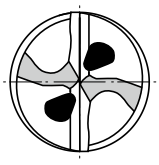
**3 | CARBIDE**
A specially developed micro-grain solid carbide allows machining at high speeds.

**4 | NEW COATING**
The high-performance coating eXedur SNP is heat-resistant and wear-resistant, prevents build up edges and promotes uniform chip flushing. The result is long tool life.

**5 | 90° CHAMFER CUTTING EDGE**
A 90° countersink can be placed simultaneously with the drilling.

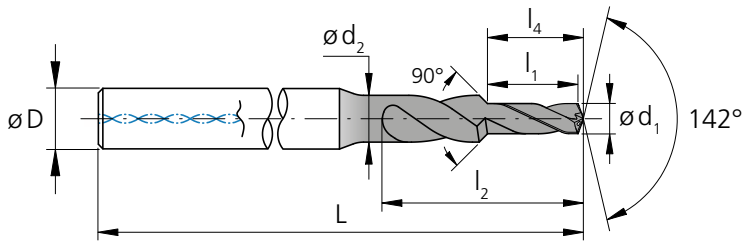
**6 | POLISHED FLUTES**
The polished flutes promote uniform chip flushing.

**7 | SINGLE GUIDING MARGIN**
The particularly smooth surfaces of the guiding margin prevent material sticking and reduce the load on the tool. The result is the highest degree of precision (straightness) and surface quality.

Drill tip 

# NEW CrazyDrill Coolpilot Titanium ATC - 3 x d

## DRILLING WITH THROUGH-TOOL COOLING




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | d2 [mm] | l2 [mm] | l4 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.118** | 3.00 | 1.60 | 6.5 | 3.20 | 4 | **1.97** | 50 | 2.PD.01000.ATC | ■ |
| | **.0413** | 1.05 | **.124** | 3.15 | 1.60 | 6.8 | 3.30 | 4 | **1.97** | 50 | 2.PD.01050.ATC | ■ |
| | **.0433** | 1.10 | **.130** | 3.30 | 1.60 | 7.1 | 3.50 | 4 | **1.97** | 50 | 2.PD.01100.ATC | ■ |
| | **.0453** | 1.15 | **.136** | 3.45 | 1.60 | 7.5 | 3.60 | 4 | **1.97** | 50 | 2.PD.01150.ATC | ■ |
| | **.0472** | 1.20 | **.142** | 3.60 | 1.90 | 7.8 | 3.80 | 4 | **1.97** | 50 | 2.PD.01200.ATC | ■ |
| | **.0492** | 1.25 | **.148** | 3.75 | 1.90 | 8.1 | 4.00 | 4 | **1.97** | 50 | 2.PD.01250.ATC | ■ |
| | **.0512** | 1.30 | **.154** | 3.90 | 1.90 | 8.4 | 4.10 | 4 | **1.97** | 50 | 2.PD.01300.ATC | ■ |
| | **.0531** | 1.35 | **.159** | 4.05 | 1.90 | 8.8 | 4.30 | 4 | **1.97** | 50 | 2.PD.01350.ATC | ■ |
| | **.0551** | 1.40 | **.165** | 4.20 | 1.90 | 9.1 | 4.40 | 4 | **1.97** | 50 | 2.PD.01400.ATC | ■ |
| | **.0571** | 1.45 | **.171** | 4.35 | 2.25 | 10.4 | 4.60 | 4 | **1.97** | 50 | 2.PD.01450.ATC | ■ |
| | **.0591** | 1.50 | **.177** | 4.50 | 2.25 | 10.7 | 4.70 | 4 | **1.97** | 50 | 2.PD.01500.ATC | ■ |
| | **.0610** | 1.55 | **.183** | 4.65 | 2.25 | 10.9 | 4.90 | 4 | **1.97** | 50 | 2.PD.01550.ATC | ■ |
| **1/16** | **.0625** | 1.587 | **.187** | 4.76 | 2.25 | 11.2 | 5.00 | 4 | **1.97** | 50 | 2.PD.F116.ATC | ■ |
| | **.0630** | 1.60 | **.189** | 4.80 | 2.25 | 11.2 | 5.10 | 4 | **1.97** | 50 | 2.PD.01600.ATC | ■ |
| | **.0650** | 1.65 | **.195** | 4.95 | 2.25 | 11.5 | 5.20 | 4 | **1.97** | 50 | 2.PD.01650.ATC | ■ |
| | **.0669** | 1.70 | **.201** | 5.10 | 2.60 | 11.8 | 5.40 | 4 | **2.09** | 53 | 2.PD.01700.ATC | ■ |
| | **.0689** | 1.75 | **.207** | 5.25 | 2.60 | 12.1 | 5.50 | 4 | **2.09** | 53 | 2.PD.01750.ATC | ■ |
| | **.0709** | 1.80 | **.213** | 5.40 | 2.60 | 12.3 | 5.70 | 4 | **2.09** | 53 | 2.PD.01800.ATC | ■ |
| | **.0728** | 1.85 | **.219** | 5.55 | 2.60 | 12.6 | 5.80 | 4 | **2.09** | 53 | 2.PD.01850.ATC | ■ |
| | **.0748** | 1.90 | **.224** | 5.70 | 2.60 | 12.8 | 6.00 | 4 | **2.09** | 53 | 2.PD.01900.ATC | ■ |
| | **.0768** | 1.95 | **.230** | 5.85 | 2.60 | 13.1 | 6.20 | 4 | **2.09** | 53 | 2.PD.01950.ATC | ■ |
| | **.0787** | 2.00 | **.236** | 6.00 | 3.10 | 13.3 | 6.30 | 4 | **2.17** | 55 | 2.PD.02000.ATC | ■ |
| | **.0807** | 2.05 | **.242** | 6.15 | 3.10 | 13.6 | 6.50 | 4 | **2.17** | 55 | 2.PD.02050.ATC | ■ |
| | **.0827** | 2.10 | **.248** | 6.30 | 3.10 | 13.9 | 6.60 | 4 | **2.17** | 55 | 2.PD.02100.ATC | ■ |
| | **.0846** | 2.15 | **.254** | 6.45 | 3.10 | 14.1 | 6.80 | 4 | **2.17** | 55 | 2.PD.02150.ATC | ■ |
| | **.0866** | 2.20 | **.260** | 6.60 | 3.10 | 14.4 | 7.00 | 4 | **2.17** | 55 | 2.PD.02200.ATC | ■ |
| | **.0886** | 2.25 | **.266** | 6.75 | 3.10 | 14.7 | 7.10 | 4 | **2.17** | 55 | 2.PD.02250.ATC | ■ |
| | **.0906** | 2.30 | **.272** | 6.90 | 3.50 | 14.9 | 7.30 | 4 | **2.24** | 57 | 2.PD.02300.ATC | ■ |
| | **.0925** | 2.35 | **.278** | 7.05 | 3.50 | 15.2 | 7.40 | 4 | **2.24** | 57 | 2.PD.02350.ATC | ■ |
| **3/32** | **.0937** | 2.381 | **.281** | 7.14 | 3.50 | 15.5 | 7.49 | 4 | **2.24** | 57 | 2.PD.F332.ATC | ■ |
| | **.0945** | 2.40 | **.283** | 7.20 | 3.50 | 15.6 | 7.60 | 4 | **2.24** | 57 | 2.PD.02400.ATC | ■ |
| | **.0965** | 2.45 | **.289** | 7.35 | 3.50 | 15.9 | 7.70 | 4 | **2.24** | 57 | 2.PD.02450.ATC | ■ |
| | **.0984** | 2.50 | **.295** | 7.50 | 3.50 | 16.2 | 7.90 | 4 | **2.24** | 57 | 2.PD.02500.ATC | ■ |
| | **.1004** | 2.55 | **.301** | 7.65 | 3.50 | 16.5 | 8.10 | 4 | **2.24** | 57 | 2.PD.02550.ATC | ■ |
| | **.1024** | 2.60 | **.307** | 7.80 | 4.00 | 16.9 | 8.20 | 4 | **2.24** | 57 | 2.PD.02600.ATC | ■ |
| | **.1043** | 2.65 | **.313** | 7.95 | 4.00 | 17.2 | 8.40 | 4 | **2.24** | 57 | 2.PD.02650.ATC | ■ |
| | **.1063** | 2.70 | **.319** | 8.10 | 4.00 | 17.5 | 8.50 | 4 | **2.24** | 57 | 2.PD.02700.ATC | ■ |
| | **.1083** | 2.75 | **.325** | 8.25 | 4.00 | 17.8 | 8.70 | 4 | **2.24** | 57 | 2.PD.02750.ATC | ■ |
| | **.1102** | 2.80 | **.331** | 8.40 | 4.00 | 18.2 | 8.80 | 4 | **2.24** | 57 | 2.PD.02800.ATC | ■ |
| | **.1122** | 2.85 | **.337** | 8.55 | 4.00 | 18.5 | 9.00 | 4 | **2.24** | 57 | 2.PD.02850.ATC | ■ |
| | **.1142** | 2.90 | **.343** | 8.70 | 4.00 | 18.8 | 9.20 | 4 | **2.24** | 57 | 2.PD.02900.ATC | ■ |

■ Stock item

Carbide | 3xd1 | 90° | 141° | Z2 | eXedur SNP

| Ø $d_1$ | .004" - .118" (0.1 - 3.0 mm) | | .120" - .236" (3.05 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | + .00024"<br>+ .00008" | + 0.006 mm<br>+ 0.002 mm | + .00035"<br>+ .00016" | + 0.009 mm<br>+ 0.004 mm | + .00047"<br>+ .00024" | + 0.012 mm<br>+ 0.006 mm |

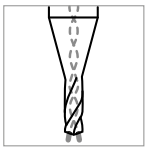
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | $l_4$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.1161** | 2.95 | **.348** | 8.85 | 4.00 | 19.1 | 9.30 | 4 | **2.24** | 57 | 2.PD.02950.ATC | ■ |
| | **.1181** | 3.00 | **.354** | 9.00 | 4.70 | 19.5 | 9.50 | 6 | **2.56** | 65 | 2.PD.03000.ATC | ■ |
| | **.1201** | 3.05 | **.360** | 9.15 | 4.70 | 19.8 | 9.60 | 6 | **2.56** | 65 | 2.PD.03050.ATC | ■ |
| | **.1220** | 3.10 | **.366** | 9.30 | 4.70 | 20.1 | 9.80 | 6 | **2.56** | 65 | 2.PD.03100.ATC | ■ |
| | **.1240** | 3.15 | **.372** | 9.45 | 4.70 | 20.4 | 10.00 | 6 | **2.56** | 65 | 2.PD.03150.ATC | ■ |
| **1/8** | **.1250** | 3.175 | **.375** | 9.53 | 4.70 | 20.6 | 10.00 | 6 | **2.56** | 65 | 2.PD.F18.ATC | ■ |
| | **.1260** | 3.20 | **.378** | 9.60 | 4.70 | 20.8 | 10.10 | 6 | **2.56** | 65 | 2.PD.03200.ATC | ■ |
| | **.1280** | 3.25 | **.384** | 9.75 | 4.70 | 21.1 | 10.30 | 6 | **2.56** | 65 | 2.PD.03250.ATC | ■ |
| | **.1299** | 3.30 | **.390** | 9.90 | 4.70 | 21.4 | 10.40 | 6 | **2.56** | 65 | 2.PD.03300.ATC | ■ |
| | **.1319** | 3.35 | **.396** | 10.05 | 4.70 | 21.7 | 10.60 | 6 | **2.56** | 65 | 2.PD.03350.ATC | ■ |
| | **.1339** | 3.40 | **.402** | 10.20 | 4.70 | 22.1 | 10.70 | 6 | **2.56** | 65 | 2.PD.03400.ATC | ■ |
| | **.1358** | 3.45 | **.407** | 10.35 | 4.70 | 22.4 | 10.90 | 6 | **2.56** | 65 | 2.PD.03450.ATC | ■ |
| | **.1378** | 3.50 | **.413** | 10.50 | 5.40 | 22.7 | 11.10 | 6 | **2.68** | 68 | 2.PD.03500.ATC | ■ |
| | **.1398** | 3.55 | **.419** | 10.65 | 5.40 | 23.0 | 11.20 | 6 | **2.68** | 68 | 2.PD.03550.ATC | ■ |
| | **.1417** | 3.60 | **.425** | 10.80 | 5.40 | 23.4 | 11.40 | 6 | **2.68** | 68 | 2.PD.03600.ATC | ■ |
| | **.1437** | 3.65 | **.431** | 10.95 | 5.40 | 23.7 | 11.50 | 6 | **2.68** | 68 | 2.PD.03650.ATC | ■ |
| | **.1457** | 3.70 | **.437** | 11.10 | 5.40 | 24.0 | 11.70 | 6 | **2.68** | 68 | 2.PD.03700.ATC | ■ |
| | **.1476** | 3.75 | **.443** | 11.25 | 5.40 | 24.3 | 11.80 | 6 | **2.68** | 68 | 2.PD.03750.ATC | ■ |
| | **.1496** | 3.80 | **.449** | 11.40 | 5.40 | 24.7 | 12.00 | 6 | **2.68** | 68 | 2.PD.03800.ATC | ■ |
| | **.1516** | 3.85 | **.455** | 11.55 | 5.40 | 25.0 | 12.20 | 6 | **2.68** | 68 | 2.PD.03850.ATC | ■ |
| | **.1535** | 3.90 | **.461** | 11.70 | 5.40 | 25.3 | 12.30 | 6 | **2.68** | 68 | 2.PD.03900.ATC | ■ |
| | **.1555** | 3.95 | **.467** | 11.85 | 5.40 | 25.6 | 12.50 | 6 | **2.68** | 68 | 2.PD.03950.ATC | ■ |
| **5/32** | **.1562** | 3.968 | **.469** | 11.90 | 5.40 | 25.7 | 12.50 | 6 | **2.68** | 68 | 2.PD.F532.ATC | ■ |
| | **.1575** | 4.00 | **.472** | 12.00 | 5.40 | 26.0 | 12.60 | 6 | **2.68** | 68 | 2.PD.04000.ATC | ■ |
| | **.1614** | 4.10 | **.484** | 12.30 | 6.00 | 26.6 | 12.90 | 6 | **2.83** | 72 | 2.PD.04100.ATC | ■ |
| | **.1654** | 4.20 | **.496** | 12.60 | 6.00 | 27.2 | 13.30 | 6 | **2.83** | 72 | 2.PD.04200.ATC | ■ |
| | **.1693** | 4.30 | **.508** | 12.90 | 6.00 | 27.9 | 13.60 | 6 | **2.83** | 72 | 2.PD.04300.ATC | ■ |
| | **.1732** | 4.40 | **.520** | 13.20 | 6.00 | 28.5 | 13.90 | 6 | **2.83** | 72 | 2.PD.04400.ATC | ■ |
| | **.1772** | 4.50 | **.531** | 13.50 | 6.00 | 29.2 | 14.20 | 6 | **2.83** | 72 | 2.PD.04500.ATC | ■ |
| | **.1811** | 4.60 | **.543** | 13.80 | 6.00 | 29.8 | 14.50 | 6 | **2.83** | 72 | 2.PD.04600.ATC | ■ |
| | **.1850** | 4.70 | **.555** | 14.10 | 7.00 | 30.5 | 14.80 | 8 | **2.95** | 75 | 2.PD.04700.ATC | ■ |
| **3/16** | **.1875** | 4.762 | **.563** | 14.29 | 7.00 | 30.8 | 15.00 | 8 | **2.95** | 75 | 2.PD.F316.ATC | ■ |
| | **.1890** | 4.80 | **.567** | 14.40 | 7.00 | 31.1 | 15.20 | 8 | **2.95** | 75 | 2.PD.04800.ATC | ■ |
| | **.1929** | 4.90 | **.579** | 14.70 | 7.00 | 31.8 | 15.50 | 8 | **2.95** | 75 | 2.PD.04900.ATC | ■ |
| | **.1969** | 5.00 | **.591** | 15.00 | 7.00 | 32.4 | 15.80 | 8 | **2.95** | 75 | 2.PD.05000.ATC | ■ |
| | **.2008** | 5.10 | **.602** | 15.30 | 7.50 | 33.1 | 16.10 | 8 | **2.95** | 75 | 2.PD.05100.ATC | ■ |
| | **.2047** | 5.20 | **.614** | 15.60 | 7.50 | 33.7 | 16.40 | 8 | **2.95** | 75 | 2.PD.05200.ATC | ■ |
| | **.2087** | 5.30 | **.626** | 15.90 | 7.50 | 34.4 | 16.70 | 8 | **2.95** | 75 | 2.PD.05300.ATC | ■ |
| | **.2126** | 5.40 | **.638** | 16.20 | 8.00 | 35.0 | 17.10 | 8 | **3.15** | 80 | 2.PD.05400.ATC | ■ |
| | **.2165** | 5.50 | **.650** | 16.50 | 8.00 | 35.7 | 17.40 | 8 | **3.15** | 80 | 2.PD.05500.ATC | ■ |
| **7/32** | **.2189** | 5.560 | **.657** | 16.68 | 8.00 | 36.0 | 17.52 | 8 | **3.15** | 80 | 2.PD.F732.ATC | ■ |
| | **.2205** | 5.60 | **.661** | 16.80 | 8.00 | 36.3 | 17.70 | 8 | **3.15** | 80 | 2.PD.05600.ATC | ■ |
| | **.2244** | 5.70 | **.673** | 17.10 | 8.00 | 37.0 | 18.00 | 8 | **3.15** | 80 | 2.PD.05700.ATC | ■ |
| | **.2283** | 5.80 | **.685** | 17.40 | 8.00 | 37.6 | 18.30 | 8 | **3.15** | 80 | 2.PD.05800.ATC | ■ |
| | **.2323** | 5.90 | **.697** | 17.70 | 8.00 | 38.3 | 18.60 | 8 | **3.15** | 80 | 2.PD.05900.ATC | ■ |
| | **.2362** | 6.00 | **.709** | 18.00 | 8.00 | 38.9 | 18.90 | 8 | **3.15** | 80 | 2.PD.06000.ATC | ■ |
| **1/4** | **.2500** | 6.350 | **.750** | 19.05 | 8.00 | 41.1 | 20.02 | 8 | **3.15** | 80 | 2.PD.F14.ATC | ■ |

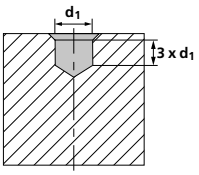
Complementary products
CrazyDrill Cool Titanium ATC p.348

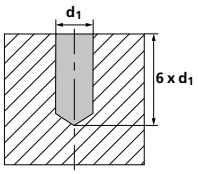
CRAZYDRILL by Mikron Tool Coolpilot Titanium ATC

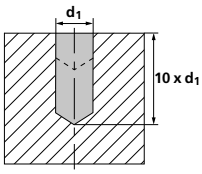
# NEW CrazyDrill Coolpilot Titanium ATC - 3 x d

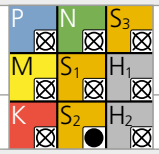
## DRILLING WITH THROUGH-TOOL COOLING | CUTTING DATA OVERVIEW

| | Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High |
|---|---|---|---|---|---|---|---|
|  | $S_2$ | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 40 \| **131** | 60 \| **197** |
| | | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |






**f** [mm/rev] **| [IPR]**

| | **Ød1** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.0 mm **| .039"** | | 1.25 mm **| .049"** | | **1/16"** 1.5 mm **| .059"** | | **3/32"** 2.0 mm **| .079"** | | 2.5 mm **| .098"** | | **1/8"** 3.0 mm **| .118"** | | **5/32"** 4.0 mm **| .158"** | | **3/16" - 7/32"** 5.0 mm **| .197"** | | **1/4"** 6.0 mm **| .236"** | |
| | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High |
| | 0.020 **.0008** | 0.025 **.0010** | 0.025 **.0010** | 0.030 **.0012** | 0.030 **.0012** | 0.035 **.0014** | 0.035 **.0014** | 0.045 **.0018** | 0.045 **.0018** | 0.055 **.0022** | 0.050 **.0020** | 0.065 **.0026** | 0.060 **.0024** | 0.075 **.0030** | 0.070 **.0028** | 0.085 **.0033** | 0.075 **.0030** | 0.090 **.0035** |

# Drilling process CrazyDrill Coolpilot Titanium

## SHORT DRILLING 3 X D AND 90° COUNTERSINK

### Coolant type, pressure and filtration

#### Coolant type

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

**Filtration:** Good filter quality is very important when using through coolant drills. Dirt particles or residual chips can clog the coolant holes and consequently reduce dramatically the flowrate.
The following filter qualities must be adhered especially in small diameters:

- Drill with Ø < .078" (2 mm) filter quality ≤ .0004" (0.010 mm).
- Drill with Ø < .118" (3 mm) filter quality ≤ .0008" (0.020 mm).
- Drill with Ø < 1/4" (6.35 mm) filter quality ≤ .0020" (0.050 mm).

**Coolant pressure**: At least the coolant pressure mentioned in the chart is required for the CrazyDrill Coolpilot Titanium ATC to achieve reliable drilling. High pressure is generally better for the cooling and flushing effect.

| **Ø $d_1$ Tool** | [mm] **\| [inch]** | 1.0 mm - 2.0 mm **\| .039" - .079"** | 2.0 mm - 4.0 mm **\| .079" - .156"** | 4.0 mm - 6.35 mm **\| .156" - 1/4"** |
|---|---|---|---|---|
| **Minimal pressure** | [bar] | 40 | 30 | 25 |
| | **[psi]** | **580** | **435** | **363** |

### Tool holders

For detailed indications for tool holders see chapter "Technical information".

### Pilot drilling and short drilling

Pilot drilling with CrazyDrill Coolpilot Titanium ATC is the perfect preparation for accurate drilling (position and alignment accuracy) and stable machining process.

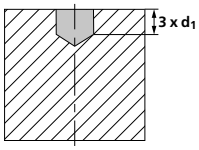
Drilling quality (position and alignment accuracy, no measurable transition from pilot to follow-up hole) and stable machining process are assured due to matched diameters of the tools.

CrazyDrill Coolpilot Titanium ATC not only is the perfect preparation of deep follow-up holes. Concurrently it is a short drill for highly precise and quick drilling up to 3 x d + 90° countersink.

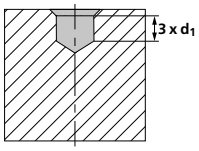
## DRILLING PROCESS

### 1 | PILOT DRILLING OR SHORT DRILLING

- Turn on internal coolant.
- Drilling in one step with recommended cutting speed and feed rate (see cutting data table).




- If needed, after the desired cutting depth of 3 x d is reached, a chamfer angle of 90° can be realized.




Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# NEW CrazyDrill Hexalobe



NEW



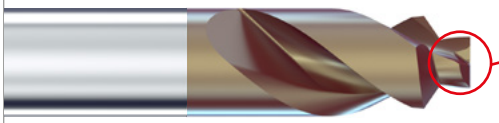
## THE NEW CONCEPT FOR MACHINING YOUR TORX® SOCKET

### New concept

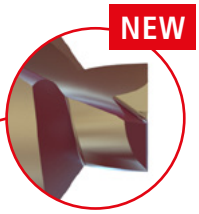
- Drilling - Chamfering - Milling - Deburring: Four operations in three steps with two tools.
- High efficient machining in shorter time for titanium, stainless steel and cobalt chrome.

CRAZYDRILL Hexalobe FLAT

Combined drill

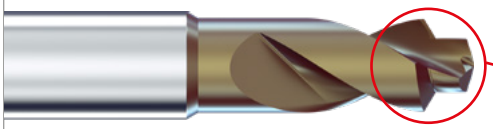


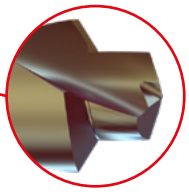
NEW



Now also available as flat drill

CRAZYDRILL Hexalobe





Drilling and chamfering in one step

CRAZYMILL Hexalobe

Micro endmill



NEW



Now also available for cobalt chrome geometry

### Performance features

- Highest stiffness
- New cutting geometry

### Your advantages

- Shorter milling process
- Highest profile precision
- Excellent surface quality
- Minimal burr

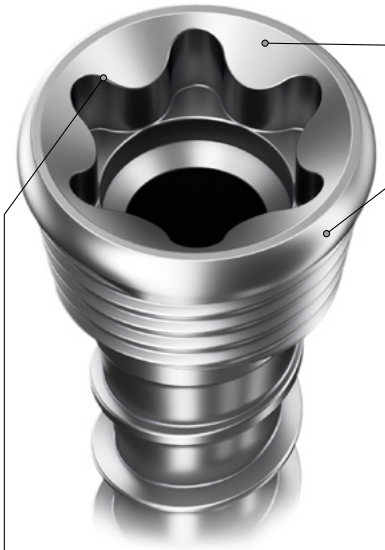
**Regrinding:** These products are not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the CrazyDrill Hexalobe / CrazyMill Hexalobe (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYDRILL by Mikron Tool Hexalobe

# NEW Best performance on hexalobular sockets

**TURNKEY SOLUTION FOR TITANIUM, STAINLESS STEEL AND COBALT CHROME**



## Material

### ■ Titanium

S2

Ti Gr.5 ELI
TiAl6V4 ELI
3.7165

### ■ Stainless Steel

M

316 LM
X2CrNiMo18-15-3
1.4441

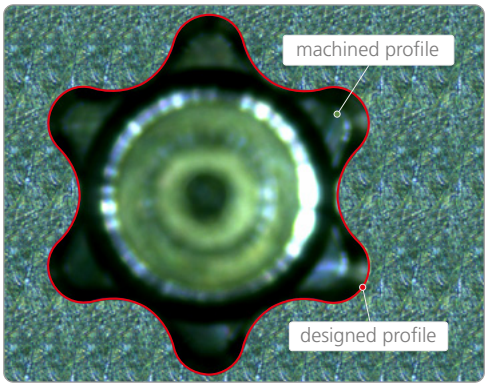
### ■ Cobalt chrome

S3

ASTM F1537
CrCoMo28
ISO 5832-12

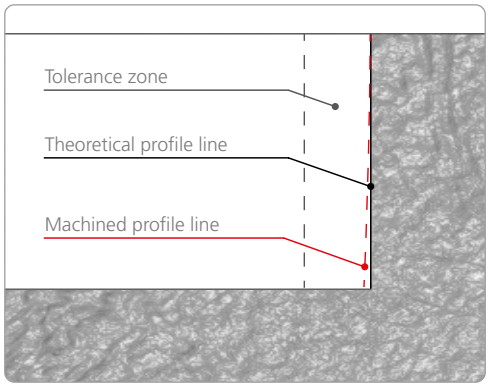
## Shape precision

### ■ Nearly perfect profile




Perfect profile matching.

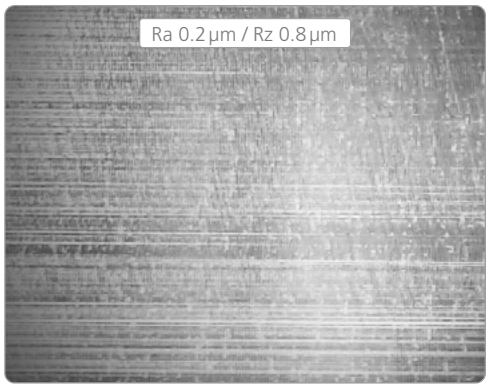
### ■ Perpendicularity




Guaranteed profile geometry.

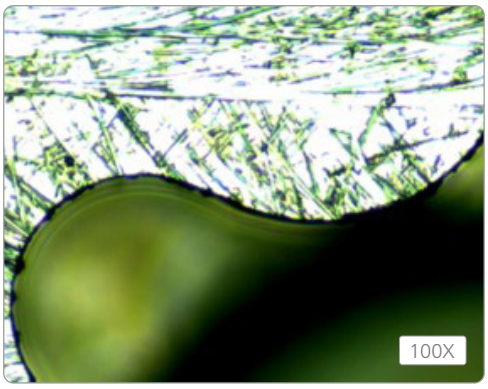
## Quality and performance

### Surface quality



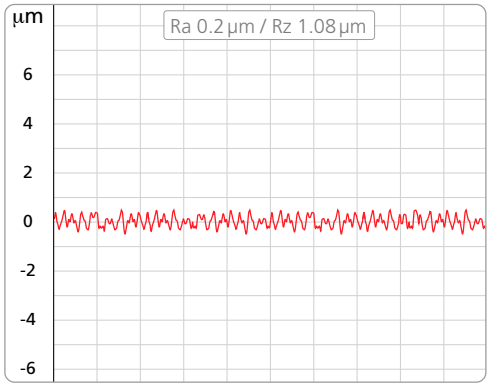

Excellent surface quality.*1

### Nearly burr free




Machining profile with minimal burrs.

### Chamfer roughness




Lowest roughness on chamfer surface.*1

### Milling cycle time

| TORX® type | Time [s] |
|---|---|
| T6 | 27 |
| T8 | 24 |
| T10 | 22 |
| T15 | 22 |
| T20 | 21 |
| T25 | 20 |

Machined on titanium with version 3.5 x d and p = 0.4 x d.*1

**Note *1:** The quality and cycle time depends on cutting parameters and machine conditions.

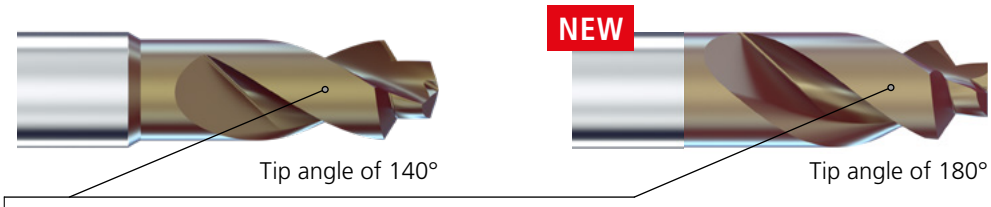
CRAZYDRILL by Mikron Tool Hexalobe

# NEW High efficient drilling hexalobular socket

## THE COMBINED DRILL

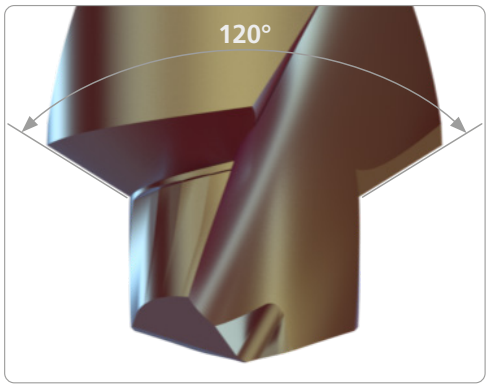
### CrazyDrill Hexalobe & CrazyDrill Hexalobe Flat

**The new combined drill for TORX® socket machining**




### Features

■ **Two in one**




The pre-hole (with tip angle of 140° or 180°) and a 120° chamfer are combined in one single operation.

■ **Two cutting geometries**

Two types of drills have been developed for best machining titanium, stainless steel and cobalt chrome.

■ **Diameter range**

Standard diameters for pre-hole drilling "Torx®" socket from T4 to T30.

■ **On request**

Special sizes available on request.

■ **Coating**

Cr Chrome free coating to avoid cross contamination on medical parts.

# CrazyDrill Hexalobe

| Tip 140° | | Flat 180° |
|---|---|---|
| Ti | SST / CoCr | Ti / SST / CoCr |

■ Coated
■ External cooling










Page 182 | Page 182 | Page 183

## NEW

**1 | SHANK**
The reinforced solid carbide shank guarantees stability, high degree of concentricity and hence maximum drilling precision.

**2 | CARBIDE**
The specially developed micro-grain carbide meets all requirements in terms of mechanical properties.

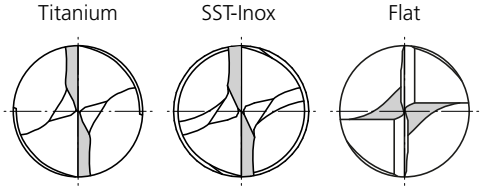
**3 | NEW COATING**
The high-performance coating eXedur SNP is heat-resistant and super wear-resistant, prevents buildup edges and promotes uniform chip flushing. The result is long tool life.

**4 | 120° CHAMFER**
The pre-hole and a 120° chamfer are combined on one single operation.

**5 | CUTTING GEOMETRY**
Two specific geometries have been developed for the machining of:
- **Titanium**
- **Stainless steel / Cobalt chrome**

Good chip breaking and quick chip removal are guaranteed.

Drill tip



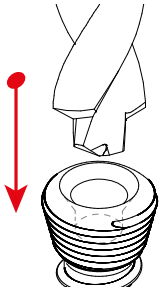
# NEW Machining process

## HELICAL INTERPOLATION FOR TITANIUM

Ti
S2

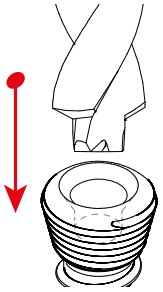
### Step 1

**Pre-hole drilling with 120° chamfer**



**140° tip angle**

**or**

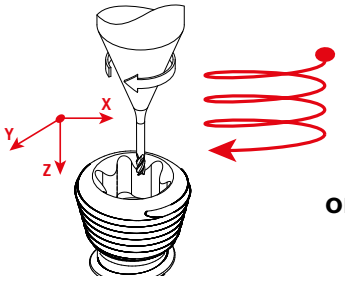


**180° tip angle**

### Step 2

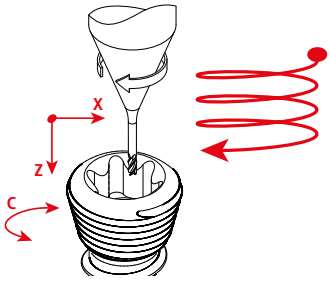
**Helical interpolation XYZ**

**XYZ**
Interpolation of linear axes X, Y and Z with stationary workpiece.




**or**

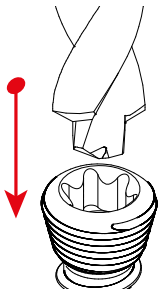
**Helical interpolation XCZ**




**XCZ**
Interpolation of linear axes X, Z and subspindle axis C with workpiece on rotation.

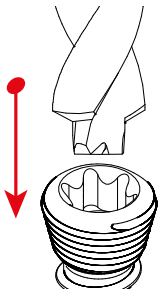
### Step 3

**Deburring**



**140° tip angle**

**or**



**180° tip angle**

Repeat chamfering to clean the burrs.

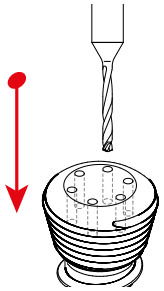
**Titanium:** Helical interpolation is the optimum process, ssaving up to 20% of cycle time in comparison to side milling process (see page 180).

## LOBE DRILLING AND HELICAL INTERPOLATION FOR STAINLESS STEEL AND COBALT CHROME

### Step 1

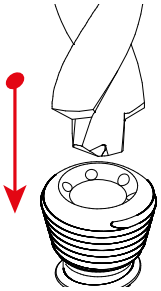
**Lobe drilling**

SST M | CoCr S3



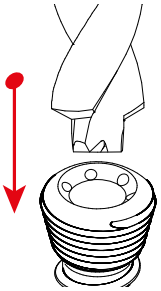
### Step 2

**Pre-hole drilling with 120° chamfer**



**140° tip angle**

**or**

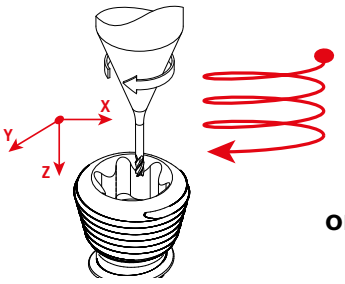


**180° tip angle**

### Step 3

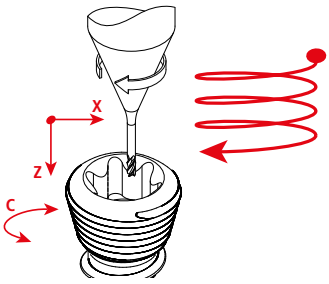
**Helical interpolation XYZ**

**XYZ**
Interpolation of linear axes X, Y and Z with stationary workpiece.




**or**

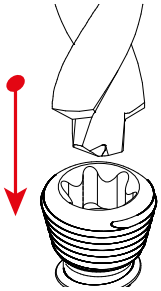
**Helical interpolation XCZ**




**XCZ**
Interpolation of linear axes X, Z and subspindle axis C with workpiece on rotation.

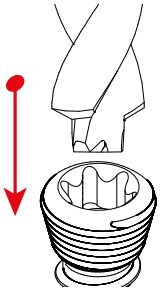
### Step 4

**Deburring**



**140° tip angle**

**or**



**180° tip angle**

Repeat chamfering to clean the burrs.

**Stainless steel:** With helical iterpolation, drilling of the lobes is required. Result: longer tool life, better dimensional control of the TORX® shape and a more stable process in comparison to side milling process (see page 180).

**Cobalt Chrome:** Helical interpolation is the optimum process, ssaving up to 20% of cycle time in comparison to side milling process (see page 181).

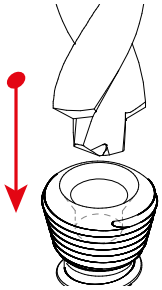
# NEW Machining process

## SIDE MILLING FOR TITANIUM AND STAINLESS STEEL

Ti S2 | SST M

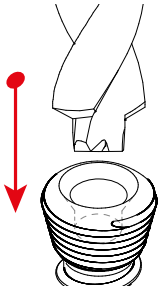
### Step 1

**Pre-hole drilling with 120° chamfer**



**140° tip angle**

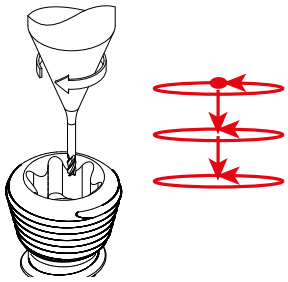
**or**



**180° tip angle**

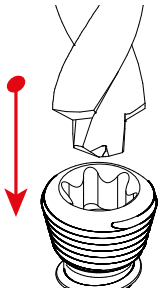
### Step 2

**Side milling**



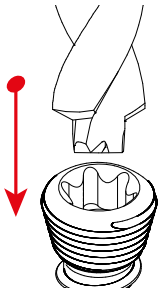
### Step 3

**Deburring**



**140° tip angle**

**or**



**180° tip angle**

Repeat chamfering to clean the burrs.

**Titanium:** Helical interpolation is the optimum process (see page 178), saving up to 20% of cycle time in comparison to side milling process.

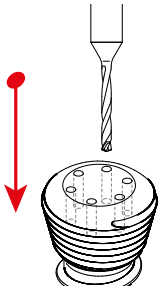
**Stainless steel:** With helical iterpolation, drilling of the lobes is required (see page 179). Result: longer tool life, better dimensional control of the TORX® shape and a more stable process in comparison to side milling process.

## LOBE DRILLING AND SIDE MILLING FOR COBALT CHROME

CoCr
S3

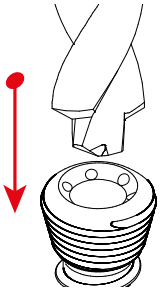
### Step 1

**Lobe drilling**



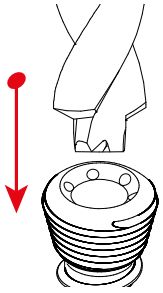
### Step 2

**Pre-hole drilling with 120° chamfer**



**140° tip angle**

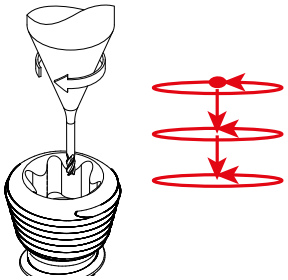
**or**



**180° tip angle**

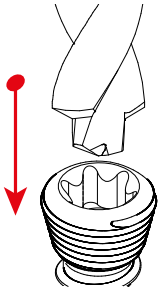
### Step 3

**Side milling**



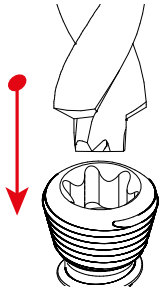
### Step 4

**Deburring**



**140° tip angle**

**or**



**180° tip angle**

Repeat chamfering to clean the burrs.

**Cobalt chrome:** Helical interpolation is the optimum process (see page 179), saving up to 20% of cycle time in comparison to side milling process.

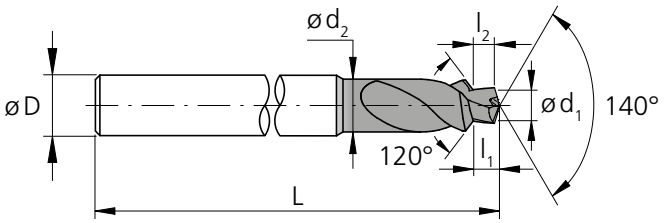
CRAZYDRILL by Mikron Tool Hexalobe

# CrazyDrill Hexalobe - Tip 140°

Carbide | 120° | 140° | Z2 | eXedur SNP

| Ø $d_1$ | **.035" - .150"** (0.9 - 3.8 mm) | |
|---|---|---|
| Tolerance | **0 - .00031"** | 0 - 0.008 mm |

## Dimensions related to ISO 10664




SST M | Ti S2 | CoCr S3

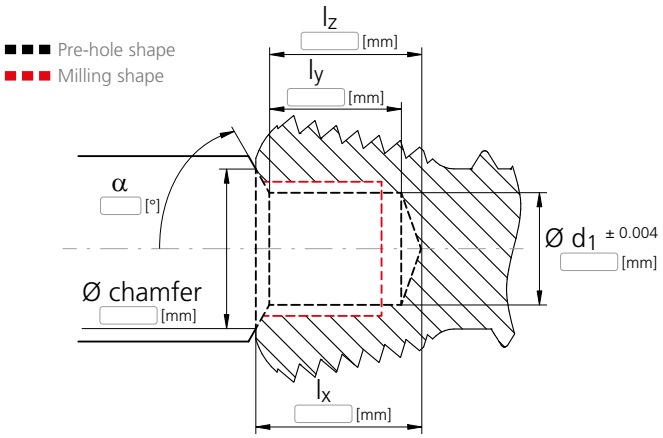
| TORX® type | $d_1$ 0/-.00031 [inch] | $d_1$ 0/-0.008 [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Titanium | SST-Inox / CoCr | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T4 | **.035** | 0.9 | **.028** | 0.70 | 1.7 | 0.56 | 3 | **1.57** | 40 | 2.CD.006090.120 | .T | .I | ■ |
| T5 | **.039** | 1.0 | **.034** | 0.87 | 2.0 | 0.72 | 3 | **1.57** | 40 | 2.CD.007100.120 | .T | .I | ■ |
| T5 | **.039** | 1.0 | **.030** | 0.75 | 2.0 | 0.59 | 3 | **1.57** | 40 | 2.CD.006100.120 | .T | .I | ■ |
| T6 | **.047** | 1.2 | **.042** | 1.06 | 2.2 | 0.88 | 3 | **1.57** | 40 | 2.CD.007120.120 | .T | .I | ■ |
| T6 | **.047** | 1.2 | **.034** | 0.86 | 2.2 | 0.67 | 3 | **1.57** | 40 | 2.CD.006120.120 | .T | .I | ■ |
| T7 | **.055** | 1.4 | **.041** | 1.05 | 3.0 | 0.83 | 3 | **1.57** | 40 | 2.CD.006140.120 | .T | .I | ■ |
| T7 | **.055** | 1.4 | **.040** | 1.01 | 3.0 | 0.79 | 3 | **1.57** | 40 | 2.CD.005140.120 | .T | .I | ■ |
| T8 | **.063** | 1.6 | **.055** | 1.40 | 3.0 | 1.15 | 3 | **1.57** | 40 | 2.CD.007160.120 | .T | .I | ■ |
| T8 | **.063** | 1.6 | **.041** | 1.05 | 3.0 | 0.81 | 3 | **1.57** | 40 | 2.CD.005160.120 | .T | .I | ■ |
| T10 | **.075** | 1.9 | **.056** | 1.42 | 4.0 | 1.13 | 4 | **1.57** | 40 | 2.CD.005190.120 | .T | .I | ■ |
| T15 | **.091** | 2.3 | **.070** | 1.78 | 4.0 | 1.42 | 4 | **1.97** | 50 | 2.CD.006230.120 | .T | .I | ■ |
| T20 | **.106** | 2.7 | **.083** | 2.12 | 5.0 | 1.70 | 6 | **1.97** | 50 | 2.CD.006270.120 | .T | .I | ■ |
| T25 | **.122** | 3.1 | **.112** | 2.84 | 6.0 | 2.36 | 6 | **1.97** | 50 | 2.CD.007310.120 | .T | .I | ■ |
| T30 | **.150** | 3.8 | **.139** | 3.52 | 6.0 | 2.93 | 6 | **1.97** | 50 | 2.CD.008380.120 | .T | .I | ■ |
| T30 | **.150** | 3.8 | **.120** | 3.04 | 6.0 | 2.45 | 6 | **1.97** | 50 | 2.CD.007380.120 | .T | .I | ■ |

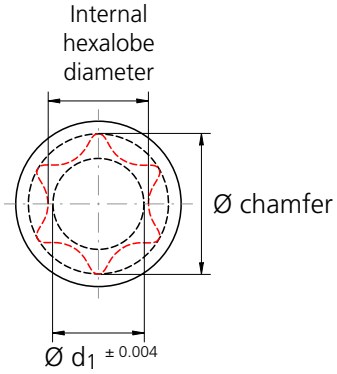
■ Stock item

**Complementary products**

CrazyMill Hexalobe p.522

## Customized combined drill




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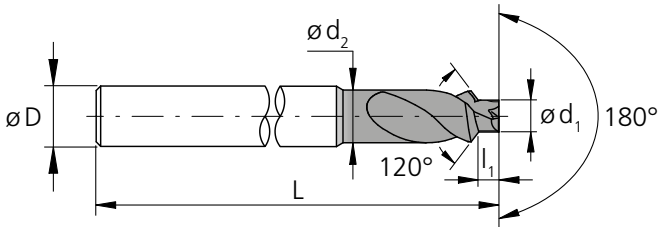
# CrazyDrill Hexalobe Flat - Tip 180°

| Carbide | 120° | 180° | Z2 | | eXedur SNP |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.035" - .150"** (0.9 - 3.8 mm) | |
| Tolerance | **0 - .00031"** | 0 - 0.008 mm |

NEW

## Dimensions related to ISO 10664




| SST | Ti | CoCr |
|---|---|---|
| M | S2 | S3 |

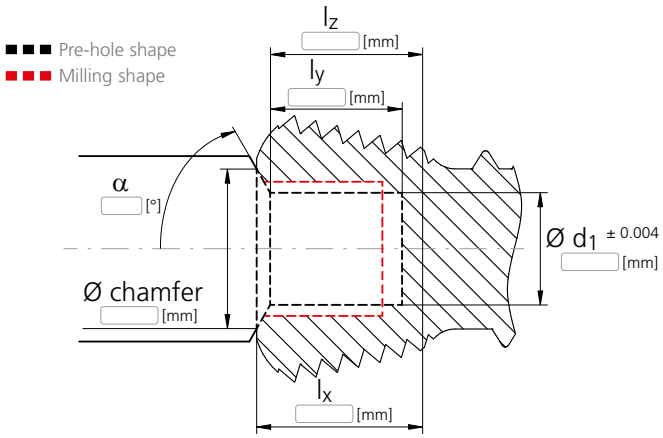
| TORX® type | $d_1$ 0/-.00031 [inch] | $d_1$ 0/-0.008 [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| T4 | **.035** | 0.9 | **.022** | 0.56 | 1.7 | 3 | **1.57** | 40 | 2.CDF.006090.120 | ■ |
| T5 | **.039** | 1.0 | **.028** | 0.72 | 2.0 | 3 | **1.57** | 40 | 2.CDF.007100.120 | ■ |
| T5 | **.039** | 1.0 | **.023** | 0.59 | 2.0 | 3 | **1.57** | 40 | 2.CDF.006100.120 | ■ |
| T6 | **.047** | 1.2 | **.035** | 0.88 | 2.2 | 3 | **1.57** | 40 | 2.CDF.007120.120 | ■ |
| T6 | **.047** | 1.2 | **.026** | 0.67 | 2.2 | 3 | **1.57** | 40 | 2.CDF.006120.120 | ■ |
| T7 | **.055** | 1.4 | **.033** | 0.83 | 3.0 | 3 | **1.57** | 40 | 2.CDF.006140.120 | ■ |
| T7 | **.055** | 1.4 | **.031** | 0.79 | 3.0 | 3 | **1.57** | 40 | 2.CDF.005140.120 | ■ |
| T8 | **.063** | 1.6 | **.045** | 1.15 | 3.0 | 3 | **1.57** | 40 | 2.CDF.007160.120 | ■ |
| T8 | **.063** | 1.6 | **.032** | 0.81 | 3.0 | 3 | **1.57** | 40 | 2.CDF.005160.120 | ■ |
| T10 | **.075** | 1.9 | **.044** | 1.13 | 4.0 | 4 | **1.57** | 40 | 2.CDF.005190.120 | ■ |
| T15 | **.091** | 2.3 | **.056** | 1.42 | 4.0 | 4 | **1.97** | 50 | 2.CDF.006230.120 | ■ |
| T20 | **.106** | 2.7 | **.067** | 1.70 | 5.0 | 6 | **1.97** | 50 | 2.CDF.006270.120 | ■ |
| T25 | **.122** | 3.1 | **.093** | 2.36 | 6.0 | 6 | **1.97** | 50 | 2.CDF.007310.120 | ■ |
| T30 | **.150** | 3.8 | **.115** | 2.93 | 6.0 | 6 | **1.97** | 50 | 2.CDF.008380.120 | ■ |
| T30 | **.150** | 3.8 | **.096** | 2.45 | 6.0 | 6 | **1.97** | 50 | 2.CDF.007380.120 | ■ |

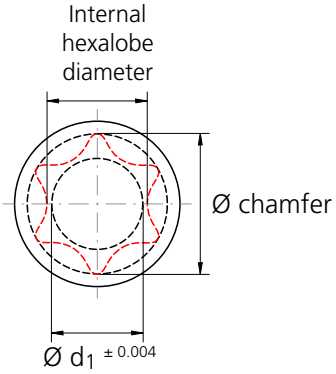
■ Stock item

**Complementary products**

CrazyMill Hexalobe p.522

## Customized combined drill




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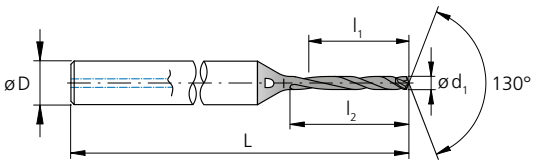
CRAZYDRILL by Mikron Tool Hexalobe

# CrazyDrill SST-Inox - Type IK / IN

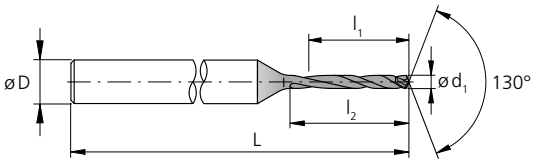
| Carbide | 8xd1 | 130° | Z2 | eXedur RIP |
|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 |








SST M | CoCr S3

| TORX® type | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number **Integrated cooling** | Item number **External cooling** | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T4 - T5 | **.010** | 0.25 | **.079** | 2.0 | 2.5 | 3 | **1.50** | 38 | 2.CD.080025.IK | 2.CD.080025.IN | ■ |
| T6 | **.012** | 0.30 | **.094** | 2.4 | 2.9 | 3 | **1.50** | 38 | 2.CD.080030.IK | 2.CD.080030.IN | ■ |
| T7 | **.014** | 0.35 | **.110** | 2.8 | 3.4 | 3 | **1.50** | 38 | 2.CD.080035.IK | 2.CD.080035.IN | ■ |
| T8 | **.016** | 0.40 | **.126** | 3.2 | 3.9 | 3 | **1.50** | 38 | 2.CD.080040.IK | 2.CD.080040.IN | ■ |
| T10 | **.020** | 0.50 | **.157** | 4.0 | 4.9 | 3 | **1.65** | 42 | 2.CD.080050.IK | 2.CD.080050.IN | ■ |
| T15 | **.024** | 0.60 | **.189** | 4.8 | 5.9 | 3 | **1.65** | 42 | 2.CD.080060.IK | 2.CD.080060.IN | ■ |
| T20 | **.028** | 0.70 | **.220** | 5.6 | 6.9 | 3 | **1.77** | 45 | 2.CD.080070.IK | 2.CD.080070.IN | ■ |
| T25 | **.031** | 0.80 | **.252** | 6.4 | 7.8 | 3 | **1.77** | 45 | 2.CD.080080.IK | 2.CD.080080.IN | ■ |
| T30 | **.039** | 1.00 | **.315** | 8.0 | 9.8 | 3 | **1.89** | 48 | 2.CD.080100.IK | 2.CD.080100.IN | ■ |

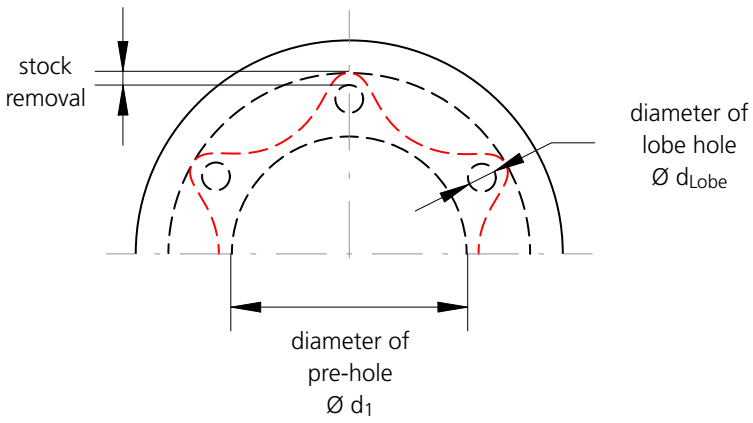
■ Stock item

# Cutting tool recommendation



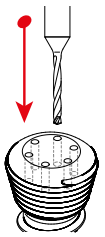
## Only for process with lobe drilling in stainless steel or chrome cobalt

| TORX® type | $d_{Lobe}$ [inch] | $d_{Lobe}$ [mm] | Stock removal [inch] | Stock removal [mm] | Lobe drilling | | Pre-hole drilling | Socket milling | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Integrated cooling | External cooling | | Stainless steel | Chrome cobalt |
| T4 | **.010** | 0.25 | **.0008** | 0.02 | 2.CD.080025.IK | 2.CD.080025.IN | 2.CD.006090.120.I | 2.CMI35.B1Z3.020.1<br>2.CMI35.C1Z3.020.1 | 2.CMR35.B1Z3.020.1<br>2.CMR35.C1Z3.020.1 |
| T5 | **.010** | 0.25 | **.0020** | 0.05 | 2.CD.080025.IK | 2.CD.080025.IN | 2.CD.007100.120.I | 2.CMI35.B1Z3.020.1<br>2.CMI35.C1Z3.020.1 | 2.CMR35.B1Z3.020.1<br>2.CMR35.C1Z3.020.1 |
| T5 | **.010** | 0.25 | **.0020** | 0.05 | 2.CD.080025.IK | 2.CD.080025.IN | 2.CD.006100.120.I | 2.CMI35.B1Z3.020.1<br>2.CMI35.C1Z3.020.1 | 2.CMR35.B1Z3.020.1<br>2.CMR35.C1Z3.020.1 |
| T6 | **.012** | 0.30 | **.0020** | 0.05 | 2.CD.080030.IK | 2.CD.080030.IN | 2.CD.007120.120.I | 2.CMI35.B1Z3.030.1<br>2.CMI35.C1Z3.030.1 | 2.CMR35.B1Z3.030.1<br>2.CMR35.C1Z3.030.1 |
| T6 | **.012** | 0.30 | **.0020** | 0.05 | 2.CD.080030.IK | 2.CD.080030.IN | 2.CD.006120.120.I | 2.CMI35.B1Z3.030.1<br>2.CMI35.C1Z3.030.1 | 2.CMR35.B1Z3.030.1<br>2.CMR35.C1Z3.030.1 |
| T7 | **.014** | 0.35 | **.0028** | 0.07 | 2.CD.080035.IK | 2.CD.080035.IN | 2.CD.006140.120.I | 2.CMI35.B1Z3.030.1<br>2.CMI35.C1Z3.030.1 | 2.CMR35.B1Z3.030.1<br>2.CMR35.C1Z3.030.1 |
| T7 | **.014** | 0.35 | **.0028** | 0.07 | 2.CD.080035.IK | 2.CD.080035.IN | 2.CD.005140.120.I | 2.CMI35.B1Z3.030.1<br>2.CMI35.C1Z3.030.1 | 2.CMR35.B1Z3.030.1<br>2.CMR35.C1Z3.030.1 |
| T8 | **.016** | 0.40 | **.0031** | 0.08 | 2.CD.080040.IK | 2.CD.080040.IN | 2.CD.007160.120.I | 2.CMI35.B1Z4.040.1<br>2.CMI35.C1Z4.040.1 | 2.CMR35.B1Z4.040.1<br>2.CMR35.C1Z4.040.1 |
| T8 | **.016** | 0.40 | **.0031** | 0.08 | 2.CD.080040.IK | 2.CD.080040.IN | 2.CD.005160.120.I | 2.CMI35.B1Z4.040.1<br>2.CMI35.C1Z4.040.1 | 2.CMR35.B1Z4.040.1<br>2.CMR35.C1Z4.040.1 |
| T10 | **.020** | 0.50 | **.0024** | 0.06 | 2.CD.080050.IK | 2.CD.080050.IN | 2.CD.005190.120.I | 2.CMI35.B1Z4.040.1<br>2.CMI35.C1Z4.040.1<br>2.CMI35.B1Z4.050.1<br>2.CMI35.C1Z4.050.1 | 2.CMR35.B1Z4.040.1<br>2.CMR35.C1Z4.040.1<br>2.CMR35.B1Z4.050.1<br>2.CMR35.C1Z4.050.1 |
| T15 | **.024** | 0.60 | **.0028** | 0.07 | 2.CD.080060.IK | 2.CD.080060.IN | 2.CD.006230.120.I | 2.CMI35.B1Z4.050.1<br>2.CMI35.C1Z4.050.1 | 2.CMR35.B1Z4.050.1<br>2.CMR35.C1Z4.050.1 |
| T20 | **.028** | 0.70 | **.0035** | 0.09 | 2.CD.080070.IK | 2.CD.080070.IN | 2.CD.006270.120.I | 2.CMI35.B1Z4.060.1<br>2.CMI35.C1Z4.060.1 | 2.CMR35.B1Z4.060.1<br>2.CMR35.C1Z4.060.1 |
| T25 | **.031** | 0.80 | **.0039** | 0.10 | 2.CD.080080.IK | 2.CD.080080.IN | 2.CD.007310.120.I | 2.CMI35.B1Z4.080.1<br>2.CMI35.C1Z4.080.1 | 2.CMR35.B1Z4.080.1<br>2.CMR35.C1Z4.080.1 |
| T30 | **.039** | 1.00 | **.0047** | 0.12 | 2.CD.080100.IK | 2.CD.080100.IN | 2.CD.008380.120.I | 2.CMI35.B1Z4.100.1<br>2.CMI35.C1Z4.100.1 | 2.CMR35.B1Z4.100.1<br>2.CMR35.C1Z4.100.1 |
| T30 | **.039** | 1.00 | **.0047** | 0.12 | 2.CD.080100.IK | 2.CD.080100.IN | 2.CD.007380.120.I | 2.CMI35.B1Z4.100.1<br>2.CMI35.C1Z4.100.1 | 2.CMR35.B1Z4.100.1<br>2.CMR35.C1Z4.100.1 |



CRAZYDRILL by Mikron Tool Hexalobe

# NEW Lobe drilling

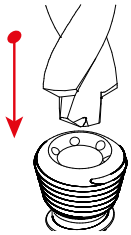




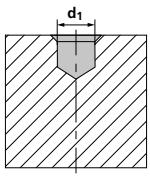


| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [SFM] \| [m/min] | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|
| M | Stainless steel austenitic | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | **98 – 148** 30 – 45 | 1 - 4 x d1 | 1 - 2 x d1 |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | **131 – 164** 40 – 50 | 1 - 3 x d1 | 1 - 2 x d1 |
| | | | CrCoMo28 | ASTM F1537 | | | |
| M | Stainless steel austenitic | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | **98 – 148** 30 – 45 | 1 - 4 x d1 | 1 - 2 x d1 |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | **131 – 164** 40 – 50 | 1 - 3 x d1 | 1 - 2 x d1 |
| | | | CrCoMo28 | ASTM F1537 | | | |

# NEW Pre-hole drilling



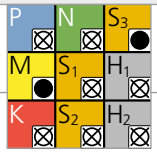





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [SFM] \| [m/min] |
|---|---|---|---|---|---|
| M | Stainless steel austenitic | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | **82 – 115** 25 – 35 |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| $S_2$ | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | **66 – 98** 20 – 30 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | **82 – 115** 25 – 35 |
| | | | CrCoMo28 | ASTM F1537 | |

$v_c$ **[SFM] |** [m/min]
**f [IPR] |** [mm/rev]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended

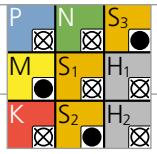



| | T4<br>Ød1<br>**.0098"** \| 0.25 mm<br>f | T5<br>Ød1<br>**.0118"** \| 0.30 mm<br>f | T6<br>Ød1<br>**.0138"** \| 0.30 mm<br>f | T7<br>Ød1<br>**.0138"** \| 0.30 mm<br>f | T8<br>Ød1<br>**.0157"** \| 0.40 mm<br>f | T10<br>Ød1<br>**.0197"** \| 0.50 mm<br>f | T15<br>Ød1<br>**.0236"** \| 0.60 mm<br>f | T20<br>Ød1<br>**.0276"** \| 0.70 mm<br>f | T25<br>Ød1<br>**.0315"** \| 0.80 mm<br>f | T30<br>Ød1<br>**.0394"** \| 1.00 mm<br>f |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0004 - .0008**<br>0.01 - 0.02 | **.0004 - .0008**<br>0.01 - 0.02 | **.0004 - .0008**<br>0.01 - 0.02 | **.0004 - .0008**<br>0.01 - 0.02 | **.0004 - .0008**<br>0.01 - 0.02 | **.0004 - .0008**<br>0.01 - 0.02 | **.0006 - .0010**<br>0.015 - 0.025 | **.0006 - .0010**<br>0.015 - 0.025 | **.0006 - .0010**<br>0.015 - 0.025 | **.0010 - .0014**<br>0.025 - 0.035 |
| | **.0008 - .0012**<br>0.02 - 0.03 | **.0008 - .0012**<br>0.02 - 0.03 | **.0008 - .0012**<br>0.02 - 0.03 | **.0008 - .0012**<br>0.02 - 0.03 | **.0008 - .0012**<br>0.02 - 0.03 | **.0008 - .0012**<br>0.02 - 0.03 | **.0006 - .0008**<br>0.015 - 0.020 | **.0006 - .0008**<br>0.015 - 0.020 | **.0006 - .0008**<br>0.015 - 0.020 | **.0020 - .0024**<br>0.05 - 0.06 |
| | **.0004 - .0006**<br>0.010 - 0.015 | **.0004 - .0006**<br>0.010 - 0.015 | **.0004 - .0006**<br>0.010 - 0.015 | **.0004 - .0006**<br>0.010 - 0.015 | **.0004 - .0006**<br>0.010 - 0.015 | **.0004 - .0006**<br>0.010 - 0.015 | **.0006 - .0010**<br>0.015 - 0.020 | **.0006 - .0010**<br>0.015 - 0.020 | **.0006 - .0008**<br>0.015 - 0.025 | **.0008 - .0012**<br>0.02 - 0.03 |
| | **.0006 - .0010**<br>0.015 - 0.025 | **.0006 - .0010**<br>0.015 - 0.025 | **.0006 - .0010**<br>0.015 - 0.025 | **.0006 - .0010**<br>0.015 - 0.025 | **.0006 - .0010**<br>0.015 - 0.025 | **.0006 - .0010**<br>0.015 - 0.025 | **.0010 - .0014**<br>0.025 - 0.035 | **.0010 - .0014**<br>0.025 - 0.035 | **.0006 - .0008**<br>0.015 - 0.020 | **.0016 - .0020**<br>0.04 - 0.05 |



$v_c$ **[SFM] |** [m/min]
**f [IPR] |** [mm/rev]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| | T4<br>Ød1<br>**.039"** \| 0.9 mm<br>f | T5<br>Ød1<br>**.039"** \| 1.0 mm<br>f | T6<br>Ød1<br>**.047"** \| 1.2 mm<br>f | T7<br>Ød1<br>**.055"** \| 1.4 mm<br>f | T8<br>Ød1<br>**.063"** \| 1.6 mm<br>f | T10<br>Ød1<br>**.075"** \| 1.9 mm<br>f | T15<br>Ød1<br>**.091"** \| 2.3 mm<br>f | T20<br>Ød1<br>**.106"** \| 2.7 mm<br>f | T25<br>Ød1<br>**.122"** \| 3.1 mm<br>f | T30<br>Ød1<br>**.150"** \| 3.8 mm<br>f |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0008 - .0012**<br>0.02 - 0.03 | **.0008 - .0012**<br>0.02 - 0.03 | **.0012 - .0016**<br>0.03 - 0.04 | **.0012 - .0016**<br>0.03 - 0.04 | **.0012 - .0016**<br>0.03 - 0.04 | **.0020 - .0024**<br>0.05 - 0.06 | **.0020 - .0024**<br>0.05 - 0.06 | **.0024 - .0028**<br>0.06 - 0.07 | **.0028 - .0032**<br>0.07 - 0.08 | **.0028 - .0032**<br>0.07 - 0.08 |
| | **.00039 - .00059**<br>0.010 - 0.015 | **.00039 - .00059**<br>0.010 - 0.015 | **.00047 - .00071**<br>0.012 - 0.018 | **.00055 - .00079**<br>0.014 - 0.020 | **.00059 - .00098**<br>0.015 - 0.025 | **.00079 - .00118**<br>0.020 - 0.030 | **.00098 - .00138**<br>0.025 - 0.035 | **.00098 - .00157**<br>0.025 - 0.040 | **.00118 - .00177**<br>0.030 - 0.045 | **.00177 - .00276**<br>0.045 - 0.070 |
| | **.00020 - .00059**<br>0.005 - 0.015 | **.00020 - .00059**<br>0.005 - 0.015 | **.00024 - .00071**<br>0.006 - 0.018 | **.00028 - .00079**<br>0.007 - 0.020 | **.00031 - .00098**<br>0.008 - 0.025 | **.00039 - .00118**<br>0.010 - 0.030 | **.00047 - .00138**<br>0.012 - 0.035 | **.00055 - .00157**<br>0.014 - 0.040 | **.00063 - .00197**<br>0.016 - 0.050 | **.00079 - .00217**<br>0.020 - 0.055 |

### Coolant type, pressure, filtration and flowrate

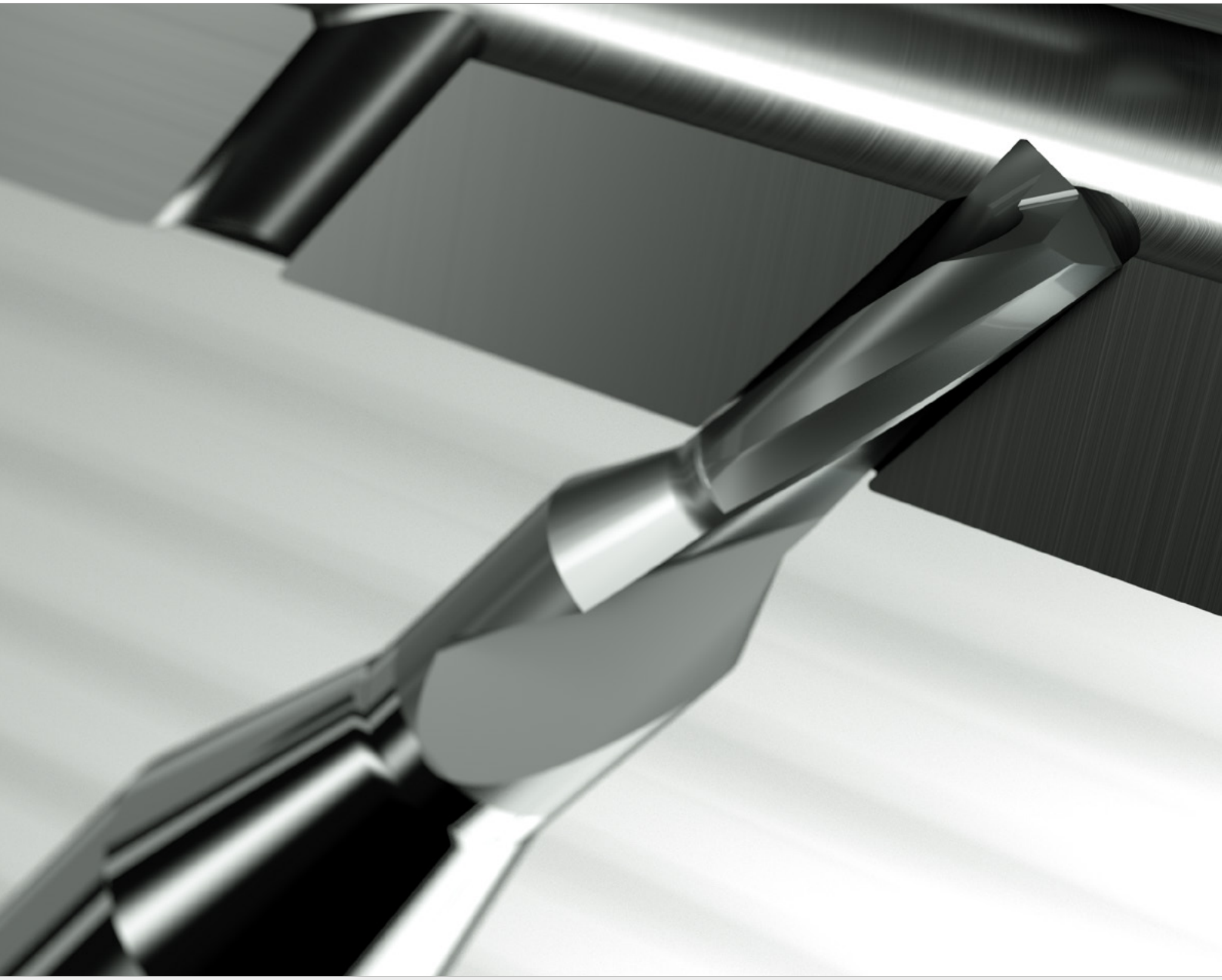
For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling medium is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical information".

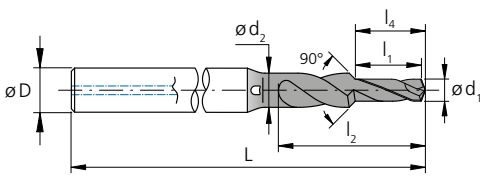
# Customized short / pilot drills



**Mikron Tool produces solid carbide pilot and short drills according to your needs and requirements and within the following range:**

## CHARACTERISTICS

- Diameter min.: .0039" (0.1 mm)
- Diameter max.: 1.26" (32.0 mm), please contact us for larger diameters
- Maximum tool length: 16.34" (415 mm)
- Tool diameter tolerance max.: ± 20 µin (0.5 µm)
- Chamfer and point angle as per customer need
- Step drill: see customer-specific step drill
- Concentricity between shank and diameters max.: ≤ 79 µin (2 µm)
- Number of cutting edges: 1, 2 or 3
- Cutting direction: right-hand drill or left-hand drill
- Conical and cylindrical drill
- Direction of rotation: right-hand cutting or drill left-hand cutting
- Drill material: tungsten carbide, grade selection depending on application




## COATINGS

Many choices according to application

## COOLING

- Drill with internal coolant helix shape holes to the tip of the drill
- Drill with internal coolant straight holes through the shank
- Drill for external coolant supply

## TYPE OF SHAFT

- Cylindrical as per DIN 6535 HA
- Cylindrical as per DIN 6535 HE (Whistle Notch)
- Cylindrical as per DIN 6535 HB (Weldon)
- More upon request

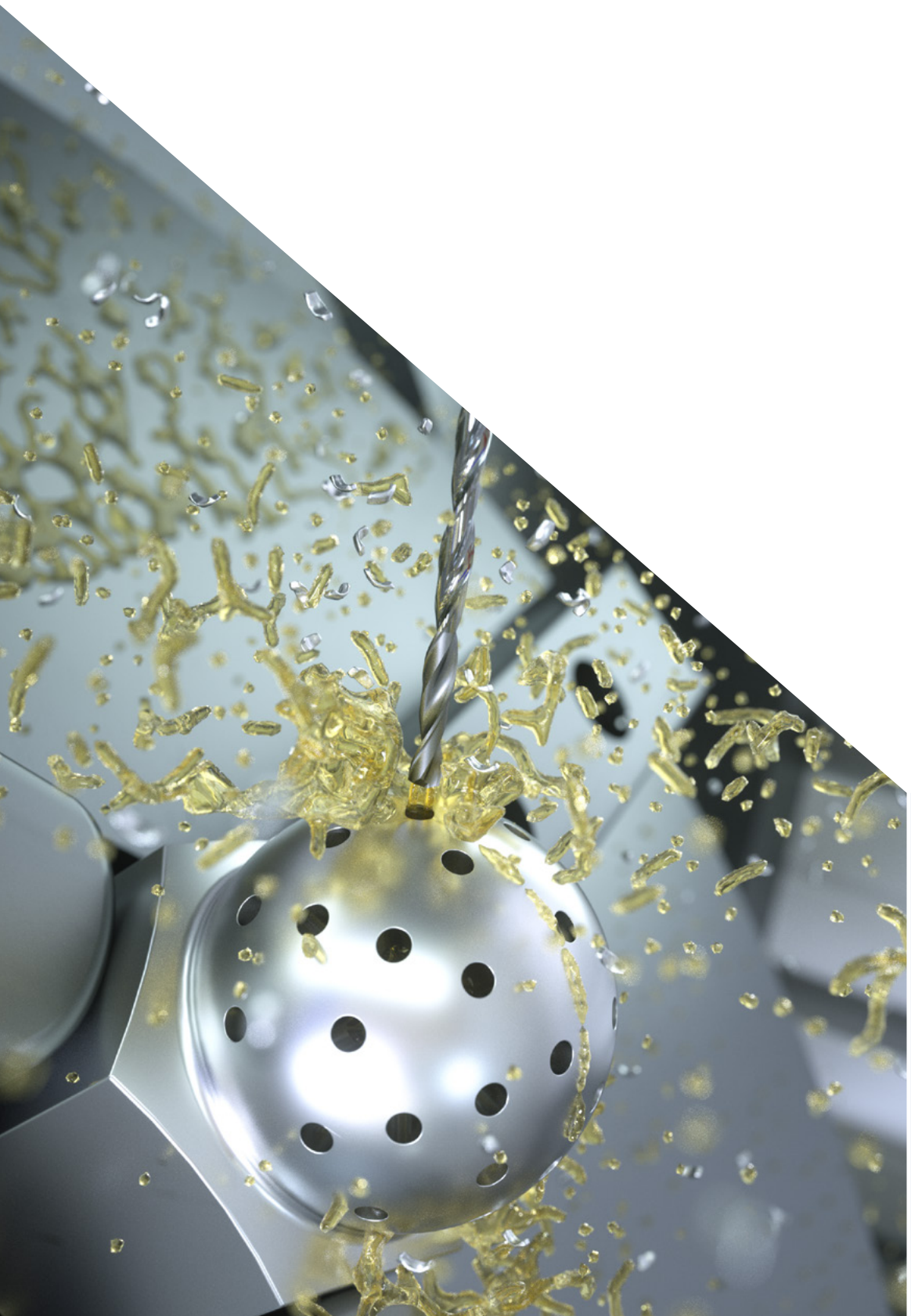
## MATERIAL TO BE MACHINED

Drills for steel, corrosion-resistant steels, i.e. stainless steels, titanium / titanium alloys, super alloys or heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, drills for hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

## TREATMENTS

Cutting edge preparation, polishing of flutes

# crazy about drilling



# 06


**OVERVIEW** **192**

CODIFICATION KEY 194

MIQUDRILL 210 196
Depth up to 8 x d, Ø 0.1 mm - 3.0 mm | **.004" – .118"**

CRAZYDRILL STEEL 210
Depth up to 7 x d, Ø 0.4 mm - 6.35 mm | **1/64" – 1/4"**

CRAZYDRILL ALU 226
Depth up to 10 x d, Ø 0.4 mm - 3.0 mm | **.016" – .118"**

CRAZYDRILL SST-INOX 242
Depth up to 12 x d, Ø 0.2 mm - 2.0 mm | **.008" – .079"**

CRAZYDRILL COOL 256
Depth up to 15 x d, Ø 0.75 mm - 6.0 mm | **.030" – .236"**

CRAZYDRILL COOL XL 282
Depth up to 40 x d, Ø 1.0 mm - 6.0 mm | **.039" – .236"**

CRAZYDRILL COOL SST-INOX 306
Depth up to 40 x d, Ø 1.0 mm - 6.35 mm | **.039" – 1/4"**

CRAZYDRILL COOL TITANIUM ATC / PTC 336
Depth up to 10 x d, Ø 1.0 mm - 6.35 mm | **.039" – 1/4"**

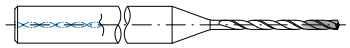
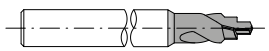
CRAZYDRILL FLEX 364
Depth up to 50 x d, Ø 0.1 mm - 2.0 mm | **.004" – .079"**

CUSTOMIZED DRILLS 408

CUSTOMIZED STEP DRILLS 410

# Overview

## CUTTING TOOL SOLUTIONS

| | | |
|---|---|---|
| | MIQUDRILL 210 |  |
| | CRAZYDRILL Steel |  |
| | CRAZYDRILL Alu |  |
| | CRAZYDRILL SST-Inox |  |
| | CRAZYDRILL Cool |  |
| | CRAZYDRILL Cool XL |  |
| | CRAZYDRILL Cool SST-Inox |  |
| NEW | CRAZYDRILL Cool Titanium ATC |  |
| NEW | CRAZYDRILL Cool Titanium PTC |  |
| | CRAZYDRILL Flex |  |
| | **Customized drills** |  |
| | **Customized step drills** |  |

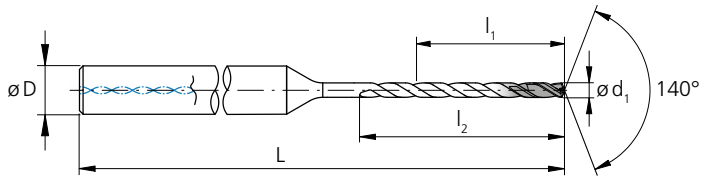
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



| ø - range [mm] \| [inch] | max. depth | Cooling Int. | Cooling Ext. | P Unalloyed and alloyed steel | M Stainless steel | K Cast iron | N Non ferrous metals | $S_1$ Super alloys | $S_2$ Alloyed titanium | $S_2$ Pure titanium | $S_3$ CrCo alloys | $H_1$ Hardened steel <55 HRC | $H_2$ Hardened steel ≥55 HRC | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1–3.0<br>**.004"–.118"** | up to 8 x d | – | ✔ | ◐ | ⊠ | ◐ | ◐ | ⊠ | ⊠ | ⊠ | ⊠ | ◐ | ⊠ | **196** |
| 0.4–6.35<br>**1/64"–1/4"** | 4 x d<br>6 - 7 x d | – | ✔ | ● | ⊠ | ● | ◐ | ○ | ○ | ○ | ○ | ◐ | ⊠ | **210** |
| 0.4–3.0<br>**.016"–.118"** | 5 x d<br>10 x d | – | ✔ | ⊠ | ⊠ | ⊠ | ● | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | **226** |
| 0.2–2.0<br>**.008"–.079"** | 8 x d<br>12 x d | ✔ | ✔ | ⊠ | ● | ⊠ | ◐ | ● | ⊠ | ⊠ | ● | ⊠ | ⊠ | **242** |
| 0.75–6.0<br>**.030"–.236"** | 6 x d<br>10 x d<br>15 x d | ✔ | – | ● | ○ | ● | ◐ | ○ | ○ | ○ | ○ | ● | ⊠ | **256** |
| 1.0–6.0<br>**.039"–.236"** | 15 x d<br>20 x d<br>30 x d<br>40 x d | ✔ | – | ● | ○ | ● | ● | ⊠ | ○ | ○ | ○ | ◐ | ⊠ | **282** |
| 1.0–6.35<br>**.039"–1/4"** | 6 x d<br>10 x d<br>15 x d<br>20 x d<br>30 x d<br>40 x d | ✔ | – | ⊠ | ● | ⊠ | ⊠ | ● | ⊠ | ⊠ | ● | ⊠ | ⊠ | **306** |
| 1.0–6.35<br>**.039"–1/4"** | 6 x d<br>10 x d | ✔ | – | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ● | ⊠ | ⊠ | ⊠ | ⊠ | **336** |
| 1.0–6.35<br>**.039"–1/4"** | 3 x d<br>6 x d | ✔ | – | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ⊠ | ● | ⊠ | ⊠ | ⊠ | **336** |
| 0.1–2.0<br>**.004"–.079"** | 20 x d<br>30 x d<br>50 x d | ✔ | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | ⊠ | **364** |
| 0.1–32.0<br>**.004"–1.26"** | as required | ✔ | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | **408** |
| 0.1–32.0<br>**.004"–1.26"** | as required | ✔ | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | **410** |

# Codification key

## ITEM NUMBER EASY TO UNDERSTAND




## 2.CD.100200.IC

**Division number**
- 2 = Mikron Tool SA Agno

**Family**
- CrazyDrill

**Cutting length $l_1$**
- 100 = 10 x $d_1$

**Cutting diameter $d_1$**
- 200 = Ø 2 mm

**Geometry and coolant information**
- S = Steel geometry
- A = Aluminium geometry
- IK = Stainless steel geometry with integrated coolant in the shaft
- IN = Stainless steel geometry with external coolant
- IC = Stainless steel geometry with through-tool-cooling
- CS = Steel geometry with through-tool-cooling
- CA = Geometry for non ferrous metals with through-tool-cooling
- XL = Deep hole drilling geometry
- ATC = Alloyed titanium geometry with through-tool-cooling
- PTC = Pure titanium geometry with through-tool-cooling

## 2.CFI.50100.IK.1

**Division number**
- 2 = Mikron Tool SA Agno

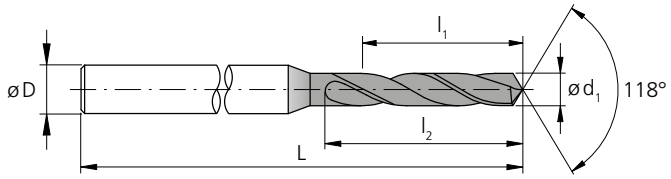
**Family**
- CFI = CrazyDrill Flex SST-Inox
- CFS = CrazyDrill Flex Steel
- CFT = CrazyDrill Flex Titanium

**Cutting length $l_1$**
- 50 = 50 x $d_1$

**Coating**
- 1 = coated
- 0 = uncoated

**Coolant system information**
- IK = Integrated coolant on the shaft

**Cutting diameter $d_1$**
- 100 = Ø 1 mm




## 2.MD.210285.0

**Division number**
- 2 = Mikron Tool SA Agno

**Family**
- MiquDrill

**Tool type**
- 210 = drill

**Cutting diameter $d_1$**
- 285 = Ø 2.85 mm

**Coating**
- 1 = coated
- 0 = uncoated

## 2.CD.040F116.S

**Division number**
- 2 = Mikron Tool SA Agno

**Family**
- CD = CrazyDrill
- CFS = CrazyDrill Flex Steel
- CFI = CrazyDrill Flex SST-Inox

**Cutting length $l_1$**
- 040 = 4 x $d_1$

**Family feature**
- S = CrazyDrill Steel
- IK = CrazyDrill SST-Inox Type IK
- IN = CrazyDrill SST-Inox Type IN
- IC = CrazyDrill Cool SST-Inox
- CS = CrazyDrill Cool Coated
- XL = CrazyDrill Cool XL
- ATC = CrazyDrill Cool Titanium ATC
- PTC = CrazyDrill Cool Titanium PTC

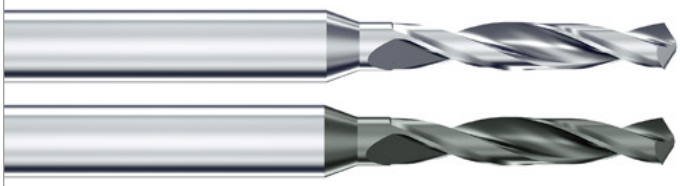
**Cutting diameter in fractional inches $d_1$**
- F116 = Ø 1/16"

# MiquDrill 210



MIQUDRILL 210

## A SMALL DRILL WITH GREAT AVAILABILITY



MiquDrill 210 is universally applicable for steel (alloyed and unalloyed), cast iron and nonferrous metals (e.g. aluminum with high silicium level). Available from stock in the diameter range:

- from .012" to .118" (0.3 mm to 3.0 mm) - coated version (eXedur RIP)
- from .004" to .118" (0.1 mm to 3.0 mm) - uncoated version

with the following increment:

- .0004" (0.01 mm) in the diameter range from .004" to .079" (0.1 mm to 2.0 mm)
- .0020" (0.05 mm) from .079" to .118" (2.0 mm to 3.0 mm)

Compared to uncoated version, "MiquDrill 210 coated" is the solution for higher requirements concerning tool life and/or shorter machining times, the machining of hardened steel < 55 HRC and also for difficult-to-machine materials.

The geometry of MiquDrill 210, the tool with good price / performance ratio, is especially designed for micro-machining of drilling depths between 2.4 and 8.0 x d. These depths are reached with few chip pecking cycles.

This precision drill is the optimal solution for the production of small and medium batch sizes or a large range of variants. First class quality and process accuracy are assured

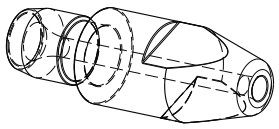
**Regrinding:** This product is not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the MiquDrill 210 (diameter, length, cutting direction…)? Ask us about our customized versions!

# Features and benefits

## FITS EVERY APPLICATION

- **HIGH DEGREE OF PROCESS RELIABILITY** | due to high quality
- **HIGH DEGREE OF PRECISION** | due to small tolerances
- **LOW PRODUCTION COSTS** | due to the low cost of tool



**COMPONENT**
Welding nozzle

**MATERIAL**
CuZn39Pb3 / 2.0401 / UNS 38500

**MACHINING**
- Drilling
- d = 2 mm **| .079"**
- Drilling depth 6 mm **| .236"**

**DRILLING TOOL**
Mikron Tool - MiquDrill 210 - coated

| DATA | MIKRON TOOL |
|---|---|
| Tool type | MiquDrill 210<br>- Carbide<br>- Coated<br>- External cooling |
| Item number | 2.MD.210200.1 |
| Cutting data | $v_c$ = 80 m/min **\| 263 SFM**<br>f = 0.048 mm/rev **\| .00189 IPR**<br>$Q_1$ = 4 mm **\| .158"**<br>$Q_x$ = 2 mm **\| .079"** |

## Uncoated

- External cooling
- Ø .004" - .118" (0.1 - 3.0 mm)



Page 200

## Coated

- External cooling
- Ø .012" - .118" (0.3 - 3.0 mm)




Page 200

**1 | SHAFT**
The accurately grinded shaft guarantees high concentricity and therefore highest position accuracy.

**2 | SOLID CARBIDE**
The use of latest generation carbide grades allows highest machining speed and feed if compared with HSS tools, drilling with MiquDrill is considerably faster.

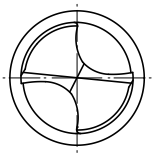
**3 | COATING**
The coated version of the drill is adapted for hardened steels < 55 HRC and reaches even a better tool life.

**4 | HELICAL FLUTE**
The geometry of the helical flute guarantees an optimal chip flow. No chip removal necessary.

**5 | TIP GEOMETRY**
The geometry of the universal drill is especially adapted for micro-machining. High process accuracy and productivity are guaranteed.

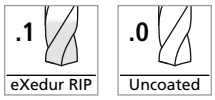
**6 | DIAMETER RANGE AND INCREMENTS**
Available from stock in diameters from .004" (0.1 mm) and in smallest diameter increments of .0004" (0.01 mm), respectively of .0019" (0.05 mm) starting from Ø .079" (2.0 mm).

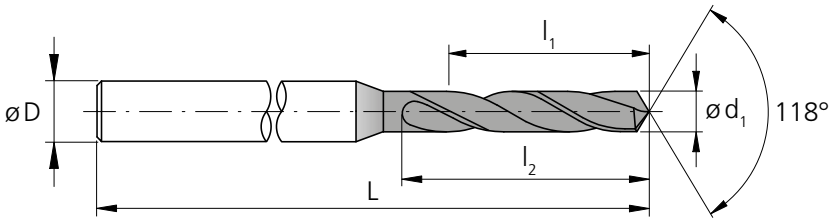
Tip drill



# MiquDrill 210 - coated / uncoated

## DRILLING WITH EXTERNAL COOLING




| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0039** | 0.10 | **.020** | 0.50 | 0.6 | 1.0 | **1.18** | 30 | 2.MD.210010 | - | .0 | ◪ |
| **.0043** | 0.11 | **.019** | 0.49 | 0.6 | 1.0 | **1.18** | 30 | 2.MD.210011 | - | .0 | ◪ |
| **.0047** | 0.12 | **.019** | 0.48 | 0.6 | 1.0 | **1.18** | 30 | 2.MD.210012 | - | .0 | ◪ |
| **.0051** | 0.13 | **.026** | 0.67 | 0.8 | 1.0 | **1.18** | 30 | 2.MD.210013 | - | .0 | ◪ |
| **.0055** | 0.14 | **.026** | 0.66 | 0.8 | 1.0 | **1.18** | 30 | 2.MD.210014 | - | .0 | ◪ |
| **.0059** | 0.15 | **.026** | 0.65 | 0.8 | 1.0 | **1.18** | 30 | 2.MD.210015 | - | .0 | ◪ |
| **.0063** | 0.16 | **.033** | 0.84 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210016 | - | .0 | ◪ |
| **.0067** | 0.17 | **.033** | 0.83 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210017 | - | .0 | ◪ |
| **.0071** | 0.18 | **.032** | 0.82 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210018 | - | .0 | ◪ |
| **.0075** | 0.19 | **.032** | 0.81 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210019 | - | .0 | ◪ |
| **.0079** | 0.20 | **.031** | 0.80 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210020 | - | .0 | ◪ |
| **.0083** | 0.21 | **.031** | 0.79 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210021 | - | .0 | ◪ |
| **.0087** | 0.22 | **.031** | 0.78 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210022 | - | .0 | ◪ |
| **.0091** | 0.23 | **.030** | 0.77 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210023 | - | .0 | ◪ |
| **.0094** | 0.24 | **.030** | 0.76 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210024 | - | .0 | ◪ |
| **.0098** | 0.25 | **.030** | 0.75 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210025 | - | .0 | ◪ |
| **.0102** | 0.26 | **.029** | 0.74 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210026 | - | .0 | ◪ |
| **.0106** | 0.27 | **.029** | 0.73 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210027 | - | .0 | ◪ |
| **.0110** | 0.28 | **.028** | 0.72 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210028 | - | .0 | ◪ |
| **.0114** | 0.29 | **.028** | 0.71 | 1.0 | 1.0 | **1.18** | 30 | 2.MD.210029 | - | .0 | ◪ |
| **.0118** | 0.30 | **.047** | 1.20 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210030 | .1 | .0 | ■ |
| **.0122** | 0.31 | **.047** | 1.19 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210031 | .1 | .0 | ■ |
| **.0126** | 0.32 | **.046** | 1.18 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210032 | .1 | .0 | ■ |
| **.0130** | 0.33 | **.046** | 1.17 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210033 | .1 | .0 | ■ |
| **.0134** | 0.34 | **.046** | 1.16 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210034 | .1 | .0 | ■ |
| **.0138** | 0.35 | **.045** | 1.15 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210035 | .1 | .0 | ■ |
| **.0142** | 0.36 | **.045** | 1.14 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210036 | .1 | .0 | ■ |
| **.0146** | 0.37 | **.044** | 1.13 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210037 | .1 | .0 | ■ |
| **.0150** | 0.38 | **.044** | 1.12 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210038 | .1 | .0 | ■ |
| **.0154** | 0.39 | **.044** | 1.11 | 1.5 | 1.0 | **1.18** | 30 | 2.MD.210039 | .1 | .0 | ■ |
| **.0157** | 0.40 | **.063** | 1.60 | 2.0 | 1.0 | **1.18** | 30 | 2.MD.210040 | .1 | .0 | ■ |
| **.0161** | 0.41 | **.063** | 1.59 | 2.0 | 1.0 | **1.18** | 30 | 2.MD.210041 | .1 | .0 | ■ |
| **.0165** | 0.42 | **.062** | 1.58 | 2.0 | 1.0 | **1.18** | 30 | 2.MD.210042 | .1 | .0 | ■ |
| **.0169** | 0.43 | **.062** | 1.57 | 2.0 | 1.0 | **1.18** | 30 | 2.MD.210043 | .1 | .0 | ■ |
| **.0173** | 0.44 | **.061** | 1.56 | 2.0 | 1.0 | **1.18** | 30 | 2.MD.210044 | .1 | .0 | ■ |

■ Stock item, packing unit of 5 pcs.
◪ Stock item only in uncoated version, packing unit of 5 pcs.

Carbide | 2.4 - 8xd$_1$ | 118° | Z2

| | | |
|---|---|---|
| Ø d$_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
| Tolerance | **0 - .00016"** | 0 - 0.004 mm |

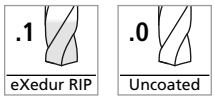


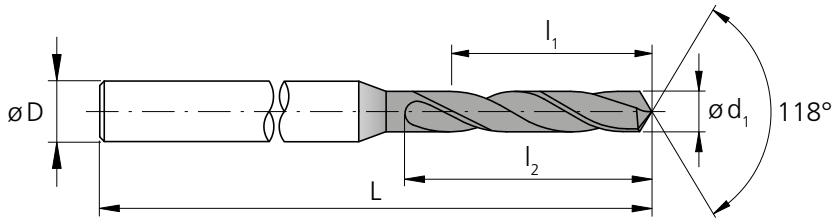
| d$_1$ [inch] | d$_1$ [mm] | l$_1$ [inch] | l$_1$ [mm] | l$_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0177** | 0.45 | **.120** | 3.05 | 3.5 | 1.0 | **1.18** | 30 | 2.MD.210045 | .1 | .0 | ■ |
| **.0181** | 0.46 | **.120** | 3.04 | 3.5 | 1.0 | **1.18** | 30 | 2.MD.210046 | .1 | .0 | ■ |
| **.0185** | 0.47 | **.119** | 3.03 | 3.5 | 1.0 | **1.18** | 30 | 2.MD.210047 | .1 | .0 | ■ |
| **.0189** | 0.48 | **.119** | 3.02 | 3.5 | 1.0 | **1.18** | 30 | 2.MD.210048 | .1 | .0 | ■ |
| **.0193** | 0.49 | **.138** | 3.51 | 4.0 | 1.0 | **1.18** | 30 | 2.MD.210049 | .1 | .0 | ■ |
| **.0197** | 0.50 | **.138** | 3.50 | 4.0 | 1.0 | **1.18** | 30 | 2.MD.210050 | .1 | .0 | ■ |
| **.0201** | 0.51 | **.137** | 3.49 | 4.0 | 1.0 | **1.18** | 30 | 2.MD.210051 | .1 | .0 | ■ |
| **.0205** | 0.52 | **.137** | 3.48 | 4.0 | 1.0 | **1.18** | 30 | 2.MD.210052 | .1 | .0 | ■ |
| **.0209** | 0.53 | **.137** | 3.47 | 4.0 | 1.0 | **1.18** | 30 | 2.MD.210053 | .1 | .0 | ■ |
| **.0213** | 0.54 | **.156** | 3.96 | 4.5 | 1.0 | **1.18** | 30 | 2.MD.210054 | .1 | .0 | ■ |
| **.0217** | 0.55 | **.156** | 3.95 | 4.5 | 1.0 | **1.18** | 30 | 2.MD.210055 | .1 | .0 | ■ |
| **.0220** | 0.56 | **.155** | 3.94 | 4.5 | 1.0 | **1.18** | 30 | 2.MD.210056 | .1 | .0 | ■ |
| **.0224** | 0.57 | **.155** | 3.93 | 4.5 | 1.0 | **1.18** | 30 | 2.MD.210057 | .1 | .0 | ■ |
| **.0228** | 0.58 | **.154** | 3.92 | 4.5 | 1.0 | **1.18** | 30 | 2.MD.210058 | .1 | .0 | ■ |
| **.0232** | 0.59 | **.154** | 3.91 | 4.5 | 1.0 | **1.18** | 30 | 2.MD.210059 | .1 | .0 | ■ |
| **.0236** | 0.60 | **.154** | 3.90 | 4.5 | 1.0 | **1.18** | 30 | 2.MD.210060 | .1 | .0 | ■ |
| **.0240** | 0.61 | **.173** | 4.39 | 5.0 | 1.0 | **1.18** | 30 | 2.MD.210061 | .1 | .0 | ■ |
| **.0244** | 0.62 | **.172** | 4.38 | 5.0 | 1.0 | **1.18** | 30 | 2.MD.210062 | .1 | .0 | ■ |
| **.0248** | 0.63 | **.172** | 4.37 | 5.0 | 1.0 | **1.18** | 30 | 2.MD.210063 | .1 | .0 | ■ |
| **.0252** | 0.64 | **.172** | 4.36 | 5.0 | 1.0 | **1.18** | 30 | 2.MD.210064 | .1 | .0 | ■ |
| **.0256** | 0.65 | **.171** | 4.35 | 5.0 | 1.0 | **1.18** | 30 | 2.MD.210065 | .1 | .0 | ■ |
| **.0260** | 0.66 | **.171** | 4.34 | 5.0 | 1.0 | **1.18** | 30 | 2.MD.210066 | .1 | .0 | ■ |
| **.0264** | 0.67 | **.170** | 4.33 | 5.0 | 1.0 | **1.18** | 30 | 2.MD.210067 | .1 | .0 | ■ |
| **.0268** | 0.68 | **.194** | 4.92 | 5.6 | 1.0 | **1.18** | 30 | 2.MD.210068 | .1 | .0 | ■ |
| **.0272** | 0.69 | **.193** | 4.91 | 5.6 | 1.0 | **1.18** | 30 | 2.MD.210069 | .1 | .0 | ■ |
| **.0276** | 0.70 | **.193** | 4.90 | 5.6 | 1.0 | **1.18** | 30 | 2.MD.210070 | .1 | .0 | ■ |
| **.0280** | 0.71 | **.193** | 4.89 | 5.6 | 1.0 | **1.18** | 30 | 2.MD.210071 | .1 | .0 | ■ |
| **.0283** | 0.72 | **.192** | 4.88 | 5.6 | 1.0 | **1.18** | 30 | 2.MD.210072 | .1 | .0 | ■ |
| **.0287** | 0.73 | **.192** | 4.87 | 5.6 | 1.0 | **1.18** | 30 | 2.MD.210073 | .1 | .0 | ■ |
| **.0291** | 0.74 | **.191** | 4.86 | 5.6 | 1.0 | **1.18** | 30 | 2.MD.210074 | .1 | .0 | ■ |
| **.0295** | 0.75 | **.191** | 4.85 | 5.6 | 1.0 | **1.18** | 30 | 2.MD.210075 | .1 | .0 | ■ |
| **.0299** | 0.76 | **.226** | 5.74 | 6.5 | 1.0 | **1.18** | 30 | 2.MD.210076 | .1 | .0 | ■ |
| **.0303** | 0.77 | **.226** | 5.73 | 6.5 | 1.0 | **1.18** | 30 | 2.MD.210077 | .1 | .0 | ■ |
| **.0307** | 0.78 | **.225** | 5.72 | 6.5 | 1.0 | **1.18** | 30 | 2.MD.210078 | .1 | .0 | ■ |
| **.0311** | 0.79 | **.225** | 5.71 | 6.5 | 1.0 | **1.18** | 30 | 2.MD.210079 | .1 | .0 | ■ |

| Complementary products | |
|---|---|
| MiquDrill Centro | p.58 |
| MiquDrill 200 | p.94 |
| CrazyDrill Crosspilot | p.146 |

# MiquDrill 210 - coated / uncoated

## DRILLING WITH EXTERNAL COOLING

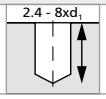
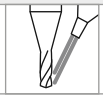



| d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0315** | 0.80 | **.224** | 5.70 | 6.5 | 1.5 | **1.18** | 30 | 2.MD.210080 | .1 | .0 | ■ |
| **.0319** | 0.81 | **.224** | 5.69 | 6.5 | 1.5 | **1.18** | 30 | 2.MD.210081 | .1 | .0 | ■ |
| **.0323** | 0.82 | **.224** | 5.68 | 6.5 | 1.5 | **1.18** | 30 | 2.MD.210082 | .1 | .0 | ■ |
| **.0327** | 0.83 | **.223** | 5.67 | 6.5 | 1.5 | **1.18** | 30 | 2.MD.210083 | .1 | .0 | ■ |
| **.0331** | 0.84 | **.223** | 5.66 | 6.5 | 1.5 | **1.18** | 30 | 2.MD.210084 | .1 | .0 | ■ |
| **.0335** | 0.85 | **.222** | 5.65 | 6.5 | 1.5 | **1.18** | 30 | 2.MD.210085 | .1 | .0 | ■ |
| **.0339** | 0.86 | **.242** | 6.14 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210086 | .1 | .0 | ■ |
| **.0343** | 0.87 | **.241** | 6.13 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210087 | .1 | .0 | ■ |
| **.0346** | 0.88 | **.241** | 6.12 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210088 | .1 | .0 | ■ |
| **.0350** | 0.89 | **.241** | 6.11 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210089 | .1 | .0 | ■ |
| **.0354** | 0.90 | **.240** | 6.10 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210090 | .1 | .0 | ■ |
| **.0358** | 0.91 | **.240** | 6.09 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210091 | .1 | .0 | ■ |
| **.0362** | 0.92 | **.239** | 6.08 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210092 | .1 | .0 | ■ |
| **.0366** | 0.93 | **.239** | 6.07 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210093 | .1 | .0 | ■ |
| **.0370** | 0.94 | **.239** | 6.06 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210094 | .1 | .0 | ■ |
| **.0374** | 0.95 | **.238** | 6.05 | 7.0 | 1.5 | **1.18** | 30 | 2.MD.210095 | .1 | .0 | ■ |
| **.0378** | 0.96 | **.277** | 7.04 | 8.0 | 1.5 | **1.18** | 30 | 2.MD.210096 | .1 | .0 | ■ |
| **.0382** | 0.97 | **.277** | 7.03 | 8.0 | 1.5 | **1.18** | 30 | 2.MD.210097 | .1 | .0 | ■ |
| **.0386** | 0.98 | **.276** | 7.02 | 8.0 | 1.5 | **1.18** | 30 | 2.MD.210098 | .1 | .0 | ■ |
| **.0390** | 0.99 | **.276** | 7.01 | 8.0 | 1.5 | **1.18** | 30 | 2.MD.210099 | .1 | .0 | ■ |
| **.0394** | 1.00 | **.315** | 8.00 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210100 | .1 | .0 | ■ |
| **.0398** | 1.01 | **.315** | 7.99 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210101 | .1 | .0 | ■ |
| **.0402** | 1.02 | **.314** | 7.98 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210102 | .1 | .0 | ■ |
| **.0406** | 1.03 | **.314** | 7.97 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210103 | .1 | .0 | ■ |
| **.0409** | 1.04 | **.313** | 7.96 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210104 | .1 | .0 | ■ |
| **.0413** | 1.05 | **.313** | 7.95 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210105 | .1 | .0 | ■ |
| **.0417** | 1.06 | **.313** | 7.94 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210106 | .1 | .0 | ■ |
| **.0421** | 1.07 | **.312** | 7.93 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210107 | .1 | .0 | ■ |
| **.0425** | 1.08 | **.312** | 7.92 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210108 | .1 | .0 | ■ |
| **.0429** | 1.09 | **.311** | 7.91 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210109 | .1 | .0 | ■ |
| **.0433** | 1.10 | **.311** | 7.90 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210110 | .1 | .0 | ■ |
| **.0437** | 1.11 | **.311** | 7.89 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210111 | .1 | .0 | ■ |
| **.0441** | 1.12 | **.310** | 7.88 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210112 | .1 | .0 | ■ |
| **.0445** | 1.13 | **.310** | 7.87 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210113 | .1 | .0 | ■ |
| **.0449** | 1.14 | **.309** | 7.86 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210114 | .1 | .0 | ■ |
| **.0453** | 1.15 | **.309** | 7.85 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210115 | .1 | .0 | ■ |

| d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0457** | 1.16 | **.309** | 7.84 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210116 | .1 | .0 | ■ |
| **.0461** | 1.17 | **.308** | 7.83 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210117 | .1 | .0 | ■ |
| **.0465** | 1.18 | **.308** | 7.82 | 9.0 | 1.5 | **1.18** | 30 | 2.MD.210118 | .1 | .0 | ■ |
| **.0469** | 1.19 | **.347** | 8.81 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210119 | .1 | .0 | ■ |
| **.0472** | 1.20 | **.346** | 8.80 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210120 | .1 | .0 | ■ |
| **.0476** | 1.21 | **.346** | 8.79 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210121 | .1 | .0 | ■ |
| **.0480** | 1.22 | **.346** | 8.78 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210122 | .1 | .0 | ■ |
| **.0484** | 1.23 | **.345** | 8.77 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210123 | .1 | .0 | ■ |
| **.0488** | 1.24 | **.345** | 8.76 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210124 | .1 | .0 | ■ |
| **.0492** | 1.25 | **.344** | 8.75 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210125 | .1 | .0 | ■ |
| **.0496** | 1.26 | **.344** | 8.74 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210126 | .1 | .0 | ■ |
| **.0500** | 1.27 | **.344** | 8.73 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210127 | .1 | .0 | ■ |
| **.0504** | 1.28 | **.343** | 8.72 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210128 | .1 | .0 | ■ |
| **.0508** | 1.29 | **.343** | 8.71 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210129 | .1 | .0 | ■ |
| **.0512** | 1.30 | **.343** | 8.70 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210130 | .1 | .0 | ■ |
| **.0516** | 1.31 | **.342** | 8.69 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210131 | .1 | .0 | ■ |
| **.0520** | 1.32 | **.342** | 8.68 | 10.0 | 1.5 | **1.18** | 30 | 2.MD.210132 | .1 | .0 | ■ |
| **.0524** | 1.33 | **.400** | 10.17 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210133 | .1 | .0 | ■ |
| **.0528** | 1.34 | **.400** | 10.16 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210134 | .1 | .0 | ■ |
| **.0531** | 1.35 | **.400** | 10.15 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210135 | .1 | .0 | ■ |
| **.0535** | 1.36 | **.399** | 10.14 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210136 | .1 | .0 | ■ |
| **.0539** | 1.37 | **.399** | 10.13 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210137 | .1 | .0 | ■ |
| **.0543** | 1.38 | **.398** | 10.12 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210138 | .1 | .0 | ■ |
| **.0547** | 1.39 | **.398** | 10.11 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210139 | .1 | .0 | ■ |
| **.0551** | 1.40 | **.398** | 10.10 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210140 | .1 | .0 | ■ |
| **.0555** | 1.41 | **.397** | 10.09 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210141 | .1 | .0 | ■ |
| **.0559** | 1.42 | **.397** | 10.08 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210142 | .1 | .0 | ■ |
| **.0563** | 1.43 | **.396** | 10.07 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210143 | .1 | .0 | ■ |
| **.0567** | 1.44 | **.396** | 10.06 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210144 | .1 | .0 | ■ |
| **.0571** | 1.45 | **.396** | 10.05 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210145 | .1 | .0 | ■ |
| **.0575** | 1.46 | **.395** | 10.04 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210146 | .1 | .0 | ■ |
| **.0579** | 1.47 | **.395** | 10.03 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210147 | .1 | .0 | ■ |
| **.0583** | 1.48 | **.394** | 10.02 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210148 | .1 | .0 | ■ |
| **.0587** | 1.49 | **.394** | 10.01 | 11.5 | 1.5 | **1.18** | 30 | 2.MD.210149 | .1 | .0 | ■ |
| **.0591** | 1.50 | **.413** | 10.50 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210150 | .1 | .0 | ■ |
| **.0594** | 1.51 | **.413** | 10.49 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210151 | .1 | .0 | ■ |

■ Stock item, packing unit of 5 pcs.

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
| Tolerance | **0 - .00016"** | 0 - 0.004 mm |



| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0598** | 1.52 | **.413** | 10.48 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210152 | .1 | .0 | ■ |
| **.0602** | 1.53 | **.412** | 10.47 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210153 | .1 | .0 | ■ |
| **.0606** | 1.54 | **.412** | 10.46 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210154 | .1 | .0 | ■ |
| **.0610** | 1.55 | **.411** | 10.45 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210155 | .1 | .0 | ■ |
| **.0614** | 1.56 | **.411** | 10.44 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210156 | .1 | .0 | ■ |
| **.0618** | 1.57 | **.411** | 10.43 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210157 | .1 | .0 | ■ |
| **.0622** | 1.58 | **.410** | 10.42 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210158 | .1 | .0 | ■ |
| **.0626** | 1.59 | **.410** | 10.41 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210159 | .1 | .0 | ■ |
| **.0630** | 1.60 | **.409** | 10.40 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210160 | .1 | .0 | ■ |
| **.0634** | 1.61 | **.409** | 10.39 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210161 | .1 | .0 | ■ |
| **.0638** | 1.62 | **.409** | 10.38 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210162 | .1 | .0 | ■ |
| **.0642** | 1.63 | **.408** | 10.37 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210163 | .1 | .0 | ■ |
| **.0646** | 1.64 | **.408** | 10.36 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210164 | .1 | .0 | ■ |
| **.0650** | 1.65 | **.407** | 10.35 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210165 | .1 | .0 | ■ |
| **.0654** | 1.66 | **.407** | 10.34 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210166 | .1 | .0 | ■ |
| **.0657** | 1.67 | **.407** | 10.33 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210167 | .1 | .0 | ■ |
| **.0661** | 1.68 | **.406** | 10.32 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210168 | .1 | .0 | ■ |
| **.0665** | 1.69 | **.406** | 10.31 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210169 | .1 | .0 | ■ |
| **.0669** | 1.70 | **.406** | 10.30 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210170 | .1 | .0 | ■ |
| **.0673** | 1.71 | **.405** | 10.29 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210171 | .1 | .0 | ■ |
| **.0677** | 1.72 | **.405** | 10.28 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210172 | .1 | .0 | ■ |
| **.0681** | 1.73 | **.404** | 10.27 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210173 | .1 | .0 | ■ |
| **.0685** | 1.74 | **.404** | 10.26 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210174 | .1 | .0 | ■ |
| **.0689** | 1.75 | **.404** | 10.25 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210175 | .1 | .0 | ■ |
| **.0693** | 1.76 | **.403** | 10.24 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210176 | .1 | .0 | ■ |
| **.0697** | 1.77 | **.403** | 10.23 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210177 | .1 | .0 | ■ |
| **.0701** | 1.78 | **.402** | 10.22 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210178 | .1 | .0 | ■ |
| **.0705** | 1.79 | **.402** | 10.21 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210179 | .1 | .0 | ■ |
| **.0709** | 1.80 | **.402** | 10.20 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210180 | .1 | .0 | ■ |
| **.0713** | 1.81 | **.401** | 10.19 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210181 | .1 | .0 | ■ |
| **.0717** | 1.82 | **.401** | 10.18 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210182 | .1 | .0 | ■ |
| **.0720** | 1.83 | **.400** | 10.17 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210183 | .1 | .0 | ■ |
| **.0724** | 1.84 | **.400** | 10.16 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210184 | .1 | .0 | ■ |
| **.0728** | 1.85 | **.400** | 10.15 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210185 | .1 | .0 | ■ |
| **.0732** | 1.86 | **.399** | 10.14 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210186 | .1 | .0 | ■ |
| **.0736** | 1.87 | **.399** | 10.13 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210187 | .1 | .0 | ■ |

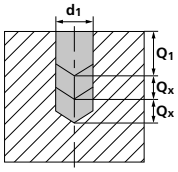
| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.0740** | 1.88 | **.398** | 10.12 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210188 | .1 | .0 | ■ |
| **.0744** | 1.89 | **.398** | 10.11 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210189 | .1 | .0 | ■ |
| **.0748** | 1.90 | **.398** | 10.10 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210190 | .1 | .0 | ■ |
| **.0752** | 1.91 | **.397** | 10.09 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210191 | .1 | .0 | ■ |
| **.0756** | 1.92 | **.397** | 10.08 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210192 | .1 | .0 | ■ |
| **.0760** | 1.93 | **.396** | 10.07 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210193 | .1 | .0 | ■ |
| **.0764** | 1.94 | **.396** | 10.06 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210194 | .1 | .0 | ■ |
| **.0768** | 1.95 | **.396** | 10.05 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210195 | .1 | .0 | ■ |
| **.0772** | 1.96 | **.395** | 10.04 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210196 | .1 | .0 | ■ |
| **.0776** | 1.97 | **.395** | 10.03 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210197 | .1 | .0 | ■ |
| **.0780** | 1.98 | **.394** | 10.02 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210198 | .1 | .0 | ■ |
| **.0783** | 1.99 | **.394** | 10.01 | 12.0 | 2.0 | **1.50** | 38 | 2.MD.210199 | .1 | .0 | ■ |
| **.0787** | 2.00 | **.394** | 10.00 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210200 | .1 | .0 | ■ |
| **.0807** | 2.05 | **.392** | 9.95 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210205 | .1 | .0 | ■ |
| **.0827** | 2.10 | **.390** | 9.90 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210210 | .1 | .0 | ■ |
| **.0846** | 2.15 | **.388** | 9.85 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210215 | .1 | .0 | ■ |
| **.0866** | 2.20 | **.386** | 9.80 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210220 | .1 | .0 | ■ |
| **.0886** | 2.25 | **.384** | 9.75 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210225 | .1 | .0 | ■ |
| **.0906** | 2.30 | **.382** | 9.70 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210230 | .1 | .0 | ■ |
| **.0925** | 2.35 | **.380** | 9.65 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210235 | .1 | .0 | ■ |
| **.0945** | 2.40 | **.378** | 9.60 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210240 | .1 | .0 | ■ |
| **.0965** | 2.45 | **.376** | 9.55 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210245 | .1 | .0 | ■ |
| **.0984** | 2.50 | **.374** | 9.50 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210250 | .1 | .0 | ■ |
| **.1004** | 2.55 | **.372** | 9.45 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210255 | .1 | .0 | ■ |
| **.1024** | 2.60 | **.370** | 9.40 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210260 | .1 | .0 | ■ |
| **.1043** | 2.65 | **.368** | 9.35 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210265 | .1 | .0 | ■ |
| **.1063** | 2.70 | **.366** | 9.30 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210270 | .1 | .0 | ■ |
| **.1083** | 2.75 | **.364** | 9.25 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210275 | .1 | .0 | ■ |
| **.1102** | 2.80 | **.362** | 9.20 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210280 | .1 | .0 | ■ |
| **.1122** | 2.85 | **.360** | 9.15 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210285 | .1 | .0 | ■ |
| **.1142** | 2.90 | **.358** | 9.10 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210290 | .1 | .0 | ■ |
| **.1161** | 2.95 | **.356** | 9.05 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210295 | .1 | .0 | ■ |
| **.1181** | 3.00 | **.354** | 9.00 | 12.0 | 3.0 | **1.50** | 38 | 2.MD.210300 | .1 | .0 | ■ |

| Complementary products | |
|---|---|
| MiquDrill Centro | p.58 |
| MiquDrill 200 | p.94 |
| CrazyDrill Crosspilot | p.146 |

# MiquDrill 210 - coated

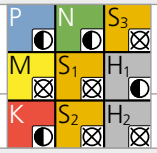
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 40 – 70 \| **131 – 230** | 2xd1 | 1xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 30 – 40 \| **98 – 131** | 2xd1 | 1xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 30 – 60 \| **98 – 197** | 2xd1 | 1xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 30 – 70 \| **98 – 230** | 2xd1 | 1xd1 |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 80 – 150 \| **262 – 492** | 2xd1 | 1xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 – 100 \| **197 – 328** | 2xd1 | 1xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 – 70 \| **131 – 230** | 2xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 – 70 \| **131 – 230** | 2xd1 | 1xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 40 – 150 \| **131 – 492** | 2xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 30 – 40 \| **98 – 131** | 2xd1 | 1xd1 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 – 40 \| **66 – 131** | 0.5xd1 | 0.5xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



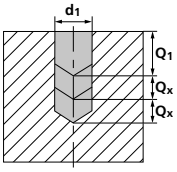

**f** [mm/rev] | **[IPR]**

| **Ød1** | | | | |
|---|---|---|---|---|
| 0.3–0.6 mm \| **.012"–.024"** | 0.6–1.0 mm \| **.024"–.039"** | 1.0–1.5 mm \| **.039"–.059"** | 1.5–2.0 mm \| **.059"–.079"** | 2.0–3.0 mm \| **.079"–.118"** |
| **f** | **f** | **f** | **f** | **f** |
| 0.009 \| **.00035** | 0.016 \| **.00063** | 0.023 \| **.00091** | 0.033 \| **.00130** | 0.045 \| **.00177** |
| 0.007 \| **.00028** | 0.011 \| **.00043** | 0.015 \| **.00059** | 0.023 \| **.00091** | 0.035 \| **.00138** |
| 0.004 \| **.00016** | 0.009 \| **.00035** | 0.014 \| **.00055** | 0.020 \| **.00079** | 0.028 \| **.00110** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 0.007 \| **.00028** | 0.013 \| **.00051** | 0.023 \| **.00091** | 0.030 \| **.00118** | 0.045 \| **.00177** |
| 0.010 \| **.00039** | 0.023 \| **.00091** | 0.038 \| **.00150** | 0.050 \| **.00197** | 0.070 \| **.00276** |
| 0.008 \| **.00031** | 0.019 \| **.00075** | 0.030 \| **.00118** | 0.045 \| **.00177** | 0.060 \| **.00236** |
| 0.008 \| **.00031** | 0.014 \| **.00055** | 0.023 \| **.00091** | 0.030 \| **.00118** | 0.045 \| **.00177** |
| 0.008 \| **.00031** | 0.014 \| **.00055** | 0.023 \| **.00091** | 0.030 \| **.00118** | 0.045 \| **.00177** |
| 0.008 \| **.00031** | 0.017 \| **.00067** | 0.030 \| **.00118** | 0.045 \| **.00177** | 0.065 \| **.00256** |
| 0.007 \| **.00028** | 0.011 \| **.00043** | 0.015 \| **.00059** | 0.023 \| **.00091** | 0.035 \| **.00138** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 0.003 \| **.00012** | 0.004 \| **.00016** | 0.007 \| **.00028** | 0.009 \| **.00035** | 0.009 \| **.00035** |
| | | | | |

# MiquDrill 210 - uncoated

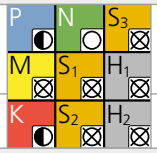
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 30 – 60 \| **98 – 197** | 2xd1 | 1xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 25 – 40 \| **82 – 131** | 2xd1 | 1xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 25 – 40 \| **82 – 131** | 2xd1 | 1xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 25 – 60 \| **82 – 197** | 2xd1 | 1xd1 |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 50 – 100 \| **164 – 328** | 2xd1 | 1xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 40 – 80 \| **82 – 262** | 2xd1 | 1xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 30 – 50 \| **98 – 164** | 2xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 30 – 50 \| **98 – 164** | 2xd1 | 1xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 30 – 80 \| **98 – 262** | 2xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 25 – 40 \| **82 – 131** | 2xd1 | 1xd1 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




**f** [mm/rev] **| [IPR]**

| **Ød1** | | | | | |
|---|---|---|---|---|---|
| 0.1–0.3 mm **| .004"–.012"** | 0.3–0.6 mm **| .012"–.024"** | 0.6–1.0 mm **| .024"–.039"** | 1.0–1.5 mm **| .039"–.059"** | 1.5 –2.0 mm **| .059"–.079"** | 2.0–3.0 mm **| .079"–.118"** |
| **f** | **f** | **f** | **f** | **f** | **f** |
| 0.003 **| .00012** | 0.009 **| .00035** | 0.016 **| .00063** | 0.023 **| .00091** | 0.033 **| .00130** | 0.045 **| .00177** |
| 0.003 **| .00012** | 0.007 **| .00028** | 0.011 **| .00043** | 0.015 **| .00059** | 0.023 **| .00091** | 0.035 **| .00138** |
| 0.002 **| .00008** | 0.004 **| .00016** | 0.009 **| .00035** | 0.014 **| .00055** | 0.020 **| .00079** | 0.028 **| .00110** |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 0.003 **| .00012** | 0.007 **| .00028** | 0.013 **| .00051** | 0.023 **| .00091** | 0.030 **| .00118** | 0.045 **| .00177** |
| 0.006 **| .00024** | 0.010 **| .00039** | 0.023 **| .00091** | 0.038 **| .00150** | 0.050 **| .00197** | 0.070 **| .00276** |
| 0.005 **| .00020** | 0.008 **| .00031** | 0.019 **| .00075** | 0.030 **| .00118** | 0.045 **| .00177** | 0.060 **| .00236** |
| 0.004 **| .00016** | 0.008 **| .00031** | 0.014 **| .00055** | 0.023 **| .00091** | 0.030 **| .00118** | 0.045 **| .00177** |
| 0.004 **| .00016** | 0.008 **| .00031** | 0.014 **| .00055** | 0.023 **| .00091** | 0.030 **| .00118** | 0.045 **| .00177** |
| 0.005 **| .00020** | 0.008 **| .00031** | 0.017 **| .00067** | 0.030 **| .00118** | 0.045 **| .00177** | 0.065 **| .00256** |
| 0.003 **| .00012** | 0.007 **| .00028** | 0.011 **| .00043** | 0.015 **| .00059** | 0.023 **| .00091** | 0.035 **| .00138** |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| Recommended: MiquDrill 210 - coated | | | | | | | | | |
| | | | | | | | | | |



# Drilling process MiquDrill 210

## QUICK AND ACCURATE DRILLING FROM 2.4 TO 8 X D

### Coolant type, pressure, filtration and flowrate

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling medium is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical information".

### MiquDrill 210

Due to the excellent self-centering of MiquDrill 210, a center or pilot drill is not obligatory on regular and straight surfaces.

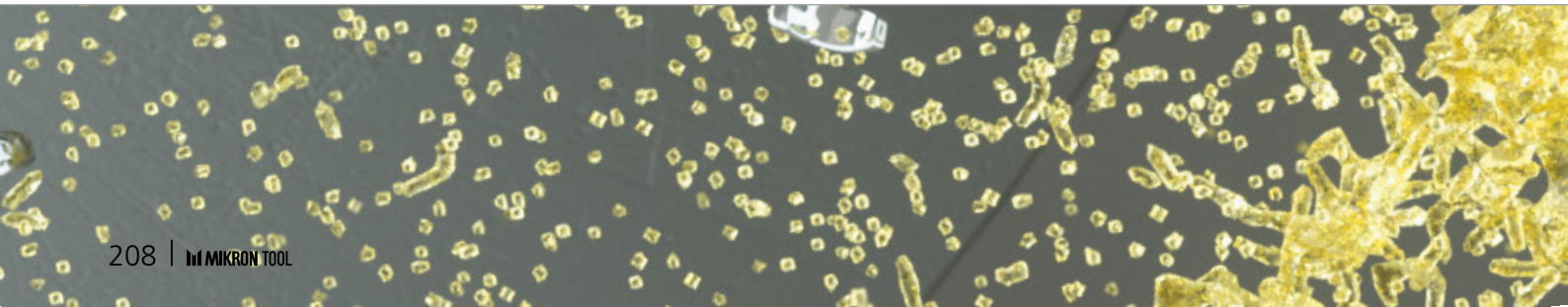
### Center drilling / pilot drilling and drilling

**Higher requirements:** On irregular and rough or inclined surfaces or for highest position accuracy and in general for drilling, Mikron Tool recommends:

- **MiquDrill Centro 90° / 120°** as centering drill
- **MiquDrill 200** as pilot drill
- **CrazyDrill Crosspilot** as pilot drill on inclined surfaces (from Ø 0.4 mm (.016"))

Pilot drilling with MiquDrill 200 or centering with MiquDrill Centro is the perfect starting position for precise drilling (position and alignment accuracy) and a stable machining process. The same does the pilot drill CrazyDrill Crosspilot when drilling on inclined surfaces.

The quality of drilling (position and alignment accuracy and stable machining process) are assured.



## DRILLING PROCESS

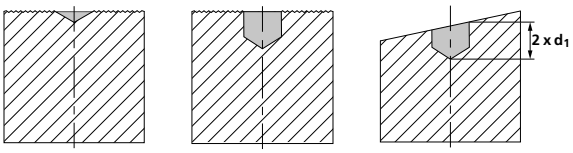
**Drilling according DIN 66025 / PAL**

G83 deep-drilling cycle with chip break and chip removal (pecks)

Q = depth of the respective peck

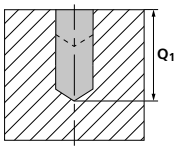
### 1 | CENTER OR PILOT DRILLING (ONLY IF NECESSARY)

- With MiquDrill Centro 90° / 120° or MiquDrill 200 (irregular or rough surfaces) or CrazyDrill Crosspilot (inclined surfaces).

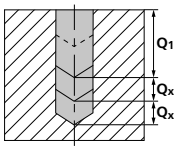



### 2 | DRILLING

- With MiquDrill 210 up to maximum drilling depth $Q_1$ (see cutting data table) in one step, afterwards remove chips.




- Additional pecks $Q_X$ according to cutting data table, afterwards remove chips.

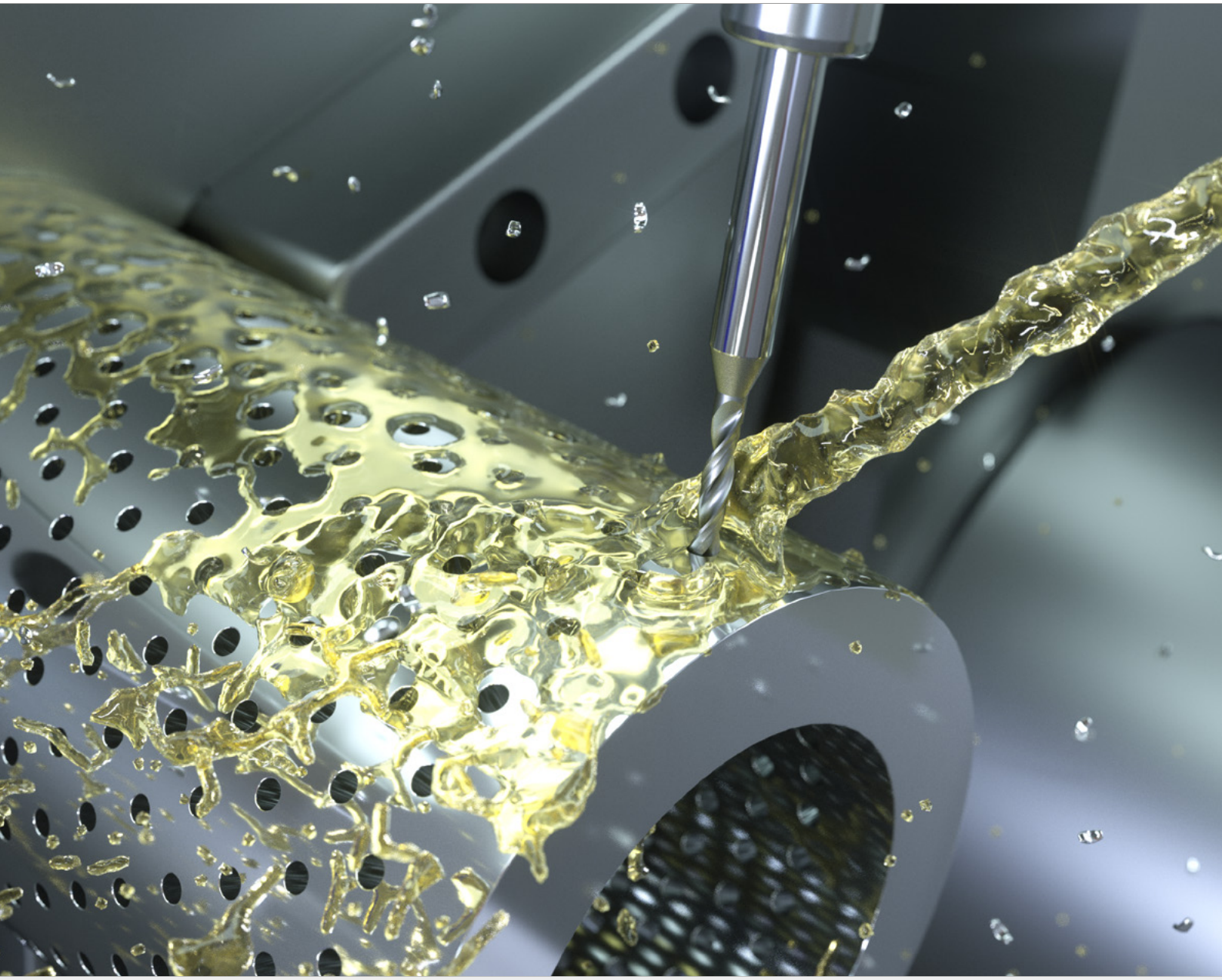



Note:

Between pecks, take the drill completely out of the hole.

After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# CrazyDrill Steel



CRAZYDRILL Steel

## FAST AND PRECISE DRILLING UP TO 7 X D



Mikron Tool offers with CrazyDrill Steel a small tool for drilling steel with highest speed, highest process reliability and accuracy, in a diameter range from 1/64" up to 1/4" (0.4 up to 6.35 mm).

It is designed for unalloyed and alloyed steels, for cast iron, aluminum and brass and for other metals. In alloyed steels the drill reaches the complete drilling depth of 4 x d or 6 x d / 7 x d in one step. Only in long-chipping materials a minimal pecking ensures a high degree of reliability. Due to the combination of its chisel "s"-form and tip angle of 140° the drill is self-centering and reaches the highest drilling speeds.

We recommend pilot drilling or centering only on irregular, rough or inclined surfaces, if a high position accuracy is requested and for drilling diameters under Ø 0.8 mm.

Its excellent tool life, the high hole and surface quality and the hole roundness make this cutting tool to a reliable partner.

No wonder the term "hole punching" was invented for this drill. It drills through the material at the highest feed rates, chip removal is unnecessary in most cases.

**Regrinding:** This product can be reground starting from Ø .055" (1.4 mm).

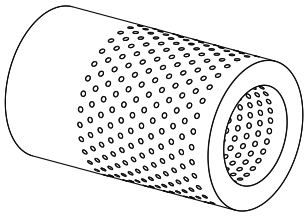
**Please note:** You couldn't find your suitable version of the CrazyDrill Steel (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYDRILL by Mikron Tool Steel

# Features and benefits

## A SMALL DRILL FOR HIGHEST REQUIREMENTS IN STEEL

- **SHORT MACHINING TIME** | due to high feeds
- **LONG TOOL LIFE** | from 10 to 20 times longer than HSS drills
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to high quality
- **HIGH DEGREE OF PRECISION** | due to good self-centering



**COMPONENT**
Filter screen

**MATERIAL**
90MnCrV8 / 1.2842 / AISI O2

**MACHINING**
- 500 holes
- d = 0.8 mm **| .032"**
- Drilling depth 4.5 mm **| .177"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Steel - 6 x d

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Steel<br>- Carbide<br>- Coated<br>- External cooling |
| Item number | 2.CD.070080.S |
| Cutting data | $v_c$ = 80 m/min **\| 263 SFM**<br>f = 0.030 mm/rev **\| .0012 IPR**<br>$Q_1$ = 4.5 mm **\| .177"** |

## 4 x d

- External cooling
- Coated





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## 6 - 7 x d

- External cooling
- Coated






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**1 | SHAFT**
The robust carbide shaft guarantees a high degree of concentricity accuracy and therefore highest drilling reliability.

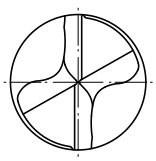
**2 | SOLID CARBIDE**
The use of a newest generation's solid carbide allows high machining feeds.

**3 | COATING**
The high-performance coating eXedur RIP guarantees a long tool life and excellent surface quality.

**4 | HELICAL FLUTE**
The geometry of the helical flute provides optimal chip flow, only minimal chip removal (pecking) is requested.

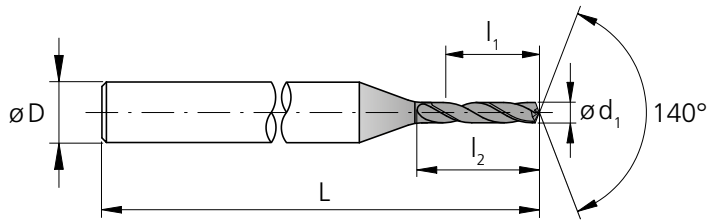
**5 | CUTTING GEOMETRY**
- Optimized cutting geometry with cutting edge preparation prevent from premature wear.
- Highest drilling speeds are possible with high process reliability.
- The solid carbide drill is self-centering due to its chisel "s"-form and guarantees a high position accuracy.

Tip drill



# CrazyDrill Steel 4 x d

## DRILLING WITH EXTERNAL COOLING




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **1/64** | **.0156** | 0.396 | **.0624** | 1.58 | 2.3 | 3 | **1.65** | 42.0 | 2.CD.040F164.S | ■ |
| | **.0157** | 0.40 | **.0630** | 1.60 | 2.3 | 3 | **1.65** | 42.0 | 2.CD.040040.S | ■ |
| | **.0177** | 0.45 | **.0709** | 1.80 | 2.6 | 3 | **1.65** | 42.0 | 2.CD.040045.S | ■ |
| | **.0197** | 0.50 | **.0787** | 2.00 | 2.9 | 3 | **1.65** | 42.0 | 2.CD.040050.S | ■ |
| | **.0217** | 0.55 | **.0866** | 2.20 | 3.2 | 3 | **1.65** | 42.0 | 2.CD.040055.S | ■ |
| | **.0236** | 0.60 | **.0945** | 2.40 | 3.5 | 3 | **1.71** | 43.5 | 2.CD.040060.S | ■ |
| | **.0256** | 0.65 | **.1024** | 2.60 | 3.8 | 3 | **1.71** | 43.5 | 2.CD.040065.S | ■ |
| | **.0276** | 0.70 | **.1102** | 2.80 | 4.1 | 3 | **1.71** | 43.5 | 2.CD.040070.S | ■ |
| | **.0295** | 0.75 | **.1181** | 3.00 | 4.4 | 3 | **1.71** | 43.5 | 2.CD.040075.S | ■ |
| **1/32** | **.0312** | 0.793 | **.1249** | 3.17 | 4.6 | 3 | **1.71** | 43.5 | 2.CD.040F132.S | ■ |
| | **.0315** | 0.80 | **.1260** | 3.20 | 4.6 | 3 | **1.71** | 43.5 | 2.CD.040080.S | ■ |
| | **.0335** | 0.85 | **.1339** | 3.40 | 4.9 | 3 | **1.71** | 43.5 | 2.CD.040085.S | ■ |
| | **.0354** | 0.90 | **.1417** | 3.60 | 5.2 | 3 | **1.71** | 43.5 | 2.CD.040090.S | ■ |
| | **.0374** | 0.95 | **.1496** | 3.80 | 5.5 | 3 | **1.71** | 43.5 | 2.CD.040095.S | ■ |
| | **.0394** | 1.00 | **.1575** | 4.00 | 5.8 | 3 | **1.73** | 44.0 | 2.CD.040100.S | ■ |
| | **.0413** | 1.05 | **.1654** | 4.20 | 6.1 | 3 | **1.73** | 44.0 | 2.CD.040105.S | ■ |
| | **.0433** | 1.10 | **.1732** | 4.40 | 6.3 | 3 | **1.73** | 44.0 | 2.CD.040110.S | ■ |
| | **.0453** | 1.15 | **.1811** | 4.60 | 6.6 | 3 | **1.73** | 44.0 | 2.CD.040115.S | ■ |
| | **.0472** | 1.20 | **.1890** | 4.80 | 7.0 | 3 | **1.77** | 45.0 | 2.CD.040120.S | ■ |
| | **.0492** | 1.25 | **.1969** | 5.00 | 7.3 | 3 | **1.77** | 45.0 | 2.CD.040125.S | ■ |
| | **.0512** | 1.30 | **.2047** | 5.20 | 7.6 | 3 | **1.77** | 45.0 | 2.CD.040130.S | ■ |
| | **.0531** | 1.35 | **.2126** | 5.40 | 7.9 | 3 | **1.77** | 45.0 | 2.CD.040135.S | ■ |
| | **.0551** | 1.40 | **.2205** | 5.60 | 8.2 | 3 | **1.81** | 46.0 | 2.CD.040140.S | ■ |
| | **.0571** | 1.45 | **.2283** | 5.80 | 8.6 | 3 | **1.81** | 46.0 | 2.CD.040145.S | ■ |
| | **.0591** | 1.50 | **.2362** | 6.00 | 8.7 | 3 | **1.81** | 46.0 | 2.CD.040150.S | ■ |
| | **.0610** | 1.55 | **.2441** | 6.20 | 9.1 | 3 | **1.81** | 46.0 | 2.CD.040155.S | ■ |

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **1/16** | **.0625** | 1.587 | **.2499** | 6.35 | 9.5 | 3 | **1.85** | 47.0 | 2.CD.040F116.S | ■ |
| | **.0630** | 1.60 | **.2520** | 6.40 | 9.5 | 3 | **1.85** | 47.0 | 2.CD.040160.S | ■ |
| | **.0650** | 1.65 | **.2598** | 6.60 | 9.7 | 3 | **1.85** | 47.0 | 2.CD.040165.S | ■ |
| | **.0669** | 1.70 | **.2677** | 6.80 | 10.0 | 3 | **1.85** | 47.0 | 2.CD.040170.S | ■ |
| | **.0689** | 1.75 | **.2756** | 7.00 | 10.3 | 3 | **1.85** | 47.0 | 2.CD.040175.S | ■ |
| | **.0709** | 1.80 | **.2835** | 7.20 | 10.8 | 3 | **1.89** | 48.0 | 2.CD.040180.S | ■ |
| | **.0728** | 1.85 | **.2913** | 7.40 | 11.0 | 3 | **1.89** | 48.0 | 2.CD.040185.S | ■ |
| | **.0748** | 1.90 | **.2992** | 7.60 | 11.2 | 3 | **1.89** | 48.0 | 2.CD.040190.S | ■ |
| | **.0768** | 1.95 | **.3071** | 7.80 | 11.4 | 3 | **1.89** | 48.0 | 2.CD.040195.S | ■ |
| | **.0787** | 2.00 | **.3150** | 8.00 | 11.9 | 4 | **2.17** | 55.0 | 2.CD.040200.S | ■ |
| | **.0807** | 2.05 | **.3228** | 8.20 | 12.1 | 4 | **2.17** | 55.0 | 2.CD.040205.S | ■ |
| | **.0827** | 2.10 | **.3307** | 8.40 | 12.3 | 4 | **2.17** | 55.0 | 2.CD.040210.S | ■ |
| | **.0846** | 2.15 | **.3386** | 8.60 | 12.6 | 4 | **2.17** | 55.0 | 2.CD.040215.S | ■ |
| | **.0866** | 2.20 | **.3465** | 8.80 | 13.0 | 4 | **2.20** | 56.0 | 2.CD.040220.S | ■ |
| | **.0886** | 2.25 | **.3543** | 9.00 | 13.3 | 4 | **2.20** | 56.0 | 2.CD.040225.S | ■ |
| | **.0906** | 2.30 | **.3622** | 9.20 | 13.6 | 4 | **2.20** | 56.0 | 2.CD.040230.S | ■ |
| | **.0925** | 2.35 | **.3701** | 9.40 | 13.9 | 4 | **2.20** | 56.0 | 2.CD.040235.S | ■ |
| **3/32** | **.0937** | 2.381 | **.3750** | 9.52 | 14.2 | 4 | **2.24** | 57.0 | 2.CD.040F332.S | ■ |
| | **.0945** | 2.40 | **.3780** | 9.60 | 14.2 | 4 | **2.24** | 57.0 | 2.CD.040240.S | ■ |
| | **.0965** | 2.45 | **.3858** | 9.80 | 14.6 | 4 | **2.24** | 57.0 | 2.CD.040245.S | ■ |
| | **.0984** | 2.50 | **.3937** | 10.00 | 14.7 | 4 | **2.24** | 57.0 | 2.CD.040250.S | ■ |
| | **.1004** | 2.55 | **.4016** | 10.20 | 15.1 | 4 | **2.24** | 57.0 | 2.CD.040255.S | ■ |
| | **.1024** | 2.60 | **.4094** | 10.40 | 15.5 | 4 | **2.28** | 58.0 | 2.CD.040260.S | ■ |
| | **.1043** | 2.65 | **.4173** | 10.60 | 15.7 | 4 | **2.28** | 58.0 | 2.CD.040265.S | ■ |
| | **.1063** | 2.70 | **.4252** | 10.80 | 16.0 | 4 | **2.28** | 58.0 | 2.CD.040270.S | ■ |
| | **.1083** | 2.75 | **.4331** | 11.00 | 16.3 | 4 | **2.28** | 58.0 | 2.CD.040275.S | ■ |

■ Stock item

Carbide | 4xd1 | 140° | Z2 | eXedur RIP

| Ø $d_1$ | .004" - .118" (0.1 - 3.0 mm) | | .120" - .236" (3.05 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | + .00016"<br>0 | + 0.004 mm<br>0 | + .00024"<br>+ .00004" | + 0.006 mm<br>+ 0.001 mm | + .00028"<br>+ .00004" | + 0.007 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1102 | 2.80 | .4409 | 11.20 | 16.8 | 4 | 2.32 | 59.0 | 2.CD.040280.S | ■ |
| | .1122 | 2.85 | .4488 | 11.40 | 17.0 | 4 | 2.32 | 59.0 | 2.CD.040285.S | ■ |
| | .1142 | 2.90 | .4567 | 11.60 | 17.2 | 4 | 2.32 | 59.0 | 2.CD.040290.S | ■ |
| | .1161 | 2.95 | .4646 | 11.80 | 17.4 | 4 | 2.32 | 59.0 | 2.CD.040295.S | ■ |
| | .1181 | 3.00 | .4724 | 12.00 | 17.6 | 4 | 2.32 | 59.0 | 2.CD.040300.S | ■ |
| | .1201 | 3.05 | .4803 | 12.20 | 17.8 | 4 | 2.36 | 60.0 | 2.CD.040305.S | ■ |
| | .1220 | 3.10 | .4882 | 12.40 | 18.1 | 4 | 2.36 | 60.0 | 2.CD.040310.S | ■ |
| | .1240 | 3.15 | .4961 | 12.60 | 18.4 | 4 | 2.36 | 60.0 | 2.CD.040315.S | ■ |
| 1/8 | .1250 | 3.175 | .5000 | 12.70 | 18.7 | 4 | 2.36 | 60.0 | 2.CD.040F18.S | ■ |
| | .1260 | 3.20 | .5039 | 12.80 | 18.7 | 4 | 2.36 | 60.0 | 2.CD.040320.S | ■ |
| | .1280 | 3.25 | .5118 | 13.00 | 19.0 | 4 | 2.36 | 60.0 | 2.CD.040325.S | ■ |
| | .1299 | 3.30 | .5197 | 13.20 | 19.3 | 4 | 2.36 | 60.0 | 2.CD.040330.S | ■ |
| | .1319 | 3.35 | .5276 | 13.40 | 19.6 | 4 | 2.36 | 60.0 | 2.CD.040335.S | ■ |
| | .1339 | 3.40 | .5354 | 13.60 | 19.9 | 4 | 2.36 | 60.0 | 2.CD.040340.S | ■ |
| | .1358 | 3.45 | .5433 | 13.80 | 20.2 | 4 | 2.36 | 60.0 | 2.CD.040345.S | ■ |
| | .1378 | 3.50 | .5512 | 14.00 | 20.5 | 4 | 2.36 | 60.0 | 2.CD.040350.S | ■ |
| | .1398 | 3.55 | .5591 | 14.20 | 20.8 | 4 | 2.36 | 60.0 | 2.CD.040355.S | ■ |
| | .1417 | 3.60 | .5669 | 14.40 | 21.1 | 4 | 2.54 | 64.5 | 2.CD.040360.S | ■ |
| | .1437 | 3.65 | .5748 | 14.60 | 21.4 | 4 | 2.54 | 64.5 | 2.CD.040365.S | ■ |
| | .1457 | 3.70 | .5827 | 14.80 | 21.6 | 4 | 2.54 | 64.5 | 2.CD.040370.S | ■ |
| | .1476 | 3.75 | .5906 | 15.00 | 21.9 | 4 | 2.54 | 64.5 | 2.CD.040375.S | ■ |
| | .1496 | 3.80 | .5984 | 15.20 | 22.2 | 4 | 2.54 | 64.5 | 2.CD.040380.S | ■ |
| | .1516 | 3.85 | .6063 | 15.40 | 22.5 | 4 | 2.54 | 64.5 | 2.CD.040385.S | ■ |
| | .1535 | 3.90 | .6142 | 15.60 | 22.8 | 4 | 2.54 | 64.5 | 2.CD.040390.S | ■ |
| | .1555 | 3.95 | .6220 | 15.80 | 23.1 | 4 | 2.54 | 64.5 | 2.CD.040395.S | ■ |
| 5/32 | .1562 | 3.968 | .6249 | 15.87 | 23.4 | 6 | 2.76 | 70.0 | 2.CD.040F532.S | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1575 | 4.00 | .6299 | 16.00 | 23.4 | 6 | 2.76 | 70.0 | 2.CD.040400.S | ■ |
| | .1614 | 4.10 | .6457 | 16.40 | 24.0 | 6 | 2.76 | 70.0 | 2.CD.040410.S | ■ |
| | .1654 | 4.20 | .6614 | 16.80 | 24.6 | 6 | 2.76 | 70.0 | 2.CD.040420.S | ■ |
| | .1693 | 4.30 | .6772 | 17.20 | 25.2 | 6 | 2.76 | 70.0 | 2.CD.040430.S | ■ |
| | .1732 | 4.40 | .6929 | 17.60 | 25.7 | 6 | 2.76 | 70.0 | 2.CD.040440.S | ■ |
| | .1772 | 4.50 | .7087 | 18.00 | 26.3 | 6 | 2.76 | 70.0 | 2.CD.040450.S | ■ |
| | .1811 | 4.60 | .7244 | 18.40 | 26.9 | 6 | 2.76 | 70.0 | 2.CD.040460.S | ■ |
| | .1850 | 4.70 | .7402 | 18.80 | 27.5 | 6 | 2.76 | 70.0 | 2.CD.040470.S | ■ |
| 3/16 | .1875 | 4.762 | .7499 | 19.05 | 28.1 | 6 | 2.76 | 70.0 | 2.CD.040F316.S | ■ |
| | .1890 | 4.80 | .7559 | 19.20 | 28.1 | 6 | 2.76 | 70.0 | 2.CD.040480.S | ■ |
| | .1929 | 4.90 | .7717 | 19.60 | 28.7 | 6 | 2.76 | 70.0 | 2.CD.040490.S | ■ |
| | .1969 | 5.00 | .7874 | 20.00 | 29.2 | 6 | 2.76 | 70.0 | 2.CD.040500.S | ■ |
| | .2008 | 5.10 | .8031 | 20.40 | 29.8 | 6 | 2.76 | 70.0 | 2.CD.040510.S | ■ |
| | .2047 | 5.20 | .8189 | 20.80 | 30.4 | 6 | 2.95 | 75.0 | 2.CD.040520.S | ■ |
| | .2087 | 5.30 | .8346 | 21.20 | 31.0 | 6 | 2.95 | 75.0 | 2.CD.040530.S | ■ |
| | .2126 | 5.40 | .8504 | 21.60 | 31.6 | 6 | 2.95 | 75.0 | 2.CD.040540.S | ■ |
| | .2165 | 5.50 | .8661 | 22.00 | 32.2 | 6 | 2.95 | 75.0 | 2.CD.040550.S | ■ |
| 7/32 | .2189 | 5.560 | .8756 | 22.24 | 32.8 | 6 | 2.95 | 75.0 | 2.CD.040F732.S | ■ |
| | .2205 | 5.60 | .8819 | 22.40 | 32.8 | 6 | 2.95 | 75.0 | 2.CD.040560.S | ■ |
| | .2244 | 5.70 | .8976 | 22.80 | 33.3 | 6 | 2.95 | 75.0 | 2.CD.040570.S | ■ |
| | .2283 | 5.80 | .9134 | 23.20 | 33.9 | 6 | 2.95 | 75.0 | 2.CD.040580.S | ■ |
| | .2323 | 5.90 | .9291 | 23.60 | 34.5 | 6 | 2.95 | 75.0 | 2.CD.040590.S | ■ |
| | .2362 | 6.00 | .9449 | 24.00 | 35.1 | 6 | 2.95 | 75.0 | 2.CD.040600.S | ■ |
| 1/4 | .2500 | 6.350 | 1.000 | 25.40 | 37.1 | 8 | 2.95 | 75.0 | 2.CD.040F14.S | ■ |

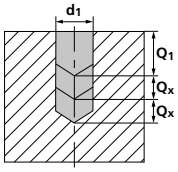
Complementary products

CrazyDrill Crosspilot p.146

# CrazyDrill Steel 4 x d

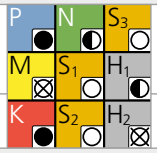
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 80 \| **262** | 120 \| **394** | 4xd1 | – |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| **197** | 80 \| **262** | 4xd1 | – |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 40 \| **131** | 60 \| **197** | 4xd1 | – |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 100 \| **328** | 150 \| **492** | 4xd1 | – |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 150 \| **492** | 220 \| **722** | 4xd1 | – |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 150 \| **492** | 200 \| **656** | 4xd1 | – |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 80 \| **262** | 120 \| **394** | 1.5xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 \| **328** | 150 \| **492** | 1.5xd1 | 1xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 70 \| **230** | 100 \| **328** | 1.5xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 70 \| **230** | 100 \| **328** | 4xd1 | – |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 20 \| **66** | 40 \| **131** | 1xd1 | 0.25xd1 |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 20 \| **66** | 40 \| **131** | 1xd1 | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| **66** | 20 \| **66** | 1xd1 | 0.3xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 15 \| **49** | 30 \| **98** | 4xd1 | – |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 15 \| **49** | 30 \| **98** | 4xd1 | – |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended

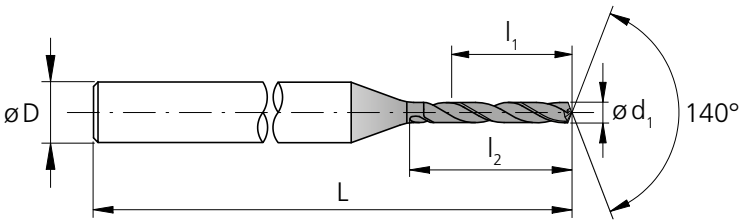


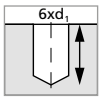

**f** [mm/rev] | **[IPR]**

| | **Ød$_1$** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1/64"** 0.4 mm \| **.016"** **f** | **1/32"** 0.8 mm \| **.032"** **f** | 1.0 mm \| **.039"** **f** | 1.25 mm \| **.049"** **f** | **1/16"** 1.5 mm \| **.059"** **f** | 2.0 mm \| **.079"** **f** | **3/32"** 2.5 mm \| **.098"** **f** | **1/8"** 3.0 mm \| **.118"** **f** | **5/32"** 4.0 mm \| **.158"** **f** | **3/16" - 7/32"** 5.0 mm \| **.197"** **f** | **1/4"** 6.0 mm \| **.236"** **f** |
| | 0.040 \| **.0016** | 0.075 \| **.0030** | 0.095 \| **.0037** | 0.110 \| **.0043** | 0.130 \| **.0051** | 0.170 \| **.0067** | 0.200 \| **.0079** | 0.230 \| **.0091** | 0.270 \| **.0106** | 0.290 \| **.0114** | 0.300 \| **.0118** |
| | 0.030 \| **.0012** | 0.060 \| **.0024** | 0.075 \| **.0030** | 0.090 \| **.0035** | 0.110 \| **.0043** | 0.140 \| **.0055** | 0.160 \| **.0063** | 0.180 \| **.0071** | 0.220 \| **.0087** | 0.230 \| **.091** | 0.240 \| **.0094** |
| | 0.035 \| **.0014** | 0.065 \| **.0026** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.110 \| **.0043** | 0.140 \| **.0055** | 0.170 \| **.0067** | 0.200 \| **.0079** | 0.230 \| **.0091** | 0.250 \| **.0098** | 0.260 \| **.0102** |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | 0.040 \| **.0016** | 0.080 \| **.0031** | 0.095 \| **.0037** | 0.120 \| **.0098** | 0.140 \| **.0055** | 0.175 \| **.0069** | 0.210 \| **.0083** | 0.240 \| **.0094** | 0.290 \| **.0114** | 0.330 \| **.0130** | 0.360 \| **.0142** |
| | 0.035 \| **.0014** | 0.065 \| **.0026** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.110 \| **.0043** | 0.140 \| **.0055** | 0.170 \| **.0067** | 0.200 \| **.0079** | 0.230 \| **.0091** | 0.250 \| **.0098** | 0.260 \| **.0102** |
| | 0.030 \| **.0012** | 0.060 \| **.0024** | 0.075 \| **.0030** | 0.090 \| **.0035** | 0.100 \| **.0039** | 0.135 \| **.0053** | 0.160 \| **.0063** | 0.180 \| **.0071** | 0.220 \| **.0087** | 0.235 \| **.0093** | 0.240 \| **.0094** |
| | 0.030 \| **.0012** | 0.055 \| **.0022** | 0.070 \| **.0028** | 0.085 \| **.0033** | 0.100 \| **.0039** | 0.130 \| **.0051** | 0.150 \| **.0059** | 0.170 \| **.0067** | 0.200 \| **.0079** | 0.220 \| **.0087** | 0.230 \| **.0091** |
| | 0.030 \| **.0012** | 0.050 \| **.0020** | 0.065 \| **.0026** | 0.070 \| **.0028** | 0.075 \| **.0030** | 0.090 \| **.0035** | 0.110 \| **.0043** | 0.140 \| **.0055** | 0.160 \| **.0063** | 0.200 \| **.0079** | 0.220 \| **.0087** |
| | 0.035 \| **.0014** | 0.055 \| **.0022** | 0.070 \| **.0028** | 0.080 \| **.0031** | 0.090 \| **.0035** | 0.110 \| **.0043** | 0.130 \| **.0051** | 0.150 \| **.0059** | 0.180 \| **.0071** | 0.220 \| **.0087** | 0.240 \| **.0094** |
| | 0.015 \| **.0006** | 0.025 \| **.0010** | 0.035 \| **.0014** | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.075 \| **.0030** | 0.095 \| **.0037** | 0.110 \| **.0043** | 0.130 \| **.0051** | 0.160 \| **.0063** | 0.220 \| **.0087** |
| | 0.002 \| **.00008** | 0.004 \| **.0002** | 0.005 \| **.00020** | 0.006 \| **.0002** | 0.007 \| **.0003** | 0.010 \| **.0004** | 0.012 \| **.0005** | 0.015 \| **.0006** | 0.020 \| **.0008** | 0.025 \| **.0010** | 0.030 \| **.0012** |
| | 0.014 \| **.0006** | 0.025 \| **.0010** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.070 \| **.0028** | 0.080 \| **.0031** | 0.095 \| **.0037** | 0.100 \| **.0039** | 0.110 \| **.0043** |
| | 0.020 \| **.0008** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.055 \| **.0022** | 0.070 \| **.0028** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0098** | 0.130 \| **.0051** | 0.140 \| **.0055** |
| | 0.006 \| **.00024** | 0.012 \| **.0005** | 0.015 \| **.0006** | 0.020 \| **.0008** | 0.025 \| **.0010** | 0.030 \| **.0012** | 0.035 \| **.0014** | 0.045 \| **.0018** | 0.060 \| **.0024** | 0.075 \| **.0030** | 0.090 \| **.0035** |
| | 0.005 \| **.00020** | 0.007 \| **.00028** | 0.010 \| **.0004** | 0.011 \| **.0004** | 0.012 \| **.0005** | 0.015 \| **.0006** | 0.020 \| **.0008** | 0.025 \| **.0010** | 0.030 \| **.0012** | 0.035 \| **.0014** | 0.040 \| **.0016** |
| | | | | | | | | | | | |

# CrazyDrill Steel 6 x d / 7 x d

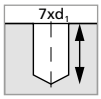
## DRILLING WITH EXTERNAL COOLING




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **1/64** | **.0156** | 0.396 | **.0935** | 2.38 | 3.1 | 3 | **1.65** | 42.0 | 2.CD.070F164.S | ■ |
| | **.0157** | 0.40 | **.0945** | 2.40 | 3.1 | 3 | **1.65** | 42.0 | 2.CD.070040.S | ■ |
| | **.0177** | 0.45 | **.1063** | 2.70 | 3.5 | 3 | **1.65** | 42.0 | 2.CD.070045.S | ■ |
| | **.0197** | 0.50 | **.1181** | 3.00 | 3.9 | 3 | **1.65** | 42.0 | 2.CD.070050.S | ■ |
| | **.0217** | 0.55 | **.1299** | 3.30 | 4.3 | 3 | **1.65** | 42.0 | 2.CD.070055.S | ■ |
| | **.0236** | 0.60 | **.1417** | 3.60 | 4.7 | 3 | **1.71** | 43.5 | 2.CD.070060.S | ■ |
| | **.0256** | 0.65 | **.1535** | 3.90 | 5.0 | 3 | **1.71** | 43.5 | 2.CD.070065.S | ■ |
| | **.0276** | 0.70 | **.1654** | 4.20 | 5.4 | 3 | **1.71** | 43.5 | 2.CD.070070.S | ■ |
| | **.0295** | 0.75 | **.1772** | 4.50 | 5.8 | 3 | **1.71** | 43.5 | 2.CD.070075.S | ■ |
| **1/32** | **.0312** | 0.793 | **.1873** | 4.76 | 6.2 | 3 | **1.77** | 45.0 | 2.CD.070F132.S | ■ |
| | **.0315** | 0.80 | **.1890** | 4.80 | 6.2 | 3 | **1.77** | 45.0 | 2.CD.070080.S | ■ |
| | **.0335** | 0.85 | **.2008** | 5.10 | 6.6 | 3 | **1.77** | 45.0 | 2.CD.070085.S | ■ |
| | **.0354** | 0.90 | **.2126** | 5.40 | 7.0 | 3 | **1.77** | 45.0 | 2.CD.070090.S | ■ |
| | **.0374** | 0.95 | **.2244** | 5.70 | 7.4 | 3 | **1.77** | 45.0 | 2.CD.070095.S | ■ |
| | **.0394** | 1.00 | **.2362** | 6.00 | 7.8 | 3 | **1.81** | 46.0 | 2.CD.070100.S | ■ |
| | **.0413** | 1.05 | **.2480** | 6.30 | 8.1 | 3 | **1.81** | 46.0 | 2.CD.070105.S | ■ |
| | **.0433** | 1.10 | **.2598** | 6.60 | 8.6 | 3 | **1.81** | 46.0 | 2.CD.070110.S | ■ |
| | **.0453** | 1.15 | **.2717** | 6.90 | 8.7 | 3 | **1.81** | 46.0 | 2.CD.070115.S | ■ |

■ Stock item




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0472** | 1.20 | **.3307** | 8.40 | 10.9 | 3 | **1.93** | 49.0 | 2.CD.070120.S | ■ |
| | **.0492** | 1.25 | **.3445** | 8.75 | 11.1 | 3 | **1.93** | 49.0 | 2.CD.070125.S | ■ |
| | **.0512** | 1.30 | **.3583** | 9.10 | 11.5 | 3 | **1.93** | 49.0 | 2.CD.070130.S | ■ |
| | **.0531** | 1.35 | **.3720** | 9.45 | 11.9 | 3 | **1.93** | 49.0 | 2.CD.070135.S | ■ |
| | **.0551** | 1.40 | **.3858** | 9.80 | 12.7 | 3 | **1.99** | 50.5 | 2.CD.070140.S | ■ |
| | **.0571** | 1.45 | **.3996** | 10.15 | 12.9 | 3 | **1.99** | 50.5 | 2.CD.070145.S | ■ |
| | **.0591** | 1.50 | **.4134** | 10.50 | 13.4 | 3 | **1.99** | 50.5 | 2.CD.070150.S | ■ |
| | **.0610** | 1.55 | **.4272** | 10.85 | 13.7 | 3 | **1.99** | 50.5 | 2.CD.070155.S | ■ |
| **1/16** | **.0625** | 1.587 | **.4374** | 11.20 | 14.5 | 3 | **2.05** | 52.0 | 2.CD.070F116.S | ■ |
| | **.0630** | 1.60 | **.4409** | 11.20 | 14.5 | 3 | **2.05** | 52.0 | 2.CD.070160.S | ■ |
| | **.0650** | 1.65 | **.4547** | 11.55 | 14.7 | 3 | **2.05** | 52.0 | 2.CD.070165.S | ■ |

■ Stock item

Carbide | 140° | Z2 | eXedur RIP

| Ø $d_1$ | .004" - .118" (0.1 - 3.0 mm) | | .120" - .236" (3.05 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | + .00016"<br>0 | + 0.004 mm<br>0 | + .00024"<br>+ .00004" | + 0.006 mm<br>+ 0.001 mm | + .00028"<br>+ .00004" | + 0.007 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .0669 | 1.70 | .4685 | 11.90 | 15.0 | 3 | 2.05 | 52.0 | 2.CD.070170.S | ■ |
| | .0689 | 1.75 | .4823 | 12.25 | 15.3 | 3 | 2.05 | 52.0 | 2.CD.070175.S | ■ |
| | .0709 | 1.80 | .4961 | 12.60 | 16.3 | 3 | 2.11 | 53.5 | 2.CD.070180.S | ■ |
| | .0728 | 1.85 | .5098 | 12.95 | 16.5 | 3 | 2.11 | 53.5 | 2.CD.070185.S | ■ |
| | .0748 | 1.90 | .5236 | 13.30 | 16.9 | 3 | 2.11 | 53.5 | 2.CD.070190.S | ■ |
| | .0768 | 1.95 | .5374 | 13.65 | 17.1 | 3 | 2.11 | 53.5 | 2.CD.070195.S | ■ |
| | .0787 | 2.00 | .5512 | 14.00 | 18.0 | 4 | 2.42 | 61.5 | 2.CD.070200.S | ■ |
| | .0807 | 2.05 | .5650 | 14.35 | 18.3 | 4 | 2.42 | 61.5 | 2.CD.070205.S | ■ |
| | .0827 | 2.10 | .5787 | 14.70 | 18.7 | 4 | 2.42 | 61.5 | 2.CD.070210.S | ■ |
| | .0846 | 2.15 | .5925 | 15.05 | 19.1 | 4 | 2.42 | 61.5 | 2.CD.070215.S | ■ |
| | .0866 | 2.20 | .6063 | 15.40 | 20.0 | 4 | 2.48 | 63.0 | 2.CD.070220.S | ■ |
| | .0886 | 2.25 | .6201 | 15.75 | 20.3 | 4 | 2.48 | 63.0 | 2.CD.070225.S | ■ |
| | .0906 | 2.30 | .6339 | 16.10 | 20.6 | 4 | 2.48 | 63.0 | 2.CD.070230.S | ■ |
| | .0925 | 2.35 | .6476 | 16.45 | 20.9 | 4 | 2.48 | 63.0 | 2.CD.070235.S | ■ |
| 3/32 | .0937 | 2.381 | .6562 | 16.80 | 21.7 | 4 | 2.54 | 64.5 | 2.CD.070240.S | ■ |
| | .0945 | 2.40 | .6614 | 16.80 | 21.7 | 4 | 2.54 | 64.5 | 2.CD.070240.S | ■ |
| | .0965 | 2.45 | .6752 | 17.15 | 22.1 | 4 | 2.54 | 64.5 | 2.CD.070245.S | ■ |
| | .0984 | 2.50 | .6890 | 17.50 | 22.2 | 4 | 2.54 | 64.5 | 2.CD.070250.S | ■ |
| | .1004 | 2.55 | .7028 | 17.85 | 22.6 | 4 | 2.54 | 64.5 | 2.CD.070255.S | ■ |
| | .1024 | 2.60 | .7165 | 18.20 | 23.5 | 4 | 2.60 | 66.0 | 2.CD.070260.S | ■ |
| | .1043 | 2.65 | .7303 | 18.55 | 23.7 | 4 | 2.60 | 66.0 | 2.CD.070265.S | ■ |
| | .1063 | 2.70 | .7441 | 18.90 | 24.0 | 4 | 2.60 | 66.0 | 2.CD.070270.S | ■ |
| | .1083 | 2.75 | .7579 | 19.25 | 24.3 | 4 | 2.60 | 66.0 | 2.CD.070275.S | ■ |
| | .1102 | 2.80 | .7717 | 19.60 | 25.3 | 4 | 2.66 | 67.5 | 2.CD.070280.S | ■ |
| | .1122 | 2.85 | .7854 | 19.95 | 25.5 | 4 | 2.66 | 67.5 | 2.CD.070285.S | ■ |
| | .1142 | 2.90 | .7992 | 20.30 | 25.7 | 4 | 2.66 | 67.5 | 2.CD.070290.S | ■ |
| | .1161 | 2.95 | .8130 | 20.65 | 25.9 | 4 | 2.66 | 67.5 | 2.CD.070295.S | ■ |
| | .1181 | 3.00 | .8268 | 21.00 | 26.2 | 4 | 2.66 | 67.5 | 2.CD.070300.S | ■ |
| | .1201 | 3.05 | .8405 | 21.35 | 27.5 | 4 | 2.76 | 70.0 | 2.CD.070305.S | ■ |
| | .1220 | 3.10 | .8543 | 21.70 | 27.9 | 4 | 2.76 | 70.0 | 2.CD.070310.S | ■ |
| | .1240 | 3.15 | .8681 | 22.05 | 28.4 | 4 | 2.76 | 70.0 | 2.CD.070315.S | ■ |
| 1/8 | .1250 | 3.175 | .8750 | 22.40 | 28.8 | 4 | 2.76 | 70.0 | 2.CD.070320.S | ■ |
| | .1260 | 3.20 | .8819 | 22.40 | 28.8 | 4 | 2.76 | 70.0 | 2.CD.070320.S | ■ |
| | .1280 | 3.25 | .8957 | 22.75 | 29.3 | 4 | 2.76 | 70.0 | 2.CD.070325.S | ■ |
| | .1299 | 3.30 | .9094 | 23.10 | 29.7 | 4 | 2.76 | 70.0 | 2.CD.070330.S | ■ |
| | .1319 | 3.35 | .9232 | 23.45 | 30.2 | 4 | 2.76 | 70.0 | 2.CD.070335.S | ■ |
| | .1339 | 3.40 | .9370 | 23.80 | 30.6 | 4 | 2.76 | 70.0 | 2.CD.070340.S | ■ |
| | .1358 | 3.45 | .9508 | 24.15 | 31.1 | 4 | 2.95 | 75.0 | 2.CD.070345.S | ■ |
| | .1378 | 3.50 | .9646 | 24.50 | 31.5 | 4 | 2.95 | 75.0 | 2.CD.070350.S | ■ |

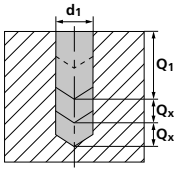
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1398 | 3.55 | .9783 | 24.85 | 32.0 | 4 | 2.95 | 75.0 | 2.CD.070355.S | ■ |
| | .1417 | 3.60 | .9921 | 25.20 | 32.4 | 4 | 2.95 | 75.0 | 2.CD.070360.S | ■ |
| | .1437 | 3.65 | 1.006 | 25.55 | 32.9 | 4 | 2.95 | 75.0 | 2.CD.070365.S | ■ |
| | .1457 | 3.70 | 1.020 | 25.90 | 33.3 | 4 | 2.95 | 75.0 | 2.CD.070370.S | ■ |
| | .1476 | 3.75 | 1.033 | 26.25 | 33.8 | 4 | 2.95 | 75.0 | 2.CD.070375.S | ■ |
| | .1496 | 3.80 | 1.047 | 26.60 | 34.2 | 4 | 2.95 | 75.0 | 2.CD.070380.S | ■ |
| | .1516 | 3.85 | 1.061 | 26.95 | 34.7 | 4 | 2.95 | 75.0 | 2.CD.070385.S | ■ |
| | .1535 | 3.90 | 1.075 | 27.30 | 35.1 | 4 | 2.95 | 75.0 | 2.CD.070390.S | ■ |
| | .1555 | 3.95 | 1.089 | 27.65 | 35.6 | 4 | 2.95 | 75.0 | 2.CD.070395.S | ■ |
| 5/32 | .1562 | 3.968 | 1.094 | 28.00 | 36.0 | 6 | 3.15 | 80.0 | 2.CD.070F532.S | ■ |
| | .1575 | 4.00 | 1.102 | 28.00 | 36.0 | 6 | 3.15 | 80.0 | 2.CD.070400.S | ■ |
| | .1614 | 4.10 | 1.130 | 28.70 | 36.9 | 6 | 3.15 | 80.0 | 2.CD.070410.S | ■ |
| | .1654 | 4.20 | 1.157 | 29.40 | 37.8 | 6 | 3.15 | 80.0 | 2.CD.070420.S | ■ |
| | .1693 | 4.30 | 1.185 | 30.10 | 38.7 | 6 | 3.15 | 80.0 | 2.CD.070430.S | ■ |
| | .1732 | 4.40 | 1.213 | 30.80 | 39.6 | 6 | 3.15 | 80.0 | 2.CD.070440.S | ■ |
| | .1772 | 4.50 | 1.240 | 31.50 | 40.5 | 6 | 3.35 | 85.0 | 2.CD.070450.S | ■ |
| | .1811 | 4.60 | 1.268 | 32.20 | 41.4 | 6 | 3.35 | 85.0 | 2.CD.070460.S | ■ |
| | .1850 | 4.70 | 1.295 | 32.90 | 42.3 | 6 | 3.35 | 85.0 | 2.CD.070470.S | ■ |
| 3/16 | .1875 | 4.762 | 1.312 | 33.60 | 43.2 | 6 | 3.35 | 85.0 | 2.CD.070F316.S | ■ |
| | .1890 | 4.80 | 1.323 | 33.60 | 43.2 | 6 | 3.35 | 85.0 | 2.CD.070480.S | ■ |
| | .1929 | 4.90 | 1.350 | 34.30 | 44.1 | 6 | 3.35 | 85.0 | 2.CD.070490.S | ■ |
| | .1969 | 5.00 | 1.378 | 35.00 | 45.0 | 6 | 3.35 | 85.0 | 2.CD.070500.S | ■ |
| | .2008 | 5.10 | 1.406 | 35.70 | 45.9 | 6 | 3.54 | 90.0 | 2.CD.070510.S | ■ |
| | .2047 | 5.20 | 1.433 | 36.40 | 46.8 | 6 | 3.54 | 90.0 | 2.CD.070520.S | ■ |
| | .2087 | 5.30 | 1.461 | 37.10 | 47.7 | 6 | 3.54 | 90.0 | 2.CD.070530.S | ■ |
| | .2126 | 5.40 | 1.488 | 37.80 | 48.6 | 6 | 3.54 | 90.0 | 2.CD.070540.S | ■ |
| | .2165 | 5.50 | 1.516 | 38.50 | 49.5 | 6 | 3.54 | 90.0 | 2.CD.070550.S | ■ |
| 7/32 | .2189 | 5.560 | 1.532 | 39.20 | 50.4 | 6 | 3.54 | 90.0 | 2.CD.070F732.S | ■ |
| | .2205 | 5.60 | 1.543 | 39.20 | 50.4 | 6 | 3.54 | 90.0 | 2.CD.070560.S | ■ |
| | .2244 | 5.70 | 1.571 | 39.90 | 51.3 | 6 | 3.74 | 95.0 | 2.CD.070570.S | ■ |
| | .2283 | 5.80 | 1.598 | 40.60 | 52.2 | 6 | 3.74 | 95.0 | 2.CD.070580.S | ■ |
| | .2323 | 5.90 | 1.626 | 41.30 | 53.1 | 6 | 3.74 | 95.0 | 2.CD.070590.S | ■ |
| | .2362 | 6.00 | 1.654 | 42.00 | 54.0 | 6 | 3.74 | 95.0 | 2.CD.070600.S | ■ |
| 1/4 | .2500 | 6.350 | 1.750 | 44.45 | 57.2 | 8 | 3.74 | 95.0 | 2.CD.070F14.S | ■ |

| Complementary products | |
|---|---|
| CrazyDrill Pilot | p.134 |
| CrazyDrill Crosspilot | p.146 |

# CrazyDrill Steel 6 x d / 7 x d

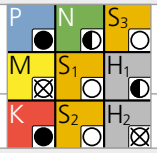
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ 6xd | $Q_x$ 6xd | $Q_1$ 7xd | $Q_x$ 7xd |
|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 80 \| 262 | 120 \| 394 | 6xd1 | – | 7xd1 | – |
| | | 1.0401 | C15 | AISI 1015 | | | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| 197 | 80 \| 262 | 6xd1 | – | 7xd1 | – |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 40 \| 131 | 60 \| 197 | 6xd1 | – | 7xd1 | – |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 100 \| 328 | 150 \| 492 | 6xd1 | – | 7xd1 | – |
| | | 0.6030 | GG30 | ASTM 40B | | | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 150 \| 492 | 220 \| 722 | 4xd1 | 2xd1 | 4xd1 | 2xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 150 \| 492 | 200 \| 656 | 4xd1 | 2xd1 | 4xd1 | 2xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 80 \| 262 | 120 \| 394 | 1.5xd1 | 1xd1 | 1.5xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 \| 328 | 150 \| 492 | 1.5xd1 | 1xd1 | 1.5xd1 | 1xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 70 \| 230 | 100 \| 328 | 1.5xd1 | 1xd1 | 1.5xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 70 \| 230 | 100 \| 328 | 4xd1 | 2xd1 | 4xd1 | 3xd1 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 20 \| 66 | 40 \| 131 | 1xd1 | 0.25xd1 | 1xd1 | 0.25xd1 |
| | | 2.4668 | | Inconel 718 | | | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 20 \| 66 | 40 \| 131 | 1xd1 | 0.25xd1 | 1xd1 | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| 66 | 20 \| 66 | 1xd1 | 0.3xd1 | 1xd1 | 0.3xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 15 \| 49 | 30 \| 98 | 4xd1 | 0.25xd1 | 4xd1 | 0.25xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 15 \| 49 | 30 \| 98 | 4xd1 | 1xd1 | 4xd1 | 1xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




**f** [mm/rev] | **[IPR]**

| Ød1 | 1/64" 0.4 mm \| .016" | 1/32" 0.8 mm \| .032" | 1.0 mm \| .039" | 1.25 mm \| .049" | 1/16" 1.5 mm \| .059" | 2.0 mm \| .079" | 3/32" 2.5 mm \| .098" | 1/8" 3.0 mm \| .118" | 5/32" 4.0 mm \| .158" | 3/16" - 7/32" 5.0 mm \| .197" | 1/4" 6.0 mm \| .236" |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | f | f | f | f | f | f | f | f | f | f | f |
| | 0.040 \| .0016 | 0.075 \| .0030 | 0.095 \| .0037 | 0.110 \| .0043 | 0.130 \| .0051 | 0.170 \| .0067 | 0.200 \| .0079 | 0.230 \| .0091 | 0.270 \| .0106 | 0.290 \| .0114 | 0.300 \| .0118 |
| | 0.030 \| .0012 | 0.060 \| .0024 | 0.075 \| .0030 | 0.090 \| .0035 | 0.110 \| .0043 | 0.140 \| .0055 | 0.160 \| .0063 | 0.180 \| .0071 | 0.220 \| .0087 | 0.230 \| .091 | 0.240 \| .0094 |
| | 0.035 \| .0014 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.110 \| .0043 | 0.140 \| .0055 | 0.170 \| .0067 | 0.200 \| .0079 | 0.230 \| .0091 | 0.250 \| .0098 | 0.260 \| .0102 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | 0.040 \| .0016 | 0.080 \| .0031 | 0.095 \| .0037 | 0.120 \| .0098 | 0.140 \| .0055 | 0.175 \| .0069 | 0.210 \| .0083 | 0.240 \| .0094 | 0.290 \| .0114 | 0.330 \| .0130 | 0.360 \| .0142 |
| | 0.035 \| .0014 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.110 \| .0043 | 0.140 \| .0055 | 0.170 \| .0067 | 0.200 \| .0079 | 0.230 \| .0091 | 0.250 \| .0098 | 0.260 \| .0102 |
| | 0.030 \| .0012 | 0.060 \| .0024 | 0.075 \| .0030 | 0.090 \| .0035 | 0.100 \| .0039 | 0.135 \| .0053 | 0.160 \| .0063 | 0.180 \| .0071 | 0.220 \| .0087 | 0.235 \| .0093 | 0.240 \| .0094 |
| | 0.030 \| .0012 | 0.055 \| .0022 | 0.070 \| .0028 | 0.085 \| .0033 | 0.100 \| .0039 | 0.130 \| .0051 | 0.150 \| .0059 | 0.170 \| .0067 | 0.200 \| .0079 | 0.220 \| .0087 | 0.230 \| .0091 |
| | 0.030 \| .0012 | 0.050 \| .0020 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 | 0.090 \| .0035 | 0.110 \| .0043 | 0.140 \| .0055 | 0.160 \| .0063 | 0.200 \| .0079 | 0.220 \| .0087 |
| | 0.035 \| .0014 | 0.055 \| .0022 | 0.070 \| .0028 | 0.080 \| .0031 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.180 \| .0071 | 0.220 \| .0087 | 0.240 \| .0094 |
| | 0.015 \| .0006 | 0.025 \| .0010 | 0.035 \| .0014 | 0.050 \| .0020 | 0.060 \| .0024 | 0.075 \| .0030 | 0.095 \| .0037 | 0.110 \| .0043 | 0.130 \| .0051 | 0.160 \| .0063 | 0.220 \| .0087 |
| | 0.002 \| .00008 | 0.004 \| .0002 | 0.005 \| .00020 | 0.006 \| .0002 | 0.007 \| .0003 | 0.010 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 |
| | 0.014 \| .0006 | 0.025 \| .0010 | 0.030 \| .0012 | 0.040 \| .0016 | 0.045 \| .0018 | 0.060 \| .0024 | 0.070 \| .0028 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 | 0.110 \| .0043 |
| | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.055 \| .0022 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0098 | 0.130 \| .0051 | 0.140 \| .0055 |
| | 0.006 \| .00024 | 0.012 \| .0005 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.060 \| .0024 | 0.075 \| .0030 | 0.090 \| .0035 |
| | 0.005 \| .00020 | 0.007 \| .00028 | 0.010 \| .0004 | 0.011 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 |
| | | | | | | | | | | | |



# Drilling process CrazyDrill Steel

## ACCURATE AND QUICK DRILLING UP TO 7 X D

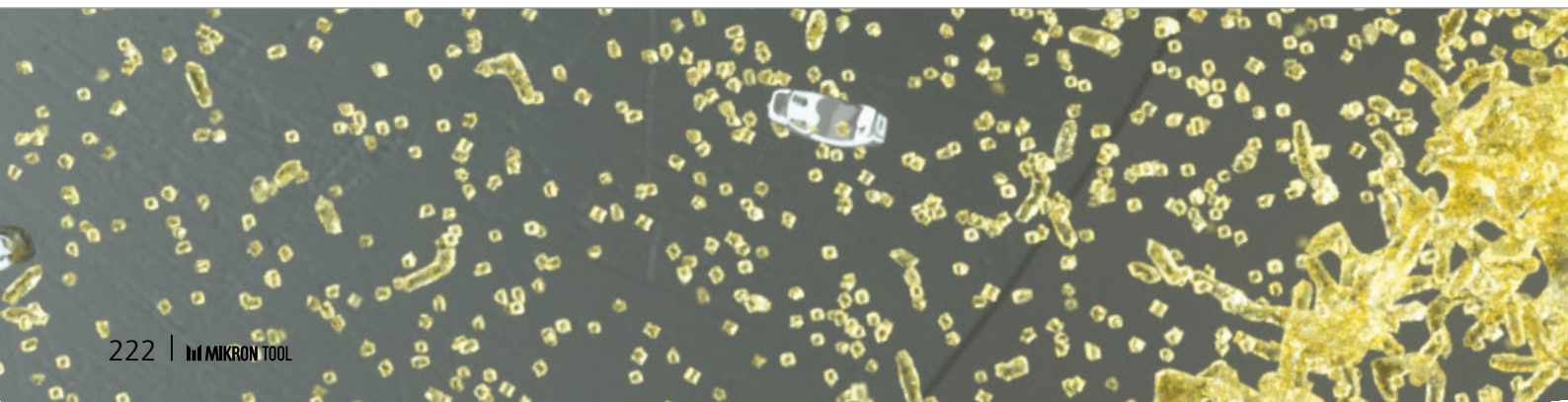
### Coolant type, pressure, filtration and flowrate

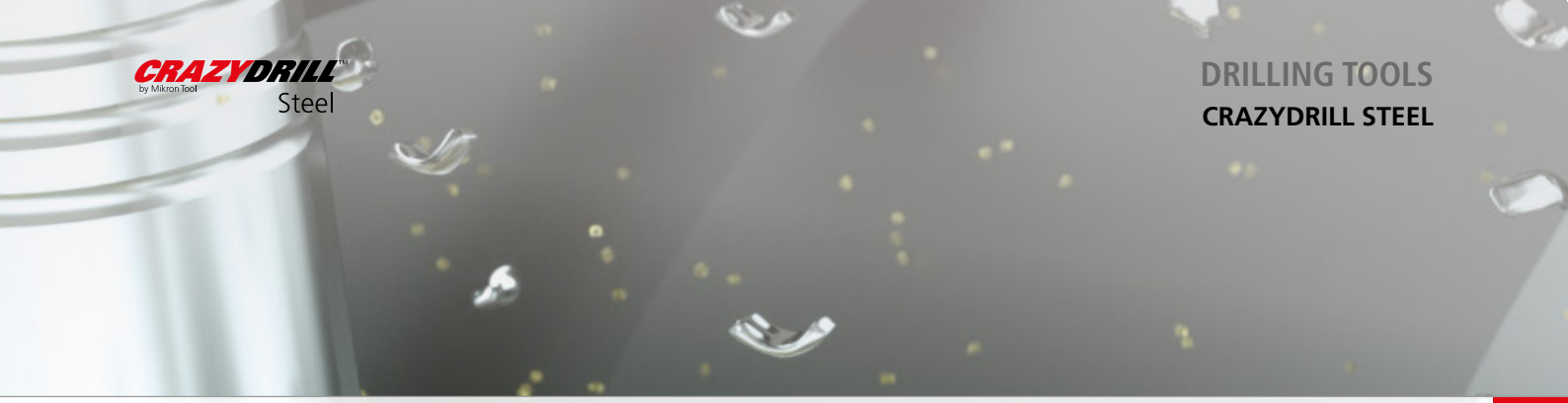
For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling medium is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical information".







**CrazyDrill Steel up to 4 x d**

Due to the excellent self-centering of CrazyDrill Steel, centering or pilot drilling is not necessary on regular and straight surfaces up to a maximal drilling depth of 4 x d.

**CrazyDrill Steel 6 x d / 7 x d**

Due to the excellent self-centering of CrazyDrill Steel, centering or pilot drilling is not necessary for drilling diameters over Ø.032" (0.8 mm) on regular and straight surfaces up to a maximal drilling depth of 7 x d.

**Pilot drilling and drilling**

**Higher requirements:** On irregular, rough or inclined surfaces or for highest position accuracy and in general for drilling until 6 x d under diameter Ø.032" (0.8 mm), Mikron Tool recommends:

- **CrazyDrill Pilot** for pilot drilling
- **CrazyDrill Crosspilot** for pilot drilling on inclined surfaces

Pilot drilling with CrazyDrill Pilot is the perfect starting point for accurate drilling (position and alignment accuracy) and a stable machining process. This is also valid for the pilot drill CrazyDrill Crosspilot on inclined surfaces.

The quality of drilling (position and alignment accuracy, no measurable transition from pilot hole to follow-up hole) and a stable machining process are guaranteed by means of a predetermined tool.



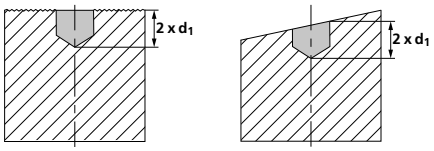


# Drilling process CrazyDrill Steel

## DRILLING IN ONE STEP (DEPENDING ON MATERIAL, SEE CUTTING DATA CHART)

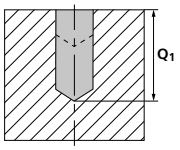
### 1 | PILOT DRILLING

- CrazyDrill Pilot (irregular or rough surfaces) or CrazyDrill Crosspilot (inclined surfaces).

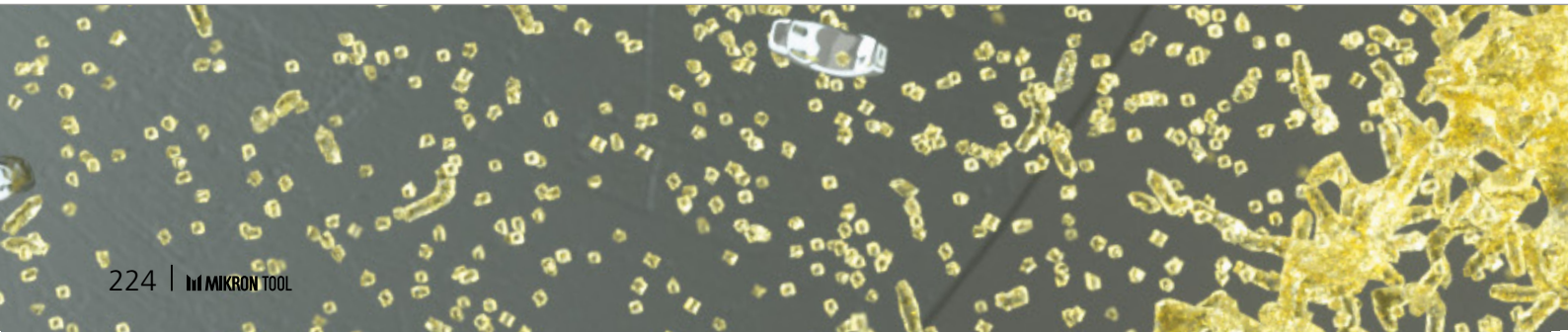



### 2 | DRILLING

- CrazyDrill Steel up to maximum drilling depth $Q_1$ in one step.




Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

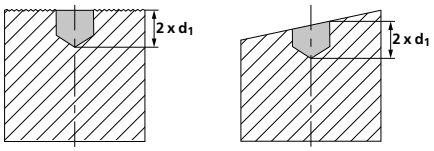


## DRILLING AS PER DIN 66025 / PAL (DEPENDING ON MATERIAL, SEE CUTTING DATA CHART)

G83 deep-drilling cycle with chip break and chip removal (pecks)
Q = depth of the respective peck

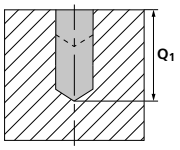
### 1 | PILOT DRILLING

- With CrazyDrill Pilot (irregular or rough surfaces) or CrazyDrill Crosspilot (inclined surfaces).

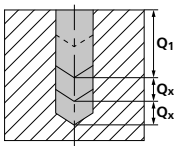



### 2 | DRILLING

- Drilling with CrazyDrill Steel up to maximum drilling depth $Q_1$ in one step, with subsequent chip removal.

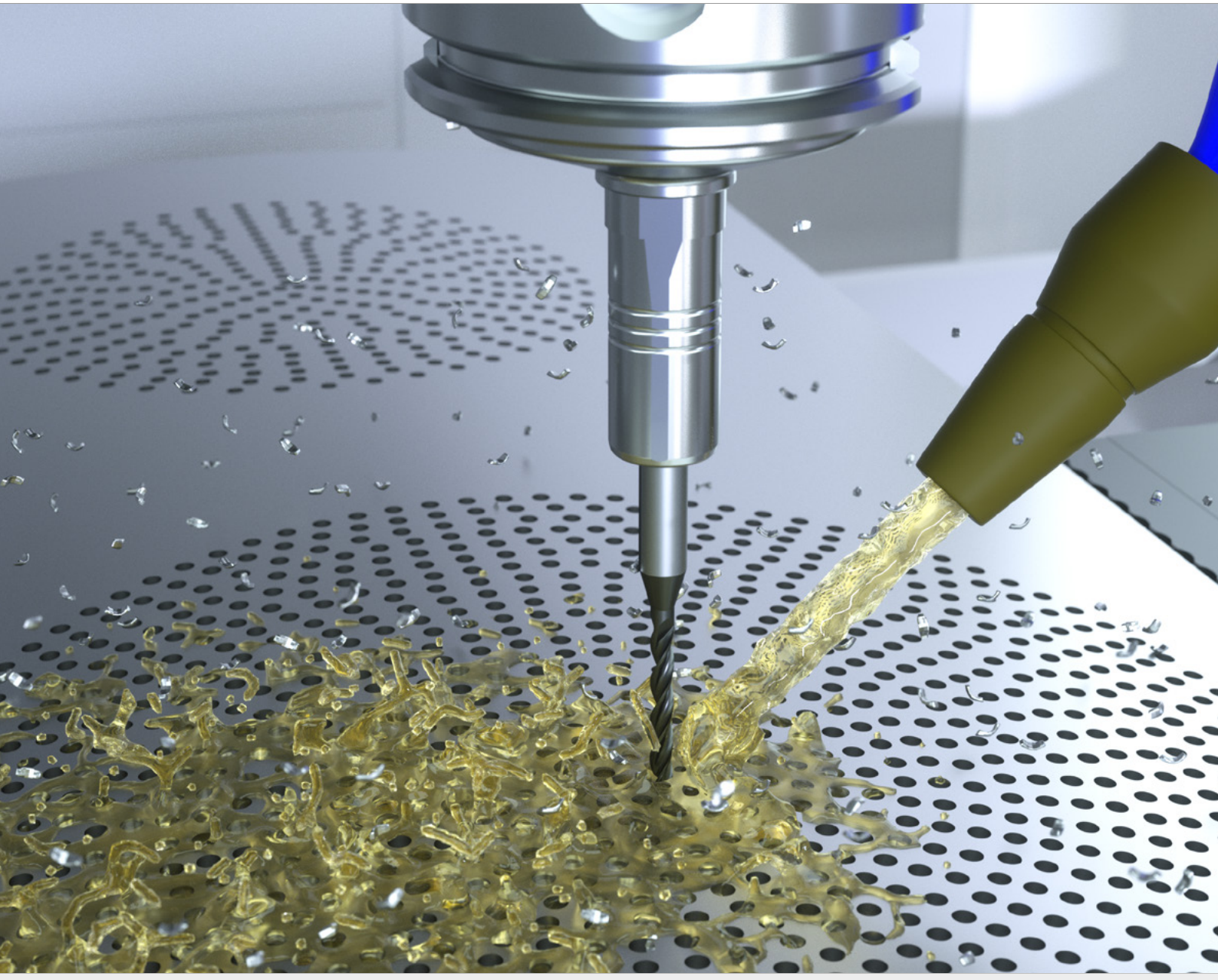



- Further pecks $Q_X$ according to cutting data table, with subsequent chip removal.




Note:
Drill can be retracted completely from the hole between pecks.
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# CrazyDrill Alu



CRAZYDRILL Alu

## SPEED, PRECISION AND TOOL LIFE: THREE QUALITIES IN ONE DRILL



With CrazyDrill Alu, Mikron Tool offers a program of small coated drills for highest performance in cast and wrought aluminum alloys. The diameter range is .016" up to .118" (0.4 mm to 3.0 mm) with a depth of cut up to 10 x d.

This solid carbide drill impresses mostly with its extraordinary high drilling speed and tool life also in aluminum alloys with high silicon content.

With a three flutes and a reduced chisel geometry, self-centering upon tool entry is guaranteed. Spot or pilot drilling are not necessary. Highest hole straightness, roundness and surface quality are guaranteed.

Spot drilling or starter drilling is only recommended on irregular, rough or inclined surfaces.

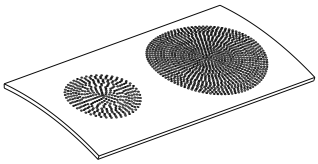
**Regrinding:** This product can be reground starting from Ø .055" (1.4 mm).

**Please note:** You couldn't find your suitable version of the CrazyDrill Alu (diameter, length, cutting direction…)? Ask us about our customized versions!

# Features and benefits

## THREE FLUTES FOR PERFECT SELF-CENTERING

- **SHORT MACHINING TIME** | due to highest cutting parameters
- **LONG TOOL LIFE** | due to the high performance DLC coating
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to the high quality
- **HIGH DEGREE OF PRECISION** | due to small tolerances
- **LOW PRODUCTION COSTS** | no pilot drilling or centering needed



**COMPONENT**
Speaker cover

**MATERIAL**
AlMgSi 0.5 / 3.3206 / ASTM B221

**MACHINING**
- 2'000 holes
- d = 1.2 mm **| .047"**
- Drilling depth 5 mm **| .197"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Alu - 5 x d

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Alu<br>- Carbide<br>- Coated<br>- External cooling |
| Item number | 2.CD.050120.A |
| Cutting data | $v_c$ = 150 m/min **| 492 SFM**<br>f = 0.07 mm/rev **| .0028 IPR**<br>$Q_1$ = 5 mm **| .197"** |

## 5 x d

- External cooling
- Coated



Page 230

## 10 x d

- External cooling
- Coated




Page 234

**1 | SHAFT**
The robust carbide shaft guarantees a high degree of concentric accuracy and reliability.

**2 | SOLID CARBIDE**
The use of latest generation carbide grades allows highest machining speed and feed.

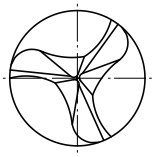
**3 | THREE FLUTES WITH REDUCED CHISEL GEOMETRY**
Allows stable self-centering, spot drilling or pilot drilling are not necessary.

**4 | COATING**
The DLC (diamond-like carbon) coating protects the tool from premature wear and guarantees a longer tool life.

**5 | HELICAL FLUTE GEOMETRY**
Provides optimal chip evacuation, only limited pecking is needed on drilling depths up to 10 x d.

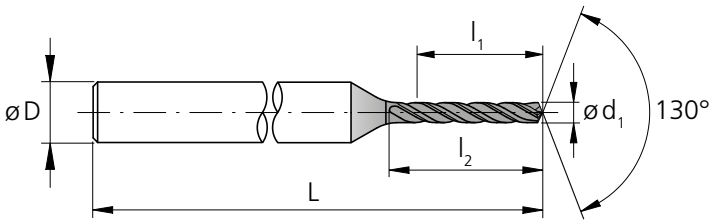
**6 | TIP ANGLE OF 130°**
Burr free drilling is assured by the 130° tip angle and sharp cutting edges. Highest drilling accuracy is guaranteed.

Drill tip



# CrazyDrill Alu 5 x d

## DRILLING WITH EXTERNAL COOLING




| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.0157** | 0.40 | **.079** | 2.00 | 2.9 | 3 | **1.69** | 43.0 | 2.CD.050040.A | ■ |
| **.0177** | 0.45 | **.089** | 2.25 | 3.3 | 3 | **1.69** | 43.0 | 2.CD.050045.A | ■ |
| **.0197** | 0.50 | **.098** | 2.50 | 3.6 | 3 | **1.69** | 43.0 | 2.CD.050050.A | ■ |
| **.0217** | 0.55 | **.108** | 2.75 | 4.0 | 3 | **1.69** | 43.0 | 2.CD.050055.A | ■ |
| **.0236** | 0.60 | **.118** | 3.00 | 4.3 | 3 | **1.69** | 43.0 | 2.CD.050060.A | ■ |
| **.0256** | 0.65 | **.128** | 3.25 | 4.7 | 3 | **1.69** | 43.0 | 2.CD.050065.A | ■ |
| **.0276** | 0.70 | **.138** | 3.50 | 5.1 | 3 | **1.77** | 45.0 | 2.CD.050070.A | ■ |
| **.0295** | 0.75 | **.148** | 3.75 | 5.4 | 3 | **1.77** | 45.0 | 2.CD.050075.A | ■ |
| **.0315** | 0.80 | **.157** | 4.00 | 5.8 | 3 | **1.77** | 45.0 | 2.CD.050080.A | ■ |
| **.0335** | 0.85 | **.167** | 4.25 | 6.1 | 3 | **1.77** | 45.0 | 2.CD.050085.A | ■ |
| **.0354** | 0.90 | **.177** | 4.50 | 6.5 | 3 | **1.77** | 45.0 | 2.CD.050090.A | ■ |
| **.0374** | 0.95 | **.187** | 4.75 | 6.9 | 3 | **1.81** | 46.0 | 2.CD.050095.A | ■ |
| **.0394** | 1.00 | **.197** | 5.00 | 7.2 | 3 | **1.81** | 46.0 | 2.CD.050100.A | ■ |
| **.0413** | 1.05 | **.207** | 5.25 | 7.6 | 3 | **1.81** | 46.0 | 2.CD.050105.A | ■ |
| **.0433** | 1.10 | **.217** | 5.50 | 8.0 | 3 | **1.81** | 46.0 | 2.CD.050110.A | ■ |
| **.0453** | 1.15 | **.226** | 5.75 | 8.3 | 3 | **1.89** | 48.0 | 2.CD.050115.A | ■ |
| **.0472** | 1.20 | **.236** | 6.00 | 8.7 | 3 | **1.89** | 48.0 | 2.CD.050120.A | ■ |
| **.0492** | 1.25 | **.246** | 6.25 | 9.0 | 3 | **1.89** | 48.0 | 2.CD.050125.A | ■ |
| **.0512** | 1.30 | **.256** | 6.50 | 9.4 | 3 | **1.89** | 48.0 | 2.CD.050130.A | ■ |
| **.0531** | 1.35 | **.266** | 6.75 | 9.8 | 3 | **1.89** | 48.0 | 2.CD.050135.A | ■ |
| **.0551** | 1.40 | **.276** | 7.00 | 10.1 | 3 | **1.89** | 48.0 | 2.CD.050140.A | ■ |
| **.0571** | 1.45 | **.285** | 7.25 | 10.5 | 3 | **1.93** | 49.0 | 2.CD.050145.A | ■ |
| **.0591** | 1.50 | **.295** | 7.50 | 10.9 | 3 | **1.93** | 49.0 | 2.CD.050150.A | ■ |
| **.0610** | 1.55 | **.305** | 7.75 | 11.2 | 3 | **1.99** | 50.5 | 2.CD.050155.A | ■ |
| **.0625** | 1.60 | **.315** | 8.00 | 11.6 | 3 | **1.99** | 50.5 | 2.CD.050160.A | ■ |
| **.0630** | 1.65 | **.325** | 8.25 | 11.9 | 3 | **1.99** | 50.5 | 2.CD.050165.A | ■ |
| **.0650** | 1.70 | **.335** | 8.50 | 12.3 | 3 | **1.99** | 50.5 | 2.CD.050170.A | ■ |

■ Stock item

Carbide | 5xd1 | 130° | Z3 | DLC

| | | |
|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 |



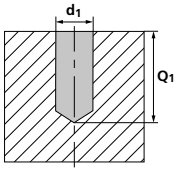
| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.0689** | 1.75 | **.344** | 8.75 | 12.7 | 3 | **2.05** | 52.0 | 2.CD.050175.A | ■ |
| **.0709** | 1.80 | **.354** | 9.00 | 13.0 | 3 | **2.05** | 52.0 | 2.CD.050180.A | ■ |
| **.0728** | 1.85 | **.364** | 9.25 | 13.4 | 3 | **2.05** | 52.0 | 2.CD.050185.A | ■ |
| **.0748** | 1.90 | **.374** | 9.50 | 13.7 | 3 | **2.11** | 53.5 | 2.CD.050190.A | ■ |
| **.0768** | 1.95 | **.384** | 9.75 | 14.1 | 3 | **2.11** | 53.5 | 2.CD.050195.A | ■ |
| **.0787** | 2.00 | **.394** | 10.00 | 14.5 | 4 | **2.36** | 60.0 | 2.CD.050200.A | ■ |
| **.0807** | 2.05 | **.404** | 10.25 | 14.8 | 4 | **2.36** | 60.0 | 2.CD.050205.A | ■ |
| **.0827** | 2.10 | **.413** | 10.50 | 15.2 | 4 | **2.36** | 60.0 | 2.CD.050210.A | ■ |
| **.0846** | 2.15 | **.423** | 10.75 | 15.6 | 4 | **2.36** | 60.0 | 2.CD.050215.A | ■ |
| **.0866** | 2.20 | **.433** | 11.00 | 15.9 | 4 | **2.42** | 61.5 | 2.CD.050220.A | ■ |
| **.0886** | 2.25 | **.443** | 11.25 | 16.3 | 4 | **2.42** | 61.5 | 2.CD.050225.A | ■ |
| **.0906** | 2.30 | **.453** | 11.50 | 16.6 | 4 | **2.42** | 61.5 | 2.CD.050230.A | ■ |
| **.0925** | 2.35 | **.463** | 11.75 | 17.0 | 4 | **2.42** | 61.5 | 2.CD.050235.A | ■ |
| **.0945** | 2.40 | **.472** | 12.00 | 17.4 | 4 | **2.44** | 62.0 | 2.CD.050240.A | ■ |
| **.0965** | 2.45 | **.482** | 12.25 | 17.7 | 4 | **2.44** | 62.0 | 2.CD.050245.A | ■ |
| **.0984** | 2.50 | **.492** | 12.50 | 18.1 | 4 | **2.44** | 62.0 | 2.CD.050250.A | ■ |
| **.1004** | 2.55 | **.502** | 12.75 | 18.4 | 4 | **2.48** | 63.0 | 2.CD.050255.A | ■ |
| **.1024** | 2.60 | **.512** | 13.00 | 18.8 | 4 | **2.48** | 63.0 | 2.CD.050260.A | ■ |
| **.1043** | 2.65 | **.522** | 13.25 | 19.2 | 4 | **2.48** | 63.0 | 2.CD.050265.A | ■ |
| **.1063** | 2.70 | **.531** | 13.50 | 19.5 | 4 | **2.48** | 63.0 | 2.CD.050270.A | ■ |
| **.1083** | 2.75 | **.541** | 13.75 | 19.9 | 4 | **2.54** | 64.5 | 2.CD.050275.A | ■ |
| **.1102** | 2.80 | **.551** | 14.00 | 20.3 | 4 | **2.54** | 64.5 | 2.CD.050280.A | ■ |
| **.1122** | 2.85 | **.561** | 14.25 | 20.6 | 4 | **2.54** | 64.5 | 2.CD.050285.A | ■ |
| **.1142** | 2.90 | **.571** | 14.50 | 21.0 | 4 | **2.56** | 65.0 | 2.CD.050290.A | ■ |
| **.1161** | 2.95 | **.581** | 14.75 | 21.3 | 4 | **2.56** | 65.0 | 2.CD.050295.A | ■ |
| **.1181** | 3.00 | **.591** | 15.00 | 21.7 | 4 | **2.56** | 65.0 | 2.CD.050300.A | ■ |

| Complementary products | |
|---|---|
| CrazyDrill Twicenter | p.72 |
| CrazyDrill Pilot | p.134 |
| CrazyDrill Crosspilot | p.146 |

# CrazyDrill Alu 5 x d

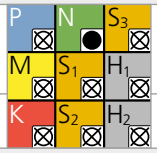
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Low | $v_c$ [m/min] \| [SFM] High | $Q_1$ |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 40 \| **131** | 300 \| **984** | 5xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 40 \| **131** | 200 \| **656** | 5xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended

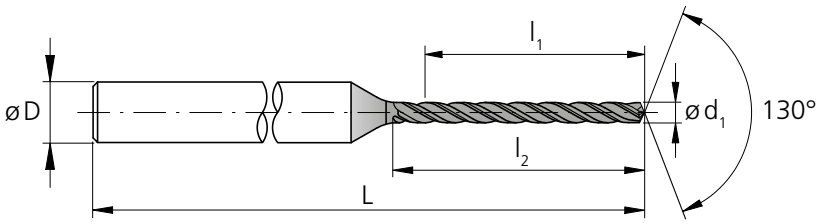



**f** [mm/rev] | **[IPR]**

| Ød1 | 0.5 mm \| **.020"** | 1.0 mm \| **.039"** | 1.5 mm \| **.059"** | 2.0 mm \| **.079"** | 2.5 mm \| **.098"** | 3.0 mm \| **.118"** |
|---|---|---|---|---|---|---|
| | **f** | **f** | **f** | **f** | **f** | **f** |
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| | 0.04 \| **.0016** | 0.07 \| **.0028** | 0.10 \| **.0039** | 0.12 \| **.0047** | 0.15 \| **.0059** | 0.18 \| **.0071** |
| | 0.05 \| **.0020** | 0.08 \| **.0031** | 0.11 \| **.0043** | 0.15 \| **.0059** | 0.18 \| **.0071** | 0.21 \| **.0083** |
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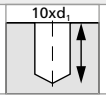
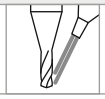
# CrazyDrill Alu 10 x d

## DRILLING WITH EXTERNAL COOLING




| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.0157** | 0.40 | **.157** | 4.00 | 4.9 | 3 | **1.77** | 45.0 | 2.CD.100040.A | ■ |
| **.0177** | 0.45 | **.177** | 4.50 | 5.5 | 3 | **1.77** | 45.0 | 2.CD.100045.A | ■ |
| **.0197** | 0.50 | **.197** | 5.00 | 6.1 | 3 | **1.77** | 45.0 | 2.CD.100050.A | ■ |
| **.0217** | 0.55 | **.217** | 5.50 | 6.7 | 3 | **1.77** | 45.0 | 2.CD.100055.A | ■ |
| **.0236** | 0.60 | **.236** | 6.00 | 7.3 | 3 | **1.85** | 47.0 | 2.CD.100060.A | ■ |
| **.0256** | 0.65 | **.256** | 6.50 | 8.0 | 3 | **1.85** | 47.0 | 2.CD.100065.A | ■ |
| **.0276** | 0.70 | **.276** | 7.00 | 8.6 | 3 | **1.85** | 47.0 | 2.CD.100070.A | ■ |
| **.0295** | 0.75 | **.295** | 7.50 | 9.2 | 3 | **1.93** | 49.0 | 2.CD.100075.A | ■ |
| **.0315** | 0.80 | **.315** | 8.00 | 9.8 | 3 | **1.93** | 49.0 | 2.CD.100080.A | ■ |
| **.0335** | 0.85 | **.335** | 8.50 | 10.4 | 3 | **1.93** | 49.0 | 2.CD.100085.A | ■ |
| **.0354** | 0.90 | **.354** | 9.00 | 11.0 | 3 | **1.93** | 49.0 | 2.CD.100090.A | ■ |
| **.0374** | 0.95 | **.374** | 9.50 | 11.6 | 3 | **1.99** | 50.5 | 2.CD.100095.A | ■ |
| **.0394** | 1.00 | **.394** | 10.00 | 12.2 | 3 | **1.99** | 50.5 | 2.CD.100100.A | ■ |
| **.0413** | 1.05 | **.413** | 10.50 | 12.8 | 3 | **2.05** | 52.0 | 2.CD.100105.A | ■ |
| **.0433** | 1.10 | **.433** | 11.00 | 13.5 | 3 | **2.05** | 52.0 | 2.CD.100110.A | ■ |
| **.0453** | 1.15 | **.453** | 11.50 | 14.1 | 3 | **2.11** | 53.5 | 2.CD.100115.A | ■ |
| **.0472** | 1.20 | **.472** | 12.00 | 14.7 | 3 | **2.11** | 53.5 | 2.CD.100120.A | ■ |
| **.0492** | 1.25 | **.492** | 12.50 | 15.3 | 3 | **2.11** | 53.5 | 2.CD.100125.A | ■ |
| **.0512** | 1.30 | **.512** | 13.00 | 15.9 | 3 | **2.19** | 55.5 | 2.CD.100130.A | ■ |
| **.0531** | 1.35 | **.531** | 13.50 | 16.5 | 3 | **2.19** | 55.5 | 2.CD.100135.A | ■ |
| **.0551** | 1.40 | **.551** | 14.00 | 17.1 | 3 | **2.19** | 55.5 | 2.CD.100140.A | ■ |
| **.0571** | 1.45 | **.571** | 14.50 | 17.7 | 3 | **2.19** | 55.5 | 2.CD.100145.A | ■ |
| **.0591** | 1.50 | **.591** | 15.00 | 18.4 | 4 | **2.54** | 64.5 | 2.CD.100150.A | ■ |
| **.0610** | 1.55 | **.610** | 15.50 | 19.0 | 4 | **2.54** | 64.5 | 2.CD.100155.A | ■ |
| **.0625** | 1.60 | **.630** | 16.00 | 19.6 | 4 | **2.54** | 64.5 | 2.CD.100160.A | ■ |
| **.0630** | 1.65 | **.650** | 16.50 | 20.2 | 4 | **2.54** | 64.5 | 2.CD.100165.A | ■ |
| **.0650** | 1.70 | **.669** | 17.00 | 20.8 | 4 | **2.64** | 67.0 | 2.CD.100170.A | ■ |

■ Stock item

| Carbide |   |   | Z3 |  |   |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 |



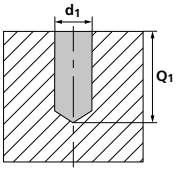
| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|
| **.0689** | 1.75 | **.689** | 17.50 | 21.4 | 4 | **2.64** | 67.0 | 2.CD.100175.A | ■ |
| **.0709** | 1.80 | **.709** | 18.00 | 22.0 | 4 | **2.64** | 67.0 | 2.CD.100180.A | ■ |
| **.0728** | 1.85 | **.728** | 18.50 | 22.6 | 4 | **2.70** | 68.5 | 2.CD.100185.A | ■ |
| **.0748** | 1.90 | **.748** | 19.00 | 23.2 | 4 | **2.70** | 68.5 | 2.CD.100190.A | ■ |
| **.0768** | 1.95 | **.768** | 19.50 | 23.9 | 4 | **2.70** | 68.5 | 2.CD.100195.A | ■ |
| **.0787** | 2.00 | **.787** | 20.00 | 24.5 | 4 | **2.76** | 70.0 | 2.CD.100200.A | ■ |
| **.0807** | 2.05 | **.807** | 20.50 | 25.1 | 4 | **2.76** | 70.0 | 2.CD.100205.A | ■ |
| **.0827** | 2.10 | **.827** | 21.00 | 25.7 | 4 | **2.76** | 70.0 | 2.CD.100210.A | ■ |
| **.0846** | 2.15 | **.846** | 21.50 | 26.3 | 4 | **2.83** | 72.0 | 2.CD.100215.A | ■ |
| **.0866** | 2.20 | **.866** | 22.00 | 26.9 | 4 | **2.83** | 72.0 | 2.CD.100220.A | ■ |
| **.0886** | 2.25 | **.886** | 22.50 | 27.5 | 4 | **2.83** | 72.0 | 2.CD.100225.A | ■ |
| **.0906** | 2.30 | **.906** | 23.00 | 28.1 | 4 | **2.89** | 73.5 | 2.CD.100230.A | ■ |
| **.0925** | 2.35 | **.925** | 23.50 | 28.7 | 4 | **2.89** | 73.5 | 2.CD.100235.A | ■ |
| **.0945** | 2.40 | **.945** | 24.00 | 29.4 | 4 | **2.89** | 73.5 | 2.CD.100240.A | ■ |
| **.0965** | 2.45 | **.965** | 24.50 | 30.0 | 4 | **2.95** | 75.0 | 2.CD.100245.A | ■ |
| **.0984** | 2.50 | **.984** | 25.00 | 30.6 | 4 | **2.95** | 75.0 | 2.CD.100250.A | ■ |
| **.1004** | 2.55 | **1.00** | 25.50 | 31.2 | 4 | **2.95** | 75.0 | 2.CD.100255.A | ■ |
| **.1024** | 2.60 | **1.02** | 26.00 | 31.8 | 4 | **3.01** | 76.5 | 2.CD.100260.A | ■ |
| **.1043** | 2.65 | **1.04** | 26.50 | 32.4 | 4 | **3.01** | 76.5 | 2.CD.100265.A | ■ |
| **.1063** | 2.70 | **1.06** | 27.00 | 33.0 | 4 | **3.01** | 76.5 | 2.CD.100270.A | ■ |
| **.1083** | 2.75 | **1.08** | 27.50 | 33.6 | 4 | **3.07** | 78.0 | 2.CD.100275.A | ■ |
| **.1102** | 2.80 | **1.10** | 28.00 | 34.3 | 4 | **3.07** | 78.0 | 2.CD.100280.A | ■ |
| **.1122** | 2.85 | **1.12** | 28.50 | 34.9 | 4 | **3.07** | 78.0 | 2.CD.100285.A | ■ |
| **.1142** | 2.90 | **1.14** | 29.00 | 35.5 | 4 | **3.15** | 80.0 | 2.CD.100290.A | ■ |
| **.1161** | 2.95 | **1.16** | 29.50 | 36.1 | 4 | **3.15** | 80.0 | 2.CD.100295.A | ■ |
| **.1181** | 3.00 | **1.18** | 30.00 | 36.7 | 4 | **3.15** | 80.0 | 2.CD.100300.A | ■ |

| Complementary products | |
|---|---|
| CrazyDrill Twicenter | p.72 |
| CrazyDrill Pilot | p.134 |
| CrazyDrill Crosspilot | p.146 |

# CrazyDrill Alu 10 x d

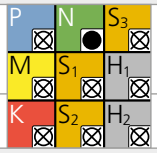
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Low | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | | |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 40 \| **131** | 300 \| **984** | 5xd1 | 1xd1 - 2xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 40 \| **131** | 200 \| **656** | 5xd1 | 1xd1 - 2xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




**f** [mm/rev] | **[IPR]**

| Ød1 | | | | | | |
|---|---|---|---|---|---|---|
| 0.5 mm \| **.020"** | 1.0 mm \| **.039"** | 1.5 mm \| **.059"** | 2.0 mm \| **.079"** | 2.5 mm \| **.098"** | 3.0 mm \| **.118"** | |
| **f** | **f** | **f** | **f** | **f** | **f** | |
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| 0.04 \| **.0016** | 0.07 \| **.0028** | 0.10 \| **.0039** | 0.12 \| **.0047** | 0.15 \| **.0059** | 0.18 \| **.0071** | |
| 0.05 \| **.0020** | 0.08 \| **.0031** | 0.11 \| **.0043** | 0.15 \| **.0059** | 0.18 \| **.0071** | 0.21 \| **.0083** | |
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# Drilling process CrazyDrill Alu

## ACCURATE AND QUICK DRILLING UP TO 10 X D

### Coolant type, pressure and filtration

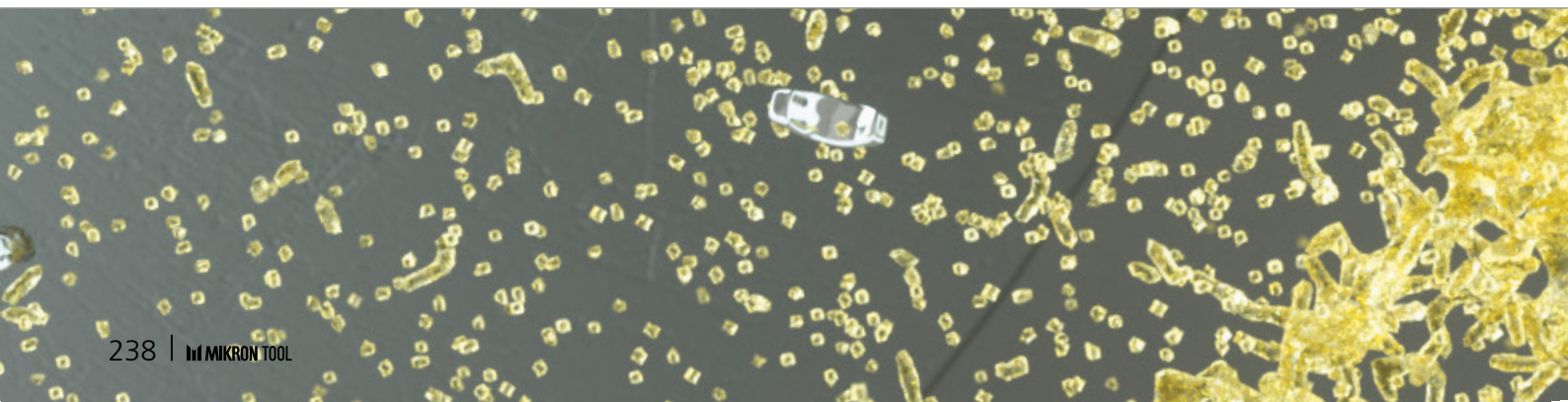
For best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

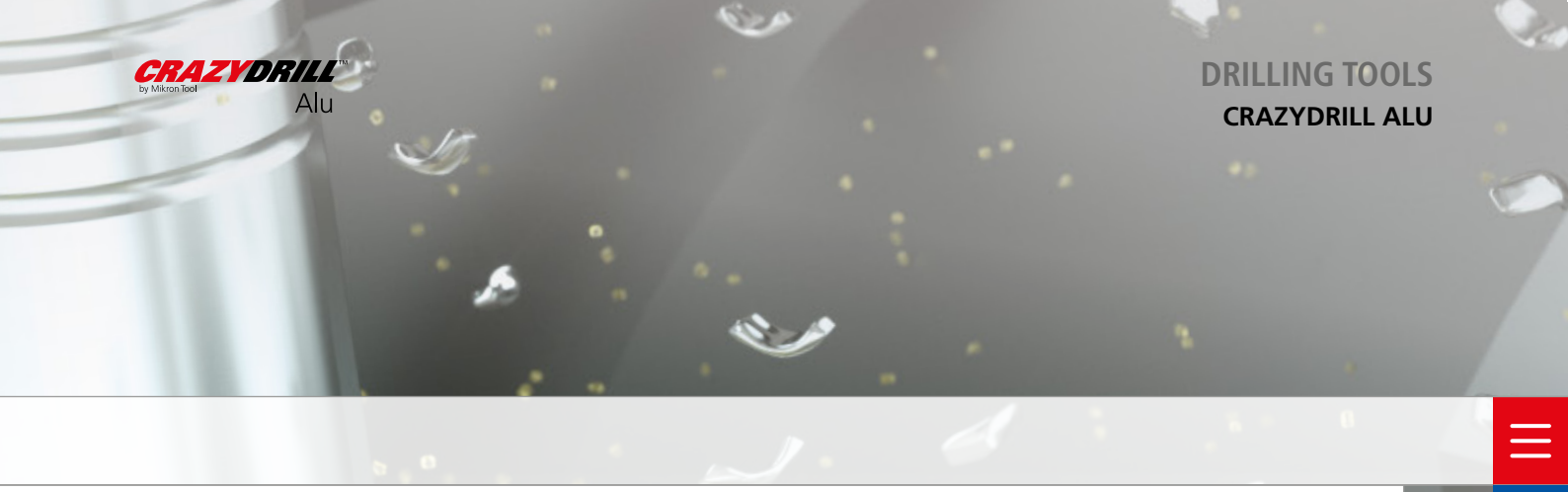
It is necessary that the coolant is well directed to the drill tip, thus cooling and lubricating the drill perfectly and flushing chips.

Flood coolant requires no specific parameters regarding filtration and coolant pressure.

### Tool holders

For detailed indications on tool holders see chapter "Technical information".







**CrazyDrill Alu up to 5 x d / 10 x d**

Due to the excellent self-centering of CrazyDrill Alu, spot drilling or pilot drilling is not necessary on even and flat surfaces up to a maximum drilling depth of 10 x d.

**Centering, pilot drilling and drilling**

Mikron Tool requirements for rough or inclined surfaces:

- **CrazyDrill Twicenter** for centering
- **CrazyDrill Pilot** for pilot drilling
- **CrazyDrill Crosspilot** for pilot drilling on inclined surfaces

Centering with CrazyDrill Twicenter or pilot drilling with CrazyDrill Pilot is the perfect start for accurate drilling (position and alignment accuracy) and a consistent machining process. This is also valid for CrazyDrill Crosspilot on inclined surfaces.

The quality of drilling (position and alignment accuracy, no measurable transition from pilot hole to the following drilling steps) and a stable machining process is guaranteed by carefully determined tool tolerances.



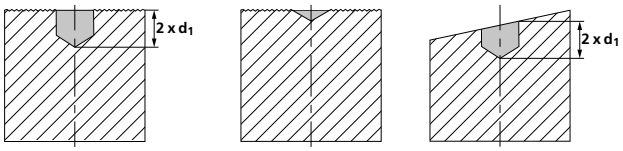


# Drilling process CrazyDrill Alu

## ONE STEP DRILLING UP TO 5 X D

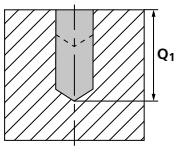
### 1 | PILOT DRILLING

- With CrazyDrill Pilot or CrazyDrill Twicenter (irregular surfaces) or CrazyDrill Crosspilot (inclined surfaces).

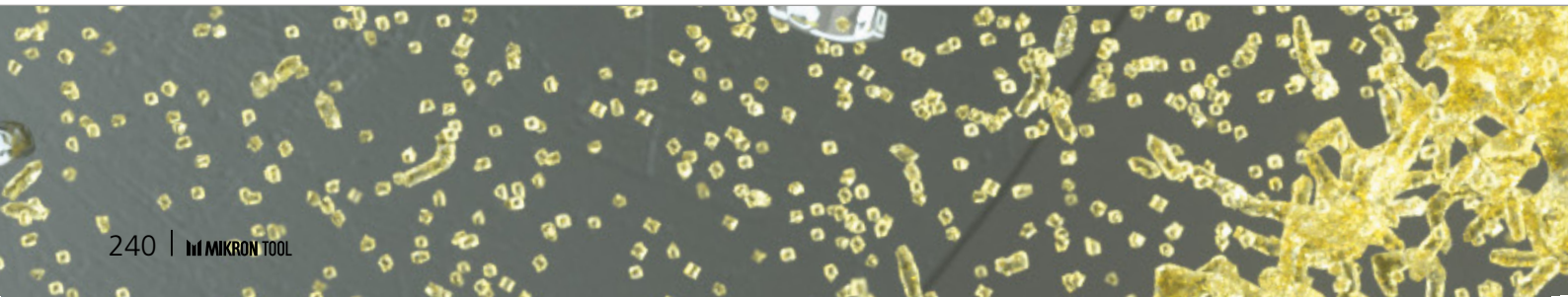



### 2 | DRILLING

- With CrazyDrill Alu at recommended cutting speed and feet rate in one step.




Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

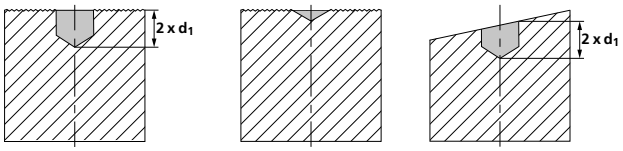


## DRILLING UP TO 10 X D AS PER DIN 66025 / PAL

G83 deep-drilling cycle with chip break and chip removal (pecks)
Q = depth of the respective peck

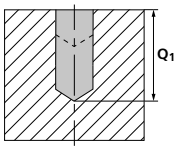
### 1 | PILOT DRILLING

- With CrazyDrill Pilot or CrazyDrill Twicenter (irregular surfaces) or CrazyDrill Crosspilot (inclined surfaces).

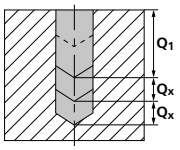



### 2 | DRILLING

- First step $Q_1$ with CrazyDrill Alu to maximum drilling depth Q1 in one step, followed by peck to remove chips.




- Additional pecks $Q_X$ as per cutting data chart, afterwards followed by peck to remove chips.




Note:
Drill can be retracted completely from the hole between pecks. However if vibrations occur, we recommend that the drill is not retracted completely from the hole.
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

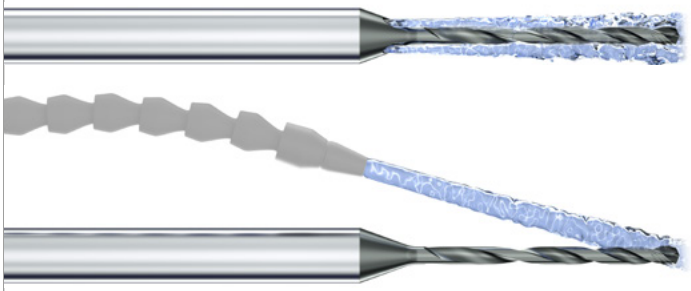
PATENTED

# CrazyDrill SST-Inox



CRAZYDRILL SST-Inox

## HIGH PROCESS RELIABILITY WITH PATENTED GEOMETRY





With CrazyDrill SST-Inox Mikron Tool offers two exclusive drill types for drilling in stainless steel up to 12 x d in the diameter range of .008" to .079" (0.2 to 2.0 mm).

Both variants of this drill meet the challenge very well for machining of stainless steel, chromium-cobalt alloys or heat resistant steel. Their geometry differs significantly from other products available in the market today and guarantees short machining time and process reliability.

The polished tip section with small transverse cutting reduces the feed force and gives the drill good centering properties. The special tip geometry produces short chips even in materials where long chips are the norm and avoids cutting edge breakages. The digressive helical flute is responsible for good chip removal.

CrazyDrill SST-Inox Type IK has 3 - 4 cooling channels going through the shaft which guarantee an efficient coolant jet. This jet keeps the temperature under control and flushes the chips from the hole, the result is a better tool life.

Due to the excellent self-centering of CrazyDrill SST-Inox 8 x d, a centering / pilot drilling is only recommended on irregular, rough or inclined surfaces. While for the 12 x d version, a pilot centering or drill is recommended.

**Regrinding:** This product is not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the CrazyDrill SST-Inox (diameter, length, cutting direction…)? Ask us about our customized versions!

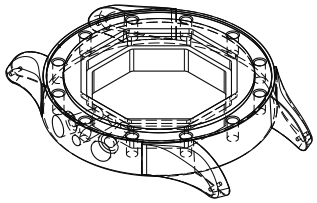
CRAZYDRILL by Mikron Tool SST- Inox

PATENTED

# Features and benefits

**FOR MORE PERFORMANCE IN STAINLESS, HEAT AND ACID RESISTANT STEELS**

- **SHORT MACHINING TIME** | up to 10 times faster
- **LONG TOOL LIFE** | up to 15 times longer
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to excellent chip evacuation
- **HIGH DEGREE OF PRECISION** | due to small tolerances
- **LOW PRODUCTION COSTS** | quick and reliable processes



**COMPONENT**
Watch housing

**MATERIAL**
X2CrNiMo 18-14-3 / 1.4435 / AISI 316L

**MACHINING**
- Drilling
- d = 0.6 mm **| .024"**
- Drilling depth 3 mm **| .118"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill SST-Inox IK - 8 x d

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill SST-Inox<br>- Carbide<br>- Coated<br>- Integrated cooling |
| Item number | 2.CD.080060.IK |
| Cutting data | $v_c$ = 40 m/min **\| 131 SFM**<br>f = 0.025 mm/rev **\| .00098 IPR**<br>$Q_1$ = 1.2 mm **\| .047"**<br>$Q_x$ = 0.9 mm **\| .035"** |

# Type IN

- External cooling
- Coated

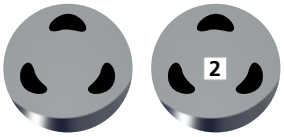


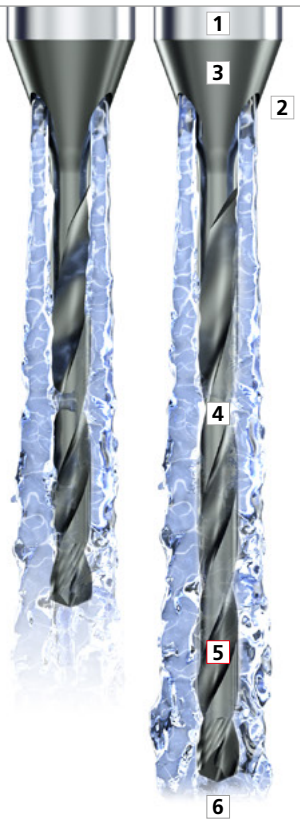


Page 247

# Type IK

- Integrated cooling
- Coated




Page 246

**1 | SHAFT**
The robust carbide shaft allows stable drilling without vibrations.

**2 | NEW COOLING CONCEPT**
The integrated coolant through the shank provides efficient cooling to the drill tip. The result is a reliable process and an increased productivity.

**3 | CARBIDE**
The carbide especially developed for CrazyDrill SST-Inox fulfills perfectly all requirements for the machining of stainless and heat resistant steel.

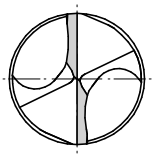
**4 | COATING**
The especially developed high-performance coating eXedur RIP is abrasion and heat resistant. It prevents build up material and supports a smooth chip removal. The result is a long tool life.

**5 | DIGRESSIVE FLUTE**
The newest patented digressive flute technology guarantees a quick chip evacuation and a high stiffness.

**6 | CUTTING GEOMETRY**
The drill point geometry is especially developed for stainless and acid resistant steels:

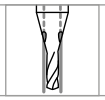
- high cutting edge stability
- short chips
- self-centering

Drill tip

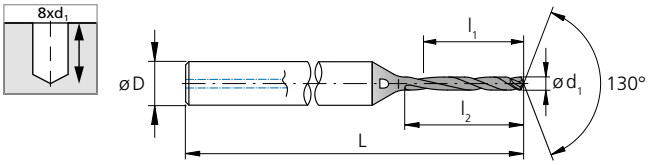


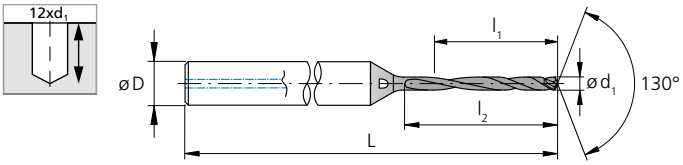
CRAZYDRILL by Mikron Tool SST-Inox

# Type IK 8 x d / 12 x d



## DRILLING WITH INTEGRATED COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .0079 | 0.20 | .063 | 1.6 | 2.0 | 3 | 1.50 | 38 | 2.CD.080020.IK | ■ |
| | .0098 | 0.25 | .079 | 2.0 | 2.5 | 3 | 1.50 | 38 | 2.CD.080025.IK | ■ |
| | .0118 | 0.30 | .094 | 2.4 | 2.9 | 3 | 1.50 | 38 | 2.CD.080030.IK | ■ |
| | .0138 | 0.35 | .110 | 2.8 | 3.4 | 3 | 1.50 | 38 | 2.CD.080035.IK | ■ |
| 1/64 | .0156 | 0.396 | .126 | 3.2 | 3.9 | 3 | 1.50 | 38 | 2.CD.080F164.IK | ■ |
| | .0157 | 0.40 | .126 | 3.2 | 3.9 | 3 | 1.50 | 38 | 2.CD.080040.IK | ■ |
| | .0177 | 0.45 | .142 | 3.6 | 4.4 | 3 | 1.65 | 42 | 2.CD.080045.IK | ■ |
| | .0197 | 0.50 | .157 | 4.0 | 4.9 | 3 | 1.65 | 42 | 2.CD.080050.IK | ■ |
| | .0217 | 0.55 | .173 | 4.4 | 5.4 | 3 | 1.65 | 42 | 2.CD.080055.IK | ■ |
| | .0236 | 0.60 | .189 | 4.8 | 5.9 | 3 | 1.65 | 42 | 2.CD.080060.IK | ■ |
| | .0256 | 0.65 | .205 | 5.2 | 6.4 | 3 | 1.77 | 45 | 2.CD.080065.IK | ■ |
| | .0276 | 0.70 | .220 | 5.6 | 6.9 | 3 | 1.77 | 45 | 2.CD.080070.IK | ■ |
| | .0295 | 0.75 | .236 | 6.0 | 7.4 | 3 | 1.77 | 45 | 2.CD.080075.IK | ■ |
| 1/32 | .0312 | 0.793 | .252 | 6.4 | 7.8 | 3 | 1.77 | 45 | 2.CD.080F132.IK | ■ |
| | .0315 | 0.80 | .252 | 6.4 | 7.8 | 3 | 1.77 | 45 | 2.CD.080080.IK | ■ |
| | .0335 | 0.85 | .268 | 6.8 | 8.3 | 3 | 1.77 | 45 | 2.CD.080085.IK | ■ |
| | .0354 | 0.90 | .283 | 7.2 | 8.8 | 3 | 1.77 | 45 | 2.CD.080090.IK | ■ |
| | .0374 | 0.95 | .299 | 7.6 | 9.3 | 3 | 1.89 | 48 | 2.CD.080095.IK | ■ |
| | .0394 | 1.00 | .315 | 8.0 | 9.8 | 3 | 1.89 | 48 | 2.CD.080100.IK | ■ |
| | .0413 | 1.05 | .331 | 8.4 | 10.3 | 3 | 1.89 | 48 | 2.CD.080105.IK | ■ |
| | .0433 | 1.10 | .346 | 8.8 | 10.8 | 3 | 1.89 | 48 | 2.CD.080110.IK | ■ |
| | .0453 | 1.15 | .362 | 9.2 | 11.3 | 3 | 1.89 | 48 | 2.CD.080115.IK | ■ |
| | .0472 | 1.20 | .378 | 9.6 | 11.8 | 3 | 1.89 | 48 | 2.CD.080120.IK | ■ |
| | .0492 | 1.25 | .394 | 10.0 | 12.3 | 4 | 2.05 | 52 | 2.CD.080125.IK | ■ |
| | .0512 | 1.30 | .409 | 10.4 | 12.7 | 4 | 2.05 | 52 | 2.CD.080130.IK | ■ |
| | .0531 | 1.35 | .425 | 10.8 | 13.2 | 4 | 2.05 | 52 | 2.CD.080135.IK | ■ |
| | .0551 | 1.40 | .441 | 11.2 | 13.7 | 4 | 2.05 | 52 | 2.CD.080140.IK | ■ |
| | .0571 | 1.45 | .457 | 11.6 | 14.2 | 4 | 2.05 | 52 | 2.CD.080145.IK | ■ |
| | .0591 | 1.50 | .472 | 12.0 | 14.7 | 4 | 2.05 | 52 | 2.CD.080150.IK | ■ |
| | .0610 | 1.55 | .488 | 12.4 | 15.2 | 4 | 2.17 | 55 | 2.CD.080155.IK | ■ |
| 1/16 | .0625 | 1.587 | .504 | 12.8 | 15.7 | 4 | 2.17 | 55 | 2.CD.080F116.IK | ■ |
| | .0630 | 1.60 | .504 | 12.8 | 15.7 | 4 | 2.17 | 55 | 2.CD.080160.IK | ■ |
| | .0650 | 1.65 | .520 | 13.2 | 16.2 | 4 | 2.17 | 55 | 2.CD.080165.IK | ■ |
| | .0669 | 1.70 | .535 | 13.6 | 16.7 | 4 | 2.17 | 55 | 2.CD.080170.IK | ■ |
| | .0689 | 1.75 | .551 | 14.0 | 17.2 | 4 | 2.17 | 55 | 2.CD.080175.IK | ■ |
| | .0709 | 1.80 | .567 | 14.4 | 17.6 | 4 | 2.17 | 55 | 2.CD.080180.IK | ■ |
| | .0728 | 1.85 | .583 | 14.8 | 18.1 | 4 | 2.17 | 55 | 2.CD.080185.IK | ■ |
| | .0748 | 1.90 | .598 | 15.2 | 18.6 | 4 | 2.17 | 55 | 2.CD.080190.IK | ■ |
| | .0768 | 1.95 | .614 | 15.6 | 19.1 | 4 | 2.17 | 55 | 2.CD.080195.IK | ■ |
| | .0787 | 2.00 | .630 | 16.0 | 19.6 | 4 | 2.17 | 55 | 2.CD.080200.IK | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .0079 | 0.20 | .094 | 2.4 | 2.8 | 3 | 1.50 | 38 | 2.CD.120020.IK | ■ |
| | .0098 | 0.25 | .118 | 3.0 | 3.5 | 3 | 1.50 | 38 | 2.CD.120025.IK | ■ |
| | .0118 | 0.30 | .142 | 3.6 | 4.1 | 3 | 1.50 | 38 | 2.CD.120030.IK | ■ |
| | .0138 | 0.35 | .165 | 4.2 | 4.8 | 3 | 1.50 | 38 | 2.CD.120035.IK | ■ |
| 1/64 | .0156 | 0.396 | .189 | 4.8 | 5.5 | 3 | 1.50 | 38 | 2.CD.120F164.IK | ■ |
| | .0157 | 0.40 | .189 | 4.8 | 5.5 | 3 | 1.50 | 38 | 2.CD.120040.IK | ■ |
| | .0177 | 0.45 | .213 | 5.4 | 6.2 | 3 | 1.65 | 42 | 2.CD.120045.IK | ■ |
| | .0197 | 0.50 | .236 | 6.0 | 6.9 | 3 | 1.65 | 42 | 2.CD.120050.IK | ■ |
| | .0217 | 0.55 | .260 | 6.6 | 7.6 | 3 | 1.65 | 42 | 2.CD.120055.IK | ■ |
| | .0236 | 0.60 | .283 | 7.2 | 8.3 | 3 | 1.65 | 42 | 2.CD.120060.IK | ■ |
| | .0256 | 0.65 | .307 | 7.8 | 9.0 | 3 | 1.77 | 45 | 2.CD.120065.IK | ■ |
| | .0276 | 0.70 | .331 | 8.4 | 9.7 | 3 | 1.77 | 45 | 2.CD.120070.IK | ■ |
| | .0295 | 0.75 | .354 | 9.0 | 10.4 | 3 | 1.77 | 45 | 2.CD.120075.IK | ■ |
| 1/32 | .0312 | 0.793 | .378 | 9.6 | 11.0 | 3 | 1.77 | 45 | 2.CD.120F132.IK | ■ |
| | .0315 | 0.80 | .378 | 9.6 | 11.0 | 3 | 1.77 | 45 | 2.CD.120080.IK | ■ |
| | .0335 | 0.85 | .402 | 10.2 | 11.7 | 3 | 1.77 | 45 | 2.CD.120085.IK | ■ |
| | .0354 | 0.90 | .425 | 10.8 | 12.4 | 3 | 1.77 | 45 | 2.CD.120090.IK | ■ |
| | .0374 | 0.95 | .449 | 11.4 | 13.1 | 3 | 1.89 | 48 | 2.CD.120095.IK | ■ |
| | .0394 | 1.00 | .472 | 12.0 | 13.8 | 3 | 1.89 | 48 | 2.CD.120100.IK | ■ |
| | .0413 | 1.05 | .496 | 12.6 | 14.5 | 3 | 1.89 | 48 | 2.CD.120105.IK | ■ |
| | .0433 | 1.10 | .520 | 13.2 | 15.2 | 3 | 1.89 | 48 | 2.CD.120110.IK | ■ |
| | .0453 | 1.15 | .543 | 13.8 | 15.9 | 3 | 1.89 | 48 | 2.CD.120115.IK | ■ |
| | .0472 | 1.20 | .567 | 14.4 | 16.6 | 3 | 1.89 | 48 | 2.CD.120120.IK | ■ |
| | .0492 | 1.25 | .591 | 15.0 | 17.3 | 4 | 2.17 | 55 | 2.CD.120125.IK | ■ |
| | .0512 | 1.30 | .614 | 15.6 | 17.9 | 4 | 2.17 | 55 | 2.CD.120130.IK | ■ |
| | .0531 | 1.35 | .638 | 16.2 | 18.6 | 4 | 2.17 | 55 | 2.CD.120135.IK | ■ |
| | .0551 | 1.40 | .661 | 16.8 | 19.3 | 4 | 2.17 | 55 | 2.CD.120140.IK | ■ |
| | .0571 | 1.45 | .685 | 17.4 | 20.0 | 4 | 2.17 | 55 | 2.CD.120145.IK | ■ |
| | .0591 | 1.50 | .709 | 18.0 | 20.7 | 4 | 2.17 | 55 | 2.CD.120150.IK | ■ |
| | .0610 | 1.55 | .732 | 18.6 | 21.4 | 4 | 2.28 | 58 | 2.CD.120155.IK | ■ |
| 1/16 | .0625 | 1.587 | .756 | 19.2 | 22.1 | 4 | 2.28 | 58 | 2.CD.120F116.IK | ■ |
| | .0630 | 1.60 | .756 | 19.2 | 22.1 | 4 | 2.28 | 58 | 2.CD.120160.IK | ■ |
| | .0650 | 1.65 | .780 | 19.8 | 22.8 | 4 | 2.28 | 58 | 2.CD.120165.IK | ■ |
| | .0669 | 1.70 | .803 | 20.4 | 23.5 | 4 | 2.28 | 58 | 2.CD.120170.IK | ■ |
| | .0689 | 1.75 | .827 | 21.0 | 24.2 | 4 | 2.28 | 58 | 2.CD.120175.IK | ■ |
| | .0709 | 1.80 | .850 | 21.6 | 24.8 | 4 | 2.28 | 58 | 2.CD.120180.IK | ■ |
| | .0728 | 1.85 | .874 | 22.2 | 25.5 | 4 | 2.36 | 60 | 2.CD.120185.IK | ■ |
| | .0748 | 1.90 | .898 | 22.8 | 26.2 | 4 | 2.36 | 60 | 2.CD.120190.IK | ■ |
| | .0768 | 1.95 | .921 | 23.4 | 26.9 | 4 | 2.36 | 60 | 2.CD.120195.IK | ■ |
| | .0787 | 2.00 | .945 | 24.0 | 27.6 | 4 | 2.36 | 60 | 2.CD.120200.IK | ■ |

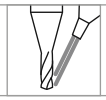
■ Stock item

**Complementary products**


| | |
|---|---|
| CrazyDrill Twicenter | p.72 |
| CrazyDrill Pilot SST-Inox | p.122 |
| CrazyDrill Crosspilot | p.146 |

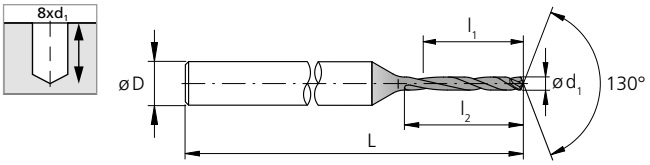
# Type IN 8 x d / 12 x d

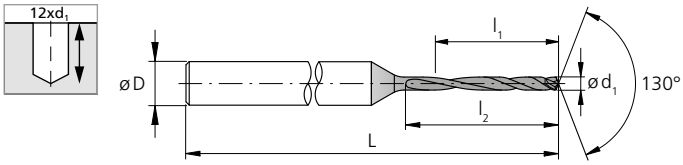
Carbide | 130° | Z2 | eXedur RIP



## DRILLING WITH EXTERNAL COOLING

| | | |
|---|---|---|
| Ø$d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | |
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 |




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0079** | 0.20 | **.063** | 1.6 | 2.0 | 3 | **1.50** | 38 | 2.CD.080020.IN | ■ |
| | **.0098** | 0.25 | **.079** | 2.0 | 2.5 | 3 | **1.50** | 38 | 2.CD.080025.IN | ■ |
| | **.0118** | 0.30 | **.094** | 2.4 | 2.9 | 3 | **1.50** | 38 | 2.CD.080030.IN | ■ |
| | **.0138** | 0.35 | **.110** | 2.8 | 3.4 | 3 | **1.50** | 38 | 2.CD.080035.IN | ■ |
| **1/64** | **.0156** | 0.396 | **.126** | 3.2 | 3.9 | 3 | **1.50** | 38 | 2.CD.080F164.IN | ■ |
| | **.0157** | 0.40 | **.126** | 3.2 | 3.9 | 3 | **1.50** | 38 | 2.CD.080040.IN | ■ |
| | **.0177** | 0.45 | **.142** | 3.6 | 4.4 | 3 | **1.65** | 42 | 2.CD.080045.IN | ■ |
| | **.0197** | 0.50 | **.157** | 4.0 | 4.9 | 3 | **1.65** | 42 | 2.CD.080050.IN | ■ |
| | **.0217** | 0.55 | **.173** | 4.4 | 5.4 | 3 | **1.65** | 42 | 2.CD.080055.IN | ■ |
| | **.0236** | 0.60 | **.189** | 4.8 | 5.9 | 3 | **1.65** | 42 | 2.CD.080060.IN | ■ |
| | **.0256** | 0.65 | **.205** | 5.2 | 6.4 | 3 | **1.77** | 45 | 2.CD.080065.IN | ■ |
| | **.0276** | 0.70 | **.220** | 5.6 | 6.9 | 3 | **1.77** | 45 | 2.CD.080070.IN | ■ |
| | **.0295** | 0.75 | **.236** | 6.0 | 7.4 | 3 | **1.77** | 45 | 2.CD.080075.IN | ■ |
| **1/32** | **.0312** | 0.793 | **.252** | 6.4 | 7.8 | 3 | **1.77** | 45 | 2.CD.080F132.IN | ■ |
| | **.0315** | 0.80 | **.252** | 6.4 | 7.8 | 3 | **1.77** | 45 | 2.CD.080080.IN | ■ |
| | **.0335** | 0.85 | **.268** | 6.8 | 8.3 | 3 | **1.77** | 45 | 2.CD.080085.IN | ■ |
| | **.0354** | 0.90 | **.283** | 7.2 | 8.8 | 3 | **1.77** | 45 | 2.CD.080090.IN | ■ |
| | **.0374** | 0.95 | **.299** | 7.6 | 9.3 | 3 | **1.89** | 48 | 2.CD.080095.IN | ■ |
| | **.0394** | 1.00 | **.315** | 8.0 | 9.8 | 3 | **1.89** | 48 | 2.CD.080100.IN | ■ |
| | **.0413** | 1.05 | **.331** | 8.4 | 10.3 | 3 | **1.89** | 48 | 2.CD.080105.IN | ■ |
| | **.0433** | 1.10 | **.346** | 8.8 | 10.8 | 3 | **1.89** | 48 | 2.CD.080110.IN | ■ |
| | **.0453** | 1.15 | **.362** | 9.2 | 11.3 | 3 | **1.89** | 48 | 2.CD.080115.IN | ■ |
| | **.0472** | 1.20 | **.378** | 9.6 | 11.8 | 3 | **1.89** | 48 | 2.CD.080120.IN | ■ |
| | **.0492** | 1.25 | **.394** | 10.0 | 12.3 | 3 | **2.05** | 52 | 2.CD.080125.IN | ■ |
| | **.0512** | 1.30 | **.409** | 10.4 | 12.7 | 3 | **2.05** | 52 | 2.CD.080130.IN | ■ |
| | **.0531** | 1.35 | **.425** | 10.8 | 13.2 | 3 | **2.05** | 52 | 2.CD.080135.IN | ■ |
| | **.0551** | 1.40 | **.441** | 11.2 | 13.7 | 3 | **2.05** | 52 | 2.CD.080140.IN | ■ |
| | **.0571** | 1.45 | **.457** | 11.6 | 14.2 | 3 | **2.05** | 52 | 2.CD.080145.IN | ■ |
| | **.0591** | 1.50 | **.472** | 12.0 | 14.7 | 3 | **2.05** | 52 | 2.CD.080150.IN | ■ |
| | **.0610** | 1.55 | **.488** | 12.4 | 15.2 | 3 | **2.17** | 55 | 2.CD.080155.IN | ■ |
| **1/16** | **.0625** | 1.587 | **.504** | 12.8 | 15.7 | 3 | **2.17** | 55 | 2.CD.080F116.IN | ■ |
| | **.0630** | 1.60 | **.504** | 12.8 | 15.7 | 3 | **2.17** | 55 | 2.CD.080160.IN | ■ |
| | **.0650** | 1.65 | **.520** | 13.2 | 16.2 | 3 | **2.17** | 55 | 2.CD.080165.IN | ■ |
| | **.0669** | 1.70 | **.535** | 13.6 | 16.7 | 3 | **2.17** | 55 | 2.CD.080170.IN | ■ |
| | **.0689** | 1.75 | **.551** | 14.0 | 17.2 | 3 | **2.17** | 55 | 2.CD.080175.IN | ■ |
| | **.0709** | 1.80 | **.567** | 14.4 | 17.6 | 3 | **2.17** | 55 | 2.CD.080180.IN | ■ |
| | **.0728** | 1.85 | **.583** | 14.8 | 18.1 | 3 | **2.17** | 55 | 2.CD.080185.IN | ■ |
| | **.0748** | 1.90 | **.598** | 15.2 | 18.6 | 3 | **2.17** | 55 | 2.CD.080190.IN | ■ |
| | **.0768** | 1.95 | **.614** | 15.6 | 19.1 | 3 | **2.17** | 55 | 2.CD.080195.IN | ■ |
| | **.0787** | 2.00 | **.630** | 16.0 | 19.6 | 3 | **2.17** | 55 | 2.CD.080200.IN | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0079** | 0.20 | **.094** | 2.4 | 2.8 | 3 | **1.50** | 38 | 2.CD.120020.IN | ■ |
| | **.0098** | 0.25 | **.118** | 3.0 | 3.5 | 3 | **1.50** | 38 | 2.CD.120025.IN | ■ |
| | **.0118** | 0.30 | **.142** | 3.6 | 4.1 | 3 | **1.50** | 38 | 2.CD.120030.IN | ■ |
| | **.0138** | 0.35 | **.165** | 4.2 | 4.8 | 3 | **1.50** | 38 | 2.CD.120035.IN | ■ |
| **1/64** | **.0156** | 0.396 | **.189** | 4.8 | 5.5 | 3 | **1.50** | 38 | 2.CD.120F164.IN | ■ |
| | **.0157** | 0.40 | **.189** | 4.8 | 5.5 | 3 | **1.50** | 38 | 2.CD.120040.IN | ■ |
| | **.0177** | 0.45 | **.213** | 5.4 | 6.2 | 3 | **1.65** | 42 | 2.CD.120045.IN | ■ |
| | **.0197** | 0.50 | **.236** | 6.0 | 6.9 | 3 | **1.65** | 42 | 2.CD.120050.IN | ■ |
| | **.0217** | 0.55 | **.260** | 6.6 | 7.6 | 3 | **1.65** | 42 | 2.CD.120055.IN | ■ |
| | **.0236** | 0.60 | **.283** | 7.2 | 8.3 | 3 | **1.65** | 42 | 2.CD.120060.IN | ■ |
| | **.0256** | 0.65 | **.307** | 7.8 | 9.0 | 3 | **1.77** | 45 | 2.CD.120065.IN | ■ |
| | **.0276** | 0.70 | **.331** | 8.4 | 9.7 | 3 | **1.77** | 45 | 2.CD.120070.IN | ■ |
| | **.0295** | 0.75 | **.354** | 9.0 | 10.4 | 3 | **1.77** | 45 | 2.CD.120075.IN | ■ |
| **1/32** | **.0312** | 0.793 | **.378** | 9.6 | 11.0 | 3 | **1.77** | 45 | 2.CD.120F132.IN | ■ |
| | **.0315** | 0.80 | **.378** | 9.6 | 11.0 | 3 | **1.77** | 45 | 2.CD.120080.IN | ■ |
| | **.0335** | 0.85 | **.402** | 10.2 | 11.7 | 3 | **1.77** | 45 | 2.CD.120085.IN | ■ |
| | **.0354** | 0.90 | **.425** | 10.8 | 12.4 | 3 | **1.77** | 45 | 2.CD.120090.IN | ■ |
| | **.0374** | 0.95 | **.449** | 11.4 | 13.1 | 3 | **1.89** | 48 | 2.CD.120095.IN | ■ |
| | **.0394** | 1.00 | **.472** | 12.0 | 13.8 | 3 | **1.89** | 48 | 2.CD.120100.IN | ■ |
| | **.0413** | 1.05 | **.496** | 12.6 | 14.5 | 3 | **1.89** | 48 | 2.CD.120105.IN | ■ |
| | **.0433** | 1.10 | **.520** | 13.2 | 15.2 | 3 | **1.89** | 48 | 2.CD.120110.IN | ■ |
| | **.0453** | 1.15 | **.543** | 13.8 | 15.9 | 3 | **1.89** | 48 | 2.CD.120115.IN | ■ |
| | **.0472** | 1.20 | **.567** | 14.4 | 16.6 | 3 | **1.89** | 48 | 2.CD.120120.IN | ■ |
| | **.0492** | 1.25 | **.591** | 15.0 | 17.3 | 3 | **2.17** | 55 | 2.CD.120125.IN | ■ |
| | **.0512** | 1.30 | **.614** | 15.6 | 17.9 | 3 | **2.17** | 55 | 2.CD.120130.IN | ■ |
| | **.0531** | 1.35 | **.638** | 16.2 | 18.6 | 3 | **2.17** | 55 | 2.CD.120135.IN | ■ |
| | **.0551** | 1.40 | **.661** | 16.8 | 19.3 | 3 | **2.17** | 55 | 2.CD.120140.IN | ■ |
| | **.0571** | 1.45 | **.685** | 17.4 | 20.0 | 3 | **2.17** | 55 | 2.CD.120145.IN | ■ |
| | **.0591** | 1.50 | **.709** | 18.0 | 20.7 | 3 | **2.17** | 55 | 2.CD.120150.IN | ■ |
| | **.0610** | 1.55 | **.732** | 18.6 | 21.4 | 3 | **2.28** | 58 | 2.CD.120155.IN | ■ |
| **1/16** | **.0625** | 1.587 | **.756** | 19.2 | 22.1 | 3 | **2.28** | 58 | 2.CD.120F116.IN | ■ |
| | **.0630** | 1.60 | **.756** | 19.2 | 22.1 | 3 | **2.28** | 58 | 2.CD.120160.IN | ■ |
| | **.0650** | 1.65 | **.780** | 19.8 | 22.8 | 3 | **2.28** | 58 | 2.CD.120165.IN | ■ |
| | **.0669** | 1.70 | **.803** | 20.4 | 23.5 | 3 | **2.28** | 58 | 2.CD.120170.IN | ■ |
| | **.0689** | 1.75 | **.827** | 21.0 | 24.2 | 3 | **2.28** | 58 | 2.CD.120175.IN | ■ |
| | **.0709** | 1.80 | **.850** | 21.6 | 24.8 | 3 | **2.28** | 58 | 2.CD.120180.IN | ■ |
| | **.0728** | 1.85 | **.874** | 22.2 | 25.5 | 3 | **2.36** | 60 | 2.CD.120185.IN | ■ |
| | **.0748** | 1.90 | **.898** | 22.8 | 26.2 | 3 | **2.36** | 60 | 2.CD.120190.IN | ■ |
| | **.0768** | 1.95 | **.921** | 23.4 | 26.9 | 3 | **2.36** | 60 | 2.CD.120195.IN | ■ |
| | **.0787** | 2.00 | **.945** | 24.0 | 27.6 | 3 | **2.36** | 60 | 2.CD.120200.IN | ■ |

■ Stock item

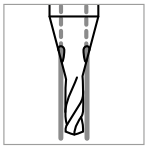
**Complementary products**

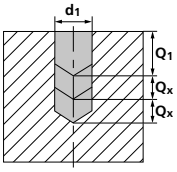

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|---|---|
| CrazyDrill Twicenter | p.72 |
| CrazyDrill Pilot SST-Inox | p.122 |
| CrazyDrill Crosspilot | p.146 |

CRAZYDRILL by Mikron Tool SST-Inox

# Type IK 8 x d / 12 x d

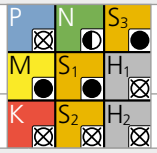
## DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 35 \| **115** | 50 \| **164** | 1xd1 – 4xd1 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 35 \| **115** | 50 \| **164** | 1xd1 – 4xd1 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 35 \| **115** | 50 \| **164** | 1xd1 – 4xd1 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 30 \| **98** | 45 \| **148** | 1xd1 – 4xd1 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 \| **131** | 100 \| **328** | 4xd1 – 8xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 \| **131** | 100 \| **328** | 4xd1 – 8xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 15 \| **49** | 30 \| **98** | 0.5xd1 – 1xd1 |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 40 \| **131** | 50 \| **164** | 1xd1 – 3xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

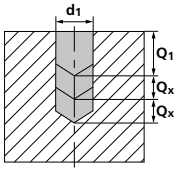
| $Q_x$ | Ød1 1/64" 0.2–0.5 mm \| .008"–.020" f | 1/32" 0.6–0.8 mm \| .024"–.032" f | 0.9–1.1 mm \| .035"–.043" f | 1.2–1.4 mm \| .047"–.055" f | 1/16" 1.5–1.7 mm \| .059"–.067" f | 1.8–2.0 mm \| .071"–.079" f |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 1xd1–2xd1 | 0.010–0.020 \| **.0004–.0008** | 0.020–0.030 \| **.0008–.0012** | 0.030–0.040 \| **.0012–.0016** | 0.040–0.050 \| **.0016–.0020** | 0.050–0.060 \| **.0020–.0024** | 0.060–0.070 \| **.0024–.0028** |
| 1xd1–2xd1 | 0.015–0.030 \| **.0006–.0012** | 0.030–0.040 \| **.0012–.0016** | 0.040–0.050 \| **.0016–.0020** | 0.050–0.060 \| **.0020–.0024** | 0.060–0.070 \| **.0024–.0028** | 0.070–0.080 \| **.0028–.0031** |
| 1xd1–2xd1 | 0.010–0.020 \| **.0004–.0008** | 0.020–0.025 \| **.0008–.0010** | 0.025–0.035 \| **.0010–.0014** | 0.040–0.050 \| **.0016–.0020** | 0.050–0.060 \| **.0020–.0024** | 0.060–0.070 \| **.0024–.0028** |
| 1xd1–2xd1 | 0.010–0.020 \| **.0004–.0008** | 0.020–0.030 \| **.0008–.0012** | 0.030–0.035 \| **.0012–.0014** | 0.035–0.045 \| **.0014–.0018** | 0.045–0.055 \| **.0018–.0022** | 0.055–0.060 \| **.0022–.0024** |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 4xd1 | 0.040–0.060 \| **.0016–.0024** | 0.050–0.080 \| **.0020–.0031** | 0.060–0.100 \| **.0024–.0039** | 0.080–0.120 \| **.0031–.0047** | 0.100–0.150 \| **.0039–.0059** | 0.120–0.180 \| **.0047–.0071** |
| 4xd1 | 0.040–0.060 \| **.0016–.0024** | 0.050–0.080 \| **.0020–.0031** | 0.060–0.100 \| **.0024–.0039** | 0.080–0.120 \| **.0031–.0047** | 0.100–0.150 \| **.0039–.0059** | 0.120–0.180 \| **.0047–.0071** |
| | | | | | | |
| | | | | | | |
| 0.5xd1 | 0.010–0.015 \| **.0004–.0006** | 0.015–0.020 \| **.0006–.0008** | 0.020–0.025 \| **.0008–.0010** | 0.025–0.035 \| **.0010–.0014** | 0.035–0.040 \| **.0014–.0016** | 0.045–0.055 \| **.0018–.0022** |
| | | | | | | |
| | | | | | | |
| 1xd1–2xd1 | 0.020–0.030 \| **.0008–.0012** | 0.030–0.040 \| **.0012–.0016** | 0.050–0.060 \| **.0020–.0024** | 0.060–0.070 \| **.0024–.0028** | 0.070–0.080 \| **.0028–.0031** | 0.080–0.100 \| **.0031–.0039** |
| | | | | | | |
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CRAZYDRILL by Mikron Tool SST-Inox

# Type IN 8 x d / 12 x d

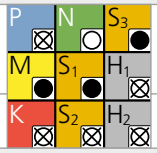
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 30 \| **98** | 40 \| **131** | 0.5xd1 – 1xd1 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 30 \| **98** | 40 \| **131** | 0.5xd1 – 1xd1 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 30 \| **98** | 40 \| **131** | 0.5xd1 – 1xd1 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 25 \| **82** | 30 \| **98** | 0.5xd1 – 1xd1 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 30 \| **98** | 100 \| **328** | 2xd1 – 4xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 30 \| **98** | 100 \| **328** | 1xd1 – 4xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 15 \| **49** | 25 \| **82** | 0.25xd1 – 0.5xd1 |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 25 \| **82** | 35 \| **115** | 0.5xd1 – 1xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| $Q_x$ | Ød1 1/64" 0.2–0.5 mm \| .008"–.020" f | 1/32" 0.6–0.8 mm \| .024"–.032" f | 0.9–1.1 mm \| .035"–.043" f | 1.2–1.4 mm \| .047"–.055" f | 1/16" 1.5–1.7 mm \| .059"–.067" f | 1.8–2.0 mm \| .071"–.079" f |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 0.5xd1 | 0.010–0.015 \| **.0004–.0006** | 0.015–0.025 \| **.0006–.0010** | 0.025–0.030 \| **.0010–.0012** | 0.030–0.040 \| **.0012–.0016** | 0.040–0.050 \| **.0016–.0020** | 0.050–0.060 \| **.0020–.0024** |
| 0.5xd1 | 0.015–0.020 \| **.0006–.0008** | 0.020–0.025 \| **.0008–.0010** | 0.030–0.035 \| **.0012–.0014** | 0.040–0.050 \| **.0016–.0020** | 0.050–0.060 \| **.0020–.0024** | 0.060–0.070 \| **.0024–.0028** |
| 0.5xd1 | 0.010–0.015 \| **.0004–.0006** | 0.015–0.020 \| **.0006–.0008** | 0.020–0.030 \| **.0008–.0012** | 0.030–0.040 \| **.0012–.0016** | 0.040–0.050 \| **.0016–.0020** | 0.050–0.060 \| **.0020–.0024** |
| 0.5xd1 | 0.010–0.015 \| **.0004–.0006** | 0.015–0.020 \| **.0006–.0008** | 0.020–0.030 \| **.0008–.0012** | 0.030–0.040 \| **.0012–.0016** | 0.040–0.045 \| **.0016–.0018** | 0.040–0.060 \| **.0016–.0024** |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 2xd1 | 0.030–0.060 \| **.0012–.0024** | 0.040–0.080 \| **.0016–.0031** | 0.050–0.100 \| **.0020–.0039** | 0.060–0.120 \| **.0024–.0047** | 0.070–0.150 \| **.0028–.0059** | 0.080–0.180 \| **.0031–.0071** |
| 1xd1–2xd1 | 0.030–0.060 \| **.0012–.0024** | 0.040–0.080 \| **.0016–.0031** | 0.050–0.100 \| **.0020–.0039** | 0.060–0.120 \| **.0024–.0047** | 0.070–0.150 \| **.0028–.0059** | 0.080–0.180 \| **.0031–.0071** |
| | | | | | | |
| | | | | | | |
| 0.25xd1 | 0.005–0.010 \| **.0002–.0004** | 0.010–0.015 \| **.0004–.0006** | 0.015–0.020 \| **.0006–.0008** | 0.020–0.025 \| **.0008–.0010** | 0.030–0.035 \| **.0012–.0014** | 0.030–0.040 \| **.0012–.0016** |
| | | | | | | |
| | | | | | | |
| 0.5xd1 | 0.015–0.025 \| **.0006–.0010** | 0.025–0.035 \| **.0010–.0014** | 0.040–0.050 \| **.0016–.0020** | 0.050–0.060 \| **.0020–.0024** | 0.060–0.070 \| **.0024–.0028** | 0.070–0.080 \| **.0028–.0031** |
| | | | | | | |
| | | | | | | |



# Drilling process CrazyDrill SST-Inox

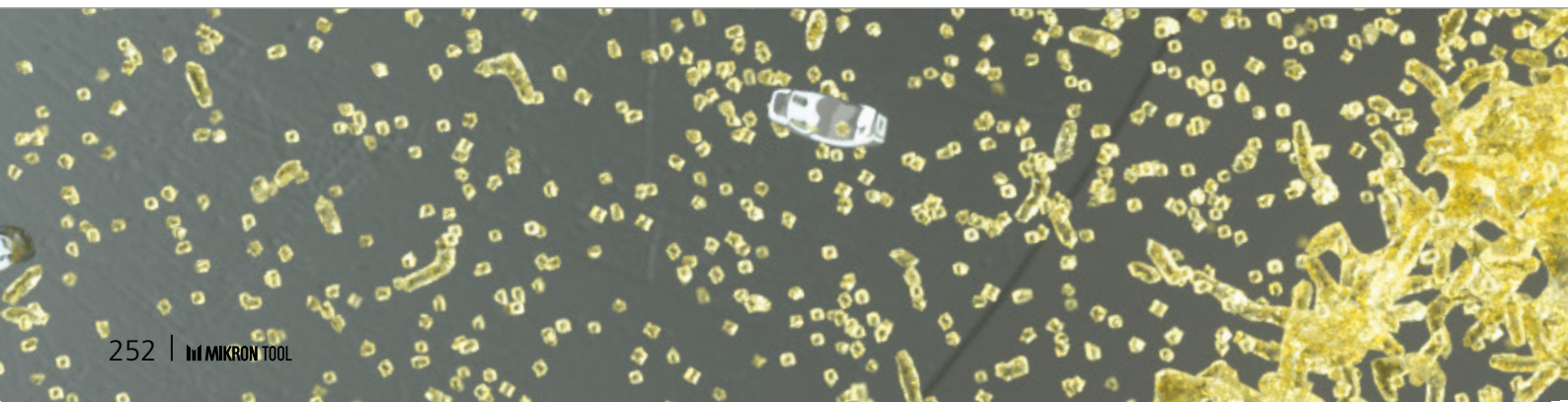
## PRECISE AND EFFICIENT DRILLING FROM Ø .008" (0.2 MM)

### Coolant type, pressure and filtration

**Coolant:** For best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

**Filter:** The large cooling channels allow a standard filter with filter quality of ≤ .002" (0.05 mm).

For tools with external cooling no specific parameters have to be considered concerning filter.



**Coolant pressure:** To ensure a reliable drilling process using tools with through-tool cooling the following minimal pressures are needed (see chart). Higher pressures are needed for smaller drill size diameters. High pressure is generally better for the cooling and flushing effect.

| | | | |
|---|---|---|---|
| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
| **Minimal pressure** | [bar] | 15 | 30 |
| | **[psi]** | **218** | **435** |

For tools with external cooling no specific parameters have to be considered concerning coolant pressure. But it must be ensured that the coolant is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical information".



# Drilling process CrazyDrill SST-Inox

## PRECISE AND EFFICIENT DRILLING FROM Ø .008" (0.2 MM)

**CrazyDrill SST-Inox IK / IN 8 x d**

Because of the high degree of self-centering capability, CrazyDrill SST-Inox can be used on regular and straight surfaces without a centering or pilot hole for drilling depths up to 8 x d.

**Higher requirements:** For irregular respectively rough or inclined surfaces or for the highest degree of position accuracy Mikron Tool recommends:

- **CrazyDrill Pilot SST-Inox** as pilot drill
- **CrazyDrill Twicenter** as center drill
- **CrazyDrill Crosspilot** as pilot drill for inclined surfaces

**CrazyDrill SST-Inox IK / IN 12 x d**

Mikron Tool recommends a pilot hole for CrazyDrill SST-Inox 12 x d:

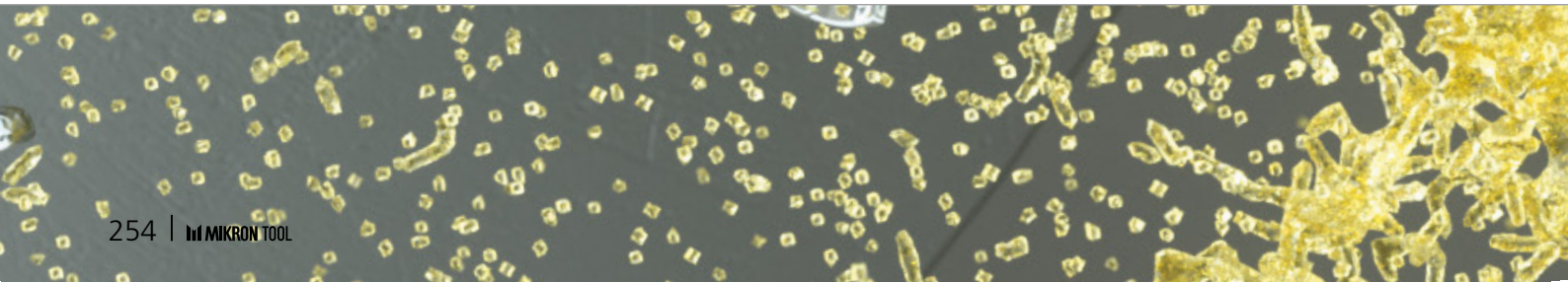
- **CrazyDrill Pilot SST-Inox** as pilot drill
- **CrazyDrill Twicenter** as center drill
- **CrazyDrill Crosspilot** as pilot drill for inclined surfaces

Thus highest alignment and process accuracy are guaranteed.

**Centering / pilot drilling and drilling**

Pilot drilling with CrazyDrill Pilot SST-Inox or centering with CrazyDrill Twicenter are the perfect combination for a precise hole (position and alignment accuracy) and a stable machining process. The pilot drill CrazyDrill Crosspilot does the same when drilling on inclined surfaces.

The drilling quality (position and alignment accuracy, no measurable transition from pilot drilling to follow-up drilling) and a stable machining process are guaranteed due to predetermined tool tolerances.



## DRILLING PROCESS

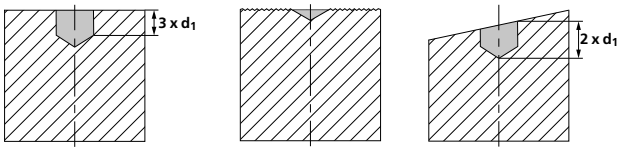
**Drilling according DIN 66025 / PAL**

G83 deep-drilling cycle with chip break and chip removal (pecks)

Q = depth of the respective peck

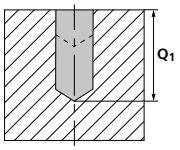
### 1 | CENTERING OR PILOT DRILLING

- With CrazyDrill Twicenter or CrazyDrill Pilot SST-Inox (irregular or rough surfaces) or CrazyDrill Crosspilot (inclined surfaces) for version 8 x d.
- With CrazyDrill Twicenter or CrazyDrill Pilot SST-Inox (straight surfaces) or CrazyDrill Crosspilot (inclined surfaces) for version 12 x d.

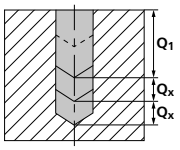



### 2 | DRILLING

- With CrazyDrill SST-Inox up to maximum drilling depth $Q_1$ in one step, followed by peck to remove chips.



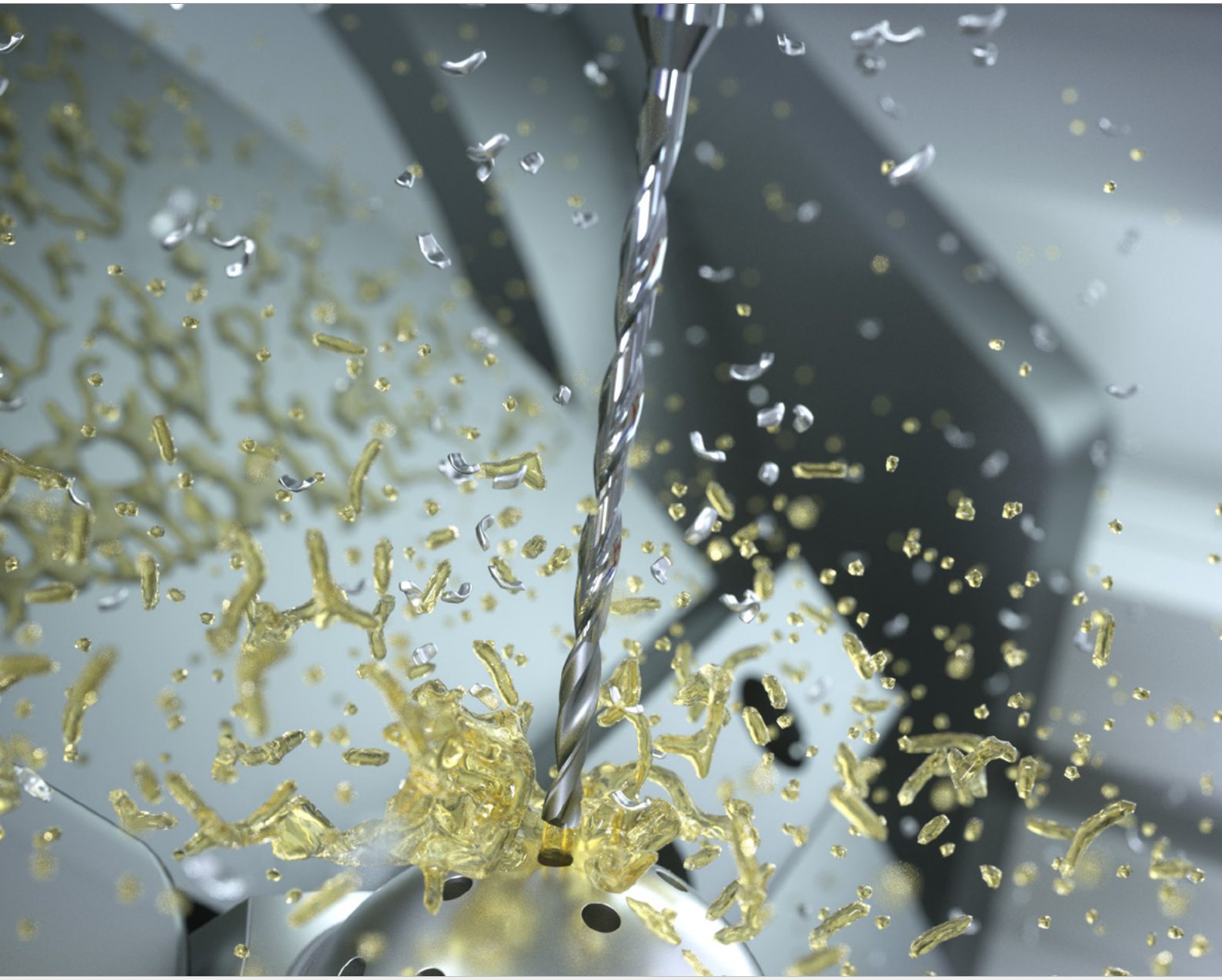

- Further pecks $Q_X$ according to cutting data table, followed by peck to remove chips.




Note:

Between pecks, take the drill completely out from the bore. After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# CrazyDrill Cool



CRAZYDRILL Cool

## HIGH PRECISION FOR DEEP HOLES UP TO 15 X D



Mikron Tool CrazyDrill Cool line offers a through coolant deep-hole drill program for a wide range of materials. The application range covered goes from hole diameters of .030" up to .236" (0.75 mm up to 6.00 mm) and depth of cut up to 15 x d.

Depending on the material to be machined, the drills are available between:

- **Coated version** (eXedur RIP) - unalloyed and alloyed steels, cast iron and even for heat treated steels up to 55HRC.
- **Uncoated version** - non ferrous metals

The high-performance eXedur RIP coating provides thermal and wear protection, guaranteeing a longer tool life.

The through coolant holes supply adequate and continuous coolant to the tip for constant cooling, lubrication and chip removal. The power chamber reduces pressure loss assureing higher flowrate when drilling even the smallest diameters.

- **Version 6 x d:** with its tip angle of 140° and its chisel "s"-form the drill has a good self-centering. We recommend pilot drilling or centering only on irregular, rough or inclined surfaces and if a high position accuracy is requested.
- **Version 10 x d and 15 x d:** We recommend CrazyDrill Pilot or, for difficult to machine materials CrazyDrill Coolpilot / CrazyDrill Pilot SST-Inox, for hole preparation on flat and even surfaces. In case of inclined surfaces up to 60° we recommend CrazyDrill Crosspilot as pilot drill.

**Regrinding:** This product can be reground starting from Ø .055" (1.4 mm).

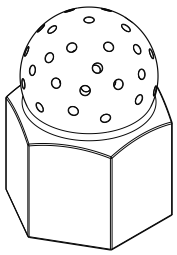
**Please note:** You couldn't find your suitable version of the CrazyDrill Cool - coated / uncoated (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYDRILL by Mikron Tool Cool

# Features and benefits

## CONSISTENT AND ACCURATE DRILLING UP TO 15 X D

- **SHORT MACHINING TIME** | due to high feed rates
- **LONG TOOL LIFE** | due to efficient coolant
- **HIGH DEGREE OF PRECISION** | due to small tolerances



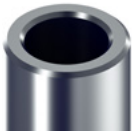
**COMPONENT**
Spray nozzle

**MATERIAL**
X2CrMoTiS18-2 / 1.4523 / ASTM 430F

**MACHINING**
- 50 holes
- d = 1.0 mm **| .039"**
- Drilling depth 15 mm **| .591"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Cool - 15 x d - coated

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Cool<br>- Carbide<br>- Coated<br>- Internal cooling |
| Item number | 2.CD.150100.CS |
| Cutting data | $v_c$ = 50 m/min **\| 164 SFM**<br>f = 0.03 mm/rev **\| .0012 IPR**<br>$Q_1$ = 0.5 mm **\| .020"**<br>$Q_x$ = 0.25 mm **\| .010"** |

| 6 x d | 10 x d | 15 x d |
|---|---|---|
| ■ Internal cooling<br>■ Coated / uncoated | ■ Internal cooling<br>■ Coated / uncoated | ■ Internal cooling<br>■ Coated / uncoated |
|  |  |  |
|  |  |  |
|  |  |  |
| Page 260 | Page 266 | Page 272 |

**1 | SHAFT**
The robust solid carbide shaft guarantees a high degree of concentric accuracy and reliability.

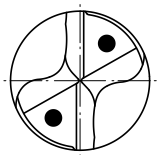
**2 | CARBIDE GRADE**
The use of latest generation carbide grades allows highest machining speed and feed.

**3 | COATING / SURFACE TREATMENT**

- **Version CA (uncoated):** Extremely smooth flutes to limit chip jamming risk. Edge preparation provides consistent tool life. Optimal for aluminum, brass and bronze.
- **Version CS (coated):** The additional high-performance eXedur RIP coating provides thermal and wear protection, guaranteeing a longer tool life. Optimal for steels, alloyed steels, cast iron.

**4 | THROUGH COOLANT AND POWER CHAMBER**
The through coolant holes supply adequate and continuous coolant to the tip for constant cooling, lubrication and chip removal. The power chamber reduces pressure loss and increases flowrate even when drilling smallest diameters (up to 3 times more).

**5 | CUTTING GEOMETRY**
The unique CrazyDrill S tip geometry together with the special designed flutes allows highest drilling performance, improves chip evacuation and limits the need for pecking (depending on work material).

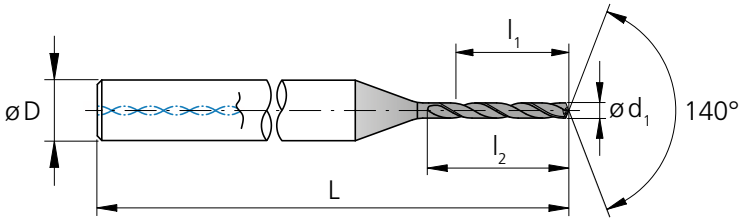
Drill tip 

CRAZYDRILL by Mikron Tool Cool

# CrazyDrill Cool 6 x d - coated / uncoated

## DRILLING WITH INTERNAL COOLING

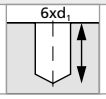
CS eXedur RIP | CA Uncoated




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0295** | 0.75 | **.1772** | 4.50 | 6.8 | 3 | **2.03** | 51.5 | 2.CD.060075 | .CS | .CA | ■ |
| **1/32** | **.0312** | 0.793 | **.1873** | 4.76 | 7.2 | 3 | **2.03** | 51.5 | 2.CD.060F132 | .CS | - | ◪ |
| | **.0315** | 0.80 | **.1890** | 4.80 | 7.2 | 3 | **2.03** | 51.5 | 2.CD.060080 | .CS | .CA | ■ |
| | **.0335** | 0.85 | **.2008** | 5.10 | 7.7 | 3 | **2.03** | 51.5 | 2.CD.060085 | .CS | .CA | ■ |
| | **.0354** | 0.90 | **.2126** | 5.40 | 8.1 | 3 | **2.03** | 51.5 | 2.CD.060090 | .CS | .CA | ■ |
| | **.0374** | 0.95 | **.2244** | 5.70 | 8.6 | 3 | **2.03** | 51.5 | 2.CD.060095 | .CS | .CA | ■ |
| | **.0394** | 1.00 | **.2362** | 6.00 | 9.0 | 4 | **2.17** | 55.0 | 2.CD.060100 | .CS | .CA | ■ |
| | **.0413** | 1.05 | **.2480** | 6.30 | 9.5 | 4 | **2.17** | 55.0 | 2.CD.060105 | .CS | .CA | ■ |
| | **.0433** | 1.10 | **.2598** | 6.60 | 9.9 | 4 | **2.17** | 55.0 | 2.CD.060110 | .CS | .CA | ■ |
| | **.0453** | 1.15 | **.2717** | 6.90 | 10.4 | 4 | **2.17** | 55.0 | 2.CD.060115 | .CS | .CA | ■ |
| | **.0472** | 1.20 | **.2835** | 7.20 | 10.8 | 4 | **2.17** | 55.0 | 2.CD.060120 | .CS | .CA | ■ |
| | **.0492** | 1.25 | **.2953** | 7.50 | 11.3 | 4 | **2.17** | 55.0 | 2.CD.060125 | .CS | .CA | ■ |
| | **.0512** | 1.30 | **.3071** | 7.80 | 11.7 | 4 | **2.24** | 57.0 | 2.CD.060130 | .CS | .CA | ■ |
| | **.0531** | 1.35 | **.3189** | 8.10 | 12.2 | 4 | **2.24** | 57.0 | 2.CD.060135 | .CS | .CA | ■ |
| | **.0551** | 1.40 | **.3307** | 8.40 | 12.6 | 4 | **2.24** | 57.0 | 2.CD.060140 | .CS | .CA | ■ |
| | **.0571** | 1.45 | **.3425** | 8.70 | 13.1 | 4 | **2.24** | 57.0 | 2.CD.060145 | .CS | .CA | ■ |
| | **.0591** | 1.50 | **.3543** | 9.00 | 13.5 | 4 | **2.24** | 57.0 | 2.CD.060150 | .CS | .CA | ■ |
| | **.0610** | 1.55 | **.3661** | 9.30 | 14.0 | 4 | **2.32** | 59.0 | 2.CD.060155 | .CS | .CA | ■ |
| **1/16** | **.0625** | 1.587 | **.3749** | 9.52 | 14.4 | 4 | **2.32** | 59.0 | 2.CD.060F116 | .CS | - | ◪ |
| | **.0630** | 1.60 | **.3780** | 9.60 | 14.4 | 4 | **2.32** | 59.0 | 2.CD.060160 | .CS | .CA | ■ |
| | **.0650** | 1.65 | **.3898** | 9.90 | 14.9 | 4 | **2.32** | 59.0 | 2.CD.060165 | .CS | .CA | ■ |
| | **.0669** | 1.70 | **.4016** | 10.20 | 15.3 | 4 | **2.32** | 59.0 | 2.CD.060170 | .CS | .CA | ■ |
| | **.0689** | 1.75 | **.4134** | 10.50 | 15.8 | 4 | **2.32** | 59.0 | 2.CD.060175 | .CS | .CA | ■ |
| | **.0709** | 1.80 | **.4252** | 10.80 | 16.2 | 4 | **2.40** | 61.0 | 2.CD.060180 | .CS | .CA | ■ |
| | **.0728** | 1.85 | **.4370** | 11.10 | 16.7 | 4 | **2.40** | 61.0 | 2.CD.060185 | .CS | .CA | ■ |
| | **.0748** | 1.90 | **.4488** | 11.40 | 17.1 | 4 | **2.40** | 61.0 | 2.CD.060190 | .CS | .CA | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0768** | 1.95 | **.4606** | 11.70 | 17.6 | 4 | **2.40** | 61.0 | 2.CD.060195 | .CS | .CA | ■ |
| | **.0787** | 2.00 | **.4724** | 12.00 | 18.0 | 4 | **2.48** | 63.0 | 2.CD.060200 | .CS | .CA | ■ |
| | **.0807** | 2.05 | **.4843** | 12.30 | 18.5 | 4 | **2.48** | 63.0 | 2.CD.060205 | .CS | .CA | ■ |
| | **.0827** | 2.10 | **.4961** | 12.60 | 18.9 | 4 | **2.48** | 63.0 | 2.CD.060210 | .CS | .CA | ■ |
| | **.0846** | 2.15 | **.5079** | 12.90 | 19.4 | 4 | **2.48** | 63.0 | 2.CD.060215 | .CS | .CA | ■ |
| | **.0866** | 2.20 | **.5197** | 13.20 | 19.8 | 4 | **2.48** | 63.0 | 2.CD.060220 | .CS | .CA | ■ |
| | **.0886** | 2.25 | **.5315** | 13.50 | 20.3 | 4 | **2.48** | 63.0 | 2.CD.060225 | .CS | .CA | ■ |
| | **.0906** | 2.30 | **.5433** | 13.80 | 20.7 | 4 | **2.56** | 65.0 | 2.CD.060230 | .CS | .CA | ■ |
| | **.0925** | 2.35 | **.5551** | 14.10 | 21.2 | 4 | **2.56** | 65.0 | 2.CD.060235 | .CS | .CA | ■ |
| **3/32** | **.0937** | 2.381 | **.5624** | 14.29 | 21.6 | 4 | **2.56** | 65.0 | 2.CD.060F332 | .CS | - | ◪ |
| | **.0945** | 2.40 | **.5669** | 14.40 | 21.6 | 4 | **2.56** | 65.0 | 2.CD.060240 | .CS | .CA | ■ |
| | **.0965** | 2.45 | **.5787** | 14.70 | 22.1 | 4 | **2.56** | 65.0 | 2.CD.060245 | .CS | .CA | ■ |
| | **.0984** | 2.50 | **.5906** | 15.00 | 22.5 | 4 | **2.56** | 65.0 | 2.CD.060250 | .CS | .CA | ■ |
| | **.1004** | 2.55 | **.6024** | 15.30 | 22.7 | 4 | **2.56** | 65.0 | 2.CD.060255 | .CS | .CA | ■ |
| | **.1024** | 2.60 | **.6142** | 15.60 | 23.4 | 4 | **2.62** | 66.5 | 2.CD.060260 | .CS | .CA | ■ |
| | **.1043** | 2.65 | **.6260** | 15.90 | 23.9 | 4 | **2.62** | 66.5 | 2.CD.060265 | .CS | .CA | ■ |
| | **.1063** | 2.70 | **.6378** | 16.20 | 24.3 | 4 | **2.62** | 66.5 | 2.CD.060270 | .CS | .CA | ■ |
| | **.1083** | 2.75 | **.6496** | 16.50 | 24.8 | 4 | **2.70** | 68.5 | 2.CD.060275 | .CS | .CA | ■ |
| | **.1102** | 2.80 | **.6614** | 16.80 | 25.2 | 4 | **2.70** | 68.5 | 2.CD.060280 | .CS | .CA | ■ |
| | **.1122** | 2.85 | **.6732** | 17.10 | 25.7 | 4 | **2.70** | 68.5 | 2.CD.060285 | .CS | .CA | ■ |
| | **.1142** | 2.90 | **.6850** | 17.40 | 26.1 | 4 | **2.70** | 68.5 | 2.CD.060290 | .CS | .CA | ■ |
| | **.1161** | 2.95 | **.6968** | 17.70 | 26.6 | 4 | **2.70** | 68.5 | 2.CD.060295 | .CS | .CA | ■ |
| | **.1181** | 3.00 | **.7087** | 18.00 | 27.0 | 6 | **2.87** | 73.0 | 2.CD.060300 | .CS | .CA | ■ |
| | **.1201** | 3.05 | **.7205** | 18.30 | 27.5 | 6 | **2.87** | 73.0 | 2.CD.060305 | .CS | .CA | ■ |
| | **.1220** | 3.10 | **.7323** | 18.60 | 27.9 | 6 | **2.87** | 73.0 | 2.CD.060310 | .CS | .CA | ■ |
| | **.1240** | 3.15 | **.7441** | 18.90 | 28.4 | 6 | **2.87** | 73.0 | 2.CD.060315 | .CS | .CA | ■ |

■ Stock item
◪ Stock item only in one version

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | |
|---|---|---|---|---|
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 | **+ .00024"**<br>**+ .00004"** | + 0.006 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1/8** | **.1250** | 3.175 | **.7500** | 19.05 | 28.8 | 6 | **2.87** | 73.0 | 2.CD.060F18 | .CS | - | ◪ |
| | **.1260** | 3.20 | **.7559** | 19.20 | 28.8 | 6 | **2.87** | 73.0 | 2.CD.060320 | .CS | .CA | ■ |
| | **.1280** | 3.25 | **.7677** | 19.50 | 29.3 | 6 | **2.87** | 73.0 | 2.CD.060325 | .CS | .CA | ■ |
| | **.1299** | 3.30 | **.7795** | 19.80 | 29.7 | 6 | **2.97** | 75.5 | 2.CD.060330 | .CS | .CA | ■ |
| | **.1319** | 3.35 | **.7913** | 20.10 | 30.2 | 6 | **2.97** | 75.5 | 2.CD.060335 | .CS | .CA | ■ |
| | **.1339** | 3.40 | **.8031** | 20.40 | 30.6 | 6 | **2.97** | 75.5 | 2.CD.060340 | .CS | .CA | ■ |
| | **.1358** | 3.45 | **.8150** | 20.70 | 31.1 | 6 | **2.97** | 75.5 | 2.CD.060345 | .CS | .CA | ■ |
| | **.1378** | 3.50 | **.8268** | 21.00 | 31.5 | 6 | **2.97** | 75.5 | 2.CD.060350 | .CS | .CA | ■ |
| | **.1398** | 3.55 | **.8386** | 21.30 | 32.0 | 6 | **2.97** | 75.5 | 2.CD.060355 | .CS | .CA | ■ |
| | **.1417** | 3.60 | **.8504** | 21.60 | 32.4 | 6 | **3.05** | 77.5 | 2.CD.060360 | .CS | .CA | ■ |
| | **.1437** | 3.65 | **.8622** | 21.90 | 32.9 | 6 | **3.05** | 77.5 | 2.CD.060365 | .CS | .CA | ■ |
| | **.1457** | 3.70 | **.8740** | 22.20 | 33.3 | 6 | **3.05** | 77.5 | 2.CD.060370 | .CS | .CA | ■ |
| | **.1476** | 3.75 | **.8858** | 22.50 | 33.8 | 6 | **3.05** | 77.5 | 2.CD.060375 | .CS | .CA | ■ |
| | **.1496** | 3.80 | **.8976** | 22.80 | 34.2 | 6 | **3.05** | 77.5 | 2.CD.060380 | .CS | .CA | ■ |
| | **.1516** | 3.85 | **.9094** | 23.10 | 34.7 | 6 | **3.11** | 79.0 | 2.CD.060385 | .CS | .CA | ■ |
| | **.1535** | 3.90 | **.9213** | 23.40 | 35.1 | 6 | **3.11** | 79.0 | 2.CD.060390 | .CS | .CA | ■ |
| | **.1555** | 3.95 | **.9331** | 23.70 | 35.6 | 6 | **3.11** | 79.0 | 2.CD.060395 | .CS | .CA | ■ |
| **5/32** | **.1562** | 3.968 | **.9373** | 23.81 | 36.0 | 6 | **3.11** | 79.0 | 2.CD.060F532 | .CS | - | ◪ |
| | **.1575** | 4.00 | **.9449** | 24.00 | 36.0 | 6 | **3.11** | 79.0 | 2.CD.060400 | .CS | .CA | ■ |
| | **.1614** | 4.10 | **.9685** | 24.60 | 35.3 | 6 | **3.17** | 80.5 | 2.CD.060410 | .CS | .CA | ■ |
| | **.1654** | 4.20 | **.9921** | 25.20 | 36.1 | 6 | **3.17** | 80.5 | 2.CD.060420 | .CS | .CA | ■ |
| | **.1693** | 4.30 | **1.016** | 25.80 | 36.1 | 6 | **3.17** | 80.5 | 2.CD.060430 | .CS | .CA | ■ |
| | **.1732** | 4.40 | **1.039** | 26.40 | 37.0 | 6 | **3.17** | 80.5 | 2.CD.060440 | .CS | .CA | ■ |
| | **.1772** | 4.50 | **1.063** | 27.00 | 37.8 | 6 | **3.17** | 80.5 | 2.CD.060450 | .CS | .CA | ■ |
| | **.1811** | 4.60 | **1.087** | 27.60 | 38.6 | 6 | **3.17** | 80.5 | 2.CD.060460 | .CS | .CA | ■ |
| | **.1850** | 4.70 | **1.110** | 28.20 | 39.5 | 6 | **3.33** | 84.5 | 2.CD.060470 | .CS | .CA | ■ |

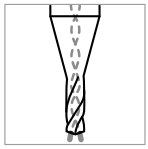
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3/16** | **.1875** | 4.762 | **1.125** | 28.57 | 40.3 | 6 | **3.33** | 84.5 | 2.CD.060F316 | .CS | - | ◪ |
| | **.1890** | 4.80 | **1.134** | 28.80 | 40.3 | 6 | **3.33** | 84.5 | 2.CD.060480 | .CS | .CA | ■ |
| | **.1929** | 4.90 | **1.157** | 29.40 | 41.2 | 6 | **3.33** | 84.5 | 2.CD.060490 | .CS | .CA | ■ |
| | **.1969** | 5.00 | **1.181** | 30.00 | 42.0 | 6 | **3.33** | 84.5 | 2.CD.060500 | .CS | .CA | ■ |
| | **.2008** | 5.10 | **1.205** | 30.60 | 40.8 | 6 | **3.33** | 84.5 | 2.CD.060510 | .CS | .CA | ■ |
| | **.2047** | 5.20 | **1.228** | 31.20 | 41.6 | 6 | **3.33** | 84.5 | 2.CD.060520 | .CS | .CA | ■ |
| | **.2087** | 5.30 | **1.252** | 31.80 | 42.4 | 6 | **3.33** | 84.5 | 2.CD.060530 | .CS | .CA | ■ |
| | **.2126** | 5.40 | **1.276** | 32.40 | 45.4 | 6 | **3.46** | 88.0 | 2.CD.060540 | .CS | .CA | ■ |
| | **.2165** | 5.50 | **1.299** | 33.00 | 46.2 | 6 | **3.46** | 88.0 | 2.CD.060550 | .CS | .CA | ■ |
| **7/32** | **.2189** | 5.560 | **1.313** | 33.36 | 47.0 | 6 | **3.46** | 88.0 | 2.CD.060F732 | .CS | - | ◪ |
| | **.2205** | 5.60 | **1.323** | 33.60 | 47.0 | 6 | **3.46** | 88.0 | 2.CD.060560 | .CS | .CA | ■ |
| | **.2244** | 5.70 | **1.346** | 34.20 | 45.6 | 6 | **3.46** | 88.0 | 2.CD.060570 | .CS | .CA | ■ |
| | **.2283** | 5.80 | **1.370** | 34.80 | 46.4 | 6 | **3.46** | 88.0 | 2.CD.060580 | .CS | .CA | ■ |
| | **.2323** | 5.90 | **1.394** | 35.40 | 47.2 | 6 | **3.46** | 88.0 | 2.CD.060590 | .CS | .CA | ■ |
| | **.2362** | 6.00 | **1.417** | 36.00 | 48.0 | 6 | **3.46** | 88.0 | 2.CD.060600 | .CS | .CA | ■ |

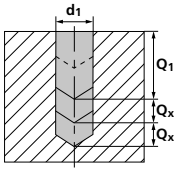
| Complementary products | |
|---|---|
| CrazyDrill Pilot | p.134 |
| CrazyDrill Crosspilot | p.146 |
| CrazyDrill Coolpilot | p.156 |
| CrazyDrill Pilot SST-Inox | p.122 |

CRAZYDRILL by Mikron Tool Cool

# CrazyDrill Cool 6 x d - coated

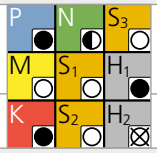
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| **197** | 140 \| **459** | 6xd1 | – |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| **197** | 120 \| **394** | 6xd1 | – |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 40 \| **131** | 80 \| **262** | 6xd1 | – |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 25 \| **82** | 50 \| **164** | 0.5xd1 | 0.25xd1 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 20 \| **131** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 20 \| **131** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| **197** | 140 \| **459** | 6xd1 | – |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| **328** | 300 \| **984** | 6xd1 | – |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 \| **328** | 200 \| **656** | 6xd1 | – |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 100 \| **328** | 200 \| **656** | 1.5xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 \| **328** | 140 \| **459** | 1xd1 | 0.5xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 80 \| **262** | 120 \| **394** | 2xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 80 \| **262** | 150 \| **492** | 6xd1 | – |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 15 \| **49** | 20 \| **66** | 0.5xd1 | 0.25xd1 |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 15 \| **49** | 20 \| **66** | 0.5xd1 | 0.25xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



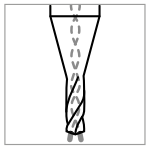

**f** [mm/rev] **| [IPR]**

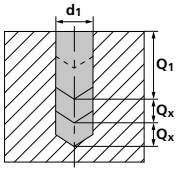
| Ød1 | 1/32" 0.8 mm \| .032" f | 1.0 mm \| .039" f | 1.25 mm \| .049" f | 1/16" 1.5 mm \| .059" f | 2.0 mm \| .079" f | 3/32" 2.5 mm \| .098" f | 1/8" 3.0 mm \| .118" f | 5/32" 4.0 mm \| .158" f | 3/16" - 7/32" 5.0 mm \| .197" f | 6.0 mm \| .236" f |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.240 \| .0094 |
| | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.150 \| .0059 | 0.170 \| .0067 | 0.180 \| .0071 |
| | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.100 \| .0039 | 0.120 \| .0047 | 0.150 \| .0059 | 0.170 \| .0067 |
| | 0.011 \| .0004 | 0.030 \| .0012 | 0.045 \| .0018 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.120 \| .0047 | 0.130 \| .0051 | 0.140 \| .0055 |
| | 0.020 \| .0008 | 0.050 \| .0020 | 0.065 \| .0026 | 0.080 \| .0031 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.180 \| .0071 | 0.200 \| .0079 | 0.220 \| .0087 |
| | 0.010 \| .0004 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.130 \| .0051 |
| | 0.010 \| .0004 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.130 \| .0051 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | 0.075 \| .0030 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.170 \| .0067 | 0.190 \| .0075 | 0.210 \| .0083 | 0.240 \| .0094 | 0.260 \| .0102 | 0.280 \| .0110 |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.240 \| .0094 |
| | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.100 \| .0039 | 0.130 \| .0051 | 0.150 \| .0059 | 0.170 \| .0067 | 0.210 \| .0083 | 0.250 \| .0098 | 0.300 \| .0118 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.140 \| .0055 | 0.170 \| .0067 | 0.200 \| .0079 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.140 \| .0055 | 0.170 \| .0067 | 0.200 \| .0079 |
| | 0.080 \| .0031 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.170 \| .0067 | 0.190 \| .0075 | 0.200 \| .0079 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.200 \| .0079 |
| | 0.009 \| .0004 | 0.012 \| .0005 | 0.014 \| .0006 | 0.017 \| .0007 | 0.020 \| .0008 | 0.022 \| .0009 | 0.024 \| .0009 | 0.034 \| .0013 | 0.039 \| .0015 | 0.044 \| .0017 |
| | 0.020 \| .0008 | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 |
| | 0.020 \| .0008 | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 |
| | 0.009 \| .0004 | 0.012 \| .0005 | 0.014 \| .0006 | 0.019 \| .0007 | 0.024 \| .0009 | 0.029 \| .0011 | 0.034 \| .0013 | 0.039 \| .0015 | 0.044 \| .0017 | 0.054 \| .0021 |
| | 0.008 \| .0003 | 0.010 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | | | | | | | | | | |

CRAZYDRILL by Mikron Tool Cool

# CrazyDrill Cool 6 x d - uncoated

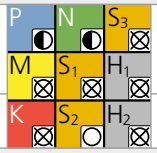
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 40 \| **131** | 60 \| **197** | 6xd1 | – |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 40 \| **131** | 60 \| **197** | 6xd1 | – |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 20 \| **66** | 40 \| **131** | 6xd1 | – |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| **328** | 300 \| **984** | 6xd1 | – |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 \| **328** | 200 \| **656** | 6xd1 | – |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 100 \| **328** | 200 \| **656** | 1.5xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 \| **328** | 140 \| **459** | 1xd1 | 0.5xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 80 \| **262** | 120 \| **394** | 2xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 80 \| **262** | 150 \| **492** | 6xd1 | – |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




**f** [mm/rev] **| [IPR]**

| **Ød1** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.8 mm **\| .032"** | 1.0 mm **\| .039"** | 1.25 mm **\| .049"** | 1.5 mm **\| .059"** | 2.0 mm **\| .079"** | 2.5 mm **\| .098"** | 3.0 mm **\| .118"** | 4.0 mm **\| .158"** | 35.0 mm **\| .197"** | 6.0 mm **\| .236"** |
| **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.080 **\| .0031** | 0.100 **\| .0039** | 0.120 **\| .0047** | 0.140 **\| .0055** | 0.180 **\| .0071** | 0.210 **\| .0083** | 0.240 **\| .0094** |
| 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.110 **\| .0043** | 0.120 **\| .0047** | 0.150 **\| .0059** | 0.170 **\| .0067** | 0.180 **\| .0071** |
| 0.030 **\| .0012** | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.120 **\| .0047** | 0.150 **\| .0059** | 0.170 **\| .0067** |
| Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.080 **\| .0031** | 0.100 **\| .0039** | 0.120 **\| .0047** | 0.140 **\| .0055** | 0.180 **\| .0071** | 0.210 **\| .0083** | 0.240 **\| .0094** |
| 0.060 **\| .0024** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.130 **\| .0051** | 0.150 **\| .0059** | 0.170 **\| .0067** | 0.210 **\| .0083** | 0.250 **\| .0098** | 0.300 **\| .0118** |
| 0.055 **\| .0022** | 0.065 **\| .0026** | 0.080 **\| .0031** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.140 **\| .0055** | 0.170 **\| .0067** | 0.200 **\| .0079** |
| 0.055 **\| .0022** | 0.065 **\| .0026** | 0.080 **\| .0031** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.140 **\| .0055** | 0.170 **\| .0067** | 0.200 **\| .0079** |
| 0.080 **\| .0031** | 0.100 **\| .0039** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.150 **\| .0059** | 0.170 **\| .0067** | 0.190 **\| .0075** | 0.200 **\| .0079** | 0.210 **\| .0083** | 0.230 **\| .0091** |
| 0.020 **\| .0008** | 0.030 **\| .0012** | 0.040 **\| .0016** | 0.055 **\| .0022** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.150 **\| .0059** | 0.200 **\| .0079** |
| Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| 0.020 **\| .0008** | 0.020 **\| .0008** | 0.030 **\| .0012** | 0.035 **\| .0014** | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.065 **\| .0028** | 0.070 **\| .0028** | 0.075 **\| .0030** |
| 0.020 **\| .0008** | 0.020 **\| .0008** | 0.030 **\| .0012** | 0.035 **\| .0014** | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.065 **\| .0028** | 0.070 **\| .0028** | 0.075 **\| .0030** |
| Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| Recommended: CrazyDrill Cool - coated | | | | | | | | | |

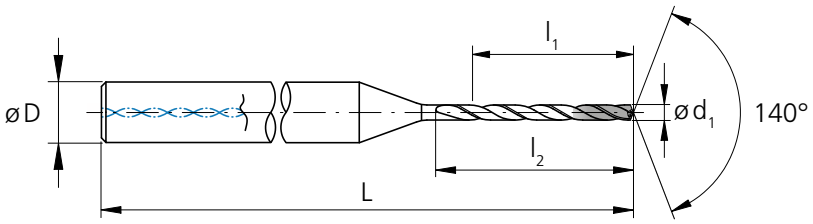
CRAZYDRILL by Mikron Tool Cool

# CrazyDrill Cool 10 x d - coated / uncoated

## DRILLING WITH INTERNAL COOLING

CS eXedur RIP

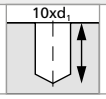
CA Uncoated




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0295** | 0.75 | **.2953** | 7.50 | 9.8 | 3 | **2.13** | 54.0 | 2.CD.100075 | .CS | .CA | ■ |
| **1/32** | **.0312** | 0.793 | **.3122** | 7.93 | 10.4 | 3 | **2.13** | 54.0 | 2.CD.100F132 | .CS | - | ◪ |
| | **.0315** | 0.80 | **.3150** | 8.00 | 10.4 | 3 | **2.13** | 54.0 | 2.CD.100080 | .CS | .CA | ■ |
| | **.0335** | 0.85 | **.3346** | 8.50 | 11.1 | 3 | **2.20** | 56.0 | 2.CD.100085 | .CS | .CA | ■ |
| | **.0354** | 0.90 | **.3543** | 9.00 | 11.7 | 3 | **2.20** | 56.0 | 2.CD.100090 | .CS | .CA | ■ |
| | **.0374** | 0.95 | **.3740** | 9.50 | 12.4 | 3 | **2.20** | 56.0 | 2.CD.100095 | .CS | .CA | ■ |
| | **.0394** | 1.00 | **.3937** | 10.00 | 13.0 | 4 | **2.32** | 59.0 | 2.CD.100100 | .CS | .CA | ■ |
| | **.0413** | 1.05 | **.4134** | 10.50 | 13.7 | 4 | **2.32** | 59.0 | 2.CD.100105 | .CS | .CA | ■ |
| | **.0433** | 1.10 | **.4331** | 11.00 | 14.3 | 4 | **2.32** | 59.0 | 2.CD.100110 | .CS | .CA | ■ |
| | **.0453** | 1.15 | **.4528** | 11.50 | 15.0 | 4 | **2.32** | 59.0 | 2.CD.100115 | .CS | .CA | ■ |
| | **.0472** | 1.20 | **.4724** | 12.00 | 15.6 | 4 | **2.42** | 61.5 | 2.CD.100120 | .CS | .CA | ■ |
| | **.0492** | 1.25 | **.4921** | 12.50 | 16.3 | 4 | **2.42** | 61.5 | 2.CD.100125 | .CS | .CA | ■ |
| | **.0512** | 1.30 | **.5118** | 13.00 | 16.9 | 4 | **2.42** | 61.5 | 2.CD.100130 | .CS | .CA | ■ |
| | **.0531** | 1.35 | **.5315** | 13.50 | 17.6 | 4 | **2.42** | 61.5 | 2.CD.100135 | .CS | .CA | ■ |
| | **.0551** | 1.40 | **.5512** | 14.00 | 18.0 | 4 | **2.42** | 61.5 | 2.CD.100140 | .CS | .CA | ■ |
| | **.0571** | 1.45 | **.5709** | 14.50 | 18.9 | 4 | **2.50** | 63.5 | 2.CD.100145 | .CS | .CA | ■ |
| | **.0591** | 1.50 | **.5906** | 15.00 | 19.5 | 4 | **2.50** | 63.5 | 2.CD.100150 | .CS | .CA | ■ |
| | **.0610** | 1.55 | **.6102** | 15.50 | 20.2 | 4 | **2.50** | 63.5 | 2.CD.100155 | .CS | .CA | ■ |
| **1/16** | **.0625** | 1.587 | **.6248** | 15.87 | 20.8 | 4 | **2.60** | 66.0 | 2.CD.100F116 | .CS | - | ◪ |
| | **.0630** | 1.60 | **.6299** | 16.00 | 20.8 | 4 | **2.60** | 66.0 | 2.CD.100160 | .CS | .CA | ■ |
| | **.0650** | 1.65 | **.6496** | 16.50 | 21.5 | 4 | **2.60** | 66.0 | 2.CD.100165 | .CS | .CA | ■ |
| | **.0669** | 1.70 | **.6693** | 17.00 | 22.1 | 4 | **2.60** | 66.0 | 2.CD.100170 | .CS | .CA | ■ |
| | **.0689** | 1.75 | **.6890** | 17.50 | 22.8 | 4 | **2.60** | 66.0 | 2.CD.100175 | .CS | .CA | ■ |
| | **.0709** | 1.80 | **.7087** | 18.00 | 23.4 | 4 | **2.68** | 68.0 | 2.CD.100180 | .CS | .CA | ■ |
| | **.0728** | 1.85 | **.7283** | 18.50 | 24.1 | 4 | **2.68** | 68.0 | 2.CD.100185 | .CS | .CA | ■ |
| | **.0748** | 1.90 | **.7480** | 19.00 | 24.7 | 4 | **2.68** | 68.0 | 2.CD.100190 | .CS | .CA | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0768** | 1.95 | **.7677** | 19.50 | 25.0 | 4 | **2.68** | 68.0 | 2.CD.100195 | .CS | .CA | ■ |
| | **.0787** | 2.00 | **.7874** | 20.00 | 26.0 | 4 | **2.76** | 70.0 | 2.CD.100200 | .CS | .CA | ■ |
| | **.0807** | 2.05 | **.8071** | 20.50 | 26.7 | 4 | **2.76** | 70.0 | 2.CD.100205 | .CS | .CA | ■ |
| | **.0827** | 2.10 | **.8268** | 21.00 | 27.3 | 4 | **2.76** | 70.0 | 2.CD.100210 | .CS | .CA | ■ |
| | **.0846** | 2.15 | **.8465** | 21.50 | 28.0 | 4 | **2.83** | 72.0 | 2.CD.100215 | .CS | .CA | ■ |
| | **.0866** | 2.20 | **.8661** | 22.00 | 28.6 | 4 | **2.83** | 72.0 | 2.CD.100220 | .CS | .CA | ■ |
| | **.0886** | 2.25 | **.8858** | 22.50 | 29.3 | 4 | **2.83** | 72.0 | 2.CD.100225 | .CS | .CA | ■ |
| | **.0906** | 2.30 | **.9055** | 23.00 | 29.9 | 4 | **2.91** | 74.0 | 2.CD.100230 | .CS | .CA | ■ |
| | **.0925** | 2.35 | **.9252** | 23.50 | 30.6 | 4 | **2.91** | 74.0 | 2.CD.100235 | .CS | .CA | ■ |
| **3/32** | **.0937** | 2.381 | **.9374** | 23.81 | 31.2 | 4 | **2.91** | 74.0 | 2.CD.100F332 | .CS | - | ◪ |
| | **.0945** | 2.40 | **.9449** | 24.00 | 31.2 | 4 | **2.91** | 74.0 | 2.CD.100240 | .CS | .CA | ■ |
| | **.0965** | 2.45 | **.9646** | 24.50 | 31.9 | 4 | **2.97** | 75.5 | 2.CD.100245 | .CS | .CA | ■ |
| | **.0984** | 2.50 | **.9843** | 25.00 | 32.5 | 4 | **2.97** | 75.5 | 2.CD.100250 | .CS | .CA | ■ |
| | **.1004** | 2.55 | **1.004** | 25.50 | 33.2 | 4 | **2.97** | 75.5 | 2.CD.100255 | .CS | .CA | ■ |
| | **.1024** | 2.60 | **1.024** | 26.00 | 33.8 | 4 | **3.05** | 77.5 | 2.CD.100260 | .CS | .CA | ■ |
| | **.1043** | 2.65 | **1.043** | 26.50 | 34.5 | 4 | **3.05** | 77.5 | 2.CD.100265 | .CS | .CA | ■ |
| | **.1063** | 2.70 | **1.063** | 27.00 | 35.1 | 4 | **3.05** | 77.5 | 2.CD.100270 | .CS | .CA | ■ |
| | **.1083** | 2.75 | **1.083** | 27.50 | 35.8 | 4 | **3.11** | 79.0 | 2.CD.100275 | .CS | .CA | ■ |
| | **.1102** | 2.80 | **1.102** | 28.00 | 36.4 | 4 | **3.11** | 79.0 | 2.CD.100280 | .CS | .CA | ■ |
| | **.1122** | 2.85 | **1.122** | 28.50 | 37.1 | 4 | **3.11** | 79.0 | 2.CD.100285 | .CS | .CA | ■ |
| | **.1142** | 2.90 | **1.142** | 29.00 | 37.7 | 4 | **3.17** | 80.5 | 2.CD.100290 | .CS | .CA | ■ |
| | **.1161** | 2.95 | **1.161** | 29.50 | 38.4 | 4 | **3.17** | 80.5 | 2.CD.100295 | .CS | .CA | ■ |
| | **.1181** | 3.00 | **1.181** | 30.00 | 39.0 | 6 | **3.35** | 85.0 | 2.CD.100300 | .CS | .CA | ■ |
| | **.1201** | 3.05 | **1.201** | 30.50 | 39.7 | 6 | **3.35** | 85.0 | 2.CD.100305 | .CS | .CA | ■ |
| | **.1220** | 3.10 | **1.220** | 31.00 | 40.3 | 6 | **3.35** | 85.0 | 2.CD.100310 | .CS | .CA | ■ |
| | **.1240** | 3.15 | **1.240** | 31.50 | 41.0 | 6 | **3.41** | 86.5 | 2.CD.100315 | .CS | .CA | ■ |

■ Stock item
◪ Stock item only in one version

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | |
|---|---|---|---|---|
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 | **+ .00024"**<br>**+ .00004"** | + 0.006 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1/8** | **.1250** | 3.175 | **1.250** | 31.75 | 41.6 | 6 | **3.41** | 86.5 | 2.CD.100F18 | .CS | - | ◪ |
| | **.1260** | 3.20 | **1.260** | 32.00 | 41.6 | 6 | **3.41** | 86.5 | 2.CD.100320 | .CS | .CA | ■ |
| | **.1280** | 3.25 | **1.280** | 32.50 | 42.3 | 6 | **3.41** | 86.5 | 2.CD.100325 | .CS | .CA | ■ |
| | **.1299** | 3.30 | **1.299** | 33.00 | 42.9 | 6 | **3.41** | 86.5 | 2.CD.100330 | .CS | .CA | ■ |
| | **.1319** | 3.35 | **1.319** | 33.50 | 43.6 | 6 | **3.50** | 89.0 | 2.CD.100335 | .CS | .CA | ■ |
| | **.1339** | 3.40 | **1.339** | 34.00 | 44.2 | 6 | **3.50** | 89.0 | 2.CD.100340 | .CS | .CA | ■ |
| | **.1358** | 3.45 | **1.358** | 34.50 | 44.9 | 6 | **3.50** | 89.0 | 2.CD.100345 | .CS | .CA | ■ |
| | **.1378** | 3.50 | **1.378** | 35.00 | 45.5 | 6 | **3.58** | 91.0 | 2.CD.100350 | .CS | .CA | ■ |
| | **.1398** | 3.55 | **1.398** | 35.50 | 46.2 | 6 | **3.58** | 91.0 | 2.CD.100355 | .CS | .CA | ■ |
| | **.1417** | 3.60 | **1.417** | 36.00 | 46.8 | 6 | **3.58** | 91.0 | 2.CD.100360 | .CS | .CA | ■ |
| | **.1437** | 3.65 | **1.437** | 36.50 | 47.5 | 6 | **3.58** | 91.0 | 2.CD.100365 | .CS | .CA | ■ |
| | **.1457** | 3.70 | **1.457** | 37.00 | 48.1 | 6 | **3.66** | 93.0 | 2.CD.100370 | .CS | .CA | ■ |
| | **.1476** | 3.75 | **1.476** | 37.50 | 48.8 | 6 | **3.66** | 93.0 | 2.CD.100375 | .CS | .CA | ■ |
| | **.1496** | 3.80 | **1.496** | 38.00 | 49.4 | 6 | **3.66** | 93.0 | 2.CD.100380 | .CS | .CA | ■ |
| | **.1516** | 3.85 | **1.516** | 38.50 | 50.1 | 6 | **3.74** | 95.0 | 2.CD.100385 | .CS | .CA | ■ |
| | **.1535** | 3.90 | **1.535** | 39.00 | 50.7 | 6 | **3.74** | 95.0 | 2.CD.100390 | .CS | .CA | ■ |
| | **.1555** | 3.95 | **1.555** | 39.50 | 51.4 | 6 | **3.74** | 95.0 | 2.CD.100395 | .CS | .CA | ■ |
| **5/32** | **.1562** | 3.968 | **1.562** | 39.68 | 52.0 | 6 | **3.74** | 95.0 | 2.CD.100F532 | .CS | - | ◪ |
| | **.1575** | 4.00 | **1.575** | 40.00 | 52.0 | 6 | **3.74** | 95.0 | 2.CD.100400 | .CS | .CA | ■ |
| | **.1614** | 4.10 | **1.614** | 41.00 | 53.3 | 6 | **3.88** | 98.5 | 2.CD.100410 | .CS | .CA | ■ |
| | **.1654** | 4.20 | **1.654** | 42.00 | 54.6 | 6 | **3.88** | 98.5 | 2.CD.100420 | .CS | .CA | ■ |
| | **.1693** | 4.30 | **1.693** | 43.00 | 54.2 | 6 | **3.88** | 98.5 | 2.CD.100430 | .CS | .CA | ■ |
| | **.1732** | 4.40 | **1.732** | 44.00 | 55.4 | 6 | **3.88** | 98.5 | 2.CD.100440 | .CS | .CA | ■ |
| | **.1772** | 4.50 | **1.772** | 45.00 | 54.9 | 6 | **3.88** | 98.5 | 2.CD.100450 | .CS | .CA | ■ |
| | **.1811** | 4.60 | **1.811** | 46.00 | 56.1 | 6 | **3.88** | 98.5 | 2.CD.100460 | .CS | .CA | ■ |
| | **.1850** | 4.70 | **1.850** | 47.00 | 61.1 | 6 | **4.17** | 106.0 | 2.CD.100470 | .CS | .CA | ■ |

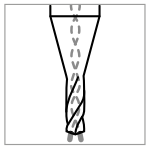
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3/16** | **.1875** | 4.762 | **1.875** | 47.62 | 62.4 | 6 | **4.17** | 106.0 | 2.CD.100F316 | .CS | - | ◪ |
| | **.1890** | 4.80 | **1.890** | 48.00 | 62.4 | 6 | **4.17** | 106.0 | 2.CD.100480 | .CS | .CA | ■ |
| | **.1929** | 4.90 | **1.929** | 49.00 | 61.7 | 6 | **4.17** | 106.0 | 2.CD.100490 | .CS | .CA | ■ |
| | **.1969** | 5.00 | **1.969** | 50.00 | 63.0 | 6 | **4.17** | 106.0 | 2.CD.100500 | .CS | .CA | ■ |
| | **.2008** | 5.10 | **2.008** | 51.00 | 64.3 | 6 | **4.17** | 106.0 | 2.CD.100510 | .CS | .CA | ■ |
| | **.2047** | 5.20 | **2.047** | 52.00 | 62.4 | 6 | **4.17** | 106.0 | 2.CD.100520 | .CS | .CA | ■ |
| | **.2087** | 5.30 | **2.087** | 53.00 | 63.6 | 6 | **4.17** | 106.0 | 2.CD.100530 | .CS | .CA | ■ |
| | **.2126** | 5.40 | **2.126** | 54.00 | 70.2 | 6 | **4.47** | 113.5 | 2.CD.100540 | .CS | .CA | ■ |
| | **.2165** | 5.50 | **2.165** | 55.00 | 71.5 | 6 | **4.47** | 113.5 | 2.CD.100550 | .CS | .CA | ■ |
| **7/32** | **.2189** | 5.560 | **2.189** | 55.60 | 72.8 | 6 | **4.47** | 113.5 | 2.CD.100F732 | .CS | - | ◪ |
| | **.2205** | 5.60 | **2.205** | 56.00 | 72.8 | 6 | **4.47** | 113.5 | 2.CD.100560 | .CS | .CA | ■ |
| | **.2244** | 5.70 | **2.244** | 57.00 | 71.8 | 6 | **4.47** | 113.5 | 2.CD.100570 | .CS | .CA | ■ |
| | **.2283** | 5.80 | **2.283** | 58.00 | 73.1 | 6 | **4.47** | 113.5 | 2.CD.100580 | .CS | .CA | ■ |
| | **.2323** | 5.90 | **2.323** | 59.00 | 72.0 | 6 | **4.47** | 113.5 | 2.CD.100590 | .CS | .CA | ■ |
| | **.2362** | 6.00 | **2.362** | 60.00 | 73.2 | 6 | **4.47** | 113.5 | 2.CD.100600 | .CS | .CA | ■ |

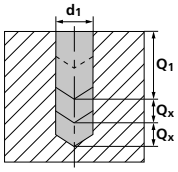
| Complementary products | |
|---|---|
| CrazyDrill Pilot | p.134 |
| CrazyDrill Crosspilot | p.146 |
| CrazyDrill Coolpilot | p.156 |
| CrazyDrill Pilot SST-Inox | p.122 |

CRAZYDRILL by Mikron Tool Cool

# CrazyDrill Cool 10 x d - coated

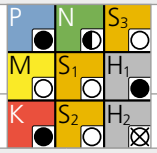
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| **197** | 140 \| **459** | 6xd1 | 2xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| **197** | 120 \| **394** | 6xd1 | 2xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 40 \| **131** | 80 \| **262** | 6xd1 | 2xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 25 \| **82** | 50 \| **164** | 0.5xd1 | 0.25xd1 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 20 \| **131** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 20 \| **131** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| **197** | 140 \| **459** | 10xd1 | – |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| **328** | 300 \| **984** | 10xd1 | – |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 \| **328** | 200 \| **656** | 10xd1 | – |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 100 \| **328** | 200 \| **656** | 1.5xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 \| **328** | 140 \| **459** | 1xd1 | 0.5xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 80 \| **262** | 120 \| **394** | 2xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 80 \| **262** | 150 \| **492** | 10xd1 | – |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 15 \| **49** | 20 \| **66** | 0.5xd1 | 0.25xd1 |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 15 \| **49** | 20 \| **66** | 0.5xd1 | 0.25xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



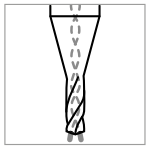

**f** [mm/rev] **| [IPR]**

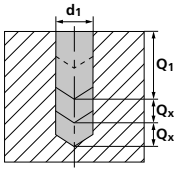
| Ød1 | 1/32" 0.8 mm \| .032" f | 1.0 mm \| .039" f | 1.25 mm \| .049" f | 1/16" 1.5 mm \| .059" f | 2.0 mm \| .079" f | 3/32" 2.5 mm \| .098" f | 1/8" 3.0 mm \| .118" f | 5/32" 4.0 mm \| .158" f | 3/16" - 7/32" 5.0 mm \| .197" f | 6.0 mm \| .236" f |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.240 \| .0094 |
| | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.150 \| .0059 | 0.170 \| .0067 | 0.180 \| .0071 |
| | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.100 \| .0039 | 0.120 \| .0047 | 0.150 \| .0059 | 0.170 \| .0067 |
| | 0.011 \| .0004 | 0.030 \| .0012 | 0.045 \| .0018 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.120 \| .0047 | 0.130 \| .0051 | 0.140 \| .0055 |
| | 0.020 \| .0008 | 0.050 \| .0020 | 0.065 \| .0026 | 0.080 \| .0031 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.180 \| .0071 | 0.200 \| .0079 | 0.220 \| .0087 |
| | 0.010 \| .0004 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.130 \| .0051 |
| | 0.010 \| .0004 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.130 \| .0051 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | 0.075 \| .0030 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.170 \| .0067 | 0.190 \| .0075 | 0.210 \| .0083 | 0.240 \| .0094 | 0.260 \| .0102 | 0.280 \| .0110 |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.240 \| .0094 |
| | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.100 \| .0039 | 0.130 \| .0051 | 0.150 \| .0059 | 0.170 \| .0067 | 0.210 \| .0083 | 0.250 \| .0098 | 0.300 \| .0118 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.140 \| .0055 | 0.170 \| .0067 | 0.200 \| .0079 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.140 \| .0055 | 0.170 \| .0067 | 0.200 \| .0079 |
| | 0.080 \| .0031 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.170 \| .0067 | 0.190 \| .0075 | 0.200 \| .0079 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.200 \| .0079 |
| | 0.007 \| .0003 | 0.010 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.018 \| .0007 | 0.022 \| .0009 | 0.020 \| .0008 | 0.022 \| .0009 | 0.032 \| .0013 | 0.042 \| .0017 |
| | 0.020 \| .0008 | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 |
| | 0.020 \| .0008 | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 |
| | 0.007 \| .0003 | 0.010 \| .0004 | 0.012 \| .0005 | 0.017 \| .0007 | 0.022 \| .0009 | 0.027 \| .0011 | 0.032 \| .0013 | 0.037 \| .0015 | 0.042 \| .0017 | 0.052 \| .0020 |
| | 0.008 \| .0003 | 0.010 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | | | | | | | | | | |

CRAZYDRILL by Mikron Tool Cool

# CrazyDrill Cool 10 x d - uncoated

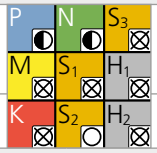
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 40 \| **131** | 60 \| **197** | 6xd1 | 2xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 40 \| **131** | 60 \| **197** | 6xd1 | 2xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 20 \| **66** | 40 \| **131** | 6xd1 | 2xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| **328** | 300 \| **984** | 10xd1 | – |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 \| **328** | 200 \| **656** | 10xd1 | – |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 100 \| **328** | 200 \| **656** | 1.5xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 \| **328** | 140 \| **459** | 1xd1 | 0.5xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 80 \| **262** | 120 \| **394** | 2xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 80 \| **262** | 150 \| **492** | 10xd1 | – |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




**f** [mm/rev] **| [IPR]**

| | **Ød1** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.8 mm **\| .032"** | 1.0 mm **\| .039"** | 1.25 mm **\| .049"** | 1.5 mm **\| .059"** | 2.0 mm **\| .079"** | 2.5 mm **\| .098"** | 3.0 mm **\| .118"** | 4.0 mm **\| .158"** | **3**5.0 mm **\| .197"** | 6.0 mm **\| .236"** |
| | **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.080 **\| .0031** | 0.100 **\| .0039** | 0.120 **\| .0047** | 0.140 **\| .0055** | 0.180 **\| .0071** | 0.210 **\| .0083** | 0.240 **\| .0094** |
| | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.110 **\| .0043** | 0.120 **\| .0047** | 0.150 **\| .0059** | 0.170 **\| .0067** | 0.180 **\| .0071** |
| | 0.030 **\| .0012** | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.120 **\| .0047** | 0.150 **\| .0059** | 0.170 **\| .0067** |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.080 **\| .0031** | 0.100 **\| .0039** | 0.120 **\| .0047** | 0.140 **\| .0055** | 0.180 **\| .0071** | 0.210 **\| .0083** | 0.240 **\| .0094** |
| | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.130 **\| .0051** | 0.150 **\| .0059** | 0.170 **\| .0067** | 0.210 **\| .0083** | 0.250 **\| .0098** | 0.300 **\| .0118** |
| | 0.055 **\| .0022** | 0.065 **\| .0026** | 0.080 **\| .0031** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.140 **\| .0055** | 0.170 **\| .0067** | 0.200 **\| .0079** |
| | 0.055 **\| .0022** | 0.065 **\| .0026** | 0.080 **\| .0031** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.140 **\| .0055** | 0.170 **\| .0067** | 0.200 **\| .0079** |
| | 0.080 **\| .0031** | 0.100 **\| .0039** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.150 **\| .0059** | 0.170 **\| .0067** | 0.190 **\| .0075** | 0.200 **\| .0079** | 0.210 **\| .0083** | 0.230 **\| .0091** |
| | 0.020 **\| .0008** | 0.030 **\| .0012** | 0.040 **\| .0016** | 0.055 **\| .0022** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.150 **\| .0059** | 0.200 **\| .0079** |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | 0.020 **\| .0008** | 0.020 **\| .0008** | 0.030 **\| .0012** | 0.035 **\| .0014** | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.065 **\| .0028** | 0.070 **\| .0028** | 0.075 **\| .0030** |
| | 0.020 **\| .0008** | 0.020 **\| .0008** | 0.030 **\| .0012** | 0.035 **\| .0014** | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.065 **\| .0028** | 0.070 **\| .0028** | 0.075 **\| .0030** |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | | | | | | | | | | |

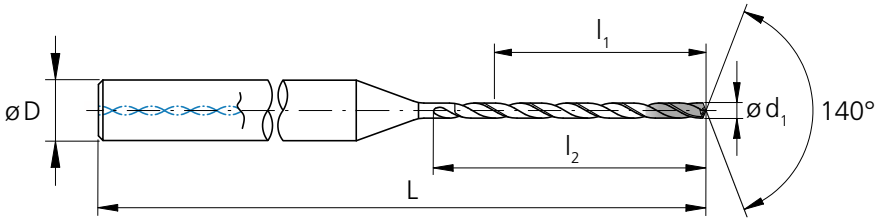
CRAZYDRILL by Mikron Tool Cool

# CrazyDrill Cool 15 x d - coated / uncoated

## DRILLING WITH INTERNAL COOLING

CS eXedur RIP

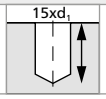
CA Uncoated




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0295** | 0.75 | **.4429** | 11.25 | 13.5 | 3 | **2.28** | 58.0 | 2.CD.150075 | .CS | .CA | ■ |
| **1/32** | **.0312** | 0.793 | **.4683** | 11.90 | 14.4 | 3 | **2.28** | 58.0 | 2.CD.150F132 | .CS | - | ◪ |
| | **.0315** | 0.80 | **.4724** | 12.00 | 14.4 | 3 | **2.28** | 58.0 | 2.CD.150080 | .CS | .CA | ■ |
| | **.0335** | 0.85 | **.5020** | 12.75 | 15.3 | 3 | **2.36** | 60.0 | 2.CD.150085 | .CS | .CA | ■ |
| | **.0354** | 0.90 | **.5315** | 13.50 | 16.2 | 3 | **2.36** | 60.0 | 2.CD.150090 | .CS | .CA | ■ |
| | **.0374** | 0.95 | **.5610** | 14.25 | 17.1 | 3 | **2.36** | 60.0 | 2.CD.150095 | .CS | .CA | ■ |
| | **.0394** | 1.00 | **.5906** | 15.00 | 18.0 | 4 | **2.52** | 64.0 | 2.CD.150100 | .CS | .CA | ■ |
| | **.0413** | 1.05 | **.6201** | 15.75 | 18.9 | 4 | **2.52** | 64.0 | 2.CD.150105 | .CS | .CA | ■ |
| | **.0433** | 1.10 | **.6496** | 16.50 | 19.8 | 4 | **2.52** | 64.0 | 2.CD.150110 | .CS | .CA | ■ |
| | **.0453** | 1.15 | **.6791** | 17.25 | 20.7 | 4 | **2.62** | 66.5 | 2.CD.150115 | .CS | .CA | ■ |
| | **.0472** | 1.20 | **.7087** | 18.00 | 21.6 | 4 | **2.62** | 66.5 | 2.CD.150120 | .CS | .CA | ■ |
| | **.0492** | 1.25 | **.7382** | 18.75 | 22.5 | 4 | **2.62** | 66.5 | 2.CD.150125 | .CS | .CA | ■ |
| | **.0512** | 1.30 | **.7677** | 19.50 | 23.4 | 4 | **2.72** | 69.0 | 2.CD.150130 | .CS | .CA | ■ |
| | **.0531** | 1.35 | **.7972** | 20.25 | 24.3 | 4 | **2.72** | 69.0 | 2.CD.150135 | .CS | .CA | ■ |
| | **.0551** | 1.40 | **.8268** | 21.00 | 25.2 | 4 | **2.72** | 69.0 | 2.CD.150140 | .CS | .CA | ■ |
| | **.0571** | 1.45 | **.8563** | 21.75 | 26.1 | 4 | **2.81** | 71.5 | 2.CD.150145 | .CS | .CA | ■ |
| | **.0591** | 1.50 | **.8858** | 22.50 | 27.0 | 4 | **2.81** | 71.5 | 2.CD.150150 | .CS | .CA | ■ |
| | **.0610** | 1.55 | **.9154** | 23.25 | 27.9 | 4 | **2.81** | 71.5 | 2.CD.150155 | .CS | .CA | ■ |
| **1/16** | **.0625** | 1.587 | **.9372** | 23.81 | 28.8 | 4 | **2.91** | 74.0 | 2.CD.150F116 | .CS | - | ◪ |
| | **.0630** | 1.60 | **.9449** | 24.00 | 28.8 | 4 | **2.91** | 74.0 | 2.CD.150160 | .CS | .CA | ■ |
| | **.0650** | 1.65 | **.9744** | 24.75 | 29.7 | 4 | **2.91** | 74.0 | 2.CD.150165 | .CS | .CA | ■ |
| | **.0669** | 1.70 | **1.004** | 25.50 | 30.6 | 4 | **2.91** | 74.0 | 2.CD.150170 | .CS | .CA | ■ |
| | **.0689** | 1.75 | **1.033** | 26.25 | 31.5 | 4 | **3.01** | 76.5 | 2.CD.150175 | .CS | .CA | ■ |
| | **.0709** | 1.80 | **1.063** | 27.00 | 32.4 | 4 | **3.01** | 76.5 | 2.CD.150180 | .CS | .CA | ■ |
| | **.0728** | 1.85 | **1.093** | 27.75 | 33.3 | 4 | **3.01** | 76.5 | 2.CD.150185 | .CS | .CA | ■ |
| | **.0748** | 1.90 | **1.122** | 28.50 | 34.2 | 4 | **3.11** | 79.0 | 2.CD.150190 | .CS | .CA | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0768** | 1.95 | **1.152** | 29.25 | 35.1 | 4 | **3.11** | 79.0 | 2.CD.150195 | .CS | .CA | ■ |
| | **.0787** | 2.00 | **1.181** | 30.00 | 36.0 | 4 | **3.11** | 79.0 | 2.CD.150200 | .CS | .CA | ■ |
| | **.0807** | 2.05 | **1.211** | 30.75 | 36.9 | 4 | **3.21** | 81.5 | 2.CD.150205 | .CS | .CA | ■ |
| | **.0827** | 2.10 | **1.240** | 31.50 | 37.8 | 4 | **3.21** | 81.5 | 2.CD.150210 | .CS | .CA | ■ |
| | **.0846** | 2.15 | **1.270** | 32.25 | 38.7 | 4 | **3.21** | 81.5 | 2.CD.150215 | .CS | .CA | ■ |
| | **.0866** | 2.20 | **1.299** | 33.00 | 39.6 | 4 | **3.31** | 84.0 | 2.CD.150220 | .CS | .CA | ■ |
| | **.0886** | 2.25 | **1.329** | 33.75 | 40.5 | 4 | **3.31** | 84.0 | 2.CD.150225 | .CS | .CA | ■ |
| | **.0906** | 2.30 | **1.358** | 34.50 | 41.4 | 4 | **3.31** | 84.0 | 2.CD.150230 | .CS | .CA | ■ |
| | **.0925** | 2.35 | **1.388** | 35.25 | 42.3 | 4 | **3.41** | 86.5 | 2.CD.150235 | .CS | .CA | ■ |
| **3/32** | **.0937** | 2.381 | **1.406** | 35.72 | 43.2 | 4 | **3.41** | 86.5 | 2.CD.150F332 | .CS | - | ◪ |
| | **.0945** | 2.40 | **1.417** | 36.00 | 43.2 | 4 | **3.41** | 86.5 | 2.CD.150240 | .CS | .CA | ■ |
| | **.0965** | 2.45 | **1.447** | 36.75 | 44.1 | 4 | **3.41** | 86.5 | 2.CD.150245 | .CS | .CA | ■ |
| | **.0984** | 2.50 | **1.476** | 37.50 | 45.0 | 4 | **3.50** | 89.0 | 2.CD.150250 | .CS | .CA | ■ |
| | **.1004** | 2.55 | **1.506** | 38.25 | 45.9 | 4 | **3.50** | 89.0 | 2.CD.150255 | .CS | .CA | ■ |
| | **.1024** | 2.60 | **1.535** | 39.00 | 46.8 | 4 | **3.50** | 89.0 | 2.CD.150260 | .CS | .CA | ■ |
| | **.1043** | 2.65 | **1.565** | 39.75 | 47.7 | 4 | **3.58** | 91.0 | 2.CD.150265 | .CS | .CA | ■ |
| | **.1063** | 2.70 | **1.594** | 40.50 | 48.6 | 4 | **3.58** | 91.0 | 2.CD.150270 | .CS | .CA | ■ |
| | **.1083** | 2.75 | **1.624** | 41.25 | 49.5 | 4 | **3.64** | 92.5 | 2.CD.150275 | .CS | .CA | ■ |
| | **.1102** | 2.80 | **1.654** | 42.00 | 50.4 | 4 | **3.64** | 92.5 | 2.CD.150280 | .CS | .CA | ■ |
| | **.1122** | 2.85 | **1.683** | 42.75 | 51.3 | 4 | **3.72** | 94.5 | 2.CD.150285 | .CS | .CA | ■ |
| | **.1142** | 2.90 | **1.713** | 43.50 | 52.2 | 4 | **3.72** | 94.5 | 2.CD.150290 | .CS | .CA | ■ |
| | **.1161** | 2.95 | **1.742** | 44.25 | 53.1 | 4 | **3.78** | 96.0 | 2.CD.150295 | .CS | .CA | ■ |
| | **.1181** | 3.00 | **1.772** | 45.00 | 54.0 | 6 | **3.94** | 100.0 | 2.CD.150300 | .CS | .CA | ■ |
| | **.1201** | 3.05 | **1.801** | 45.75 | 54.9 | 6 | **3.94** | 100.0 | 2.CD.150305 | .CS | .CA | ■ |
| | **.1220** | 3.10 | **1.831** | 46.50 | 55.8 | 6 | **3.94** | 100.0 | 2.CD.150310 | .CS | .CA | ■ |
| | **.1240** | 3.15 | **1.860** | 47.25 | 56.7 | 6 | **4.06** | 103.0 | 2.CD.150315 | .CS | .CA | ■ |

■ Stock item
◪ Stock item only in one version

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | |
|---|---|---|---|---|
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 | **+ .00024"**<br>**+ .00004"** | + 0.006 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1/8** | **.1250** | 3.175 | **1.875** | 47.63 | 57.6 | 6 | **4.06** | 103.0 | 2.CD.150F18 | .CS | - | ◪ |
| | **.1260** | 3.20 | **1.890** | 48.00 | 57.6 | 6 | **4.06** | 103.0 | 2.CD.150320 | .CS | .CA | ■ |
| | **.1280** | 3.25 | **1.919** | 48.75 | 58.5 | 6 | **4.06** | 103.0 | 2.CD.150325 | .CS | .CA | ■ |
| | **.1299** | 3.30 | **1.949** | 49.50 | 59.4 | 6 | **4.06** | 103.0 | 2.CD.150330 | .CS | .CA | ■ |
| | **.1319** | 3.35 | **1.978** | 50.25 | 60.3 | 6 | **4.17** | 106.0 | 2.CD.150335 | .CS | .CA | ■ |
| | **.1339** | 3.40 | **2.008** | 51.00 | 61.2 | 6 | **4.17** | 106.0 | 2.CD.150340 | .CS | .CA | ■ |
| | **.1358** | 3.45 | **2.037** | 51.75 | 62.1 | 6 | **4.17** | 106.0 | 2.CD.150345 | .CS | .CA | ■ |
| | **.1378** | 3.50 | **2.067** | 52.50 | 63.0 | 6 | **4.27** | 108.5 | 2.CD.150350 | .CS | .CA | ■ |
| | **.1398** | 3.55 | **2.096** | 53.25 | 63.9 | 6 | **4.27** | 108.5 | 2.CD.150355 | .CS | .CA | ■ |
| | **.1417** | 3.60 | **2.126** | 54.00 | 64.8 | 6 | **4.27** | 108.5 | 2.CD.150360 | .CS | .CA | ■ |
| | **.1437** | 3.65 | **2.156** | 54.75 | 65.7 | 6 | **4.37** | 111.0 | 2.CD.150365 | .CS | .CA | ■ |
| | **.1457** | 3.70 | **2.185** | 55.50 | 66.6 | 6 | **4.37** | 111.0 | 2.CD.150370 | .CS | .CA | ■ |
| | **.1476** | 3.75 | **2.215** | 56.25 | 67.5 | 6 | **4.37** | 111.0 | 2.CD.150375 | .CS | .CA | ■ |
| | **.1496** | 3.80 | **2.244** | 57.00 | 68.4 | 6 | **4.47** | 113.5 | 2.CD.150380 | .CS | .CA | ■ |
| | **.1516** | 3.85 | **2.274** | 57.75 | 69.3 | 6 | **4.47** | 113.5 | 2.CD.150385 | .CS | .CA | ■ |
| | **.1535** | 3.90 | **2.303** | 58.50 | 70.2 | 6 | **4.47** | 113.5 | 2.CD.150390 | .CS | .CA | ■ |
| | **.1555** | 3.95 | **2.333** | 59.25 | 71.1 | 6 | **4.55** | 115.5 | 2.CD.150395 | .CS | .CA | ■ |
| **5/32** | **.1562** | 3.968 | **2.343** | 59.52 | 72.0 | 6 | **4.55** | 115.5 | 2.CD.150F532 | .CS | - | ◪ |
| | **.1575** | 4.00 | **2.362** | 60.00 | 72.0 | 6 | **4.55** | 115.5 | 2.CD.150400 | .CS | .CA | ■ |
| | **.1614** | 4.10 | **2.421** | 61.50 | 73.8 | 6 | **4.78** | 121.5 | 2.CD.150410 | .CS | .CA | ■ |
| | **.1654** | 4.20 | **2.480** | 63.00 | 73.9 | 6 | **4.78** | 121.5 | 2.CD.150420 | .CS | .CA | ■ |
| | **.1693** | 4.30 | **2.539** | 64.50 | 75.7 | 6 | **4.78** | 121.5 | 2.CD.150430 | .CS | .CA | ■ |
| | **.1732** | 4.40 | **2.598** | 66.00 | 76.6 | 6 | **4.78** | 121.5 | 2.CD.150440 | .CS | .CA | ■ |
| | **.1772** | 4.50 | **2.657** | 67.50 | 76.5 | 6 | **4.78** | 121.5 | 2.CD.150450 | .CS | .CA | ■ |
| | **.1811** | 4.60 | **2.717** | 69.00 | 78.2 | 6 | **4.78** | 121.5 | 2.CD.150460 | .CS | .CA | ■ |
| | **.1850** | 4.70 | **2.776** | 70.50 | 84.6 | 6 | **5.18** | 131.5 | 2.CD.150470 | .CS | .CA | ■ |

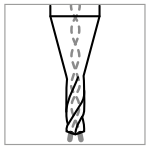
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3/16** | **.1875** | 4.762 | **2.812** | 71.43 | 86.4 | 6 | **5.18** | 131.5 | 2.CD.150F316 | .CS | - | ◪ |
| | **.1890** | 4.80 | **2.835** | 72.00 | 86.4 | 6 | **5.18** | 131.5 | 2.CD.150480 | .CS | .CA | ■ |
| | **.1929** | 4.90 | **2.894** | 73.50 | 86.2 | 6 | **5.18** | 131.5 | 2.CD.150490 | .CS | .CA | ■ |
| | **.1969** | 5.00 | **2.953** | 75.00 | 88.0 | 6 | **5.18** | 131.5 | 2.CD.150500 | .CS | .CA | ■ |
| | **.2008** | 5.10 | **3.012** | 76.50 | 88.7 | 6 | **5.18** | 131.5 | 2.CD.150510 | .CS | .CA | ■ |
| | **.2047** | 5.20 | **3.071** | 78.00 | 88.4 | 6 | **5.18** | 131.5 | 2.CD.150520 | .CS | .CA | ■ |
| | **.2087** | 5.30 | **3.130** | 79.50 | 90.1 | 6 | **5.18** | 131.5 | 2.CD.150530 | .CS | .CA | ■ |
| | **.2126** | 5.40 | **3.189** | 81.00 | 97.2 | 6 | **5.57** | 141.5 | 2.CD.150540 | .CS | .CA | ■ |
| | **.2165** | 5.50 | **3.248** | 82.50 | 99.0 | 6 | **5.57** | 141.5 | 2.CD.150550 | .CS | .CA | ■ |
| **7/32** | **.2189** | 5.560 | **3.283** | 83.40 | 98.6 | 6 | **5.57** | 141.5 | 2.CD.150F732 | .CS | - | ◪ |
| | **.2205** | 5.60 | **3.307** | 84.00 | 98.6 | 6 | **5.57** | 141.5 | 2.CD.150560 | .CS | .CA | ■ |
| | **.2244** | 5.70 | **3.366** | 85.50 | 99.2 | 6 | **5.57** | 141.5 | 2.CD.150570 | .CS | .CA | ■ |
| | **.2283** | 5.80 | **3.425** | 87.00 | 100.9 | 6 | **5.57** | 141.5 | 2.CD.150580 | .CS | .CA | ■ |
| | **.2323** | 5.90 | **3.484** | 88.50 | 100.3 | 6 | **5.57** | 141.5 | 2.CD.150590 | .CS | .CA | ■ |
| | **.2362** | 6.00 | **3.543** | 90.00 | 102.0 | 6 | **5.57** | 141.5 | 2.CD.150600 | .CS | .CA | ■ |

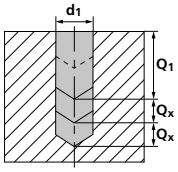
| Complementary products | |
|---|---|
| CrazyDrill Pilot | p.134 |
| CrazyDrill Crosspilot | p.146 |
| CrazyDrill Coolpilot | p.156 |
| CrazyDrill Pilot SST-Inox | p.122 |

CRAZYDRILL by Mikron Tool Cool

# CrazyDrill Cool 15 x d - coated

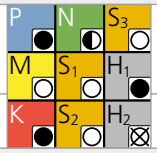
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| **197** | 140 \| **459** | 6xd1 | 2xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| **197** | 120 \| **394** | 6xd1 | 2xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 40 \| **131** | 80 \| **262** | 6xd1 | 2xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 25 \| **82** | 50 \| **164** | 0.5xd1 | 0.25xd1 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 20 \| **131** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 20 \| **131** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| **197** | 80 \| **262** | 15xd1 | – |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| **328** | 300 \| **984** | 5xd1 | 1xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 \| **328** | 200 \| **656** | 5xd1 | 1xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 100 \| **328** | 200 \| **656** | 1.5xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 \| **328** | 140 \| **459** | 1xd1 | 0.5xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 80 \| **262** | 120 \| **394** | 2xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 80 \| **262** | 150 \| **492** | 10xd1 | 5xd1 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 15 \| **49** | 20 \| **66** | 0.5xd1 | 0.25xd1 |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 15 \| **49** | 20 \| **66** | 0.5xd1 | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 15 \| **49** | 20 \| **66** | 0.5xd1 | 0.25xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 15 \| **49** | 20 \| **66** | 0.5xd1 | 0.25xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



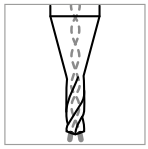

**f** [mm/rev] **| [IPR]**

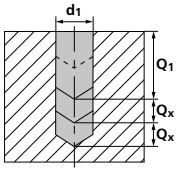
| Ød1 | 1/32" 0.8 mm \| .032" | | 1.0 mm \| .039" | 1.25 mm \| .049" | 1/16" 1.5 mm \| .059" | 2.0 mm \| .079" | 3/32" 2.5 mm \| .098" | 1/8" 3.0 mm \| .118" | 5/32" 4.0 mm \| .158" | 3/16" - 7/32" 5.0 mm \| .197" | 6.0 mm \| .236" |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | f | | f | f | f | f | f | f | f | f | f |
| | 0.050 \| .0020 | | 0.060 \| .0024 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.240 \| .0094 |
| | 0.040 \| .0016 | | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.150 \| .0059 | 0.170 \| .0067 | 0.180 \| .0071 |
| | 0.030 \| .0012 | | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.100 \| .0039 | 0.120 \| .0047 | 0.150 \| .0059 | 0.170 \| .0067 |
| | 0.011 \| .0004 | | 0.030 \| .0012 | 0.045 \| .0018 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.120 \| .0047 | 0.130 \| .0051 | 0.140 \| .0055 |
| | 0.020 \| .0008 | | 0.050 \| .0020 | 0.065 \| .0026 | 0.080 \| .0031 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.180 \| .0071 | 0.200 \| .0079 | 0.220 \| .0087 |
| | 0.010 \| .0004 | | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.130 \| .0051 |
| | 0.010 \| .0004 | | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.130 \| .0051 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | 0.040 \| .0016 | | 0.060 \| .0024 | 0.075 \| .0030 | 0.090 \| .0035 | 0.110 \| .0043 | 0.140 \| .0055 | 0.166 \| .0065 | 0.200 \| .0079 | 0.230 \| .0091 | 0.250 \| .0098 |
| | 0.040 \| .0016 | | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.160 \| .0063 | 0.190 \| .0075 | 0.210 \| .0083 |
| | 0.050 \| .0020 | | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.040 \| .0016 | | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.160 \| .0063 | 0.190 \| .0075 | 0.210 \| .0083 |
| | 0.035 \| .0014 | | 0.040 \| .0016 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.150 \| .0059 | 0.180 \| .0071 | 0.200 \| .0079 |
| | 0.050 \| .0020 | | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.020 \| .0008 | | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.200 \| .0079 |
| | 0.007 \| .0003 | | 0.010 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.018 \| .0007 | 0.022 \| .0009 | 0.020 \| .0008 | 0.022 \| .0009 | 0.032 \| .0013 | 0.042 \| .0017 |
| | 0.020 \| .0008 | | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 |
| | 0.020 \| .0008 | | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 |
| | 0.007 \| .0003 | | 0.010 \| .0004 | 0.012 \| .0005 | 0.017 \| .0007 | 0.022 \| .0009 | 0.027 \| .0011 | 0.032 \| .0013 | 0.037 \| .0015 | 0.042 \| .0017 | 0.052 \| .0020 |
| | 0.008 \| .0003 | | 0.010 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | | | | | | | | | | | | |

CRAZYDRILL by Mikron Tool Cool

# CrazyDrill Cool 15 x d - uncoated

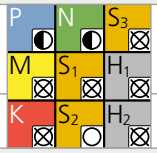
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 40 \| **131** | 60 \| **197** | 6xd1 | 2xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 40 \| **131** | 60 \| **197** | 6xd1 | 2xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 20 \| **66** | 40 \| **131** | 6xd1 | 2xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| **328** | 300 \| **984** | 5xd1 | 1xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 \| **328** | 200 \| **656** | 5xd1 | 1xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 100 \| **328** | 200 \| **656** | 1.5xd1 | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 \| **328** | 140 \| **459** | 1xd1 | 0.5xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 80 \| **262** | 120 \| **394** | 2xd1 | 1xd1 |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 80 \| **262** | 120 \| **394** | 10xd1 | 5xd1 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| **66** | 40 \| **131** | 0.5xd1 | 0.25xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




**f** [mm/rev] **| [IPR]**

| | **Ød1** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.8 mm **\| .032"** | 1.0 mm **\| .039"** | 1.25 mm **\| .049"** | 1.5 mm **\| .059"** | 2.0 mm **\| .079"** | 2.5 mm **\| .098"** | 3.0 mm **\| .118"** | 4.0 mm **\| .158"** | **3**5.0 mm **\| .197"** | 6.0 mm **\| .236"** |
| | **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.080 **\| .0031** | 0.100 **\| .0039** | 0.120 **\| .0047** | 0.140 **\| .0055** | 0.180 **\| .0071** | 0.210 **\| .0083** | 0.240 **\| .0094** |
| | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.110 **\| .0043** | 0.120 **\| .0047** | 0.150 **\| .0059** | 0.170 **\| .0067** | 0.180 **\| .0071** |
| | 0.030 **\| .0012** | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.120 **\| .0047** | 0.150 **\| .0059** | 0.170 **\| .0067** |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.080 **\| .0031** | 0.100 **\| .0039** | 0.120 **\| .0047** | 0.140 **\| .0055** | 0.180 **\| .0071** | 0.210 **\| .0083** | 0.240 **\| .0094** |
| | 0.060 **\| .0024** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.130 **\| .0051** | 0.150 **\| .0059** | 0.170 **\| .0067** | 0.210 **\| .0083** | 0.250 **\| .0098** | 0.300 **\| .0118** |
| | 0.055 **\| .0022** | 0.065 **\| .0026** | 0.080 **\| .0031** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.140 **\| .0055** | 0.170 **\| .0067** | 0.200 **\| .0079** |
| | 0.055 **\| .0022** | 0.065 **\| .0026** | 0.080 **\| .0031** | 0.090 **\| .0035** | 0.100 **\| .0039** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.140 **\| .0055** | 0.170 **\| .0067** | 0.200 **\| .0079** |
| | 0.080 **\| .0031** | 0.100 **\| .0039** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.150 **\| .0059** | 0.170 **\| .0067** | 0.190 **\| .0075** | 0.200 **\| .0079** | 0.210 **\| .0083** | 0.230 **\| .0091** |
| | 0.020 **\| .0008** | 0.030 **\| .0012** | 0.040 **\| .0016** | 0.055 **\| .0022** | 0.070 **\| .0028** | 0.090 **\| .0035** | 0.110 **\| .0043** | 0.130 **\| .0051** | 0.150 **\| .0059** | 0.200 **\| .0079** |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | 0.020 **\| .0008** | 0.020 **\| .0008** | 0.030 **\| .0012** | 0.035 **\| .0014** | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.065 **\| .0028** | 0.070 **\| .0028** | 0.075 **\| .0030** |
| | 0.020 **\| .0008** | 0.020 **\| .0008** | 0.030 **\| .0012** | 0.035 **\| .0014** | 0.040 **\| .0016** | 0.050 **\| .0020** | 0.060 **\| .0024** | 0.065 **\| .0028** | 0.070 **\| .0028** | 0.075 **\| .0030** |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | Recommended: CrazyDrill Cool - coated | | | | | | | | | |
| | | | | | | | | | | |



# Drilling process CrazyDrill Cool

## ACCURATE AND RAPID DRILLING UP TO 15 X D

### Coolant type, filtration and coolant pressure

**Coolant type:** For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

**Filtration:** Good filter quality is very important when using through coolant drills. Dirt particles or residual chips can clog the coolant holes and consequently reduce dramatically the flowrate. The following filter qualities must be adhered especially in small diameters:

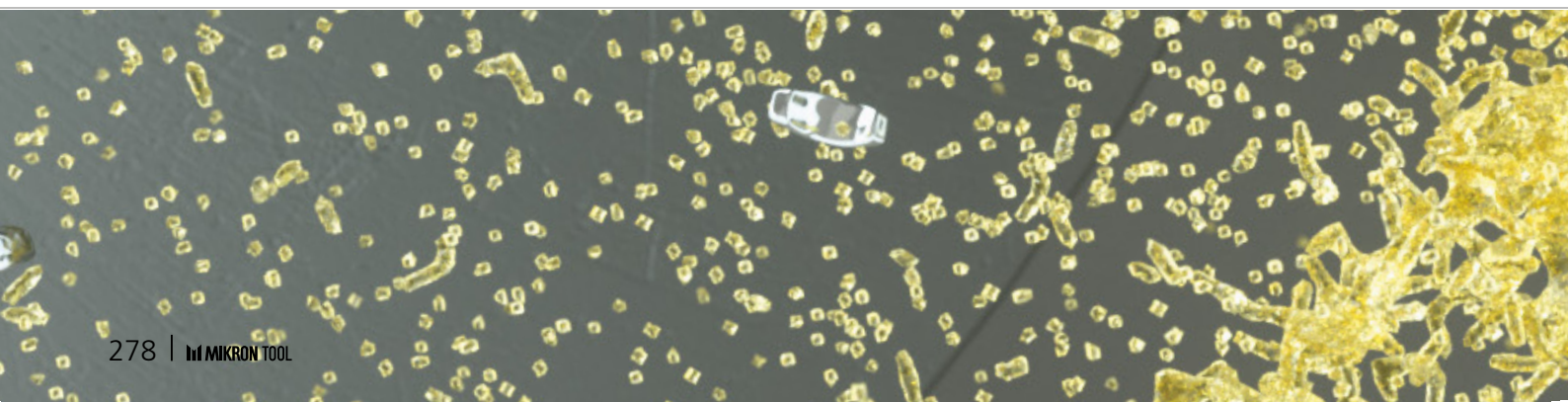
- Drill with Ø < 2 mm (.078") filter quality ≤ 0.010 mm (.0004").
- Drill with Ø < 3 mm (.118") filter quality ≤ 0.020 mm (.0008").
- Drill with Ø < 6 mm (.236") filter quality ≤ 0.050 mm (.0020").

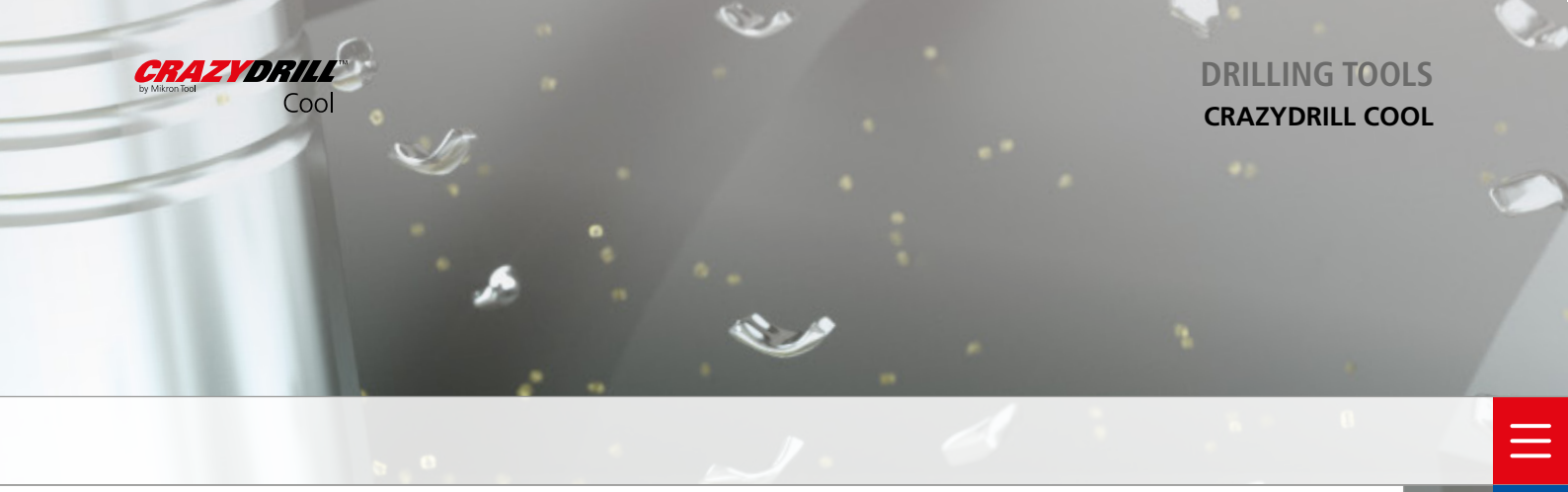
**Coolant pressure:** To ensure a reliable drilling process the following minimal pressures are required (see chart). Higher pressures are needed for smaller drill size diameters. High pressure is generally better for the cooling and chip evacuation effectiveness.

| Ø $d_1$ Tool | | Minimal pressure | |
|---|---|---|---|
| [mm] | **[inch]** | [bar] | **[psi]** |
| 0.75 | **.030** | 70 | **1015** |
| 3.00 | **.118** | 40 | **580** |
| 6.00 | **.236** | 30 | **435** |

### Tool holders

For detailed indications for tool holders see chapter "Technical information".







**CrazyDrill Cool 6 x d**

For drilling depth up to 6 x d we recommend pilot drilling or centering only on irregular, rough or inclined surface and if a high position accuracy is requested.

**CrazyDrill Cool 10 x d / 15 x d**

For these drilling depths Mikron Tool recommends pilot drilling for CrazyDrill Cool:

- **CrazyDrill Pilot** as pilot drill
- **CrazyDrill Crosspilot** as pilot drill for inclined surfaces
- **CrazyDrill Coolpilot** as pilot drill for difficult to machine materials
- **CrazyDrill Pilot SST-Inox** as pilot drill for difficult to machine materials

**Pilot drilling and drilling**

Pilot drilling with CrazyDrill Pilot is the perfect start for an accurate (position and alignment accuracy) and consistent machining process. Inclined surfaces requires the use of CrazyDrill Crosspilot.

The quality of drilling (position and alignment accuracy, no measurable transition from pilot hole to the following drilling steps) and a stable machining process are guaranteed by carefully determined tool tolerances.



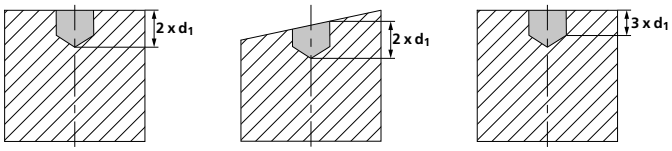


# Drilling process CrazyDrill Cool

## ONE STEP DRILLING (DEPENDING ON MATERIAL, SEE CUTTING DATA CHART)

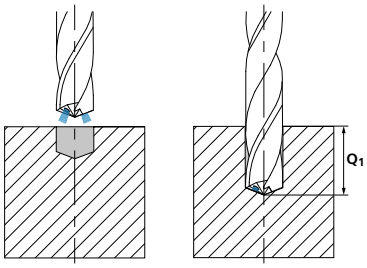
### 1 | PILOT DRILLING

- With CrazyDrill Pilot / CrazyDrill Coolpilot or CrazyDrill Pilot SST-Inox (straight surfaces) or CrazyDrill Crosspilot (inclined surfaces).




### 2 | DRILLING

- Turn on coolant of CrazyDrill Cool.
- Drilling with CrazyDrill Cool to full depth $Q_1$ in one step.



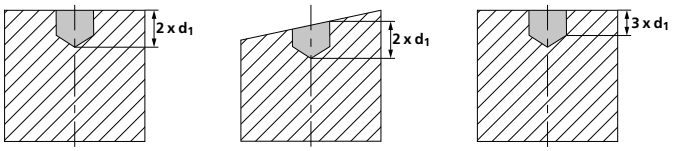

Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

## DRILLING AS PER DIN 66025 / PAL (DEPENDING ON MATERIAL, SEE CUTTING DATA CHART)

G83 deep-drilling cycle with chip break and chip removal (pecks)
Q = depth of the respective peck

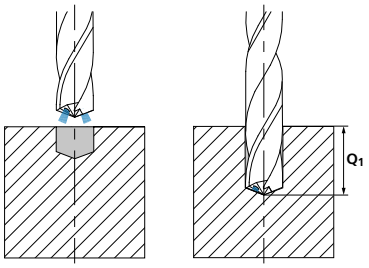
### 1 | PILOT DRILLING

- With CrazyDrill Pilot / CrazyDrill Coolpilot or CrazyDrill Pilot SST-Inox (straight surfaces) or CrazyDrill Crosspilot (inclined surfaces).

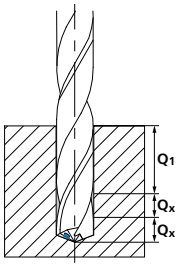



### 2 | DRILLING

- Turn on coolant of CrazyDrill Cool.
- Drilling with CrazyDrill Cool up to maximum drilling depth ($Q_1$) in one step, followed by peck to remove chips.

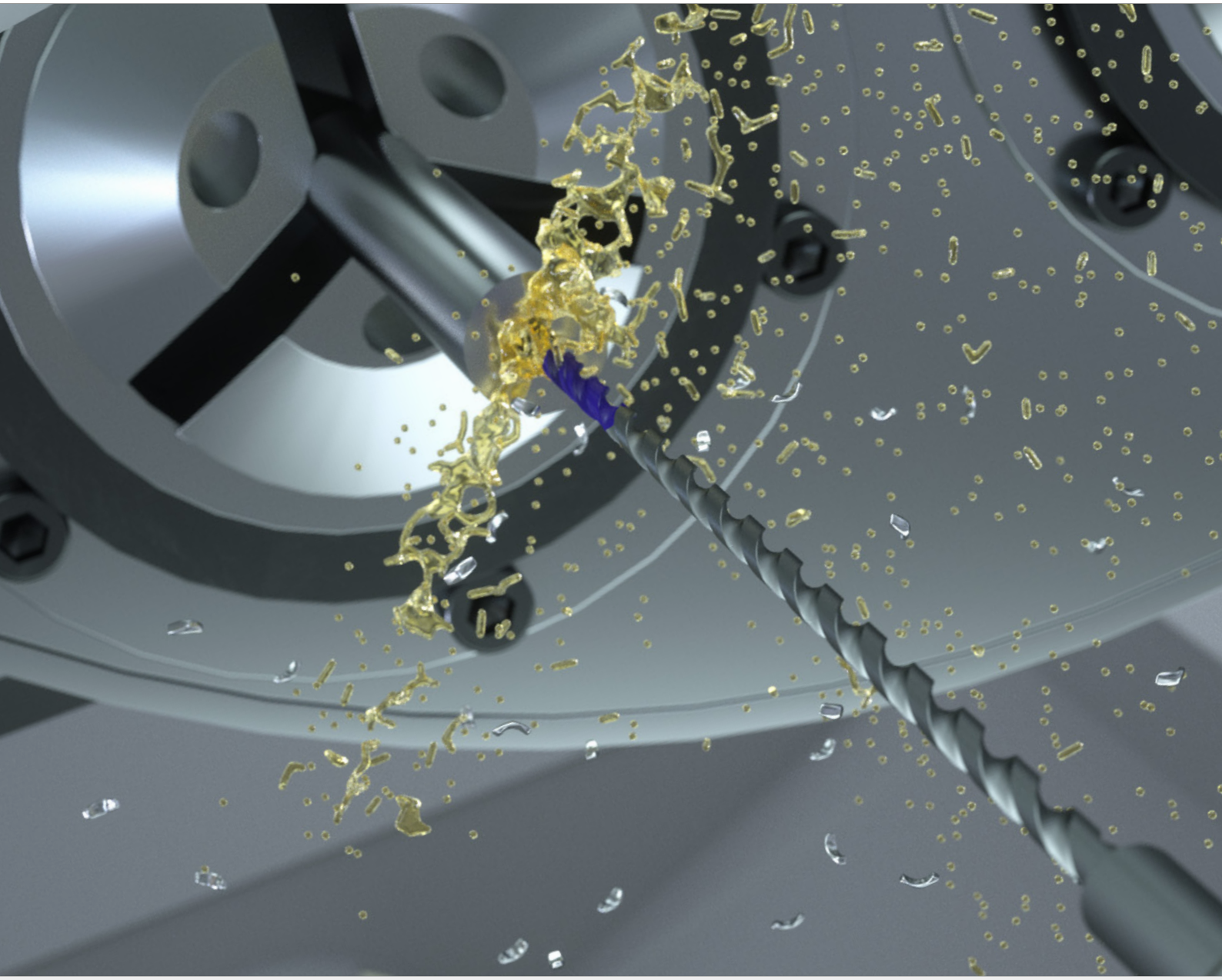



- Additional steps ($Q_X$) as per cutting data chart, followed by peck to remove chips.




Note:
Drill can be retracted completely from the hole between pecks. However if vibrations occur, we recommend that the drill tip never exits hole to prevent breakage. After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

# CrazyDrill Cool XL



CRAZYDRILL Cool XL

## DEEP HOLE DRILLING WITH HIGH SPEED AND PRECISION



CrazyDrill Cool XL line offers a solid carbide deep-hole drill in the diameter range of .039" to .236" (1.0 mm to 6.0 mm) for drilling depths up to 40 x d. All drills are coated, have through coolant and are ground with double margin.

With drilling depth up to 40 x d, this is a high performance improvement to the time consuming and costly deep-hole drilling methods such as gun drilling.

The through coolant holes supplies constant coolant flow to the tip. For small diameters, an additional power chamber in the shank assures a higher flowrate. Comparatively at same coolant pressure three time flowrate will be supplied to the cutting area. This technology enables high drilling speed with more effective chip removal. High-performance eXedur SL coating provides thermal and wear protection, guaranteeing a longer tool life.

Optimized cutting geometry for short chip formation and large flute pocket design reduces jamming risk and guarantees effective chip evacuation. Maximum drill depth of 40 x d can be reached in one shot (without pecking) at the highest speed and feed.

We recommend Mikron Tool CrazyDrill Pilot or CrazyDrill Coolpilot for hole preparation on flat and even surfaces or CrazyDrill Crosspilot on inclined surfaces up to 60°. Combining CrazyDrill Pilot / Coolpilot / Crosspilot with CrazyDrill Cool XL, enhances hole quality characteristics by means of fine tuned tolerances.

**Regrinding:** This product can be reground starting from Ø .057" (1.45 mm).

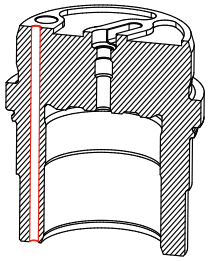
**Please note:** You couldn't find your suitable version of the CrazyDrill Cool XL (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYDRILL by Mikron Tool Cool XL

# Features and benefits

## DRILLING UP TO 40 X D IN ONE SINGLE STEP

- **SHORT MACHINING TIME** | deep hole drilling in one single step
- **LONG TOOL LIFE** | due to efficient coolant
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to short chips
- **HIGH DEGREE OF PRECISION** | due to double margin



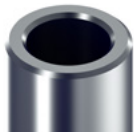
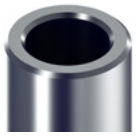
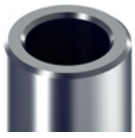
**COMPONENT**
Injector body

**MATERIAL**
100Cr6 / 1.3505 / AISI 52100

**MACHINING**
- Pilot and deep holes drilling
- d = 2.0 mm **| .079"**
- Drilling depth 76 mm **| 2.99"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Cool XL - 40 x d

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Pilot<br>CrazyDrill Cool XL<br>- Carbide<br>- Coated<br>- Internal cooling |
| Item number | 2.CD.400200.XL |
| Cutting data | $v_c$ = 70 m/min **| 230 SFM**<br>f = 0.08 mm/rev **| .0031 IPR**<br>$Q_1$ = 76 mm **| 2.99"** |

| 15 x d | 20 x d | 30 x d | 40 x d |
|---|---|---|---|
| ■ Internal cooling<br>■ Coated | ■ Internal cooling<br>■ Coated | ■ Internal cooling<br>■ Coated | ■ Internal cooling<br>■ Coated |
| ■ .039" - .236"<br>(Ø1.0 - 6.0 mm) | ■ .039" - .236"<br>(Ø1.0 - 6.0 mm) | ■ .039" - .236"<br>(Ø1.0 - 6.0 mm) | ■ .079" - .236"<br>(Ø2.0 - 6.0 mm) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Page 286 | Page 290 | Page 294 | Page 298 |

**1 | SHAFT**
The robust carbide shaft guarantees a high degree of concentric accuracy and reliability.

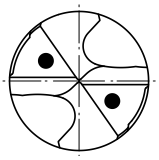
**2 | CARBIDE GRADE**
The use of latest generation carbide allows highest machining speed and feed.

**3 | COATING**
The high-performance eXedur SL coating is a thermal and wear protection against heat and abrasion. Extremely smooth and accurate, it exhibits low adhesion to work materials and prevents from cutting edge chipping. The result is controlled chip formation and long tool life.

**4 | THROUGH COOLANT AND POWER CHAMBER**
The through coolant holes supply adequate and continuous coolant to the tip for constant cooling, lubrication and chip removal. The power chamber reduces pressure loss and increases flowrate even when drilling smallest diameters.

**5 | CUTTING AND FLUTES GEOMETRY**
The CrazyDrill Cool XL cutting geometry is optimized for short chip formation. With a large chip pocket flute design, jamming risk is significantly reduced and chip evacuation is highly effective through the maximum hole depth. This tool is capable of drilling a wide range of materials in one shot (without pecking) at the highest speeds and feeds (see speed and feed chart for more details on machining approach). The double margin ground on all CrazyDrill Cool XL offers a 4-pints guide for excellent drilling stability and hole straightness.

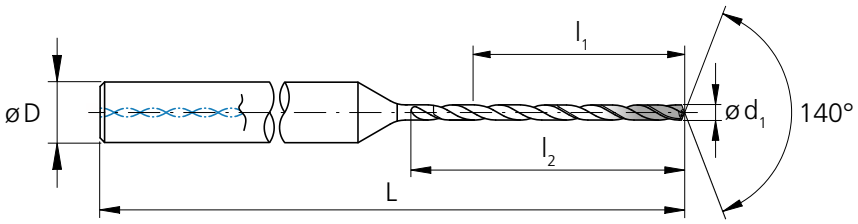
**6 | CUTTING EDGE TREATMENT**
The special cutting edge preparation reduces chipping risk and guarantees a consistent drilling process and extends tool life.

Drill tip 

CRAZYDRILL by Mikron Tool Cool XL

# CrazyDrill Cool XL 15 x d

## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.591** | 15.00 | 18.0 | 4 | **2.28** | 58 | 2.CD.150100.XL | ■ |
| | **.0413** | 1.05 | **.620** | 15.75 | 18.9 | 4 | **2.32** | 59 | 2.CD.150105.XL | ■ |
| | **.0433** | 1.10 | **.650** | 16.50 | 19.8 | 4 | **2.36** | 60 | 2.CD.150110.XL | ■ |
| | **.0453** | 1.15 | **.679** | 17.25 | 20.7 | 4 | **2.40** | 61 | 2.CD.150115.XL | ■ |
| | **.0472** | 1.20 | **.709** | 18.00 | 21.6 | 4 | **2.44** | 62 | 2.CD.150120.XL | ■ |
| | **.0492** | 1.25 | **.738** | 18.75 | 22.5 | 4 | **2.44** | 62 | 2.CD.150125.XL | ■ |
| | **.0512** | 1.30 | **.768** | 19.50 | 23.4 | 4 | **2.48** | 63 | 2.CD.150130.XL | ■ |
| | **.0531** | 1.35 | **.797** | 20.25 | 24.3 | 4 | **2.52** | 64 | 2.CD.150135.XL | ■ |
| | **.0551** | 1.40 | **.827** | 21.00 | 25.2 | 4 | **2.56** | 65 | 2.CD.150140.XL | ■ |
| | **.0571** | 1.45 | **.856** | 21.75 | 26.1 | 4 | **2.60** | 66 | 2.CD.150145.XL | ■ |
| | **.0591** | 1.50 | **.886** | 22.50 | 27.0 | 4 | **2.64** | 67 | 2.CD.150150.XL | ■ |
| | **.0610** | 1.55 | **.915** | 23.25 | 27.9 | 4 | **2.68** | 68 | 2.CD.150155.XL | ■ |
| **1/16** | **.0625** | 1.587 | **.945** | 24.00 | 28.8 | 4 | **2.68** | 68 | 2.CD.150F116.XL | ■ |
| | **.0630** | 1.60 | **.945** | 24.00 | 28.8 | 4 | **2.68** | 68 | 2.CD.150160.XL | ■ |
| | **.0650** | 1.65 | **.974** | 24.75 | 29.7 | 4 | **2.72** | 69 | 2.CD.150165.XL | ■ |
| | **.0669** | 1.70 | **1.00** | 25.50 | 30.6 | 4 | **2.76** | 70 | 2.CD.150170.XL | ■ |
| | **.0689** | 1.75 | **1.03** | 26.25 | 31.5 | 4 | **2.80** | 71 | 2.CD.150175.XL | ■ |
| | **.0709** | 1.80 | **1.06** | 27.00 | 32.4 | 4 | **2.83** | 72 | 2.CD.150180.XL | ■ |
| | **.0728** | 1.85 | **1.09** | 27.75 | 33.3 | 4 | **2.87** | 73 | 2.CD.150185.XL | ■ |
| | **.0748** | 1.90 | **1.12** | 28.50 | 34.2 | 4 | **2.91** | 74 | 2.CD.150190.XL | ■ |
| | **.0768** | 1.95 | **1.15** | 29.25 | 35.1 | 4 | **2.91** | 74 | 2.CD.150195.XL | ■ |
| | **.0787** | 2.00 | **1.18** | 30.00 | 36.0 | 4 | **2.95** | 75 | 2.CD.150200.XL | ■ |
| | **.0807** | 2.05 | **1.21** | 30.75 | 36.9 | 4 | **2.99** | 76 | 2.CD.150205.XL | ■ |
| | **.0827** | 2.10 | **1.24** | 31.50 | 37.8 | 4 | **3.03** | 77 | 2.CD.150210.XL | ■ |
| | **.0846** | 2.15 | **1.27** | 32.25 | 38.7 | 4 | **3.07** | 78 | 2.CD.150215.XL | ■ |
| | **.0866** | 2.20 | **1.30** | 33.00 | 39.6 | 4 | **3.11** | 79 | 2.CD.150220.XL | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0886** | 2.25 | **1.33** | 33.75 | 40.5 | 4 | **3.15** | 80 | 2.CD.150225.XL | ■ |
| | **.0906** | 2.30 | **1.36** | 34.50 | 41.4 | 4 | **3.15** | 80 | 2.CD.150230.XL | ■ |
| | **.0925** | 2.35 | **1.39** | 35.25 | 42.3 | 4 | **3.19** | 81 | 2.CD.150235.XL | ■ |
| **3/32** | **.0937** | 2.381 | **1.42** | 36.00 | 43.2 | 4 | **3.23** | 82 | 2.CD.150F332.XL | ■ |
| | **.0945** | 2.40 | **1.42** | 36.00 | 43.2 | 4 | **3.23** | 82 | 2.CD.150240.XL | ■ |
| | **.0965** | 2.45 | **1.45** | 36.75 | 44.1 | 4 | **3.27** | 83 | 2.CD.150245.XL | ■ |
| | **.0984** | 2.50 | **1.48** | 37.50 | 45.0 | 4 | **3.31** | 84 | 2.CD.150250.XL | ■ |
| | **.1004** | 2.55 | **1.51** | 38.25 | 45.9 | 4 | **3.35** | 85 | 2.CD.150255.XL | ■ |
| | **.1024** | 2.60 | **1.54** | 39.00 | 46.8 | 4 | **3.39** | 86 | 2.CD.150260.XL | ■ |
| | **.1043** | 2.65 | **1.56** | 39.75 | 47.7 | 4 | **3.39** | 86 | 2.CD.150265.XL | ■ |
| | **.1063** | 2.70 | **1.59** | 40.50 | 48.6 | 4 | **3.43** | 87 | 2.CD.150270.XL | ■ |
| | **.1083** | 2.75 | **1.62** | 41.25 | 49.5 | 4 | **3.46** | 88 | 2.CD.150275.XL | ■ |
| | **.1102** | 2.80 | **1.65** | 42.00 | 50.4 | 4 | **3.50** | 89 | 2.CD.150280.XL | ■ |
| | **.1122** | 2.85 | **1.68** | 42.75 | 51.3 | 4 | **3.54** | 90 | 2.CD.150285.XL | ■ |
| | **.1142** | 2.90 | **1.71** | 43.50 | 52.2 | 4 | **3.58** | 91 | 2.CD.150290.XL | ■ |
| | **.1161** | 2.95 | **1.74** | 44.25 | 53.1 | 4 | **3.62** | 92 | 2.CD.150295.XL | ■ |
| | **.1181** | 3.00 | **1.77** | 45.00 | 54.0 | 4 | **3.62** | 92 | 2.CD.150300.XL | ■ |
| | **.1201** | 3.05 | **1.80** | 45.75 | 54.9 | 6 | **3.90** | 99 | 2.CD.150305.XL | ■ |
| | **.1220** | 3.10 | **1.83** | 46.50 | 55.8 | 6 | **3.94** | 100 | 2.CD.150310.XL | ■ |
| | **.1240** | 3.15 | **1.86** | 47.25 | 56.7 | 6 | **3.98** | 101 | 2.CD.150315.XL | ■ |
| **1/8** | **.1250** | 3.175 | **1.89** | 48.00 | 57.6 | 6 | **4.02** | 102 | 2.CD.150F18.XL | ■ |
| | **.1260** | 3.20 | **1.89** | 48.00 | 57.6 | 6 | **4.02** | 102 | 2.CD.150320.XL | ■ |
| | **.1280** | 3.25 | **1.92** | 48.75 | 58.5 | 6 | **4.02** | 102 | 2.CD.150325.XL | ■ |
| | **.1299** | 3.30 | **1.95** | 49.50 | 59.4 | 6 | **4.06** | 103 | 2.CD.150330.XL | ■ |
| | **.1319** | 3.35 | **1.98** | 50.25 | 60.3 | 6 | **4.09** | 104 | 2.CD.150335.XL | ■ |
| | **.1339** | 3.40 | **2.01** | 51.00 | 61.2 | 6 | **4.13** | 105 | 2.CD.150340.XL | ■ |

■ Stock item

Carbide | 15xd1 | 140° | Z2 | eXedur SL

| Ø $d_1$ | .004" - .118" (0.1 - 3.0 mm) | | .120" - .236" (3.05 - 6.0 mm) | |
|---|---|---|---|---|
| Tolerance | + .00024"<br>0 | + 0.006 mm<br>0 | + .00035"<br>+ .00004" | + 0.009 mm<br>+ 0.001 mm |



| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1358** | 3.45 | **2.04** | 51.75 | 62.1 | 6 | **4.17** | 106 | 2.CD.150345.XL | ■ |
| | **.1378** | 3.50 | **2.07** | 52.50 | 63.0 | 6 | **4.21** | 107 | 2.CD.150350.XL | ■ |
| | **.1398** | 3.55 | **2.10** | 53.25 | 63.9 | 6 | **4.25** | 108 | 2.CD.150355.XL | ■ |
| | **.1417** | 3.60 | **2.13** | 54.00 | 64.8 | 6 | **4.25** | 108 | 2.CD.150360.XL | ■ |
| | **.1437** | 3.65 | **2.16** | 54.75 | 65.7 | 6 | **4.29** | 109 | 2.CD.150365.XL | ■ |
| | **.1457** | 3.70 | **2.19** | 55.50 | 66.6 | 6 | **4.33** | 110 | 2.CD.150370.XL | ■ |
| | **.1476** | 3.75 | **2.21** | 56.25 | 67.5 | 6 | **4.37** | 111 | 2.CD.150375.XL | ■ |
| | **.1496** | 3.80 | **2.24** | 57.00 | 68.4 | 6 | **4.41** | 112 | 2.CD.150380.XL | ■ |
| | **.1516** | 3.85 | **2.27** | 57.75 | 69.3 | 6 | **4.45** | 113 | 2.CD.150385.XL | ■ |
| | **.1535** | 3.90 | **2.30** | 58.50 | 70.2 | 6 | **4.49** | 114 | 2.CD.150390.XL | ■ |
| | **.1555** | 3.95 | **2.33** | 59.25 | 71.1 | 6 | **4.49** | 114 | 2.CD.150395.XL | ■ |
| **5/32** | **.1562** | 3.968 | **2.36** | 60.00 | 72.0 | 6 | **4.53** | 115 | 2.CD.150F532.XL | ■ |
| | **.1575** | 4.00 | **2.36** | 60.00 | 72.0 | 6 | **4.53** | 115 | 2.CD.150400.XL | ■ |
| | **.1614** | 4.10 | **2.42** | 61.50 | 73.8 | 6 | **4.61** | 117 | 2.CD.150410.XL | ■ |
| | **.1654** | 4.20 | **2.48** | 63.00 | 75.6 | 6 | **4.69** | 119 | 2.CD.150420.XL | ■ |
| | **.1693** | 4.30 | **2.54** | 64.50 | 77.4 | 6 | **4.72** | 120 | 2.CD.150430.XL | ■ |
| | **.1732** | 4.40 | **2.60** | 66.00 | 79.2 | 6 | **4.80** | 122 | 2.CD.150440.XL | ■ |
| | **.1772** | 4.50 | **2.66** | 67.50 | 81.0 | 6 | **4.88** | 124 | 2.CD.150450.XL | ■ |
| | **.1811** | 4.60 | **2.72** | 69.00 | 82.8 | 6 | **4.96** | 126 | 2.CD.150460.XL | ■ |
| | **.1850** | 4.70 | **2.78** | 70.50 | 84.6 | 6 | **5.00** | 127 | 2.CD.150470.XL | ■ |
| **3/16** | **.1875** | 4.762 | **2.83** | 72.00 | 86.4 | 6 | **5.08** | 129 | 2.CD.150F316.XL | ■ |
| | **.1890** | 4.80 | **2.83** | 72.00 | 86.4 | 6 | **5.08** | 129 | 2.CD.150480.XL | ■ |
| | **.1929** | 4.90 | **2.89** | 73.50 | 88.2 | 6 | **5.16** | 131 | 2.CD.150490.XL | ■ |
| | **.1969** | 5.00 | **2.95** | 75.00 | 90.0 | 6 | **5.24** | 133 | 2.CD.150500.XL | ■ |
| | **.2008** | 5.10 | **3.01** | 76.50 | 91.8 | 6 | **5.28** | 134 | 2.CD.150510.XL | ■ |
| | **.2047** | 5.20 | **3.07** | 78.00 | 93.6 | 6 | **5.35** | 136 | 2.CD.150520.XL | ■ |

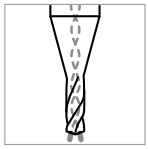
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.2087** | 5.30 | **3.13** | 79.50 | 95.4 | 6 | **5.43** | 138 | 2.CD.150530.XL | ■ |
| | **.2126** | 5.40 | **3.19** | 81.00 | 97.2 | 6 | **5.47** | 139 | 2.CD.150540.XL | ■ |
| | **.2165** | 5.50 | **3.25** | 82.50 | 99.0 | 6 | **5.55** | 141 | 2.CD.150550.XL | ■ |
| **7/32** | **.2189** | 5.560 | **3.31** | 84.00 | 100.8 | 6 | **5.63** | 143 | 2.CD.150F732.XL | ■ |
| | **.2205** | 5.60 | **3.31** | 84.00 | 100.8 | 6 | **5.63** | 143 | 2.CD.150560.XL | ■ |
| | **.2244** | 5.70 | **3.37** | 85.50 | 102.6 | 6 | **5.71** | 145 | 2.CD.150570.XL | ■ |
| | **.2283** | 5.80 | **3.43** | 87.00 | 104.4 | 6 | **5.75** | 146 | 2.CD.150580.XL | ■ |
| | **.2323** | 5.90 | **3.48** | 88.50 | 106.2 | 6 | **5.83** | 148 | 2.CD.150590.XL | ■ |
| | **.2362** | 6.00 | **3.54** | 90.00 | 108.0 | 6 | **5.91** | 150 | 2.CD.150600.XL | ■ |

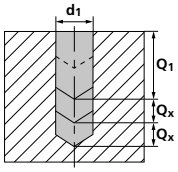
| Complementary products | |
|---|---|
| CrazyDrill Pilot | p.134 |
| CrazyDrill Coolpilot | p.156 |
| CrazyDrill Crosspilot | p.146 |

CRAZYDRILL by Mikron Tool Cool XL

# CrazyDrill Cool XL 15 x d

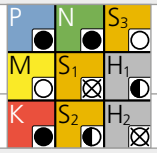
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| 197 | 140 \| 459 | 15xd1 | – |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 50 \| 164 | 130 \| 427 | 15xd1 | – |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 40 \| 131 | 100 \| 328 | 15xd1 | – |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 30 \| 98 | 60 197 | 15xd1 | – |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 40 \| 131 | 80 \| 262 | 15xd1 | – |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 30 \| 98 | 60 \| 197 | 5xd1 | 2xd1 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 80 \| 262 | 150 \| 492 | 15xd1 | – |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| 328 | 200 \| 656 | 15xd1 | – |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 80 \| 262 | 150 \| 492 | 15xd1 | – |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 \| 131 | 80 \| 262 | 2xd1 | 2xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 \| 131 | 80 \| 262 | 2xd1 | 2xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 50 \| 164 | 120 \| 394 | 15xd1 | – |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 40 \| 131 | 80 \| 262 | 15xd1 | – |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 25 \| 82 | 50 \| 164 | 3xd1 | 1xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| 66 | 40 \| 131 | 5xd1 | 1xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 20 \| 66 | 40 \| 131 | 5xd1 | 2xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 \| 66 | 40 \| 131 | 5xd1 | 1xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





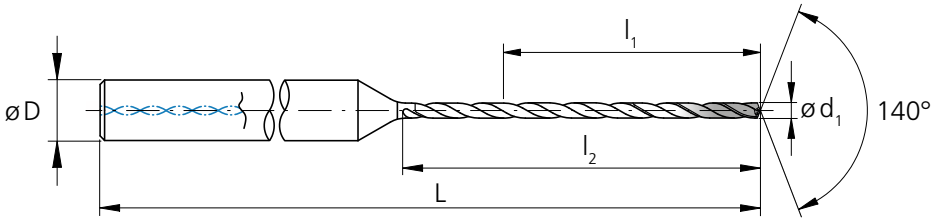

**f** [mm/rev] | **[IPR]**

| Ød1 | 1.0 mm \| .039" | 1.25 mm \| .049" | 1/16" 1.5 mm \| .059" | 2.0 mm \| .079" | 3/32" 2.5 mm \| .098" | 1/8" 3.0 mm \| .118" | 5/32" 4.0 mm \| .158" | 3/16" - 7/32" 5.0 mm \| .197" | 6.0 mm \| .236" |
|---|---|---|---|---|---|---|---|---|---|
| | f | f | f | f | f | f | f | f | f |
| | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.080 \| .0031 | 0.100 \| .0039 | 0.110 \| .0043 | 0.140 \| .0055 | 0.160 \| .0063 | 0.180 \| .0071 |
| | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.130 \| .0051 | 0.150 \| .0059 | 0.170 \| .0067 |
| | 0.040 \| .0016 | 0.045 \| .0018 | 0.055 \| .0022 | 0.070 \| .0028 | 0.085 \| .0033 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.160 \| .0063 |
| | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 |
| | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 |
| | | | | | | | | | |
| | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 0.060 \| .0024 | 0.075 \| .0030 | 0.090 \| .0035 | 0.110 \| .0043 | 0.140 \| .0055 | 0.166 \| .0065 | 0.200 \| .0079 | 0.230 \| .0091 | 0.250 \| .0098 |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.160 \| .0063 | 0.190 \| .0075 | 0.210 \| .0083 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.160 \| .0063 | 0.190 \| .0075 | 0.210 \| .0083 |
| | 0.040 \| .0016 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.150 \| .0059 | 0.180 \| .0071 | 0.200 \| .0079 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.200 \| .0079 |
| | | | | | | | | | |
| | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 |
| | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.0750 \| .0030 |
| | 0.010 \| .0004 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 |
| | 0.010 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0012 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | | | | | | | | | |

CRAZYDRILL by Mikron Tool Cool XL

# CrazyDrill Cool XL 20 x d

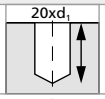
## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.787** | 20.0 | 23.0 | 4 | **2.48** | 63 | 2.CD.200100.XL | ■ |
| | **.0413** | 1.05 | **.827** | 21.0 | 24.2 | 4 | **2.52** | 64 | 2.CD.200105.XL | Δ |
| | **.0433** | 1.10 | **.866** | 22.0 | 25.3 | 4 | **2.56** | 65 | 2.CD.200110.XL | ■ |
| | **.0453** | 1.15 | **.906** | 23.0 | 26.5 | 4 | **2.60** | 66 | 2.CD.200115.XL | Δ |
| | **.0472** | 1.20 | **.945** | 24.0 | 27.6 | 4 | **2.68** | 68 | 2.CD.200120.XL | ■ |
| | **.0492** | 1.25 | **.984** | 25.0 | 28.8 | 4 | **2.72** | 69 | 2.CD.200125.XL | Δ |
| | **.0512** | 1.30 | **1.02** | 26.0 | 29.9 | 4 | **2.76** | 70 | 2.CD.200130.XL | ■ |
| | **.0531** | 1.35 | **1.06** | 27.0 | 31.1 | 4 | **2.80** | 71 | 2.CD.200135.XL | Δ |
| | **.0551** | 1.40 | **1.10** | 28.0 | 32.2 | 4 | **2.83** | 72 | 2.CD.200140.XL | ■ |
| | **.0571** | 1.45 | **1.14** | 29.0 | 33.4 | 4 | **2.87** | 73 | 2.CD.200145.XL | Δ |
| | **.0591** | 1.50 | **1.18** | 30.0 | 34.5 | 4 | **2.91** | 74 | 2.CD.200150.XL | ■ |
| | **.0610** | 1.55 | **1.22** | 31.0 | 35.7 | 4 | **2.95** | 75 | 2.CD.200155.XL | Δ |
| **1/16** | **.0625** | 1.587 | **1.26** | 32.0 | 36.8 | 4 | **2.99** | 76 | 2.CD.200F116.XL | ■ |
| | **.0630** | 1.60 | **1.26** | 32.0 | 36.8 | 4 | **2.99** | 76 | 2.CD.200160.XL | ■ |
| | **.0650** | 1.65 | **1.30** | 33.0 | 38.0 | 4 | **3.07** | 78 | 2.CD.200165.XL | Δ |
| | **.0669** | 1.70 | **1.34** | 34.0 | 39.1 | 4 | **3.11** | 79 | 2.CD.200170.XL | ■ |
| | **.0689** | 1.75 | **1.38** | 35.0 | 40.3 | 4 | **3.15** | 80 | 2.CD.200175.XL | Δ |
| | **.0709** | 1.80 | **1.42** | 36.0 | 41.4 | 4 | **3.19** | 81 | 2.CD.200180.XL | ■ |
| | **.0728** | 1.85 | **1.46** | 37.0 | 42.6 | 4 | **3.23** | 82 | 2.CD.200185.XL | Δ |
| | **.0748** | 1.90 | **1.50** | 38.0 | 43.7 | 4 | **3.27** | 83 | 2.CD.200190.XL | ■ |
| | **.0768** | 1.95 | **1.54** | 39.0 | 44.9 | 4 | **3.31** | 84 | 2.CD.200195.XL | Δ |
| | **.0787** | 2.00 | **1.57** | 40.0 | 46.0 | 4 | **3.35** | 85 | 2.CD.200200.XL | ■ |
| | **.0807** | 2.05 | **1.61** | 41.0 | 47.2 | 4 | **3.39** | 86 | 2.CD.200205.XL | Δ |
| | **.0827** | 2.10 | **1.65** | 42.0 | 48.3 | 4 | **3.46** | 88 | 2.CD.200210.XL | ■ |
| | **.0846** | 2.15 | **1.69** | 43.0 | 49.5 | 4 | **3.50** | 89 | 2.CD.200215.XL | Δ |
| | **.0866** | 2.20 | **1.73** | 44.0 | 50.6 | 4 | **3.54** | 90 | 2.CD.200220.XL | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0886** | 2.25 | **1.77** | 45.0 | 51.8 | 4 | **3.58** | 91 | 2.CD.200225.XL | Δ |
| | **.0906** | 2.30 | **1.81** | 46.0 | 52.9 | 4 | **3.62** | 92 | 2.CD.200230.XL | ■ |
| | **.0925** | 2.35 | **1.85** | 47.0 | 54.1 | 4 | **3.66** | 93 | 2.CD.200235.XL | Δ |
| **3/32** | **.0937** | 2.381 | **1.89** | 48.0 | 55.2 | 4 | **3.70** | 94 | 2.CD.200F332.XL | ■ |
| | **.0945** | 2.40 | **1.89** | 48.0 | 55.2 | 4 | **3.70** | 94 | 2.CD.200240.XL | ■ |
| | **.0965** | 2.45 | **1.93** | 49.0 | 56.4 | 4 | **3.74** | 95 | 2.CD.200245.XL | Δ |
| | **.0984** | 2.50 | **1.97** | 50.0 | 57.5 | 4 | **3.78** | 96 | 2.CD.200250.XL | ■ |
| | **.1004** | 2.55 | **2.01** | 51.0 | 58.7 | 4 | **3.82** | 97 | 2.CD.200255.XL | Δ |
| | **.1024** | 2.60 | **2.05** | 52.0 | 59.8 | 4 | **3.90** | 99 | 2.CD.200260.XL | ■ |
| | **.1043** | 2.65 | **2.09** | 53.0 | 61.0 | 4 | **3.94** | 100 | 2.CD.200265.XL | Δ |
| | **.1063** | 2.70 | **2.13** | 54.0 | 62.1 | 4 | **3.98** | 101 | 2.CD.200270.XL | ■ |
| | **.1083** | 2.75 | **2.17** | 55.0 | 63.3 | 4 | **4.02** | 102 | 2.CD.200275.XL | Δ |
| | **.1102** | 2.80 | **2.20** | 56.0 | 64.4 | 4 | **4.06** | 103 | 2.CD.200280.XL | ■ |
| | **.1122** | 2.85 | **2.24** | 57.0 | 65.6 | 4 | **4.09** | 104 | 2.CD.200285.XL | Δ |
| | **.1142** | 2.90 | **2.28** | 58.0 | 66.7 | 4 | **4.13** | 105 | 2.CD.200290.XL | ■ |
| | **.1161** | 2.95 | **2.32** | 59.0 | 67.9 | 4 | **4.17** | 106 | 2.CD.200295.XL | Δ |
| | **.1181** | 3.00 | **2.36** | 60.0 | 69.0 | 4 | **4.21** | 107 | 2.CD.200300.XL | ■ |
| | **.1201** | 3.05 | **2.40** | 61.0 | 70.2 | 6 | **4.49** | 114 | 2.CD.200305.XL | Δ |
| | **.1220** | 3.10 | **2.44** | 62.0 | 71.3 | 6 | **4.53** | 115 | 2.CD.200310.XL | ■ |
| | **.1240** | 3.15 | **2.48** | 63.0 | 72.5 | 6 | **4.61** | 117 | 2.CD.200315.XL | Δ |
| **1/8** | **.1250** | 3.175 | **2.52** | 64.0 | 73.6 | 6 | **4.65** | 118 | 2.CD.200F18.XL | ■ |
| | **.1260** | 3.20 | **2.52** | 64.0 | 73.6 | 6 | **4.65** | 118 | 2.CD.200320.XL | ■ |
| | **.1280** | 3.25 | **2.56** | 65.0 | 74.8 | 6 | **4.69** | 119 | 2.CD.200325.XL | Δ |
| | **.1299** | 3.30 | **2.60** | 66.0 | 75.9 | 6 | **4.72** | 120 | 2.CD.200330.XL | ■ |
| | **.1319** | 3.35 | **2.64** | 67.0 | 77.1 | 6 | **4.76** | 121 | 2.CD.200335.XL | Δ |
| | **.1339** | 3.40 | **2.68** | 68.0 | 78.2 | 6 | **4.80** | 122 | 2.CD.200340.XL | ■ |

■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide |  |  | Z2 |  | 

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | |
|---|---|---|---|---|
| Tolerance | **+ .00024"**<br>**0** | + 0.006 mm<br>0 | **+ .00035"**<br>**+ .00004"** | + 0.009 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1358** | 3.45 | **2.72** | 69.0 | 79.4 | 6 | **4.84** | 123 | 2.CD.200345.XL | Δ |
| | **.1378** | 3.50 | **2.76** | 70.0 | 80.5 | 6 | **4.88** | 124 | 2.CD.200350.XL | ■ |
| | **.1398** | 3.55 | **2.80** | 71.0 | 81.7 | 6 | **4.96** | 125 | 2.CD.200355.XL | Δ |
| | **.1417** | 3.60 | **2.83** | 72.0 | 82.8 | 6 | **5.00** | 126 | 2.CD.200360.XL | ■ |
| | **.1437** | 3.65 | **2.87** | 73.0 | 84.0 | 6 | **5.04** | 128 | 2.CD.200365.XL | Δ |
| | **.1457** | 3.70 | **2.91** | 74.0 | 85.1 | 6 | **5.08** | 129 | 2.CD.200370.XL | ■ |
| | **.1476** | 3.75 | **2.95** | 75.0 | 86.3 | 6 | **5.12** | 130 | 2.CD.200375.XL | Δ |
| | **.1496** | 3.80 | **2.99** | 76.0 | 87.4 | 6 | **5.16** | 131 | 2.CD.200380.XL | ■ |
| | **.1516** | 3.85 | **3.03** | 77.0 | 88.6 | 6 | **5.20** | 132 | 2.CD.200385.XL | Δ |
| | **.1535** | 3.90 | **3.07** | 78.0 | 89.7 | 6 | **5.24** | 133 | 2.CD.200390.XL | ■ |
| | **.1555** | 3.95 | **3.11** | 79.0 | 90.9 | 6 | **5.28** | 134 | 2.CD.200395.XL | Δ |
| **5/32** | **.1562** | 3.968 | **3.15** | 80.0 | 92.0 | 6 | **5.31** | 135 | 2.CD.200F532.XL | ■ |
| | **.1575** | 4.00 | **3.15** | 80.0 | 92.0 | 6 | **5.31** | 135 | 2.CD.200400.XL | ■ |
| | **.1614** | 4.10 | **3.23** | 82.0 | 94.3 | 6 | **5.43** | 138 | 2.CD.200410.XL | ■ |
| | **.1654** | 4.20 | **3.31** | 84.0 | 96.6 | 6 | **5.51** | 140 | 2.CD.200420.XL | ■ |
| | **.1693** | 4.30 | **3.39** | 86.0 | 98.9 | 6 | **5.59** | 142 | 2.CD.200430.XL | ■ |
| | **.1732** | 4.40 | **3.46** | 88.0 | 101.2 | 6 | **5.67** | 144 | 2.CD.200440.XL | ■ |
| | **.1772** | 4.50 | **3.54** | 90.0 | 103.5 | 6 | **5.75** | 146 | 2.CD.200450.XL | ■ |
| | **.1811** | 4.60 | **3.62** | 92.0 | 105.8 | 6 | **5.87** | 149 | 2.CD.200460.XL | ■ |
| | **.1850** | 4.70 | **3.70** | 94.0 | 108.1 | 6 | **5.94** | 151 | 2.CD.200470.XL | ■ |
| **3/16** | **.1875** | 4.762 | **3.78** | 96.0 | 110.4 | 6 | **6.02** | 153 | 2.CD.200F316.XL | ■ |
| | **.1890** | 4.80 | **3.78** | 96.0 | 110.4 | 6 | **6.02** | 153 | 2.CD.200480.XL | ■ |
| | **.1929** | 4.90 | **3.86** | 98.0 | 112.7 | 6 | **6.10** | 155 | 2.CD.200490.XL | ■ |
| | **.1969** | 5.00 | **3.94** | 100.0 | 115.0 | 6 | **6.22** | 158 | 2.CD.200500.XL | ■ |
| | **.2008** | 5.10 | **4.02** | 102.0 | 117.3 | 6 | **6.30** | 160 | 2.CD.200510.XL | ■ |
| | **.2047** | 5.20 | **4.09** | 104.0 | 119.6 | 6 | **6.38** | 162 | 2.CD.200520.XL | ■ |

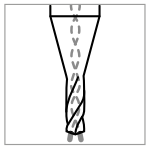
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.2087** | 5.30 | **4.17** | 106.0 | 121.9 | 6 | **6.46** | 164 | 2.CD.200530.XL | ■ |
| | **.2126** | 5.40 | **4.25** | 108.0 | 124.2 | 6 | **6.54** | 166 | 2.CD.200540.XL | ■ |
| | **.2165** | 5.50 | **4.33** | 110.0 | 126.5 | 6 | **6.65** | 169 | 2.CD.200550.XL | ■ |
| **7/32** | **.2189** | 5.560 | **4.41** | 112.0 | 128.8 | 6 | **6.73** | 171 | 2.CD.200F732.XL | ■ |
| | **.2205** | 5.60 | **4.41** | 112.0 | 128.8 | 6 | **6.73** | 171 | 2.CD.200560.XL | ■ |
| | **.2244** | 5.70 | **4.49** | 114.0 | 131.1 | 6 | **6.81** | 173 | 2.CD.200570.XL | ■ |
| | **.2283** | 5.80 | **4.57** | 116.0 | 133.4 | 6 | **6.89** | 175 | 2.CD.200580.XL | ■ |
| | **.2323** | 5.90 | **4.65** | 118.0 | 135.7 | 6 | **6.97** | 177 | 2.CD.200590.XL | ■ |
| | **.2362** | 6.00 | **4.72** | 120.0 | 138.0 | 6 | **7.09** | 180 | 2.CD.200600.XL | ■ |

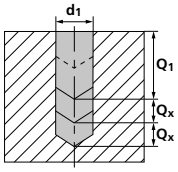
| Complementary products | |
|---|---|
| CrazyDrill Pilot | p.134 |
| CrazyDrill Coolpilot | p.156 |
| CrazyDrill Crosspilot | p.146 |

CRAZYDRILL by Mikron Tool Cool XL

# CrazyDrill Cool XL 20 x d

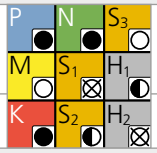
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| 197 | 120 \| 394 | 20xd1 | – |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 50 \| 164 | 120 \| 394 | 20xd1 | – |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 40 \| 131 | 100 \| 328 | 20xd1 | – |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 30 \| 98 | 60 197 | 20xd1 | – |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 40 \| 131 | 80 \| 262 | 20xd1 | – |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 30 \| 98 | 60 \| 197 | 5xd1 | 2xd1 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 80 \| 262 | 150 \| 492 | 20xd1 | – |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| 328 | 200 \| 656 | 20xd1 | – |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 80 \| 262 | 150 \| 492 | 20xd1 | – |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 \| 131 | 80 \| 262 | 2xd1 | 2xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 \| 131 | 80 \| 262 | 2xd1 | 2xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 50 \| 164 | 120 \| 394 | 20xd1 | – |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 40 \| 131 | 80 \| 262 | 20xd1 | – |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 25 \| 82 | 50 \| 164 | 3xd1 | 1xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| 66 | 40 \| 131 | 5xd1 | 1xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 20 \| 66 | 40 \| 131 | 5xd1 | 2xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 \| 66 | 40 \| 131 | 5xd1 | 1xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





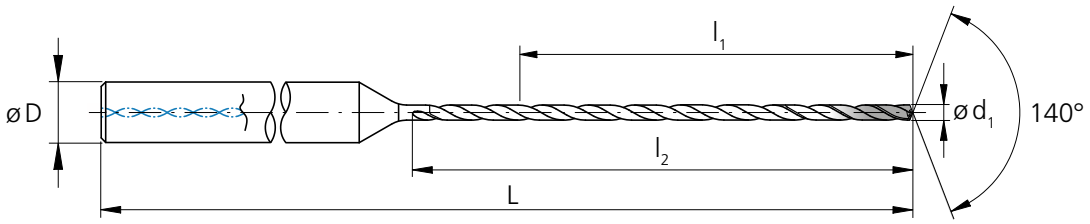

**f** [mm/rev] | **[IPR]**

| Ød1 | 1.0 mm \| .039" | 1.25 mm \| .049" | 1/16" 1.5 mm \| .059" | 2.0 mm \| .079" | 3/32" 2.5 mm \| .098" | 1/8" 3.0 mm \| .118" | 5/32" 4.0 mm \| .158" | 3/16" - 7/32" 5.0 mm \| .197" | 6.0 mm \| .236" |
|---|---|---|---|---|---|---|---|---|---|
| | f | f | f | f | f | f | f | f | f |
| | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.080 \| .0031 | 0.100 \| .0039 | 0.110 \| .0043 | 0.140 \| .0055 | 0.160 \| .0063 | 0.180 \| .0071 |
| | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.080 \| .0031 | 0.090 \| .0035 | 0.100 \| .0039 | 0.130 \| .0051 | 0.150 \| .0059 | 0.170 \| .0067 |
| | 0.040 \| .0016 | 0.045 \| .0018 | 0.055 \| .0022 | 0.070 \| .0028 | 0.085 \| .0033 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.160 \| .0063 |
| | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 |
| | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 |
| | | | | | | | | | |
| | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.170 \| .0067 | 0.180 \| .0071 |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.160 \| .0063 | 0.190 \| .0075 | 0.210 \| .0083 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.160 \| .0063 | 0.190 \| .0075 | 0.210 \| .0083 |
| | 0.040 \| .0016 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.150 \| .0059 | 0.180 \| .0071 | 0.200 \| .0079 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.200 \| .0079 |
| | | | | | | | | | |
| | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 |
| | 0.020 \| .0008 | 0.030 \| .0012 | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.065 \| .0026 | 0.070 \| .0028 | 0.075 \| .0030 |
| | 0.010 \| .0004 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 |
| | 0.010 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0012 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | | | | | | | | | |

CRAZYDRILL by Mikron Tool Cool XL

# CrazyDrill Cool XL 30 x d

## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **1.18** | 30.0 | 33.0 | 4 | **2.87** | 73 | 2.CD.300100.XL | ■ |
| | **.0413** | 1.05 | **1.24** | 31.5 | 34.7 | 4 | **2.95** | 75 | 2.CD.300105.XL | Δ |
| | **.0433** | 1.10 | **1.30** | 33.0 | 36.3 | 4 | **2.99** | 76 | 2.CD.300110.XL | ■ |
| | **.0453** | 1.15 | **1.36** | 34.5 | 38.0 | 4 | **3.07** | 78 | 2.CD.300115.XL | Δ |
| | **.0472** | 1.20 | **1.42** | 36.0 | 39.6 | 4 | **3.15** | 80 | 2.CD.300120.XL | ■ |
| | **.0492** | 1.25 | **1.48** | 37.5 | 41.3 | 4 | **3.19** | 81 | 2.CD.300125.XL | Δ |
| | **.0512** | 1.30 | **1.54** | 39.0 | 42.9 | 4 | **3.27** | 83 | 2.CD.300130.XL | ■ |
| | **.0531** | 1.35 | **1.59** | 40.5 | 44.6 | 4 | **3.31** | 84 | 2.CD.300135.XL | Δ |
| | **.0551** | 1.40 | **1.65** | 42.0 | 46.2 | 4 | **3.39** | 86 | 2.CD.300140.XL | ■ |
| | **.0571** | 1.45 | **1.71** | 43.5 | 47.9 | 4 | **3.46** | 88 | 2.CD.300145.XL | Δ |
| | **.0591** | 1.50 | **1.77** | 45.0 | 49.5 | 4 | **3.50** | 89 | 2.CD.300150.XL | ■ |
| | **.0610** | 1.55 | **1.83** | 46.5 | 51.2 | 4 | **3.58** | 91 | 2.CD.300155.XL | Δ |
| **1/16** | **.0625** | 1.587 | **1.89** | 48.0 | 52.8 | 4 | **3.62** | 92 | 2.CD.300F116.XL | ■ |
| | **.0630** | 1.60 | **1.89** | 48.0 | 52.8 | 4 | **3.62** | 92 | 2.CD.300160.XL | ■ |
| | **.0650** | 1.65 | **1.95** | 49.5 | 54.5 | 4 | **3.70** | 94 | 2.CD.300165.XL | Δ |
| | **.0669** | 1.70 | **2.01** | 51.0 | 56.1 | 4 | **3.78** | 96 | 2.CD.300170.XL | ■ |
| | **.0689** | 1.75 | **2.07** | 52.5 | 57.8 | 4 | **3.82** | 97 | 2.CD.300175.XL | Δ |
| | **.0709** | 1.80 | **2.13** | 54.0 | 59.4 | 4 | **3.90** | 99 | 2.CD.300180.XL | ■ |
| | **.0728** | 1.85 | **2.19** | 55.5 | 61.1 | 4 | **3.94** | 100 | 2.CD.300185.XL | Δ |
| | **.0748** | 1.90 | **2.24** | 57.0 | 62.7 | 4 | **4.02** | 102 | 2.CD.300190.XL | ■ |
| | **.0768** | 1.95 | **2.30** | 58.5 | 64.4 | 4 | **4.09** | 104 | 2.CD.300195.XL | Δ |
| | **.0787** | 2.00 | **2.36** | 60.0 | 66.0 | 4 | **4.13** | 105 | 2.CD.300200.XL | ■ |
| | **.0807** | 2.05 | **2.42** | 61.5 | 67.7 | 4 | **4.21** | 107 | 2.CD.300205.XL | Δ |
| | **.0827** | 2.10 | **2.48** | 63.0 | 69.3 | 4 | **4.29** | 109 | 2.CD.300210.XL | ■ |
| | **.0846** | 2.15 | **2.54** | 64.5 | 71.0 | 4 | **4.33** | 110 | 2.CD.300215.XL | Δ |
| | **.0866** | 2.20 | **2.60** | 66.0 | 72.6 | 4 | **4.41** | 112 | 2.CD.300220.XL | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0886** | 2.25 | **2.66** | 67.5 | 74.3 | 4 | **4.45** | 113 | 2.CD.300225.XL | Δ |
| | **.0906** | 2.30 | **2.72** | 69.0 | 75.9 | 4 | **4.53** | 115 | 2.CD.300230.XL | ■ |
| | **.0925** | 2.35 | **2.78** | 70.5 | 77.6 | 4 | **4.61** | 117 | 2.CD.300235.XL | Δ |
| **3/32** | **.0937** | 2.381 | **2.83** | 72.0 | 79.2 | 4 | **4.65** | 118 | 2.CD.300F332.XL | ■ |
| | **.0945** | 2.40 | **2.83** | 72.0 | 79.2 | 4 | **4.65** | 118 | 2.CD.300240.XL | ■ |
| | **.0965** | 2.45 | **2.89** | 73.5 | 80.9 | 4 | **4.72** | 120 | 2.CD.300245.XL | Δ |
| | **.0984** | 2.50 | **2.95** | 75.0 | 82.5 | 4 | **4.76** | 121 | 2.CD.300250.XL | ■ |
| | **.1004** | 2.55 | **3.01** | 76.5 | 84.2 | 4 | **4.84** | 123 | 2.CD.300255.XL | Δ |
| | **.1024** | 2.60 | **3.07** | 78.0 | 85.8 | 4 | **4.92** | 125 | 2.CD.300260.XL | ■ |
| | **.1043** | 2.65 | **3.13** | 79.5 | 87.5 | 4 | **4.96** | 126 | 2.CD.300265.XL | Δ |
| | **.1063** | 2.70 | **3.19** | 81.0 | 89.1 | 4 | **5.04** | 128 | 2.CD.300270.XL | ■ |
| | **.1083** | 2.75 | **3.25** | 82.5 | 90.8 | 4 | **5.08** | 129 | 2.CD.300275.XL | Δ |
| | **.1102** | 2.80 | **3.31** | 84.0 | 92.4 | 4 | **5.16** | 131 | 2.CD.300280.XL | ■ |
| | **.1122** | 2.85 | **3.37** | 85.5 | 94.1 | 4 | **5.24** | 133 | 2.CD.300285.XL | Δ |
| | **.1142** | 2.90 | **3.43** | 87.0 | 95.7 | 4 | **5.28** | 134 | 2.CD.300290.XL | ■ |
| | **.1161** | 2.95 | **3.48** | 88.5 | 97.4 | 4 | **5.35** | 136 | 2.CD.300295.XL | Δ |
| | **.1181** | 3.00 | **3.54** | 90.0 | 99.0 | 4 | **5.39** | 137 | 2.CD.300300.XL | ■ |
| | **.1201** | 3.05 | **3.60** | 91.5 | 100.7 | 6 | **5.71** | 145 | 2.CD.300305.XL | Δ |
| | **.1220** | 3.10 | **3.66** | 93.0 | 102.3 | 6 | **5.75** | 146 | 2.CD.300310.XL | ■ |
| | **.1240** | 3.15 | **3.72** | 94.5 | 104.0 | 6 | **5.83** | 148 | 2.CD.300315.XL | Δ |
| **1/8** | **.1250** | 3.175 | **3.78** | 96.0 | 105.6 | 6 | **5.91** | 150 | 2.CD.300F18.XL | ■ |
| | **.1260** | 3.20 | **3.78** | 96.0 | 105.6 | 6 | **5.91** | 150 | 2.CD.300320.XL | ■ |
| | **.1280** | 3.25 | **3.84** | 97.5 | 107.3 | 6 | **5.94** | 151 | 2.CD.300325.XL | Δ |
| | **.1299** | 3.30 | **3.90** | 99.0 | 108.9 | 6 | **6.02** | 153 | 2.CD.300330.XL | ■ |
| | **.1319** | 3.35 | **3.96** | 100.5 | 110.6 | 6 | **6.06** | 154 | 2.CD.300335.XL | Δ |
| | **.1339** | 3.40 | **4.02** | 102.0 | 112.2 | 6 | **6.14** | 156 | 2.CD.300340.XL | ■ |

■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide | 30xd$_1$ | 140° | Z2 | eXedur SL

| Ø d$_1$ | .004" - .118" (0.1 - 3.0 mm) | | .120" - .236" (3.05 - 6.0 mm) | |
|---|---|---|---|---|
| Tolerance | + .00024"<br>0 | + 0.006 mm<br>0 | + .00035"<br>+ .00004" | + 0.009 mm<br>+ 0.001 mm |

| d$_1$ [inch] | d$_1$ [inch] | d$_1$ [mm] | l$_1$ [inch] | l$_1$ [mm] | l$_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1358 | 3.45 | 4.07 | 103.5 | 113.9 | 6 | 6.22 | 158 | 2.CD.300345.XL | Δ |
| | .1378 | 3.50 | 4.13 | 105.0 | 115.5 | 6 | 6.26 | 159 | 2.CD.300350.XL | ■ |
| | .1398 | 3.55 | 4.19 | 106.5 | 117.2 | 6 | 6.34 | 161 | 2.CD.300355.XL | Δ |
| | .1417 | 3.60 | 4.25 | 108.0 | 118.8 | 6 | 6.38 | 162 | 2.CD.300360.XL | ■ |
| | .1437 | 3.65 | 4.31 | 109.5 | 120.5 | 6 | 6.46 | 164 | 2.CD.300365.XL | Δ |
| | .1457 | 3.70 | 4.37 | 111.0 | 122.1 | 6 | 6.54 | 166 | 2.CD.300370.XL | ■ |
| | .1476 | 3.75 | 4.43 | 112.5 | 123.8 | 6 | 6.57 | 167 | 2.CD.300375.XL | Δ |
| | .1496 | 3.80 | 4.49 | 114.0 | 125.4 | 6 | 6.65 | 169 | 2.CD.300380.XL | ■ |
| | .1516 | 3.85 | 4.55 | 115.5 | 127.1 | 6 | 6.73 | 171 | 2.CD.300385.XL | Δ |
| | .1535 | 3.90 | 4.61 | 117.0 | 128.7 | 6 | 6.77 | 172 | 2.CD.300390.XL | ■ |
| | .1555 | 3.95 | 4.67 | 118.5 | 130.4 | 6 | 6.85 | 174 | 2.CD.300395.XL | Δ |
| 5/32 | .1562 | 3.968 | 4.72 | 120.0 | 132.0 | 6 | 6.89 | 175 | 2.CD.300F532.XL | ■ |
| | .1575 | 4.00 | 4.72 | 120.0 | 132.0 | 6 | 6.89 | 175 | 2.CD.300400.XL | ■ |
| | .1614 | 4.10 | 4.84 | 123.0 | 135.3 | 6 | 7.05 | 179 | 2.CD.300410.XL | ■ |
| | .1654 | 4.20 | 4.96 | 126.0 | 138.6 | 6 | 7.17 | 182 | 2.CD.300420.XL | ■ |
| | .1693 | 4.30 | 5.08 | 129.0 | 141.9 | 6 | 7.28 | 185 | 2.CD.300430.XL | ■ |
| | .1732 | 4.40 | 5.20 | 132.0 | 145.2 | 6 | 7.40 | 188 | 2.CD.300440.XL | ■ |
| | .1772 | 4.50 | 5.31 | 135.0 | 148.5 | 6 | 7.52 | 191 | 2.CD.300450.XL | ■ |
| | .1811 | 4.60 | 5.43 | 138.0 | 151.8 | 6 | 7.68 | 195 | 2.CD.300460.XL | ■ |
| | .1850 | 4.70 | 5.55 | 141.0 | 155.1 | 6 | 7.80 | 198 | 2.CD.300470.XL | ■ |
| 3/16 | .1875 | 4.762 | 5.67 | 144.0 | 158.4 | 6 | 7.91 | 201 | 2.CD.300F316.XL | ■ |
| | .1890 | 4.80 | 5.67 | 144.0 | 158.4 | 6 | 7.91 | 201 | 2.CD.300480.XL | ■ |
| | .1929 | 4.90 | 5.79 | 147.0 | 161.7 | 6 | 8.03 | 204 | 2.CD.300490.XL | ■ |
| | .1969 | 5.00 | 5.91 | 150.0 | 165.0 | 6 | 8.19 | 208 | 2.CD.300500.XL | ■ |
| | .2008 | 5.10 | 6.02 | 153.0 | 168.3 | 6 | 8.31 | 211 | 2.CD.300510.XL | ■ |
| | .2047 | 5.20 | 6.14 | 156.0 | 171.6 | 6 | 8.43 | 214 | 2.CD.300520.XL | ■ |

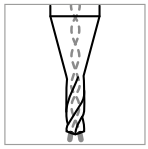
| d$_1$ [inch] | d$_1$ [inch] | d$_1$ [mm] | l$_1$ [inch] | l$_1$ [mm] | l$_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .2087 | 5.30 | 6.26 | 159.0 | 174.9 | 6 | 8.54 | 217 | 2.CD.300530.XL | ■ |
| | .2126 | 5.40 | 6.38 | 162.0 | 178.2 | 6 | 8.66 | 220 | 2.CD.300540.XL | ■ |
| | .2165 | 5.50 | 6.50 | 165.0 | 181.5 | 6 | 8.82 | 224 | 2.CD.300550.XL | ■ |
| 7/32 | .2189 | 5.560 | 6.61 | 168.0 | 184.8 | 6 | 8.94 | 227 | 2.CD.300F732.XL | ■ |
| | .2205 | 5.60 | 6.61 | 168.0 | 184.8 | 6 | 8.94 | 227 | 2.CD.300560.XL | ■ |
| | .2244 | 5.70 | 6.73 | 171.0 | 188.1 | 6 | 9.06 | 230 | 2.CD.300570.XL | ■ |
| | .2283 | 5.80 | 6.85 | 174.0 | 191.4 | 6 | 9.17 | 233 | 2.CD.300580.XL | ■ |
| | .2323 | 5.90 | 6.97 | 177.0 | 194.7 | 6 | 9.29 | 236 | 2.CD.300590.XL | ■ |
| | .2362 | 6.00 | 7.09 | 180.0 | 198.0 | 6 | 9.45 | 240 | 2.CD.300600.XL | ■ |

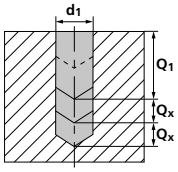
| Complementary products | |
|---|---|
| CrazyDrill Pilot | p.134 |
| CrazyDrill Coolpilot | p.156 |
| CrazyDrill Crosspilot | p.146 |

CRAZYDRILL by Mikron Tool Cool XL

# CrazyDrill Cool XL 30 x d

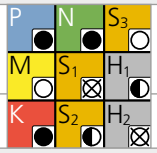
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 50 \| 164 | 120 \| 394 | 30xd1 | – |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 50 \| 164 | 120 \| 394 | 30xd1 | – |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 40 \| 131 | 100 \| 328 | 30xd1 | – |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 30 \| 98 | 60 197 | 30xd1 | – |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 40 \| 131 | 80 \| 262 | 30xd1 | – |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 30 \| 98 | 60 \| 197 | 5xd1 | 2xd1 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 80 \| 262 | 150 \| 492 | 30xd1 | – |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| 328 | 200 \| 656 | 30xd1 | – |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 80 \| 262 | 150 \| 492 | 30xd1 | – |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 \| 131 | 80 \| 262 | 2xd1 | 2xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 \| 131 | 80 \| 262 | 2xd1 | 2xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 50 \| 164 | 120 \| 394 | 30xd1 | – |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 40 \| 131 | 80 \| 262 | 30xd1 | – |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 25 \| 82 | 50 \| 164 | 3xd1 | 1xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| 66 | 40 \| 131 | 5xd1 | 1xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 20 \| 66 | 40 \| 131 | 5xd1 | 2xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 \| 66 | 40 \| 131 | 5xd1 | 1xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





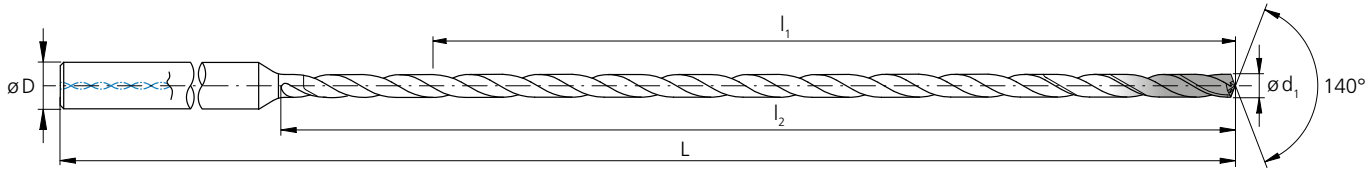

**f** [mm/rev] | **[IPR]**

| Ød1 | 1.0 mm \| .039" | 1.25 mm \| .049" | 1/16" 1.5 mm \| .059" | 2.0 mm \| .079" | 3/32" 2.5 mm \| .098" | 1/8" 3.0 mm \| .118" | 5/32" 4.0 mm \| .158" | 3/16" - 7/32" 5.0 mm \| .197" | 6.0 mm \| .236" |
|---|---|---|---|---|---|---|---|---|---|
| | f | f | f | f | f | f | f | f | f |
| | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.065 \| .0026 | 0.075 \| .0030 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.130 \| .0051 |
| | 0.035 \| .0014 | 0.040 \| .0016 | 0.050 \| .0020 | 0.065 \| .0026 | 0.075 \| .0030 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.130 \| .0051 |
| | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 | 0.110 \| .0043 | 0.120 \| .0047 |
| | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 |
| | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 |
| | | | | | | | | | |
| | 0.025 \| .0010 | 0.030 \| .0012 | 0.035 \| .0014 | 0.045 \| .0018 | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.095 \| .0037 | 0.100 \| .0039 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.170 \| .0067 | 0.180 \| .0071 |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.100 \| .0039 | 0.110 \| .0043 | 0.130 \| .0051 | 0.160 \| .0063 | 0.190 \| .0075 | 0.210 \| .0083 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.050 \| .0020 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.160 \| .0063 | 0.190 \| .0075 | 0.210 \| .0083 |
| | 0.040 \| .0016 | 0.060 \| .0024 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.120 \| .0047 | 0.150 \| .0059 | 0.180 \| .0071 | 0.200 \| .0079 |
| | 0.055 \| .0022 | 0.065 \| .0026 | 0.080 \| .0031 | 0.100 \| .0039 | 0.120 \| .0047 | 0.140 \| .0055 | 0.180 \| .0071 | 0.210 \| .0083 | 0.230 \| .0091 |
| | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.070 \| .0028 | 0.090 \| .0035 | 0.110 \| .0043 | 0.130 \| .0051 | 0.150 \| .0059 | 0.200 \| .0079 |
| | | | | | | | | | |
| | 0.005 \| .0002 | 0.010 \| .0004 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 |
| | 0.005 \| .0002 | 0.010 \| .0004 | 0.020 \| .0008 | 0.030 \| .0012 | 0.040 \| .0016 | 0.055 \| .0022 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 |
| | 0.005 \| .0002 | 0.010 \| .0004 | 0.020 \| .0008 | 0.020 \| .0008 | 0.040 \| .0016 | 0.055 \| .0022 | 0.070 \| .0028 | 0.080 \| .0031 | 0.100 \| .0039 |
| | 0.010 \| .0004 | 0.012 \| .0005 | 0.015 \| .0006 | 0.020 \| .0008 | 0.025 \| .0010 | 0.030 \| .0012 | 0.040 \| .0016 | 0.050 \| .0020 | 0.060 \| .0024 |
| | | | | | | | | | |

CRAZYDRILL by Mikron Tool Cool XL

# CrazyDrill Cool XL 40 x d

## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0787** | 2.00 | **3.15** | 80.0 | 86.0 | 4 | **4.92** | 125 | 2.CD.400200.XL | ■ |
| | **.0807** | 2.05 | **3.23** | 82.0 | 88.2 | 4 | **5.00** | 127 | 2.CD.400205.XL | Δ |
| | **.0827** | 2.10 | **3.31** | 84.0 | 90.3 | 4 | **5.12** | 130 | 2.CD.400210.XL | ■ |
| | **.0846** | 2.15 | **3.39** | 86.0 | 92.5 | 4 | **5.20** | 132 | 2.CD.400215.XL | Δ |
| | **.0866** | 2.20 | **3.46** | 88.0 | 94.6 | 4 | **5.28** | 134 | 2.CD.400220.XL | ■ |
| | **.0886** | 2.25 | **3.54** | 90.0 | 96.8 | 4 | **5.35** | 136 | 2.CD.400225.XL | Δ |
| | **.0906** | 2.30 | **3.62** | 92.0 | 98.9 | 4 | **5.43** | 138 | 2.CD.400230.XL | ■ |
| | **.0925** | 2.35 | **3.70** | 94.0 | 101.1 | 4 | **5.51** | 140 | 2.CD.400235.XL | Δ |
| **3/32** | **.0937** | 2.381 | **3.78** | 96.0 | 103.2 | 4 | **5.59** | 142 | 2.CD.400F332.XL | ■ |
| | **.0945** | 2.40 | **3.78** | 96.0 | 103.2 | 4 | **5.59** | 142 | 2.CD.400240.XL | ■ |
| | **.0965** | 2.45 | **3.86** | 98.0 | 105.4 | 4 | **5.67** | 144 | 2.CD.400245.XL | Δ |
| | **.0984** | 2.50 | **3.94** | 100.0 | 107.5 | 4 | **5.75** | 146 | 2.CD.400250.XL | ■ |
| | **.1004** | 2.55 | **4.02** | 102.0 | 109.7 | 4 | **5.83** | 148 | 2.CD.400255.XL | Δ |
| | **.1024** | 2.60 | **4.09** | 104.0 | 111.8 | 4 | **5.94** | 151 | 2.CD.400260.XL | ■ |
| | **.1043** | 2.65 | **4.17** | 106.0 | 114.0 | 4 | **6.02** | 153 | 2.CD.400265.XL | Δ |
| | **.1063** | 2.70 | **4.25** | 108.0 | 116.1 | 4 | **6.10** | 155 | 2.CD.400270.XL | ■ |
| | **.1083** | 2.75 | **4.33** | 110.0 | 118.3 | 4 | **6.18** | 157 | 2.CD.400275.XL | Δ |
| | **.1102** | 2.80 | **4.41** | 112.0 | 120.4 | 4 | **6.26** | 159 | 2.CD.400280.XL | ■ |
| | **.1122** | 2.85 | **4.49** | 114.0 | 122.6 | 4 | **6.34** | 161 | 2.CD.400285.XL | Δ |
| | **.1142** | 2.90 | **4.57** | 116.0 | 124.7 | 4 | **6.42** | 163 | 2.CD.400290.XL | ■ |
| | **.1161** | 2.95 | **4.65** | 118.0 | 126.9 | 4 | **6.50** | 165 | 2.CD.400295.XL | Δ |
| | **.1181** | 3.00 | **4.72** | 120.0 | 129.0 | 4 | **6.57** | 167 | 2.CD.400300.XL | ■ |
| | **.1201** | 3.05 | **4.80** | 122.0 | 131.2 | 6 | **6.89** | 175 | 2.CD.400305.XL | Δ |
| | **.1220** | 3.10 | **4.88** | 124.0 | 133.3 | 6 | **6.99** | 177 | 2.CD.400310.XL | ■ |
| | **.1240** | 3.15 | **4.96** | 126.0 | 135.5 | 6 | **7.09** | 180 | 2.CD.400315.XL | Δ |
| **1/8** | **.1250** | 3.175 | **5.04** | 128.0 | 137.6 | 6 | **7.17** | 182 | 2.CD.400F18.XL | ■ |
| | **.1260** | 3.20 | **5.04** | 128.0 | 137.6 | 6 | **7.17** | 182 | 2.CD.400320.XL | ■ |
| | **.1280** | 3.25 | **5.12** | 130.0 | 139.8 | 6 | **7.24** | 184 | 2.CD.400325.XL | Δ |
| | **.1299** | 3.30 | **5.20** | 132.0 | 141.9 | 6 | **7.32** | 186 | 2.CD.400330.XL | ■ |
| | **.1319** | 3.35 | **5.28** | 134.0 | 144.1 | 6 | **7.40** | 188 | 2.CD.400335.XL | Δ |
| | **.1339** | 3.40 | **5.35** | 136.0 | 146.2 | 6 | **7.48** | 190 | 2.CD.400340.XL | ■ |
| | **.1358** | 3.45 | **5.43** | 138.0 | 148.4 | 6 | **7.56** | 192 | 2.CD.400345.XL | Δ |
| | **.1378** | 3.50 | **5.51** | 140.0 | 150.5 | 6 | **7.64** | 194 | 2.CD.400350.XL | ■ |

■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide | 40xd1 | 140° | Z2 | eXedur SL

| | | | | |
|---|---|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | |
| Tolerance | **+ .00024"**<br>**0** | + 0.006 mm<br>0 | **+ .00035"**<br>**+ .00004"** | + 0.009 mm<br>+ 0.001 mm |

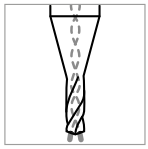
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1398** | 3.55 | **5.59** | 142.0 | 152.7 | 6 | **7.72** | 196 | 2.CD.400355.XL | Δ |
| | **.1417** | 3.60 | **5.67** | 144.0 | 154.8 | 6 | **7.80** | 198 | 2.CD.400360.XL | ■ |
| | **.1437** | 3.65 | **5.75** | 146.0 | 157.0 | 6 | **7.91** | 201 | 2.CD.400365.XL | Δ |
| | **.1457** | 3.70 | **5.83** | 148.0 | 159.1 | 6 | **7.99** | 203 | 2.CD.400370.XL | ■ |
| | **.1476** | 3.75 | **5.91** | 150.0 | 161.3 | 6 | **8.07** | 205 | 2.CD.400375.XL | Δ |
| | **.1496** | 3.80 | **5.98** | 152.0 | 163.4 | 6 | **8.15** | 207 | 2.CD.400380.XL | ■ |
| | **.1516** | 3.85 | **6.06** | 154.0 | 165.6 | 6 | **8.23** | 209 | 2.CD.400385.XL | Δ |
| | **.1535** | 3.90 | **6.14** | 156.0 | 167.7 | 6 | **8.31** | 211 | 2.CD.400390.XL | ■ |
| | **.1555** | 3.95 | **6.22** | 158.0 | 169.9 | 6 | **8.39** | 213 | 2.CD.400395.XL | Δ |
| **5/32** | **.1562** | 3.968 | **6.30** | 160.0 | 172.0 | 6 | **8.46** | 215 | 2.CD.400F532.XL | ■ |
| | **.1575** | 4.00 | **6.30** | 160.0 | 172.0 | 6 | **8.46** | 215 | 2.CD.400400.XL | ■ |
| | **.1614** | 4.10 | **6.46** | 164.0 | 176.3 | 6 | **8.66** | 220 | 2.CD.400410.XL | ■ |
| | **.1654** | 4.20 | **6.61** | 168.0 | 180.6 | 6 | **8.82** | 224 | 2.CD.400420.XL | ■ |
| | **.1693** | 4.30 | **6.77** | 172.0 | 184.9 | 6 | **8.98** | 228 | 2.CD.400430.XL | ■ |
| | **.1732** | 4.40 | **6.93** | 176.0 | 189.2 | 6 | **9.13** | 232 | 2.CD.400440.XL | ■ |
| | **.1772** | 4.50 | **7.09** | 180.0 | 193.5 | 6 | **9.29** | 236 | 2.CD.400450.XL | ■ |
| | **.1811** | 4.60 | **7.24** | 184.0 | 197.8 | 6 | **9.49** | 241 | 2.CD.400460.XL | ■ |
| | **.1850** | 4.70 | **7.40** | 188.0 | 202.1 | 6 | **9.65** | 245 | 2.CD.400470.XL | ■ |
| **3/16** | **.1875** | 4.762 | **7.56** | 192.0 | 206.4 | 6 | **9.80** | 249 | 2.CD.400F316.XL | ■ |
| | **.1890** | 4.80 | **7.56** | 192.0 | 206.4 | 6 | **9.80** | 249 | 2.CD.400480.XL | ■ |
| | **.1929** | 4.90 | **7.72** | 196.0 | 210.7 | 6 | **9.96** | 253 | 2.CD.400490.XL | ■ |
| | **.1969** | 5.00 | **7.87** | 200.0 | 215.0 | 6 | **10.16** | 258 | 2.CD.400500.XL | ■ |
| | **.2008** | 5.10 | **8.03** | 204.0 | 219.3 | 6 | **10.31** | 262 | 2.CD.400510.XL | ■ |
| | **.2047** | 5.20 | **8.19** | 208.0 | 223.6 | 6 | **10.47** | 266 | 2.CD.400520.XL | ■ |
| | **.2087** | 5.30 | **8.35** | 212.0 | 227.9 | 6 | **10.63** | 270 | 2.CD.400530.XL | ■ |
| | **.2126** | 5.40 | **8.50** | 216.0 | 232.2 | 6 | **10.79** | 274 | 2.CD.400540.XL | ■ |
| | **.2165** | 5.50 | **8.66** | 220.0 | 236.5 | 6 | **10.98** | 279 | 2.CD.400550.XL | ■ |
| **7/32** | **.2189** | 5.560 | **8.82** | 224.0 | 240.8 | 6 | **11.14** | 283 | 2.CD.400F732.XL | ■ |
| | **.2205** | 5.60 | **8.82** | 224.0 | 240.8 | 6 | **11.14** | 283 | 2.CD.400560.XL | ■ |
| | **.2244** | 5.70 | **8.98** | 228.0 | 245.1 | 6 | **11.30** | 287 | 2.CD.400570.XL | ■ |
| | **.2283** | 5.80 | **9.13** | 232.0 | 249.4 | 6 | **11.46** | 291 | 2.CD.400580.XL | ■ |
| | **.2323** | 5.90 | **9.29** | 236.0 | 253.7 | 6 | **11.61** | 295 | 2.CD.400590.XL | ■ |
| | **.2362** | 6.00 | **9.45** | 240.0 | 258.0 | 6 | **11.81** | 300 | 2.CD.400600.XL | ■ |

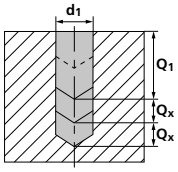
| Complementary products | |
|---|---|
| CrazyDrill Pilot | p.134 |
| CrazyDrill Coolpilot | p.156 |
| CrazyDrill Crosspilot | p.146 |

CRAZYDRILL by Mikron Tool Cool XL

# CrazyDrill Cool XL 40 x d

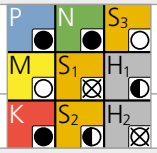
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_1$ | $Q_x$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 50 \| 164 | 120 \| 394 | 40xd1 | – |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 50 \| 164 | 120 \| 394 | 40xd1 | – |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 40 \| 131 | 100 \| 328 | 40xd1 | – |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 30 \| 98 | 60 197 | 40xd1 | – |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 40 \| 131 | 80 \| 262 | 40xd1 | – |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 30 \| 98 | 60 \| 197 | 5xd1 | 2xd1 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 80 \| 262 | 150 \| 492 | 40xd1 | – |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 \| 328 | 200 \| 656 | 40xd1 | – |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 80 \| 262 | 150 \| 492 | 40xd1 | – |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 \| 131 | 80 \| 262 | 2xd1 | 2xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 \| 131 | 80 \| 262 | 2xd1 | 2xd1 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 50 \| 164 | 120 \| 394 | 40xd1 | – |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 40 \| 131 | 80 \| 262 | 40xd1 | – |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 25 \| 82 | 50 \| 164 | 3xd1 | 1xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 20 \| 66 | 40 \| 131 | 5xd1 | 1xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 20 \| 66 | 40 \| 131 | 5xd1 | 2xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 20 \| 66 | 40 \| 131 | 5xd1 | 1xd1 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| Ød1 | 2.0 mm \| **.079"** | **3/32"** 2.5 mm \| **.098"** | **1/8"** 3.0 mm \| **.118"** | **5/32"** 4.0 mm \| **.158"** | **3/16" - 7/32"** 5.0 mm \| **.197"** | 6.0 mm \| **.236"** |
|---|---|---|---|---|---|---|
| | **f** | **f** | **f** | **f** | **f** | **f** |
| | 0.060 \| **.0024** | 0.075 \| **.0030** | 0.090 \| **.0035** | 0.110 \| **.0043** | 0.120 \| **.0047** | 0.130 \| **.0051** |
| | 0.060 \| **.0024** | 0.075 \| **.0030** | 0.090 \| **.0035** | 0.110 \| **.0043** | 0.120 \| **.0047** | 0.130 \| **.0051** |
| | 0.050 \| **.0020** | 0.060 \| **.0024** | 0.075 \| **.0030** | 0.095 \| **.0037** | 0.110 \| **.0043** | 0.120 \| **.0047** |
| | 0.045 \| **.0018** | 0.055 \| **.0022** | 0.065 \| **.0026** | 0.080 \| **.0031** | 0.095 \| **.0037** | 0.100 \| **.0039** |
| | 0.045 \| **.0018** | 0.055 \| **.0022** | 0.065 \| **.0026** | 0.080 \| **.0031** | 0.095 \| **.0037** | 0.100 \| **.0039** |
| | | | | | | |
| | 0.045 \| **.0018** | 0.055 \| **.0022** | 0.065 \| **.0026** | 0.080 \| **.0031** | 0.095 \| **.0037** | 0.100 \| **.0039** |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | 0.100 \| **.0039** | 0.110 \| **.0043** | 0.130 \| **.0051** | 0.150 \| **.0059** | 0.170 \| **.0067** | 0.180 \| **.0071** |
| | 0.070 \| **.0028** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.160 \| **.0063** | 0.190 \| **.0075** | 0.200 \| **.0079** |
| | 0.060 \| **.0024** | 0.080 \| **.0031** | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.150 \| **.0059** | 0.200 \| **.0079** |
| | 0.065 \| **.0026** | 0.080 \| **.0031** | 0.110 \| **.0043** | 0.130 \| **.0051** | 0.160 \| **.0063** | 0.190 \| **.0075** |
| | 0.065 \| **.0026** | 0.080 \| **.0031** | 0.110 \| **.0043** | 0.130 \| **.0051** | 0.160 \| **.0063** | 0.190 \| **.0075** |
| | 0.100 \| **.0039** | 0.120 \| **.0047** | 0.140 \| **.0055** | 0.180 \| **.0071** | 0.210 \| **.0083** | 0.230 \| **.0091** |
| | 0.065 \| **.0026** | 0.080 \| **.0031** | 0.110 \| **.0043** | 0.130 \| **.0051** | 0.150 \| **.0059** | 0.190 \| **.0075** |
| | | | | | | |
| | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.055 \| **.0022** | 0.070 \| **.0028** | 0.080 \| **.0031** | 0.100 \| **.0039** |
| | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.055 \| **.0022** | 0.070 \| **.0028** | 0.080 \| **.0031** | 0.100 \| **.0039** |
| | 0.020 \| **.0008** | 0.040 \| **.0016** | 0.055 \| **.0022** | 0.070 \| **.0028** | 0.080 \| **.0031** | 0.100 \| **.0039** |
| | 0.020 \| **.0008** | 0.025 \| **.0010** | 0.030 \| **.0012** | 0.040 \| **.0016** | 0.050 \| **.0020** | 0.060 \| **.0024** |
| | | | | | | |



# Drilling process CrazyDrill Cool XL

## ACCURATE AND RAPID DRILLING UP TO 40 X D

### Coolant type, filtration, coolant pressure and flowrate

**Coolant type:** For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

**Filtration:** Good filter quality is very important when using through coolant drills. Dirt particles or residual chips can clog the coolant holes and consequently reduce dramatically the flowrate. The following filter qualities must be adhered especially in small diameters:

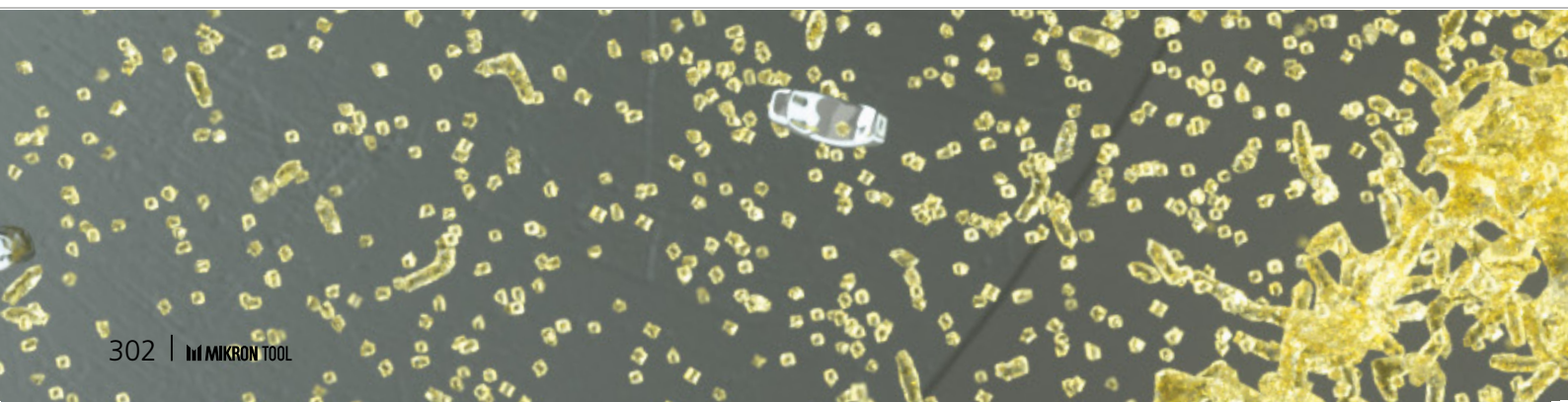
- Drill with Ø < .078" (2 mm) filter quality ≤ .0004" (0.010 mm).
- Drill with Ø < .118" (3 mm) filter quality ≤ .0008" (0.020 mm).
- Drill with Ø < .236" (6 mm) filter quality ≤ .0020" (0.050 mm).

**Coolant pressure:** To ensure a reliable drilling process the following minimal pressures are required (see chart). Higher pressures are needed for smaller drill size diameters. High pressure is generally better for the cooling and chip evacuation effectiveness.

| Ø $d_1$ Tool | | Minimal pressure | | | |
|---|---|---|---|---|---|
| | | 15 / 20 x $d_1$ | | 30 / 40 x $d_1$ | |
| [mm] | **[inch]** | [bar] | **[psi]** | [bar] | **[psi]** |
| 1.0 | **.039** | 70 | **1015** | 80 | **1160** |
| 2.0 | **.079** | 50 | **725** | 70 | **1015** |
| 4.0 | **.158** | 40 | **580** | 60 | **780** |
| 6.0 | **.236** | 30 | **435** | 50 | **725** |

### Tool holders

For detailed indications for tool holders see page see chapter "Technical information".



**CrazyDrill Cool 15 x d, 20 x d, 30 x d, 40 x d**

Mikron Tool recommends CrazyDrill Pilot for all types of CrazyDrill Cool XL:

- **CrazyDrill Pilot** as pilot drill
- **CrazyDrill Coolpilot** as pilot drill for difficult to machine materials
- **CrazyDrill Crosspilot** as pilot drill for inclined surfaces

**Pilot drilling and drilling**

Pilot drilling with CrazyDrill Pilot or CrazyDrill Coolpilot is the perfect start for an accurate (position and alignment accuracy) and consistent machining process. Inclined surfaces requires the use of CrazyDrill Crosspilot.

The quality of drilling (position and alignment accuracy, no measurable transition from pilot hole to the following drilling steps) and a stable machining process are guaranteed by carefully determined tool tolerances.

Note:
With a depth of 40 x d it might be advantageous to use after the pilot drill a 15 x d or 20 x d CrazyDrill Cool XL drill. With this the subsequent 40 x d drill gets even better guidance and protection against bending. Result: an improved tool life.

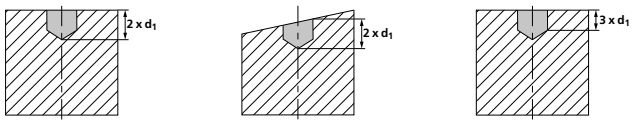


# Drilling process CrazyDrill Cool XL

## ONE STEP DRILLING (DEPENDING ON MATERIAL, SEE CUTTING DATA CHART)

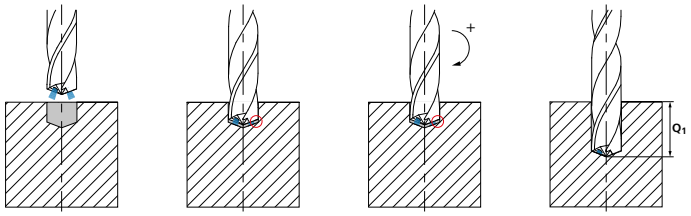
### 1 | PILOT DRILLING

- With CrazyDrill Pilot or Coolpilot (straight surfaces) or CrazyDrill Crosspilot (inclined surfaces).




### 2 | DEEP HOLE DRILLING

- Turn on coolant. Enter the hole at a maximum speed n = 500 rpm and $v_f$ = 1'000 mm/min (39.37 IPM), up to drilling depth 1.8 x d (drill should not touch the bottom of pilot hole).
- Increase speed as per cutting data chart and wait until the desired drilling speed is reached. Program dwell in case of slow spindle acceleration.
- Drill in one step with recommended cutting speed and feed rate.

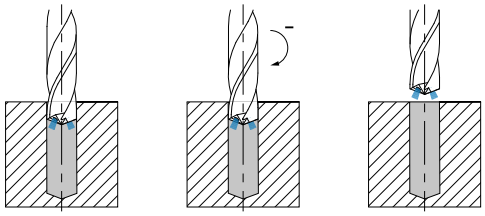



### 3 | EXIT FROM BORE

After the desired drilling depth is reached, return with the drill to drilling depth 2 x d at feed rate or reduced rapid traverse.

Reduce speed to n = 500 rpm.

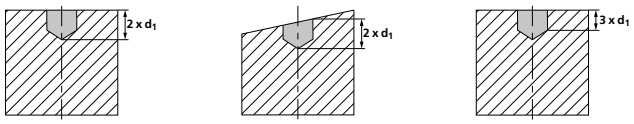
Exit the bore at speed n = 500 rpm and $v_f$ = 39.37 IPM (1'000 mm/min).



## DRILLING AS PER DIN 66025 / PAL (DEPENDING ON MATERIAL, SEE CUTTING DATA CHART)

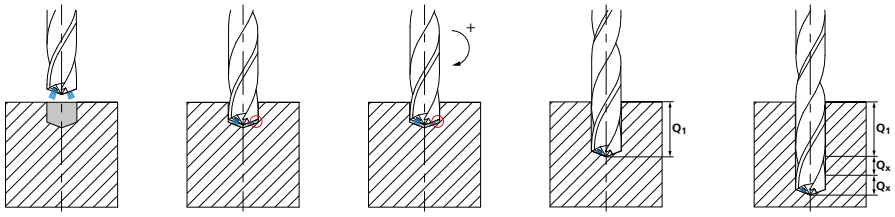
### 1 | PILOT DRILLING

- With CrazyDrill Pilot or Coolpilot (straight surfaces) or CrazyDrill Crosspilot (inclined surfaces).




### 2 | DEEP HOLE DRILLING

- Turn on coolant. Enter the hole at a maximum speed n = 500 rpm and $v_f$ = 39.37 IPM (1'000 mm/min), up to drilling depth 1.8 x d (drill should not touch the bottom of pilot hole).
- Increase speed as per cutting data chart and wait until the desired drilling speed is reached. Program well in case of slow spindle acceleration.
- Drilling with CrazyDrill Cool XL up to maximum drilling depth ($Q_1$) in one step, afterwards remove chips.
- Single steps ($Q_X$) as per cutting data chart, afterwards remove chips without taking out the drill completely from the bore.

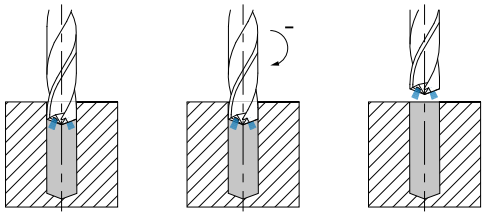



### 3 | EXIT FROM BORE

After the desired drilling depth is reached, return with the drill to drilling depth 2 x d at feed rate or reduced rapid traverse.

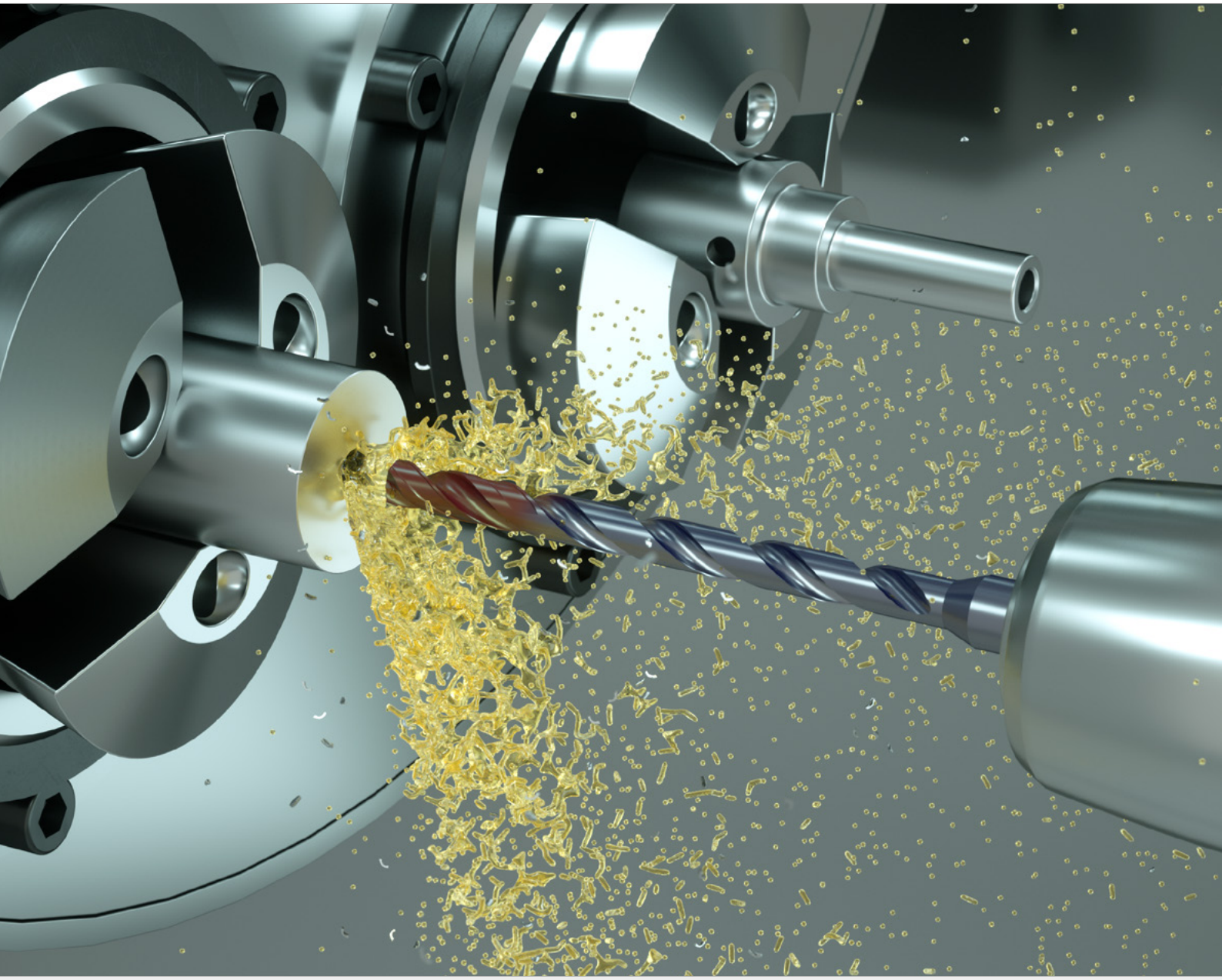
Reduce speed to n = 500 rpm.

Exit the bore at speed n = 500 rpm and vf = 39.37 IPM (1'000 mm/min).




**Note:** Do not take the drill completely out from the bore between pecks (chattering and consequent break risk). For CrazyDrill Cool XL 15 x d it's possible to enter and drill the pilot hole immediately at the cutting speed and feed recommended on the chart.

# CrazyDrill Cool SST-Inox



CRAZYDRILL Cool SST-Inox

## DEEP HOLE DRILLING OF STAINLESS STEEL & CO. IN ONE STEP



With CrazyDrill Cool SST-Inox, Mikron Tool introduces a drill for stainless steels, heat-resistant and CrCo alloys in the diameter range of .039" to 1/4" (1.0 mm to 6.35 mm) and depths of 6 x d, 10 x d, 15 x d, 20 x d, 30 x d or 40 x d.

The new tip and flute geometry as well as the shape of the cooling channels (due to this newly designed shape, up to four times more coolant volume reaches the drill tip), in conjunction with the innovative copper-red coating form the foundation for drilling in one single step up to a drilling depth of 40 x d with high performance in terms of quality, tool life and machining time.

Recommendations of Mikron Tool:

- **Version 6 x d** - centering is not necessary on straight surfaces, with its tip angle of 140° and its chisel "s"-form the drill has good self-centering. We recommend pilot drilling or centering only on irregular, rough or inclined surfaces and if a high position accuracy is requested.
- **Version 10 x d, 15 x d, 20 x d, 30 x d and 40 x d** - we recommend pilot drilling with CrazyDrill Coolpilot or CrazyDrill Crosspilot on inclined surfaces.

**Regrinding:** This product can be reground starting from Ø .055" (1.40 mm).

**Please note:** You couldn't find your suitable version of the CrazyDrill Cool SST-Inox (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYDRILL™ by Mikron Tool
Cool SST-Inox

| 6 x d | 10 x d | 15 x d | 20 x d | 30 x d | 40 x d |
|---|---|---|---|---|---|
| ■ Internal cooling<br>■ Coated | ■ Internal cooling<br>■ Coated | ■ Internal cooling<br>■ Coated | ■ Internal cooling<br>■ Coated | ■ Internal cooling<br>■ Coated | ■ Internal cooling<br>■ Coated |
|  | | | | | |
|  | | | | | |
|  |  |  |  |  |  |
| page 316 | page 318 | page 320 | page 322 | page 326 | page 328 |

**1 | SHANK**
The reinforced solid carbide shank guarantees stability, high degree of concentricity and hence maximum drilling precision.

**2 | NEW GENERATION OF COOLING CHANNELS**
Due to a newly designed shape of helical cooling channels, up to four times more coolant volume reaches the drill tip. The result is continuous and efficient chip removal as well as constant and substantial cooling of cutting edges. A Powerchamber additionally guarantees sufficiently strong coolant flow for smaller diameters up to Ø .116" (2.95 mm).

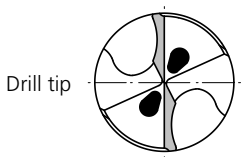
**3 | CARBIDE**
A specially developed micro-grain solid carbide allows machining at high speeds.

**4 | NEW COATING**
The high-performance coating eXedur SNP is heat-resistant and wear-resistant, prevents build up edges and promotes uniform chip flushing. A very long tool life is given.

**5 | NEW CHIP FLUTE PROFILE**
Divided into two areas:
- **Front chip flute area:** a special chip breaker shape ensures compact, short and curved chips.
- **Rear chip flute area:** an extended flute shape ensures perfect chip removal.

**6 | POLISHED FLUTES**
The polished flutes in versions 15 x d, 20 x d, 30 x d and 40 x d promote uniform chip flushing.

**7 | DOUBLE GUIDING MARGIN**
The narrow guiding chamfer ensures the highest degree of precision (straightness) and surface quality.



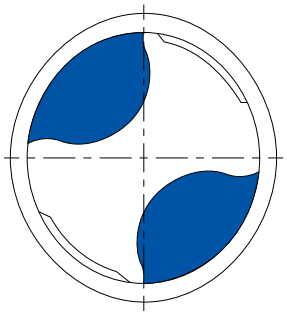
# Important features

## THE IMPORTANCE OF THE FLUTE PROFILE FOR BEST PERFORMANCE

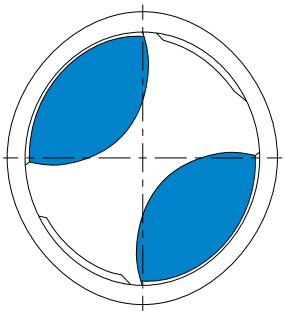
■ **New flute profile for best chip control: CrazyDrill compared to Conventional drill**

**CrazyDrill Cool SST-Inox**





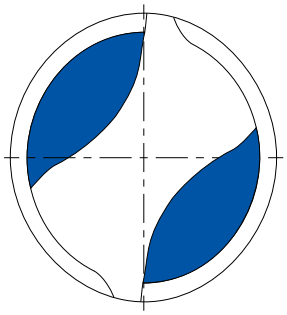
**Front chip flute profile**
A special chip breaker shape ensures compact, short and curved chips.



**Rear chip flute profile**
An extended flute shape ensures perfect chips removal.

**Conventional drill**





**One single chip flute profile**
A pecking process is necessary due to long chips and difficult evacuation.

## ■ Short chips for a perfect evacuation

**CrazyDrill Cool SST-Inox**



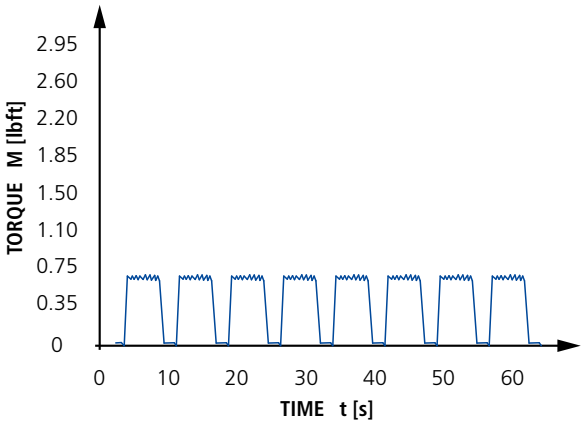
Compact, short and curved chips are easily evacuated and guarantee a long tool life as well as high process reliability.

**Conventional drill**

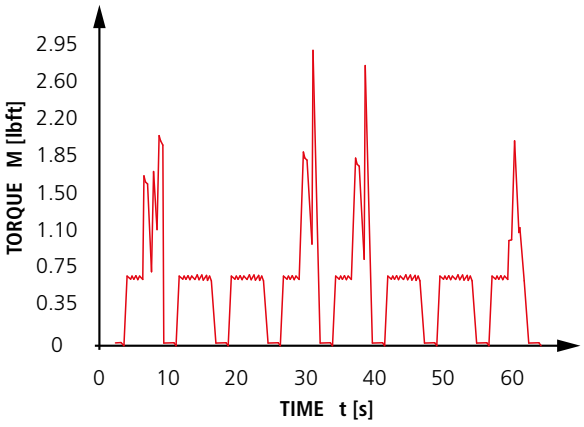


Long chips cause chip jamming and difficult evacuation. This leads to overheating with consequent build up edges. The result is a cutting edge breakout in short time.

## ■ Costant torque for a long tool life




**Conventional drill**



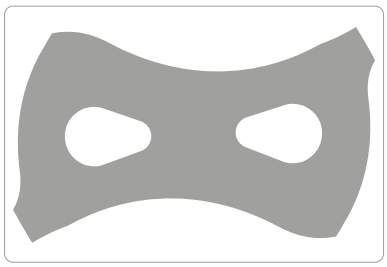

Due to the new flute profile combined with a newly designed shape of helical cooling channels, the torque is kept constant avoiding peaks that lead to unexpected tool breakage. The result is higher tool life.

# Important features

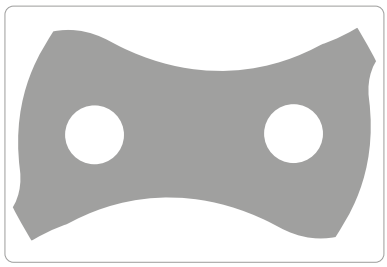
## THE IMPORTANCE OF THE COOLING SYSTEM FOR BEST PERFORMANCE

### ■ Larger cooling channels to avoid overheating

CrazyDrill Cool SST-Inox

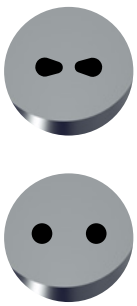


Conventional drill



The development of a new design of helical cooling channels was carried out over a 2-stage design cycle: Flow rate analysis and coolant hole design. We enlarged the section of the cooling channels without affecting the mechanical strength of the drill. Up to four times more coolant volume is reached avoiding overheating of the tool and ensuring a perfect chip removal from the cutting area.

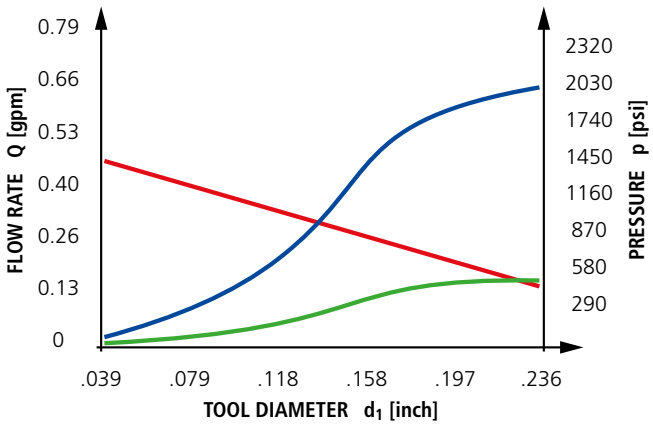
### ■ New drop shape: up to 4 times more flow rate



Coolant flow rate for new generation channels geometry

Coolant flow rate for conventional channels geometry

Average pressure needed for the new geometry

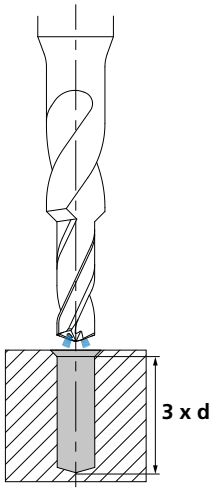



Due to the new geometry of the helical cooling channels, up to four times more coolant volume reaches the drill tip.

06

## ■ Pre-hole for a perfect alignment

### CrazyDrill Coolpilot

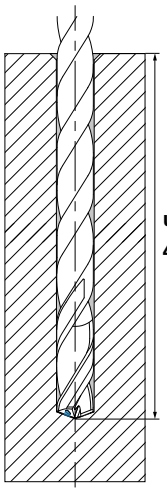



**Pilot and short drilling**
It is the ideal complement for deep hole drilling.

There is no measurable transition from pilot to follow-up hole due to the perfectly matched tolerance of the tool diameters.

It allows a short drilling up to 3 x d with a simultaneous 90° countersink.

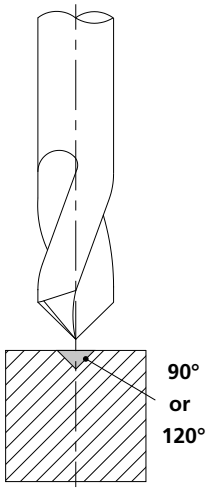
### CrazyDrill Cool SST-Inox




**Deep hole drilling**
The deep hole up to 40 x d is performed in a single feed stroke due to the new cutting edge geometry and the new coolant duct shape.

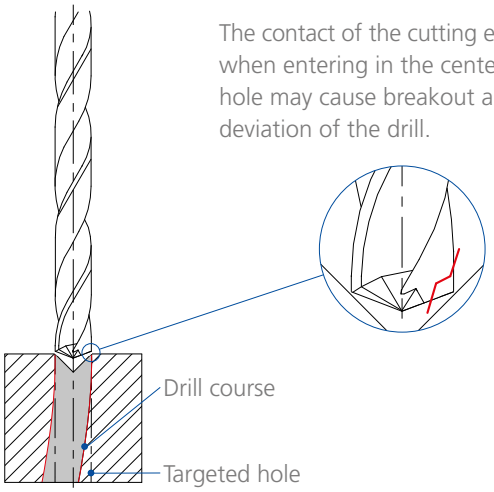
Due to the pre-hole machined with CrazyDrill Coolpilot a high position and alignment accuracy is reached as well as a stable machining process.

### Conventional centering tool




**Centering**
Centering is not the ideal complement to deep hole drilling, because the follow-up hole could be deviated.

The tip angle of the conventional centering tools (90° or 120°) may cause a breakage of cutting edges, when not matching perfectly with deep hole drills.



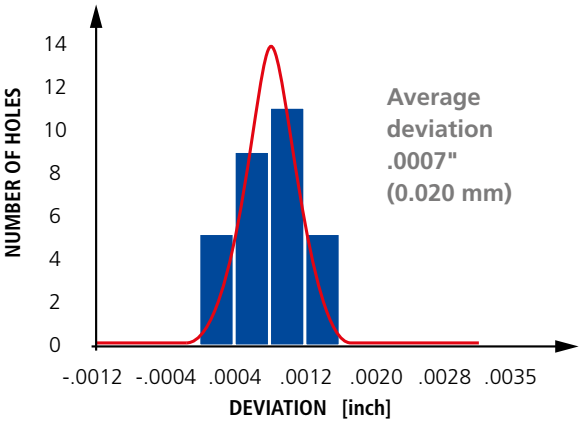

The contact of the cutting edges when entering in the center hole may cause breakout and deviation of the drill.

# Important features and benefits

## FOR MORE PERFORMANCE IN STAINLESS STEEL AND SUPERALLOYS

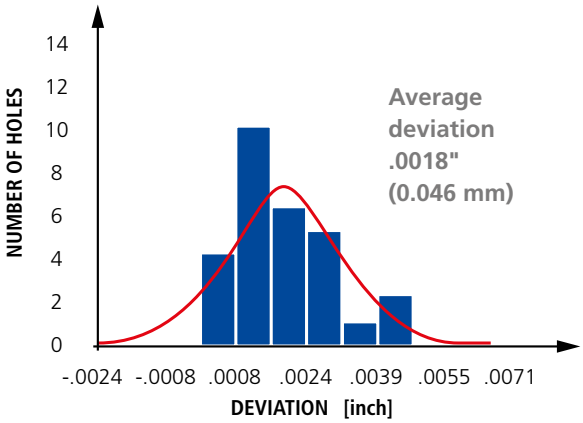
### ■ Deviation

**CrazyDrill Cool SST-Inox 30 x d**




Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: .106" (2.7 mm); Drilling depth: 3.2" (81 mm);
Step: 1; Coolant: oil; Number of holes: 3x30
Cutting data: $v_c$ = 262 SFM (80 m/min);
f = .0032 IPR (0.081 mm/rev)

**CrazyDrill Cool SST-Inox 40 x d**




Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: .106" (2.7 mm); Drilling depth: 4.3" (108 mm);
Step: 1; Coolant: oil; Number of holes: 3x30
Cutting data: $v_c$ = 262 SFM (80 m/min);
f = .0032 IPR (0.081 mm/rev)

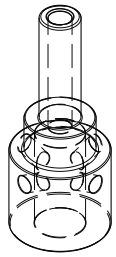
### ■ Surface roughness

**CrazyDrill Cool SST-Inox 40 x d**

| f [IPR] \| [mm/rev] | Ra exit [µin] | Ra exit [µm] | Rz exit [µin] | Rz exit [µm] |
|---|---|---|---|---|
| **.0034 \|** 0.086 | **13.0** | 0.331 | **106.3** | 2.70 |
| **.0051 \|** 0.129 | **15.3** | 0.388 | **129.5** | 3.29 |

Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: .169" (4.3 mm); Drilling depth: 6.7" (172 mm); Step: 1; Coolant: oil; Pre-hole: CrazyDrill Coolpilot
Cutting data: $v_c$ = 262 SFM (80 m/min); $f_{mid}$ = .0034 IPR (0.086 mm/rev) and $f_{high}$ = .0051 IPR (0.129 mm/rev)

- **SHORT MACHINING TIME** | up to 5 times faster
- **LONG TOOL LIFE** | up to 3 times longer
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to greater coolant flow
- **HIGH DEGREE OF PRECISION** | due to double margin



**COMPONENT**
Nozzle for food industry

**MATERIAL**
X5CrNi18-10 / 1.4301 / AISI 304

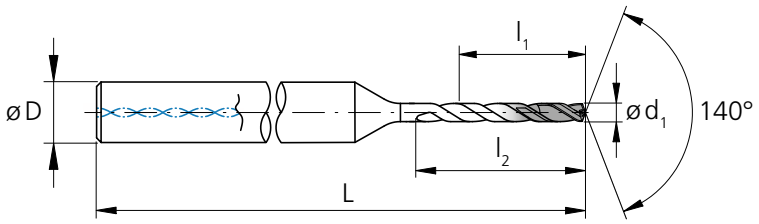
**MACHINING**
- Drilling
- d = 2.5 mm **| .098"**
- Drilling depth 26 mm **| 1.02"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Cool SST-Inox - 15 x d

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Cool SST-Inox<br>- Carbide<br>- Coated<br>- Internal cooling |
| Item number | 2.CD.150250.IC |
| Cutting data | $v_c$ = 80 m/min **| 263 SFM**<br>f = 0.075 mm/rev **| .00295 IPR**<br>$Q_1$ = 26 mm **| 1.02"** |

# CrazyDrill Cool SST-Inox 6 x d

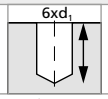
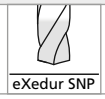
## DRILLING WITH INTERNAL COOLING




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.2362** | 6.00 | 9.0 | 4 | **2.17** | 55 | 2.CD.060100.IC | ■ |
| | **.0413** | 1.05 | **.2480** | 6.30 | 9.5 | 4 | **2.17** | 55 | 2.CD.060105.IC | ■ |
| | **.0433** | 1.10 | **.2598** | 6.60 | 9.9 | 4 | **2.17** | 55 | 2.CD.060110.IC | ■ |
| | **.0453** | 1.15 | **.2717** | 6.90 | 10.4 | 4 | **2.17** | 55 | 2.CD.060115.IC | ■ |
| | **.0472** | 1.20 | **.2835** | 7.20 | 10.8 | 4 | **2.24** | 57 | 2.CD.060120.IC | ■ |
| | **.0492** | 1.25 | **.2953** | 7.50 | 11.3 | 4 | **2.24** | 57 | 2.CD.060125.IC | ■ |
| | **.0512** | 1.30 | **.3071** | 7.80 | 11.7 | 4 | **2.24** | 57 | 2.CD.060130.IC | ■ |
| | **.0531** | 1.35 | **.3189** | 8.10 | 12.2 | 4 | **2.24** | 57 | 2.CD.060135.IC | ■ |
| | **.0551** | 1.40 | **.3307** | 8.40 | 12.6 | 4 | **2.24** | 57 | 2.CD.060140.IC | ■ |
| | **.0571** | 1.45 | **.3425** | 8.70 | 13.1 | 4 | **2.28** | 58 | 2.CD.060145.IC | ■ |
| | **.0591** | 1.50 | **.3543** | 9.00 | 13.5 | 4 | **2.28** | 58 | 2.CD.060150.IC | ■ |
| | **.0610** | 1.55 | **.3661** | 9.30 | 14.0 | 4 | **2.28** | 58 | 2.CD.060155.IC | ■ |
| **1/16** | **.0625** | 1.587 | **.3749** | 9.52 | 14.4 | 4 | **2.28** | 58 | 2.CD.060F116.IC | ■ |
| | **.0630** | 1.60 | **.3780** | 9.60 | 14.4 | 4 | **2.28** | 58 | 2.CD.060160.IC | ■ |
| | **.0650** | 1.65 | **.3898** | 9.90 | 14.9 | 4 | **2.28** | 58 | 2.CD.060165.IC | ■ |
| | **.0669** | 1.70 | **.4016** | 10.20 | 15.3 | 4 | **2.36** | 60 | 2.CD.060170.IC | ■ |
| | **.0689** | 1.75 | **.4134** | 10.50 | 15.8 | 4 | **2.36** | 60 | 2.CD.060175.IC | ■ |
| | **.0709** | 1.80 | **.4252** | 10.80 | 16.2 | 4 | **2.36** | 60 | 2.CD.060180.IC | ■ |
| | **.0728** | 1.85 | **.4370** | 11.10 | 16.7 | 4 | **2.36** | 60 | 2.CD.060185.IC | ■ |
| | **.0748** | 1.90 | **.4488** | 11.40 | 17.1 | 4 | **2.36** | 60 | 2.CD.060190.IC | ■ |
| | **.0768** | 1.95 | **.4606** | 11.70 | 17.6 | 4 | **2.36** | 60 | 2.CD.060195.IC | ■ |
| | **.0787** | 2.00 | **.4724** | 12.00 | 18.0 | 4 | **2.48** | 63 | 2.CD.060200.IC | ■ |

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0807** | 2.05 | **.4843** | 12.30 | 18.5 | 4 | **2.48** | 63 | 2.CD.060205.IC | ■ |
| | **.0827** | 2.10 | **.4961** | 12.60 | 18.9 | 4 | **2.48** | 63 | 2.CD.060210.IC | ■ |
| | **.0846** | 2.15 | **.5079** | 12.90 | 19.4 | 4 | **2.48** | 63 | 2.CD.060215.IC | ■ |
| | **.0866** | 2.20 | **.5197** | 13.20 | 19.8 | 4 | **2.48** | 63 | 2.CD.060220.IC | ■ |
| | **.0886** | 2.25 | **.5315** | 13.50 | 20.3 | 4 | **2.48** | 63 | 2.CD.060225.IC | ■ |
| | **.0906** | 2.30 | **.5433** | 13.80 | 20.7 | 4 | **2.56** | 65 | 2.CD.060230.IC | ■ |
| | **.0925** | 2.35 | **.5551** | 14.10 | 21.2 | 4 | **2.56** | 65 | 2.CD.060235.IC | ■ |
| **3/32** | **.0937** | 2.381 | **.5624** | 14.29 | 21.6 | 4 | **2.56** | 65 | 2.CD.060F332.IC | ■ |
| | **.0945** | 2.40 | **.5669** | 14.40 | 21.6 | 4 | **2.56** | 65 | 2.CD.060240.IC | ■ |
| | **.0965** | 2.45 | **.5787** | 14.70 | 22.1 | 4 | **2.56** | 65 | 2.CD.060245.IC | ■ |
| | **.0984** | 2.50 | **.5906** | 15.00 | 22.5 | 4 | **2.56** | 65 | 2.CD.060250.IC | ■ |
| | **.1004** | 2.55 | **.6024** | 15.30 | 23.0 | 4 | **2.56** | 65 | 2.CD.060255.IC | ■ |
| | **.1024** | 2.60 | **.6142** | 15.60 | 23.4 | 4 | **2.68** | 68 | 2.CD.060260.IC | ■ |
| | **.1043** | 2.65 | **.6260** | 15.90 | 23.9 | 4 | **2.68** | 68 | 2.CD.060265.IC | ■ |
| | **.1063** | 2.70 | **.6378** | 16.20 | 24.3 | 4 | **2.68** | 68 | 2.CD.060270.IC | ■ |
| | **.1083** | 2.75 | **.6496** | 16.50 | 24.8 | 4 | **2.68** | 68 | 2.CD.060275.IC | ■ |
| | **.1102** | 2.80 | **.6614** | 16.80 | 25.2 | 4 | **2.68** | 68 | 2.CD.060280.IC | ■ |
| | **.1122** | 2.85 | **.6732** | 17.10 | 25.7 | 4 | **2.68** | 68 | 2.CD.060285.IC | ■ |
| | **.1142** | 2.90 | **.6850** | 17.40 | 26.1 | 4 | **2.68** | 68 | 2.CD.060290.IC | ■ |
| | **.1161** | 2.95 | **.6968** | 17.70 | 26.6 | 4 | **2.68** | 68 | 2.CD.060295.IC | ■ |
| | **.1181** | 3.00 | **.7087** | 18.00 | 27.0 | 6 | **2.91** | 74 | 2.CD.060300.IC | ■ |
| | **.1201** | 3.05 | **.7205** | 18.30 | 27.5 | 6 | **2.91** | 74 | 2.CD.060305.IC | ■ |

■ Stock item

| Carbide |   |   | Z2 |  |   |
|---|---|---|---|---|---|

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | | **.240" - .394"** (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 | **+ .00024"**<br>**+ .00004"** | + 0.006 mm<br>+ 0.001 mm | **+ .00028"**<br>**+ .00004"** | + 0.007 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1220** | 3.10 | **.7323** | 18.60 | 27.9 | 6 | **2.91** | 74 | 2.CD.060310.IC | ■ |
| | **.1240** | 3.15 | **.7441** | 18.90 | 28.4 | 6 | **2.91** | 74 | 2.CD.060315.IC | ■ |
| **1/8** | **.1250** | 3.175 | **.7500** | 19.05 | 28.8 | 6 | **2.91** | 74 | 2.CD.060F18.IC | ■ |
| | **.1260** | 3.20 | **.7559** | 19.20 | 28.8 | 6 | **2.91** | 74 | 2.CD.060320.IC | ■ |
| | **.1280** | 3.25 | **.7677** | 19.50 | 29.3 | 6 | **2.91** | 74 | 2.CD.060325.IC | ■ |
| | **.1299** | 3.30 | **.7795** | 19.80 | 29.7 | 6 | **2.91** | 74 | 2.CD.060330.IC | ■ |
| | **.1319** | 3.35 | **.7913** | 20.10 | 30.2 | 6 | **2.91** | 74 | 2.CD.060335.IC | ■ |
| | **.1339** | 3.40 | **.8031** | 20.40 | 30.6 | 6 | **2.91** | 74 | 2.CD.060340.IC | ■ |
| | **.1358** | 3.45 | **.8150** | 20.70 | 31.1 | 6 | **2.91** | 74 | 2.CD.060345.IC | ■ |
| | **.1378** | 3.50 | **.8268** | 21.00 | 31.5 | 6 | **3.07** | 78 | 2.CD.060350.IC | ■ |
| | **.1398** | 3.55 | **.8386** | 21.30 | 32.0 | 6 | **3.07** | 78 | 2.CD.060355.IC | ■ |
| | **.1417** | 3.60 | **.8504** | 21.60 | 32.4 | 6 | **3.07** | 78 | 2.CD.060360.IC | ■ |
| | **.1437** | 3.65 | **.8622** | 21.90 | 32.9 | 6 | **3.07** | 78 | 2.CD.060365.IC | ■ |
| | **.1457** | 3.70 | **.8740** | 22.20 | 33.3 | 6 | **3.07** | 78 | 2.CD.060370.IC | ■ |
| | **.1476** | 3.75 | **.8858** | 22.50 | 33.8 | 6 | **3.07** | 78 | 2.CD.060375.IC | ■ |
| | **.1496** | 3.80 | **.8976** | 22.80 | 34.2 | 6 | **3.07** | 78 | 2.CD.060380.IC | ■ |
| | **.1516** | 3.85 | **.9094** | 23.10 | 34.7 | 6 | **3.07** | 78 | 2.CD.060385.IC | ■ |
| | **.1535** | 3.90 | **.9213** | 23.40 | 35.1 | 6 | **3.07** | 78 | 2.CD.060390.IC | ■ |
| | **.1555** | 3.95 | **.9331** | 23.70 | 35.6 | 6 | **3.07** | 78 | 2.CD.060395.IC | ■ |
| **5/32** | **.1562** | 3.968 | **.9373** | 23.81 | 36.0 | 6 | **3.07** | 78 | 2.CD.060F532.IC | ■ |
| | **.1575** | 4.00 | **.9449** | 24.00 | 36.0 | 6 | **3.07** | 78 | 2.CD.060400.IC | ■ |
| | **.1614** | 4.10 | **.9685** | 24.60 | 36.9 | 6 | **3.15** | 80 | 2.CD.060410.IC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1654** | 4.20 | **.9921** | 25.20 | 37.8 | 6 | **3.15** | 80 | 2.CD.060420.IC | ■ |
| | **.1693** | 4.30 | **1.016** | 25.80 | 38.7 | 6 | **3.15** | 80 | 2.CD.060430.IC | ■ |
| | **.1732** | 4.40 | **1.039** | 26.40 | 39.6 | 6 | **3.15** | 80 | 2.CD.060440.IC | ■ |
| | **.1772** | 4.50 | **1.063** | 27.00 | 40.5 | 6 | **3.15** | 80 | 2.CD.060450.IC | ■ |
| | **.1811** | 4.60 | **1.087** | 27.60 | 41.4 | 6 | **3.15** | 80 | 2.CD.060460.IC | ■ |
| | **.1850** | 4.70 | **1.110** | 28.20 | 42.3 | 6 | **3.31** | 84 | 2.CD.060470.IC | ■ |
| **3/16** | **.1875** | 4.762 | **1.125** | 28.57 | 43.2 | 6 | **3.31** | 84 | 2.CD.060F316.IC | ■ |
| | **.1890** | 4.80 | **1.134** | 28.80 | 43.2 | 6 | **3.31** | 84 | 2.CD.060480.IC | ■ |
| | **.1929** | 4.90 | **1.157** | 29.40 | 44.1 | 6 | **3.31** | 84 | 2.CD.060490.IC | ■ |
| | **.1969** | 5.00 | **1.181** | 30.00 | 45.0 | 6 | **3.31** | 84 | 2.CD.060500.IC | ■ |
| | **.2008** | 5.10 | **1.205** | 30.60 | 45.9 | 6 | **3.31** | 84 | 2.CD.060510.IC | ■ |
| | **.2047** | 5.20 | **1.228** | 31.20 | 46.8 | 6 | **3.31** | 84 | 2.CD.060520.IC | ■ |
| | **.2087** | 5.30 | **1.252** | 31.80 | 47.7 | 6 | **3.31** | 84 | 2.CD.060530.IC | ■ |
| | **.2126** | 5.40 | **1.276** | 32.40 | 48.6 | 6 | **3.46** | 88 | 2.CD.060540.IC | ■ |
| | **.2165** | 5.50 | **1.299** | 33.00 | 49.5 | 6 | **3.46** | 88 | 2.CD.060550.IC | ■ |
| **7/32** | **.2189** | 5.560 | **1.313** | 33.36 | 50.4 | 6 | **3.46** | 88 | 2.CD.060F732.IC | ■ |
| | **.2205** | 5.60 | **1.323** | 33.60 | 50.4 | 6 | **3.46** | 88 | 2.CD.060560.IC | ■ |
| | **.2244** | 5.70 | **1.346** | 34.20 | 51.3 | 6 | **3.46** | 88 | 2.CD.060570.IC | ■ |
| | **.2283** | 5.80 | **1.370** | 34.80 | 52.2 | 6 | **3.46** | 88 | 2.CD.060580.IC | ■ |
| | **.2323** | 5.90 | **1.394** | 35.40 | 53.1 | 6 | **3.46** | 88 | 2.CD.060590.IC | ■ |
| | **.2362** | 6.00 | **1.417** | 36.00 | 54.0 | 6 | **3.46** | 88 | 2.CD.060600.IC | ■ |
| **1/4** | **.2500** | 6.350 | **1.500** | 38.10 | 57.2 | 8 | **3.54** | 90 | 2.CD.060F14.IC | ■ |

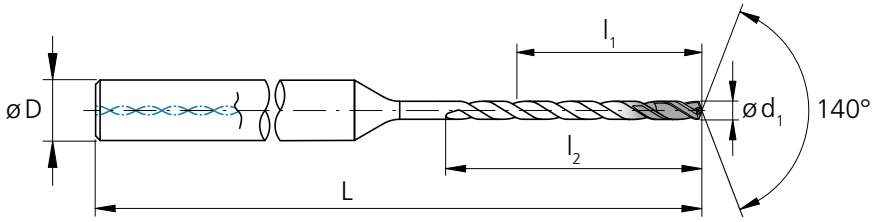
■ Stock item

**Complementary products**

CrazyDrill Coolpilot p.156
CrazyDrill Crosspilot p.146

# CrazyDrill Cool SST-Inox 10 x d

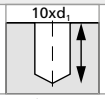
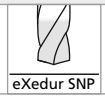
## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.3937** | 10.00 | 13.0 | 4 | **2.32** | 59 | 2.CD.100100.IC | ■ |
| | **.0413** | 1.05 | **.4134** | 10.50 | 13.7 | 4 | **2.32** | 59 | 2.CD.100105.IC | ■ |
| | **.0433** | 1.10 | **.4331** | 11.00 | 14.3 | 4 | **2.32** | 59 | 2.CD.100110.IC | ■ |
| | **.0453** | 1.15 | **.4528** | 11.50 | 15.0 | 4 | **2.32** | 59 | 2.CD.100115.IC | ■ |
| | **.0472** | 1.20 | **.4724** | 12.00 | 15.6 | 4 | **2.44** | 62 | 2.CD.100120.IC | ■ |
| | **.0492** | 1.25 | **.4921** | 12.50 | 16.3 | 4 | **2.44** | 62 | 2.CD.100125.IC | ■ |
| | **.0512** | 1.30 | **.5118** | 13.00 | 16.9 | 4 | **2.44** | 62 | 2.CD.100130.IC | ■ |
| | **.0531** | 1.35 | **.5315** | 13.50 | 17.6 | 4 | **2.44** | 62 | 2.CD.100135.IC | ■ |
| | **.0551** | 1.40 | **.5512** | 14.00 | 18.2 | 4 | **2.44** | 62 | 2.CD.100140.IC | ■ |
| | **.0571** | 1.45 | **.5709** | 14.50 | 18.9 | 4 | **2.56** | 65 | 2.CD.100145.IC | ■ |
| | **.0591** | 1.50 | **.5906** | 15.00 | 19.5 | 4 | **2.56** | 65 | 2.CD.100150.IC | ■ |
| | **.0610** | 1.55 | **.6102** | 15.50 | 20.2 | 4 | **2.56** | 65 | 2.CD.100155.IC | ■ |
| **1/16** | **.0625** | 1.587 | **.6248** | 15.87 | 20.8 | 4 | **2.56** | 65 | 2.CD.100F116.IC | ■ |
| | **.0630** | 1.60 | **.6299** | 16.00 | 20.8 | 4 | **2.56** | 65 | 2.CD.100160.IC | ■ |
| | **.0650** | 1.65 | **.6496** | 16.50 | 21.5 | 4 | **2.56** | 65 | 2.CD.100165.IC | ■ |
| | **.0669** | 1.70 | **.6693** | 17.00 | 22.1 | 4 | **2.64** | 67 | 2.CD.100170.IC | ■ |
| | **.0689** | 1.75 | **.6890** | 17.50 | 22.8 | 4 | **2.64** | 67 | 2.CD.100175.IC | ■ |
| | **.0709** | 1.80 | **.7087** | 18.00 | 23.4 | 4 | **2.64** | 67 | 2.CD.100180.IC | ■ |
| | **.0728** | 1.85 | **.7283** | 18.50 | 24.1 | 4 | **2.64** | 67 | 2.CD.100185.IC | ■ |
| | **.0748** | 1.90 | **.7480** | 19.00 | 24.7 | 4 | **2.64** | 67 | 2.CD.100190.IC | ■ |
| | **.0768** | 1.95 | **.7677** | 19.50 | 25.4 | 4 | **2.64** | 67 | 2.CD.100195.IC | ■ |
| | **.0787** | 2.00 | **.7874** | 20.00 | 26.0 | 4 | **2.76** | 70 | 2.CD.100200.IC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0807** | 2.05 | **.8071** | 20.50 | 26.7 | 4 | **2.76** | 70 | 2.CD.100205.IC | ■ |
| | **.0827** | 2.10 | **.8268** | 21.00 | 27.3 | 4 | **2.76** | 70 | 2.CD.100210.IC | ■ |
| | **.0846** | 2.15 | **.8465** | 21.50 | 28.0 | 4 | **2.76** | 70 | 2.CD.100215.IC | ■ |
| | **.0866** | 2.20 | **.8661** | 22.00 | 28.6 | 4 | **2.76** | 70 | 2.CD.100220.IC | ■ |
| | **.0886** | 2.25 | **.8858** | 22.50 | 29.3 | 4 | **2.76** | 70 | 2.CD.100225.IC | ■ |
| | **.0906** | 2.30 | **.9055** | 23.00 | 29.9 | 4 | **2.95** | 75 | 2.CD.100230.IC | ■ |
| | **.0925** | 2.35 | **.9252** | 23.50 | 30.6 | 4 | **2.95** | 75 | 2.CD.100235.IC | ■ |
| **3/32** | **.0937** | 2.381 | **.9374** | 23.81 | 31.2 | 4 | **2.95** | 75 | 2.CD.100F332.IC | ■ |
| | **.0945** | 2.40 | **.9449** | 24.00 | 31.2 | 4 | **2.95** | 75 | 2.CD.100240.IC | ■ |
| | **.0965** | 2.45 | **.9646** | 24.50 | 31.9 | 4 | **2.95** | 75 | 2.CD.100245.IC | ■ |
| | **.0984** | 2.50 | **.9843** | 25.00 | 32.5 | 4 | **2.95** | 75 | 2.CD.100250.IC | ■ |
| | **.1004** | 2.55 | **1.004** | 25.50 | 33.2 | 4 | **2.95** | 75 | 2.CD.100255.IC | ■ |
| | **.1024** | 2.60 | **1.024** | 26.00 | 33.8 | 4 | **3.15** | 80 | 2.CD.100260.IC | ■ |
| | **.1043** | 2.65 | **1.043** | 26.50 | 34.5 | 4 | **3.15** | 80 | 2.CD.100265.IC | ■ |
| | **.1063** | 2.70 | **1.063** | 27.00 | 35.1 | 4 | **3.15** | 80 | 2.CD.100270.IC | ■ |
| | **.1083** | 2.75 | **1.083** | 27.50 | 35.8 | 4 | **3.15** | 80 | 2.CD.100275.IC | ■ |
| | **.1102** | 2.80 | **1.102** | 28.00 | 36.4 | 4 | **3.15** | 80 | 2.CD.100280.IC | ■ |
| | **.1122** | 2.85 | **1.122** | 28.50 | 37.1 | 4 | **3.15** | 80 | 2.CD.100285.IC | ■ |
| | **.1142** | 2.90 | **1.142** | 29.00 | 37.7 | 4 | **3.15** | 80 | 2.CD.100290.IC | ■ |
| | **.1161** | 2.95 | **1.161** | 29.50 | 38.4 | 4 | **3.15** | 80 | 2.CD.100295.IC | ■ |
| | **.1181** | 3.00 | **1.181** | 30.00 | 39.0 | 6 | **3.43** | 87 | 2.CD.100300.IC | ■ |
| | **.1201** | 3.05 | **1.201** | 30.50 | 39.7 | 6 | **3.43** | 87 | 2.CD.100305.IC | ■ |

■ Stock item

| Carbide |   |   | Z2 |  |   |
|---|---|---|---|---|---|

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | | **.240" - .394"** (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 | **+ .00024"**<br>**+ .00004"** | + 0.006 mm<br>+ 0.001 mm | **+ .00028"**<br>**+ .00004"** | + 0.007 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1220** | 3.10 | **1.220** | 31.00 | 40.3 | 6 | **3.43** | 87 | 2.CD.100310.IC | ■ |
| | **.1240** | 3.15 | **1.240** | 31.50 | 41.0 | 6 | **3.43** | 87 | 2.CD.100315.IC | ■ |
| **1/8** | **.1250** | 3.175 | **1.250** | 31.75 | 41.6 | 6 | **3.43** | 87 | 2.CD.100F18.IC | ■ |
| | **.1260** | 3.20 | **1.260** | 32.00 | 41.6 | 6 | **3.43** | 87 | 2.CD.100320.IC | ■ |
| | **.1280** | 3.25 | **1.280** | 32.50 | 42.3 | 6 | **3.43** | 87 | 2.CD.100325.IC | ■ |
| | **.1299** | 3.30 | **1.299** | 33.00 | 42.9 | 6 | **3.43** | 87 | 2.CD.100330.IC | ■ |
| | **.1319** | 3.35 | **1.319** | 33.50 | 43.6 | 6 | **3.43** | 87 | 2.CD.100335.IC | ■ |
| | **.1339** | 3.40 | **1.339** | 34.00 | 44.2 | 6 | **3.43** | 87 | 2.CD.100340.IC | ■ |
| | **.1358** | 3.45 | **1.358** | 34.50 | 44.9 | 6 | **3.43** | 87 | 2.CD.100345.IC | ■ |
| | **.1378** | 3.50 | **1.378** | 35.00 | 45.5 | 6 | **3.74** | 95 | 2.CD.100350.IC | ■ |
| | **.1398** | 3.55 | **1.398** | 35.50 | 46.2 | 6 | **3.74** | 95 | 2.CD.100355.IC | ■ |
| | **.1417** | 3.60 | **1.417** | 36.00 | 46.8 | 6 | **3.74** | 95 | 2.CD.100360.IC | ■ |
| | **.1437** | 3.65 | **1.437** | 36.50 | 47.5 | 6 | **3.74** | 95 | 2.CD.100365.IC | ■ |
| | **.1457** | 3.70 | **1.457** | 37.00 | 48.1 | 6 | **3.74** | 95 | 2.CD.100370.IC | ■ |
| | **.1476** | 3.75 | **1.476** | 37.50 | 48.8 | 6 | **3.74** | 95 | 2.CD.100375.IC | ■ |
| | **.1496** | 3.80 | **1.496** | 38.00 | 49.4 | 6 | **3.74** | 95 | 2.CD.100380.IC | ■ |
| | **.1516** | 3.85 | **1.516** | 38.50 | 50.1 | 6 | **3.74** | 95 | 2.CD.100385.IC | ■ |
| | **.1535** | 3.90 | **1.535** | 39.00 | 50.7 | 6 | **3.74** | 95 | 2.CD.100390.IC | ■ |
| | **.1555** | 3.95 | **1.555** | 39.50 | 51.4 | 6 | **3.74** | 95 | 2.CD.100395.IC | ■ |
| **5/32** | **.1562** | 3.968 | **1.562** | 39.68 | 52.0 | 6 | **3.74** | 95 | 2.CD.100F532.IC | ■ |
| | **.1575** | 4.00 | **1.575** | 40.00 | 52.0 | 6 | **3.74** | 95 | 2.CD.100400.IC | ■ |
| | **.1614** | 4.10 | **1.614** | 41.00 | 53.3 | 6 | **3.94** | 100 | 2.CD.100410.IC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1654** | 4.20 | **1.654** | 42.00 | 54.6 | 6 | **3.94** | 100 | 2.CD.100420.IC | ■ |
| | **.1693** | 4.30 | **1.693** | 43.00 | 55.9 | 6 | **3.94** | 100 | 2.CD.100430.IC | ■ |
| | **.1732** | 4.40 | **1.732** | 44.00 | 57.2 | 6 | **3.94** | 100 | 2.CD.100440.IC | ■ |
| | **.1772** | 4.50 | **1.772** | 45.00 | 58.5 | 6 | **3.94** | 100 | 2.CD.100450.IC | ■ |
| | **.1811** | 4.60 | **1.811** | 46.00 | 59.8 | 6 | **3.94** | 100 | 2.CD.100460.IC | ■ |
| | **.1850** | 4.70 | **1.850** | 47.00 | 61.1 | 6 | **4.13** | 105 | 2.CD.100470.IC | ■ |
| **3/16** | **.1875** | 4.762 | **1.875** | 47.62 | 62.4 | 6 | **4.13** | 105 | 2.CD.100F316.IC | ■ |
| | **.1890** | 4.80 | **1.890** | 48.00 | 62.4 | 6 | **4.13** | 105 | 2.CD.100480.IC | ■ |
| | **.1929** | 4.90 | **1.929** | 49.00 | 63.7 | 6 | **4.13** | 105 | 2.CD.100490.IC | ■ |
| | **.1969** | 5.00 | **1.969** | 50.00 | 65.0 | 6 | **4.13** | 105 | 2.CD.100500.IC | ■ |
| | **.2008** | 5.10 | **2.008** | 51.00 | 66.3 | 6 | **4.13** | 105 | 2.CD.100510.IC | ■ |
| | **.2047** | 5.20 | **2.047** | 52.00 | 67.6 | 6 | **4.13** | 105 | 2.CD.100520.IC | ■ |
| | **.2087** | 5.30 | **2.087** | 53.00 | 68.9 | 6 | **4.13** | 105 | 2.CD.100530.IC | ■ |
| | **.2126** | 5.40 | **2.126** | 54.00 | 70.2 | 6 | **4.41** | 112 | 2.CD.100540.IC | ■ |
| | **.2165** | 5.50 | **2.165** | 55.00 | 71.5 | 6 | **4.41** | 112 | 2.CD.100550.IC | ■ |
| **7/32** | **.2189** | 5.560 | **2.189** | 55.60 | 72.8 | 6 | **4.41** | 112 | 2.CD.100F732.IC | ■ |
| | **.2205** | 5.60 | **2.205** | 56.00 | 72.8 | 6 | **4.41** | 112 | 2.CD.100560.IC | ■ |
| | **.2244** | 5.70 | **2.244** | 57.00 | 74.1 | 6 | **4.41** | 112 | 2.CD.100570.IC | ■ |
| | **.2283** | 5.80 | **2.283** | 58.00 | 75.4 | 6 | **4.41** | 112 | 2.CD.100580.IC | ■ |
| | **.2323** | 5.90 | **2.323** | 59.00 | 76.7 | 6 | **4.41** | 112 | 2.CD.100590.IC | ■ |
| | **.2362** | 6.00 | **2.362** | 60.00 | 78.0 | 6 | **4.41** | 112 | 2.CD.100600.IC | ■ |
| **1/4** | **.2500** | 6.350 | **2.500** | 63.50 | 82.6 | 8 | **4.57** | 116 | 2.CD.100F14.IC | ■ |

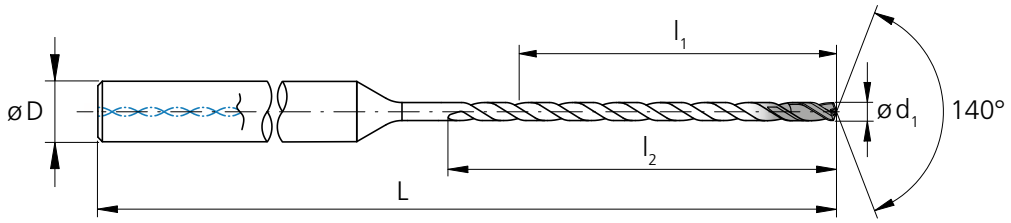
■ Stock item

**Complementary products**

CrazyDrill Coolpilot p.156
CrazyDrill Crosspilot p.146

# CrazyDrill Cool SST-Inox 15 x d

## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.591** | 15.00 | 18.5 | 4 | **2.44** | 62 | 2.CD.150100.IC | ■ |
| | **.0413** | 1.05 | **.620** | 15.75 | 19.4 | 4 | **2.44** | 62 | 2.CD.150105.IC | ■ |
| | **.0433** | 1.10 | **.650** | 16.50 | 20.4 | 4 | **2.44** | 62 | 2.CD.150110.IC | ■ |
| | **.0453** | 1.15 | **.679** | 17.25 | 21.3 | 4 | **2.44** | 62 | 2.CD.150115.IC | ■ |
| | **.0472** | 1.20 | **.709** | 18.00 | 22.2 | 4 | **2.52** | 64 | 2.CD.150120.IC | ■ |
| | **.0492** | 1.25 | **.738** | 18.75 | 23.1 | 4 | **2.52** | 64 | 2.CD.150125.IC | ■ |
| | **.0512** | 1.30 | **.768** | 19.50 | 24.1 | 4 | **2.60** | 66 | 2.CD.150130.IC | ■ |
| | **.0531** | 1.35 | **.797** | 20.25 | 25.0 | 4 | **2.60** | 66 | 2.CD.150135.IC | ■ |
| | **.0551** | 1.40 | **.827** | 21.00 | 25.9 | 4 | **2.68** | 68 | 2.CD.150140.IC | ■ |
| | **.0571** | 1.45 | **.856** | 21.75 | 26.8 | 4 | **2.76** | 70 | 2.CD.150145.IC | ■ |
| | **.0591** | 1.50 | **.886** | 22.50 | 27.8 | 4 | **2.76** | 70 | 2.CD.150150.IC | ■ |
| | **.0610** | 1.55 | **.915** | 23.25 | 28.7 | 4 | **2.95** | 75 | 2.CD.150155.IC | ■ |
| **1/16** | **.0625** | 1.587 | **.945** | 24.00 | 29.6 | 4 | **2.95** | 75 | 2.CD.150F116.IC | ■ |
| | **.0630** | 1.60 | **.945** | 24.00 | 29.6 | 4 | **2.95** | 75 | 2.CD.150160.IC | ■ |
| | **.0650** | 1.65 | **.974** | 24.75 | 30.5 | 4 | **2.95** | 75 | 2.CD.150165.IC | ■ |
| | **.0669** | 1.70 | **1.00** | 25.50 | 31.5 | 4 | **2.99** | 76 | 2.CD.150170.IC | ■ |
| | **.0689** | 1.75 | **1.03** | 26.25 | 32.4 | 4 | **2.99** | 76 | 2.CD.150175.IC | ■ |
| | **.0709** | 1.80 | **1.06** | 27.00 | 33.3 | 4 | **2.99** | 76 | 2.CD.150180.IC | ■ |
| | **.0728** | 1.85 | **1.09** | 27.75 | 34.2 | 4 | **2.99** | 76 | 2.CD.150185.IC | ■ |
| | **.0748** | 1.90 | **1.12** | 28.50 | 35.2 | 4 | **3.15** | 80 | 2.CD.150190.IC | ■ |
| | **.0768** | 1.95 | **1.15** | 29.25 | 36.1 | 4 | **3.15** | 80 | 2.CD.150195.IC | ■ |
| | **.0787** | 2.00 | **1.18** | 30.00 | 37.0 | 4 | **3.15** | 80 | 2.CD.150200.IC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0807** | 2.05 | **1.21** | 30.75 | 37.9 | 4 | **3.15** | 80 | 2.CD.150205.IC | ■ |
| | **.0827** | 2.10 | **1.24** | 31.50 | 38.9 | 4 | **3.15** | 80 | 2.CD.150210.IC | ■ |
| | **.0846** | 2.15 | **1.27** | 32.25 | 39.8 | 4 | **3.35** | 85 | 2.CD.150215.IC | ■ |
| | **.0866** | 2.20 | **1.30** | 33.00 | 40.7 | 4 | **3.35** | 85 | 2.CD.150220.IC | ■ |
| | **.0886** | 2.25 | **1.33** | 33.75 | 41.6 | 4 | **3.35** | 85 | 2.CD.150225.IC | ■ |
| | **.0906** | 2.30 | **1.36** | 34.50 | 42.6 | 4 | **3.39** | 86 | 2.CD.150230.IC | ■ |
| | **.0925** | 2.35 | **1.39** | 35.25 | 43.5 | 4 | **3.39** | 86 | 2.CD.150235.IC | ■ |
| **3/32** | **.0937** | 2.381 | **1.42** | 36.00 | 44.4 | 4 | **3.39** | 86 | 2.CD.150F332.IC | ■ |
| | **.0945** | 2.40 | **1.42** | 36.00 | 44.4 | 4 | **3.39** | 86 | 2.CD.150240.IC | ■ |
| | **.0965** | 2.45 | **1.45** | 36.75 | 45.3 | 4 | **3.39** | 86 | 2.CD.150245.IC | ■ |
| | **.0984** | 2.50 | **1.48** | 37.50 | 46.3 | 4 | **3.54** | 90 | 2.CD.150250.IC | ■ |
| | **.1004** | 2.55 | **1.51** | 38.25 | 47.2 | 4 | **3.54** | 90 | 2.CD.150255.IC | ■ |
| | **.1024** | 2.60 | **1.54** | 39.00 | 48.1 | 4 | **3.54** | 90 | 2.CD.150260.IC | ■ |
| | **.1043** | 2.65 | **1.56** | 39.75 | 49.0 | 4 | **3.54** | 90 | 2.CD.150265.IC | ■ |
| | **.1063** | 2.70 | **1.59** | 40.50 | 50.0 | 4 | **3.62** | 92 | 2.CD.150270.IC | ■ |
| | **.1083** | 2.75 | **1.62** | 41.25 | 50.9 | 4 | **3.62** | 92 | 2.CD.150275.IC | ■ |
| | **.1102** | 2.80 | **1.65** | 42.00 | 51.8 | 4 | **3.70** | 94 | 2.CD.150280.IC | ■ |
| | **.1122** | 2.85 | **1.68** | 42.75 | 52.7 | 4 | **3.70** | 94 | 2.CD.150285.IC | ■ |
| | **.1142** | 2.90 | **1.71** | 43.50 | 53.7 | 4 | **3.86** | 98 | 2.CD.150290.IC | ■ |
| | **.1161** | 2.95 | **1.74** | 44.25 | 54.6 | 4 | **3.86** | 98 | 2.CD.150295.IC | ■ |
| | **.1181** | 3.00 | **1.77** | 45.00 | 55.5 | 6 | **3.94** | 100 | 2.CD.150300.IC | ■ |
| | **.1201** | 3.05 | **1.80** | 45.75 | 56.4 | 6 | **3.94** | 100 | 2.CD.150305.IC | ■ |

■ Stock item

Carbide | 15xd1 | 140° | Z2 | eXedur SNP

| Ø $d_1$ | .004" - .118" (0.1 - 3.0 mm) | | .120" - .236" (3.05 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | + .00016"<br>0 | + 0.004 mm<br>0 | + .00024"<br>+ .00004" | + 0.006 mm<br>+ 0.001 mm | + .00028"<br>+ .00004" | + 0.007 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1220 | 3.10 | 1.83 | 46.50 | 57.4 | 6 | 4.02 | 102 | 2.CD.150310.IC | ■ |
| | .1240 | 3.15 | 1.86 | 47.25 | 58.3 | 6 | 4.02 | 102 | 2.CD.150315.IC | ■ |
| 1/8 | .1250 | 3.175 | 1.89 | 48.00 | 59.2 | 6 | 4.17 | 106 | 2.CD.150F18.IC | ■ |
| | .1260 | 3.20 | 1.89 | 48.00 | 59.2 | 6 | 4.17 | 106 | 2.CD.150320.IC | ■ |
| | .1280 | 3.25 | 1.92 | 48.75 | 60.1 | 6 | 4.17 | 106 | 2.CD.150325.IC | ■ |
| | .1299 | 3.30 | 1.95 | 49.50 | 61.1 | 6 | 4.17 | 106 | 2.CD.150330.IC | ■ |
| | .1319 | 3.35 | 1.98 | 50.25 | 62.0 | 6 | 4.17 | 106 | 2.CD.150335.IC | ■ |
| | .1339 | 3.40 | 2.01 | 51.00 | 62.9 | 6 | 4.17 | 106 | 2.CD.150340.IC | ■ |
| | .1358 | 3.45 | 2.04 | 51.75 | 63.8 | 6 | 4.17 | 106 | 2.CD.150345.IC | ■ |
| | .1378 | 3.50 | 2.07 | 52.50 | 64.8 | 6 | 4.25 | 108 | 2.CD.150350.IC | ■ |
| | .1398 | 3.55 | 2.10 | 53.25 | 65.7 | 6 | 4.25 | 108 | 2.CD.150355.IC | ■ |
| | .1417 | 3.60 | 2.13 | 54.00 | 66.6 | 6 | 4.33 | 110 | 2.CD.150360.IC | ■ |
| | .1437 | 3.65 | 2.16 | 54.75 | 67.5 | 6 | 4.33 | 110 | 2.CD.150365.IC | ■ |
| | .1457 | 3.70 | 2.19 | 55.50 | 68.5 | 6 | 4.41 | 112 | 2.CD.150370.IC | ■ |
| | .1476 | 3.75 | 2.21 | 56.25 | 69.4 | 6 | 4.41 | 112 | 2.CD.150375.IC | ■ |
| | .1496 | 3.80 | 2.24 | 57.00 | 70.3 | 6 | 4.57 | 116 | 2.CD.150380.IC | ■ |
| | .1516 | 3.85 | 2.27 | 57.75 | 71.2 | 6 | 4.57 | 116 | 2.CD.150385.IC | ■ |
| | .1535 | 3.90 | 2.30 | 58.50 | 72.2 | 6 | 4.57 | 116 | 2.CD.150390.IC | ■ |
| | .1555 | 3.95 | 2.33 | 59.25 | 73.1 | 6 | 4.57 | 116 | 2.CD.150395.IC | ■ |
| 5/32 | .1562 | 3.968 | 2.36 | 60.00 | 74.0 | 6 | 4.57 | 116 | 2.CD.150F532.IC | ■ |
| | .1575 | 4.00 | 2.36 | 60.00 | 74.0 | 6 | 4.57 | 116 | 2.CD.150400.IC | ■ |
| | .1614 | 4.10 | 2.42 | 61.50 | 75.9 | 6 | 4.65 | 118 | 2.CD.150410.IC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1654 | 4.20 | 2.48 | 63.00 | 77.7 | 6 | 4.72 | 120 | 2.CD.150420.IC | ■ |
| | .1693 | 4.30 | 2.54 | 64.50 | 79.6 | 6 | 4.80 | 122 | 2.CD.150430.IC | ■ |
| | .1732 | 4.40 | 2.60 | 66.00 | 81.4 | 6 | 4.96 | 126 | 2.CD.150440.IC | ■ |
| | .1772 | 4.50 | 2.66 | 67.50 | 83.3 | 6 | 4.96 | 126 | 2.CD.150450.IC | ■ |
| | .1811 | 4.60 | 2.72 | 69.00 | 85.1 | 6 | 4.96 | 126 | 2.CD.150460.IC | ■ |
| | .1850 | 4.70 | 2.78 | 70.50 | 87.0 | 6 | 5.08 | 129 | 2.CD.150470.IC | ■ |
| 3/16 | .1875 | 4.762 | 2.83 | 72.00 | 88.8 | 6 | 5.16 | 131 | 2.CD.150F316.IC | ■ |
| | .1890 | 4.80 | 2.83 | 72.00 | 88.8 | 6 | 5.16 | 131 | 2.CD.150480.IC | ■ |
| | .1929 | 4.90 | 2.89 | 73.50 | 90.7 | 6 | 5.24 | 133 | 2.CD.150490.IC | ■ |
| | .1969 | 5.00 | 2.95 | 75.00 | 92.5 | 6 | 5.31 | 135 | 2.CD.150500.IC | ■ |
| | .2008 | 5.10 | 3.01 | 76.50 | 94.4 | 6 | 5.39 | 137 | 2.CD.150510.IC | ■ |
| | .2047 | 5.20 | 3.07 | 78.00 | 96.2 | 6 | 5.55 | 141 | 2.CD.150520.IC | ■ |
| | .2087 | 5.30 | 3.13 | 79.50 | 98.1 | 6 | 5.55 | 141 | 2.CD.150530.IC | ■ |
| | .2126 | 5.40 | 3.19 | 81.00 | 99.9 | 6 | 5.55 | 141 | 2.CD.150540.IC | ■ |
| | .2165 | 5.50 | 3.25 | 82.50 | 101.8 | 6 | 5.63 | 143 | 2.CD.150550.IC | ■ |
| 7/32 | .2189 | 5.560 | 3.31 | 84.00 | 103.6 | 6 | 5.71 | 145 | 2.CD.150F732.IC | ■ |
| | .2205 | 5.60 | 3.31 | 84.00 | 103.6 | 6 | 5.71 | 145 | 2.CD.150560.IC | ■ |
| | .2244 | 5.70 | 3.37 | 85.50 | 105.5 | 6 | 5.79 | 147 | 2.CD.150570.IC | ■ |
| | .2283 | 5.80 | 3.43 | 87.00 | 107.3 | 6 | 5.94 | 151 | 2.CD.150580.IC | ■ |
| | .2323 | 5.90 | 3.48 | 88.50 | 109.2 | 6 | 5.94 | 151 | 2.CD.150590.IC | ■ |
| | .2362 | 6.00 | 3.54 | 90.00 | 111.0 | 6 | 5.94 | 151 | 2.CD.150600.IC | ■ |
| 1/4 | .2500 | 6.350 | 3.75 | 95.30 | 117.5 | 8 | 6.18 | 157 | 2.CD.150F14.IC | ■ |

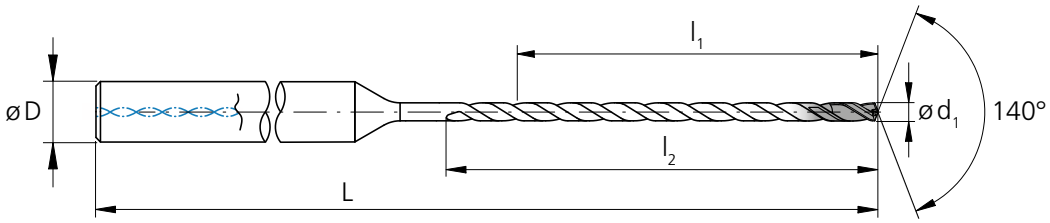
■ Stock item

Complementary products

CrazyDrill Coolpilot p.156
CrazyDrill Crosspilot p.146

# CrazyDrill Cool SST-Inox 20 x d

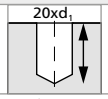
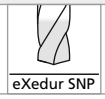
## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.787** | 20.0 | 23.5 | 4 | **2.76** | 70 | 2.CD.200100.IC | ■ |
| | **.0413** | 1.05 | **.827** | 21.0 | 24.7 | 4 | **2.76** | 70 | 2.CD.200105.IC | Δ |
| | **.0433** | 1.10 | **.866** | 22.0 | 25.9 | 4 | **2.76** | 70 | 2.CD.200110.IC | ■ |
| | **.0453** | 1.15 | **.906** | 23.0 | 27.0 | 4 | **2.76** | 70 | 2.CD.200115.IC | Δ |
| | **.0472** | 1.20 | **.945** | 24.0 | 28.2 | 4 | **2.76** | 70 | 2.CD.200120.IC | ■ |
| | **.0492** | 1.25 | **.984** | 25.0 | 29.4 | 4 | **2.76** | 70 | 2.CD.200125.IC | Δ |
| | **.0512** | 1.30 | **1.02** | 26.0 | 30.6 | 4 | **2.95** | 75 | 2.CD.200130.IC | ■ |
| | **.0531** | 1.35 | **1.06** | 27.0 | 31.7 | 4 | **2.95** | 75 | 2.CD.200135.IC | Δ |
| | **.0551** | 1.40 | **1.10** | 28.0 | 32.9 | 4 | **2.95** | 75 | 2.CD.200140.IC | ■ |
| | **.0571** | 1.45 | **1.14** | 29.0 | 34.1 | 4 | **3.07** | 78 | 2.CD.200145.IC | Δ |
| | **.0591** | 1.50 | **1.18** | 30.0 | 35.3 | 4 | **3.07** | 78 | 2.CD.200150.IC | ■ |
| | **.0610** | 1.55 | **1.22** | 31.0 | 36.4 | 4 | **3.07** | 78 | 2.CD.200155.IC | Δ |
| **1/16** | **.0625** | 1.587 | **1.26** | 32.0 | 37.6 | 4 | **3.23** | 82 | 2.CD.200F116.IC | ■ |
| | **.0630** | 1.60 | **1.26** | 32.0 | 37.6 | 4 | **3.23** | 82 | 2.CD.200160.IC | ■ |
| | **.0650** | 1.65 | **1.30** | 33.0 | 38.8 | 4 | **3.23** | 82 | 2.CD.200165.IC | Δ |
| | **.0669** | 1.70 | **1.34** | 34.0 | 40.0 | 4 | **3.35** | 85 | 2.CD.200170.IC | ■ |
| | **.0689** | 1.75 | **1.38** | 35.0 | 41.1 | 4 | **3.35** | 85 | 2.CD.200175.IC | Δ |
| | **.0709** | 1.80 | **1.42** | 36.0 | 42.3 | 4 | **3.35** | 85 | 2.CD.200180.IC | ■ |
| | **.0728** | 1.85 | **1.46** | 37.0 | 43.5 | 4 | **3.46** | 88 | 2.CD.200185.IC | Δ |
| | **.0748** | 1.90 | **1.50** | 38.0 | 44.7 | 4 | **3.46** | 88 | 2.CD.200190.IC | ■ |
| | **.0768** | 1.95 | **1.54** | 39.0 | 45.8 | 4 | **3.46** | 88 | 2.CD.200195.IC | Δ |
| | **.0787** | 2.00 | **1.57** | 40.0 | 47.0 | 4 | **3.54** | 90 | 2.CD.200200.IC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0807** | 2.05 | **1.61** | 41.0 | 48.2 | 4 | **3.54** | 90 | 2.CD.200205.IC | Δ |
| | **.0827** | 2.10 | **1.65** | 42.0 | 49.4 | 4 | **3.66** | 93 | 2.CD.200210.IC | ■ |
| | **.0846** | 2.15 | **1.69** | 43.0 | 50.5 | 4 | **3.66** | 93 | 2.CD.200215.IC | Δ |
| | **.0866** | 2.20 | **1.73** | 44.0 | 51.7 | 4 | **3.74** | 95 | 2.CD.200220.IC | ■ |
| | **.0886** | 2.25 | **1.77** | 45.0 | 52.9 | 4 | **3.74** | 95 | 2.CD.200225.IC | Δ |
| | **.0906** | 2.30 | **1.81** | 46.0 | 54.1 | 4 | **3.86** | 98 | 2.CD.200230.IC | ■ |
| | **.0925** | 2.35 | **1.85** | 47.0 | 55.2 | 4 | **3.86** | 98 | 2.CD.200235.IC | Δ |
| **3/32** | **.0937** | 2.381 | **1.89** | 48.0 | 56.4 | 4 | **3.86** | 98 | 2.CD.200F332.IC | ■ |
| | **.0945** | 2.40 | **1.89** | 48.0 | 56.4 | 4 | **3.86** | 98 | 2.CD.200240.IC | ■ |
| | **.0965** | 2.45 | **1.93** | 49.0 | 57.6 | 4 | **3.94** | 100 | 2.CD.200245.IC | Δ |
| | **.0984** | 2.50 | **1.97** | 50.0 | 58.8 | 4 | **3.94** | 100 | 2.CD.200250.IC | ■ |
| | **.1004** | 2.55 | **2.01** | 51.0 | 59.9 | 4 | **4.02** | 102 | 2.CD.200255.IC | Δ |
| | **.1024** | 2.60 | **2.05** | 52.0 | 61.1 | 4 | **4.09** | 104 | 2.CD.200260.IC | ■ |
| | **.1043** | 2.65 | **2.09** | 53.0 | 62.3 | 4 | **4.09** | 104 | 2.CD.200265.IC | Δ |
| | **.1063** | 2.70 | **2.13** | 54.0 | 63.5 | 4 | **4.09** | 104 | 2.CD.200270.IC | ■ |
| | **.1083** | 2.75 | **2.17** | 55.0 | 64.6 | 4 | **4.17** | 106 | 2.CD.200275.IC | Δ |
| | **.1102** | 2.80 | **2.20** | 56.0 | 65.8 | 4 | **4.17** | 106 | 2.CD.200280.IC | ■ |
| | **.1122** | 2.85 | **2.24** | 57.0 | 67.0 | 4 | **4.25** | 108 | 2.CD.200285.IC | Δ |
| | **.1142** | 2.90 | **2.28** | 58.0 | 68.2 | 4 | **4.25** | 108 | 2.CD.200290.IC | ■ |
| | **.1161** | 2.95 | **2.32** | 59.0 | 69.3 | 4 | **4.33** | 110 | 2.CD.200295.IC | Δ |
| | **.1181** | 3.00 | **2.36** | 60.0 | 70.5 | 6 | **4.57** | 116 | 2.CD.200300.IC | ■ |
| | **.1201** | 3.05 | **2.40** | 61.0 | 71.7 | 6 | **4.57** | 116 | 2.CD.200305.IC | Δ |

■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide |  |  | Z2 |  | 

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | | **.240" - .394"** (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 | **+ .00024"**<br>**+ .00004"** | + 0.006 mm<br>+ 0.001 mm | **+ .00028"**<br>**+ .00004"** | + 0.007 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1220** | 3.10 | **2.44** | 62.0 | 72.9 | 6 | **4.65** | 118 | 2.CD.200310.IC | ■ |
| | **.1240** | 3.15 | **2.48** | 63.0 | 74.0 | 6 | **4.65** | 118 | 2.CD.200315.IC | Δ |
| **1/8** | **.1250** | 3.175 | **2.52** | 64.0 | 75.2 | 6 | **4.72** | 120 | 2.CD.200F18.IC | ■ |
| | **.1260** | 3.20 | **2.52** | 64.0 | 75.2 | 6 | **4.72** | 120 | 2.CD.200320.IC | ■ |
| | **.1280** | 3.25 | **2.56** | 65.0 | 76.4 | 6 | **4.72** | 120 | 2.CD.200325.IC | Δ |
| | **.1299** | 3.30 | **2.60** | 66.0 | 77.6 | 6 | **4.80** | 122 | 2.CD.200330.IC | ■ |
| | **.1319** | 3.35 | **2.64** | 67.0 | 78.7 | 6 | **4.80** | 122 | 2.CD.200335.IC | Δ |
| | **.1339** | 3.40 | **2.68** | 68.0 | 79.9 | 6 | **4.96** | 126 | 2.CD.200340.IC | ■ |
| | **.1358** | 3.45 | **2.72** | 69.0 | 81.1 | 6 | **4.96** | 126 | 2.CD.200345.IC | Δ |
| | **.1378** | 3.50 | **2.76** | 70.0 | 82.3 | 6 | **4.96** | 126 | 2.CD.200350.IC | ■ |
| | **.1398** | 3.55 | **2.80** | 71.0 | 83.4 | 6 | **4.96** | 126 | 2.CD.200355.IC | Δ |
| | **.1417** | 3.60 | **2.83** | 72.0 | 84.6 | 6 | **5.04** | 128 | 2.CD.200360.IC | ■ |
| | **.1437** | 3.65 | **2.87** | 73.0 | 85.8 | 6 | **5.04** | 128 | 2.CD.200365.IC | Δ |
| | **.1457** | 3.70 | **2.91** | 74.0 | 87.0 | 6 | **5.12** | 130 | 2.CD.200370.IC | ■ |
| | **.1476** | 3.75 | **2.95** | 75.0 | 88.1 | 6 | **5.12** | 130 | 2.CD.200375.IC | Δ |
| | **.1496** | 3.80 | **2.99** | 76.0 | 89.3 | 6 | **5.20** | 132 | 2.CD.200380.IC | ■ |
| | **.1516** | 3.85 | **3.03** | 77.0 | 90.5 | 6 | **5.20** | 132 | 2.CD.200385.IC | Δ |
| | **.1535** | 3.90 | **3.07** | 78.0 | 91.7 | 6 | **5.35** | 136 | 2.CD.200390.IC | ■ |
| | **.1555** | 3.95 | **3.11** | 79.0 | 92.8 | 6 | **5.35** | 136 | 2.CD.200395.IC | Δ |
| **5/32** | **.1562** | 3.968 | **3.15** | 80.0 | 94.0 | 6 | **5.35** | 136 | 2.CD.200F532.IC | ■ |
| | **.1575** | 4.00 | **3.15** | 80.0 | 94.0 | 6 | **5.35** | 136 | 2.CD.200400.IC | ■ |
| | **.1614** | 4.10 | **3.23** | 82.0 | 96.4 | 6 | **5.55** | 141 | 2.CD.200410.IC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1654** | 4.20 | **3.31** | 84.0 | 98.7 | 6 | **5.63** | 143 | 2.CD.200420.IC | ■ |
| | **.1693** | 4.30 | **3.39** | 86.0 | 101.1 | 6 | **5.71** | 145 | 2.CD.200430.IC | ■ |
| | **.1732** | 4.40 | **3.46** | 88.0 | 103.4 | 6 | **5.79** | 147 | 2.CD.200440.IC | ■ |
| | **.1772** | 4.50 | **3.54** | 90.0 | 105.8 | 6 | **5.94** | 151 | 2.CD.200450.IC | ■ |
| | **.1811** | 4.60 | **3.62** | 92.0 | 108.1 | 6 | **5.94** | 151 | 2.CD.200460.IC | ■ |
| | **.1850** | 4.70 | **3.70** | 94.0 | 110.5 | 6 | **6.06** | 154 | 2.CD.200470.IC | ■ |
| **3/16** | **.1875** | 4.762 | **3.78** | 96.0 | 112.8 | 6 | **6.14** | 156 | 2.CD.200F316.IC | ■ |
| | **.1890** | 4.80 | **3.78** | 96.0 | 112.8 | 6 | **6.14** | 156 | 2.CD.200480.IC | ■ |
| | **.1929** | 4.90 | **3.86** | 98.0 | 115.2 | 6 | **6.22** | 158 | 2.CD.200490.IC | ■ |
| | **.1969** | 5.00 | **3.94** | 100.0 | 117.5 | 6 | **6.30** | 160 | 2.CD.200500.IC | ■ |
| | **.2008** | 5.10 | **4.02** | 102.0 | 119.9 | 6 | **6.38** | 162 | 2.CD.200510.IC | ■ |
| | **.2047** | 5.20 | **4.09** | 104.0 | 122.2 | 6 | **6.54** | 166 | 2.CD.200520.IC | ■ |
| | **.2087** | 5.30 | **4.17** | 106.0 | 124.6 | 6 | **6.54** | 166 | 2.CD.200530.IC | ■ |
| | **.2126** | 5.40 | **4.25** | 108.0 | 126.9 | 6 | **6.73** | 171 | 2.CD.200540.IC | ■ |
| | **.2165** | 5.50 | **4.33** | 110.0 | 129.3 | 6 | **6.81** | 173 | 2.CD.200550.IC | ■ |
| **7/32** | **.2189** | 5.560 | **4.41** | 112.0 | 131.6 | 6 | **6.89** | 175 | 2.CD.200F732.IC | ■ |
| | **.2205** | 5.60 | **4.41** | 112.0 | 131.6 | 6 | **6.89** | 175 | 2.CD.200560.IC | ■ |
| | **.2244** | 5.70 | **4.49** | 114.0 | 134.0 | 6 | **6.97** | 177 | 2.CD.200570.IC | ■ |
| | **.2283** | 5.80 | **4.57** | 116.0 | 136.3 | 6 | **7.13** | 181 | 2.CD.200580.IC | ■ |
| | **.2323** | 5.90 | **4.65** | 118.0 | 138.7 | 6 | **7.13** | 181 | 2.CD.200590.IC | ■ |
| | **.2362** | 6.00 | **4.72** | 120.0 | 141.0 | 6 | **7.13** | 181 | 2.CD.200600.IC | ■ |
| **1/4** | **.2500** | 6.350 | **5.00** | 127.0 | 149.2 | 8 | **7.40** | 188 | 2.CD.200F14.IC | ■ |

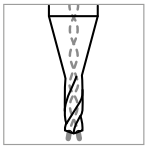
■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

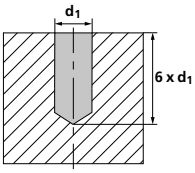
**Complementary products**

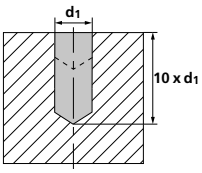
CrazyDrill Coolpilot p.156
CrazyDrill Crosspilot p.146

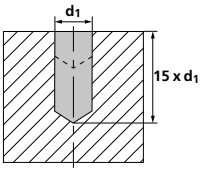
# 6 x d - 10 x d - 15 x d - 20 x d

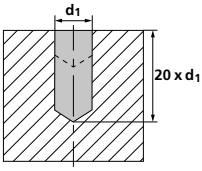
## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





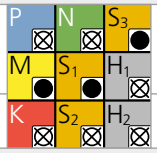




| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Low | Mid | High |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 30 \| **98** | 40 \| **131** | 50 \| **164** |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 50 \| **164** | 70 \| **230** | 90 \| **295** |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



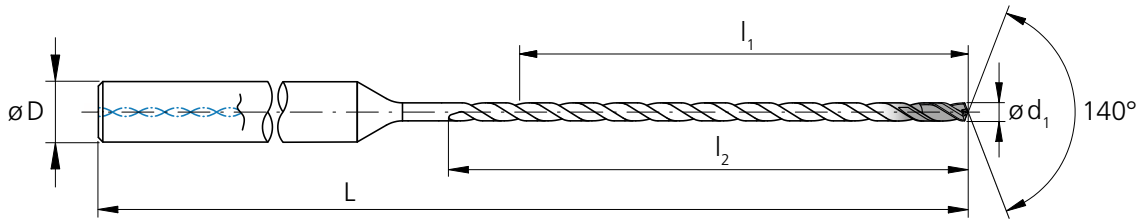

**f** [mm/rev] | **[IPR]**

| Ød1 | 1.0 mm \| .039" | | | 1.25 mm \| .049" | | | 1/16" 1.5 mm \| .059" | | | 3/32" 2.0 mm \| .079" | | | 2.5 mm \| .098" | | | 1/8" 3.0 mm \| .118" | | | 5/32" 4.0 mm \| .158" | | | 3/16" - 7/32" 5.0 mm \| .197" | | | 1/4" 6.0 mm \| .236" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | 0.010 **.0004** | 0.020 **.0008** | 0.030 **.0012** | 0.013 **.0005** | 0.025 **.0010** | 0.038 **.0015** | 0.015 **.0006** | 0.030 **.0012** | 0.045 **.0018** | 0.020 **.0008** | 0.040 **.0016** | 0.060 **.0024** | 0.025 **.0010** | 0.050 **.0020** | 0.075 **.0030** | 0.030 **.0012** | 0.060 **.0024** | 0.090 **.0035** | 0.040 **.0016** | 0.080 **.0031** | 0.120 **.0047** | 0.050 **.0020** | 0.100 **.0039** | 0.150 **.0059** | 0.060 **.0024** | 0.120 **.0047** | 0.180 **.0071** |
| | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** | 0.038 **.0015** | 0.050 **.0020** | 0.063 **.0025** | 0.045 **.0018** | 0.060 **.0024** | 0.075 **.0030** | 0.060 **.0024** | 0.080 **.0031** | 0.100 **.0039** | 0.075 **.0030** | 0.100 **.0039** | 0.125 **.0049** | 0.090 **.0035** | 0.120 **.0047** | 0.150 **.0059** | 0.120 **.0047** | 0.160 **.0063** | 0.200 **.0079** | 0.150 **.0059** | 0.200 **.0079** | 0.250 **.0098** | 0.180 **.0071** | 0.240 **.0094** | 0.300 **.0118** |
| | 0.020 **.0008** | 0.030 **.0012** | 0.040 **.0016** | 0.025 **.0010** | 0.038 **.0015** | 0.050 **.0020** | 0.030 **.0012** | 0.045 **.0018** | 0.060 **.0024** | 0.040 **.0016** | 0.060 **.0024** | 0.080 **.0031** | 0.050 **.0020** | 0.075 **.0030** | 0.100 **.0039** | 0.060 **.0024** | 0.090 **.0035** | 0.120 **.0047** | 0.080 **.0031** | 0.120 **.0047** | 0.160 **.0063** | 0.100 **.0039** | 0.150 **.0059** | 0.200 **.0079** | 0.120 **.0047** | 0.180 **.0071** | 0.240 **.0094** |
| | 0.020 **.0008** | 0.030 **.0012** | 0.040 **.0016** | 0.025 **.0010** | 0.038 **.0015** | 0.050 **.0020** | 0.030 **.0012** | 0.045 **.0018** | 0.060 **.0024** | 0.040 **.0016** | 0.060 **.0024** | 0.080 **.0031** | 0.050 **.0020** | 0.075 **.0030** | 0.100 **.0039** | 0.060 **.0024** | 0.090 **.0035** | 0.120 **.0047** | 0.080 **.0031** | 0.120 **.0047** | 0.160 **.0063** | 0.100 **.0039** | 0.150 **.0059** | 0.200 **.0079** | 0.120 **.0047** | 0.180 **.0071** | 0.240 **.0094** |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.013 **.0005** | 0.019 **.0007** | 0.025 **.0010** | 0.015 **.0006** | 0.023 **.0009** | 0.030 **.0012** | 0.020 **.0008** | 0.030 **.0012** | 0.040 **.0016** | 0.025 **.0010** | 0.038 **.0015** | 0.050 **.0020** | 0.030 **.0012** | 0.045 **.0018** | 0.060 **.0024** | 0.040 **.0016** | 0.060 **.0024** | 0.080 **.0031** | 0.050 **.0020** | 0.075 **.0030** | 0.100 **.0039** | 0.060 **.0024** | 0.090 **.0035** | 0.120 **.0047** |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | 0.020 **.0008** | 0.030 **.0012** | 0.040 **.0016** | 0.025 **.0010** | 0.038 **.0015** | 0.050 **.0020** | 0.030 **.0012** | 0.045 **.0018** | 0.060 **.0024** | 0.040 **.0016** | 0.060 **.0024** | 0.080 **.0031** | 0.050 **.0020** | 0.075 **.0030** | 0.100 **.0039** | 0.060 **.0024** | 0.090 **.0035** | 0.120 **.0047** | 0.080 **.0031** | 0.120 **.0047** | 0.160 **.0063** | 0.100 **.0039** | 0.150 **.0059** | 0.200 **.0079** | 0.120 **.0047** | 0.180 **.0071** | 0.240 **.0094** |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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CRAZYDRILL by Mikron Tool
Cool SST-Inox

# CrazyDrill Cool SST-Inox 30 x d

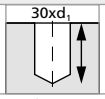
## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0571** | 1.45 | **1.71** | 43.5 | 48.6 | 4 | **3.74** | 95 | 2.CD.300145.IC | Δ |
| | **.0591** | 1.50 | **1.77** | 45.0 | 50.3 | 4 | **3.74** | 95 | 2.CD.300150.IC | ■ |
| | **.0610** | 1.55 | **1.83** | 46.5 | 51.9 | 4 | **3.74** | 95 | 2.CD.300155.IC | Δ |
| **1/16** | **.0625** | 1.587 | **1.89** | 48.0 | 53.6 | 4 | **3.94** | 100 | 2.CD.300F116.IC | ■ |
| | **.0630** | 1.60 | **1.89** | 48.0 | 53.6 | 4 | **3.94** | 100 | 2.CD.300160.IC | ■ |
| | **.0650** | 1.65 | **1.95** | 49.5 | 55.3 | 4 | **3.94** | 100 | 2.CD.300165.IC | Δ |
| | **.0669** | 1.70 | **2.01** | 51.0 | 57.0 | 4 | **3.94** | 100 | 2.CD.300170.IC | ■ |
| | **.0689** | 1.75 | **2.07** | 52.5 | 58.6 | 4 | **4.13** | 105 | 2.CD.300175.IC | Δ |
| | **.0709** | 1.80 | **2.13** | 54.0 | 60.3 | 4 | **4.13** | 105 | 2.CD.300180.IC | ■ |
| | **.0728** | 1.85 | **2.19** | 55.5 | 62.0 | 4 | **4.13** | 105 | 2.CD.300185.IC | Δ |
| | **.0748** | 1.90 | **2.24** | 57.0 | 63.7 | 4 | **4.33** | 110 | 2.CD.300190.IC | ■ |
| | **.0768** | 1.95 | **2.30** | 58.5 | 65.3 | 4 | **4.33** | 110 | 2.CD.300195.IC | Δ |
| | **.0787** | 2.00 | **2.36** | 60.0 | 67.0 | 4 | **4.33** | 110 | 2.CD.300200.IC | ■ |
| | **.0807** | 2.05 | **2.42** | 61.5 | 68.7 | 4 | **4.53** | 115 | 2.CD.300205.IC | Δ |
| | **.0827** | 2.10 | **2.48** | 63.0 | 70.4 | 4 | **4.53** | 115 | 2.CD.300210.IC | ■ |
| | **.0846** | 2.15 | **2.54** | 64.5 | 72.0 | 4 | **4.53** | 115 | 2.CD.300215.IC | Δ |
| | **.0866** | 2.20 | **2.60** | 66.0 | 73.7 | 4 | **4.72** | 120 | 2.CD.300220.IC | ■ |
| | **.0886** | 2.25 | **2.66** | 67.5 | 75.4 | 4 | **4.72** | 120 | 2.CD.300225.IC | Δ |
| | **.0906** | 2.30 | **2.72** | 69.0 | 77.1 | 4 | **4.72** | 120 | 2.CD.300230.IC | ■ |
| | **.0925** | 2.35 | **2.78** | 70.5 | 78.7 | 4 | **4.92** | 125 | 2.CD.300235.IC | Δ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **3/32** | **.0937** | 2.381 | **2.83** | 72.0 | 80.4 | 4 | **4.92** | 125 | 2.CD.300F332.IC | ■ |
| | **.0945** | 2.40 | **2.83** | 72.0 | 80.4 | 4 | **4.92** | 125 | 2.CD.300240.IC | ■ |
| | **.0965** | 2.45 | **2.89** | 73.5 | 82.1 | 4 | **4.92** | 125 | 2.CD.300245.IC | Δ |
| | **.0984** | 2.50 | **2.95** | 75.0 | 83.8 | 4 | **5.12** | 130 | 2.CD.300250.IC | ■ |
| | **.1004** | 2.55 | **3.01** | 76.5 | 85.4 | 4 | **5.12** | 130 | 2.CD.300255.IC | Δ |
| | **.1024** | 2.60 | **3.07** | 78.0 | 87.1 | 4 | **5.12** | 130 | 2.CD.300260.IC | ■ |
| | **.1043** | 2.65 | **3.13** | 79.5 | 88.8 | 4 | **5.31** | 135 | 2.CD.300265.IC | Δ |
| | **.1063** | 2.70 | **3.19** | 81.0 | 90.5 | 4 | **5.31** | 135 | 2.CD.300270.IC | ■ |
| | **.1083** | 2.75 | **3.25** | 82.5 | 92.1 | 4 | **5.43** | 138 | 2.CD.300275.IC | Δ |
| | **.1102** | 2.80 | **3.31** | 84.0 | 93.8 | 4 | **5.43** | 138 | 2.CD.300280.IC | ■ |
| | **.1122** | 2.85 | **3.37** | 85.5 | 95.5 | 4 | **5.43** | 138 | 2.CD.300285.IC | Δ |
| | **.1142** | 2.90 | **3.43** | 87.0 | 97.2 | 4 | **5.59** | 142 | 2.CD.300290.IC | ■ |
| | **.1161** | 2.95 | **3.48** | 88.5 | 98.8 | 4 | **5.59** | 142 | 2.CD.300295.IC | Δ |
| | **.1181** | 3.00 | **3.54** | 90.0 | 100.5 | 6 | **5.71** | 145 | 2.CD.300300.IC | ■ |
| | **.1201** | 3.05 | **3.60** | 91.5 | 102.2 | 6 | **5.83** | 148 | 2.CD.300305.IC | Δ |
| | **.1220** | 3.10 | **3.66** | 93.0 | 103.9 | 6 | **5.91** | 150 | 2.CD.300310.IC | ■ |
| | **.1240** | 3.15 | **3.72** | 94.5 | 105.5 | 6 | **5.91** | 150 | 2.CD.300315.IC | Δ |
| **1/8** | **.1250** | 3.175 | **3.78** | 96.0 | 107.2 | 6 | **6.02** | 153 | 2.CD.300F18.IC | ■ |
| | **.1260** | 3.20 | **3.78** | 96.0 | 107.2 | 6 | **6.02** | 153 | 2.CD.300320.IC | ■ |
| | **.1280** | 3.25 | **3.84** | 97.5 | 108.9 | 6 | **6.02** | 153 | 2.CD.300325.IC | Δ |

■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide |  |  | Z2 |  | 

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | | **.240" - .394"** (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 | **+ .00024"**<br>**+ .00004"** | + 0.006 mm<br>+ 0.001 mm | **+ .00028"**<br>**+ .00004"** | + 0.007 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1299** | 3.30 | **3.90** | 99.0 | 110.6 | 6 | **6.18** | 157 | 2.CD.300330.IC | ■ |
| | **.1319** | 3.35 | **3.96** | 100.5 | 112.2 | 6 | **6.18** | 157 | 2.CD.300335.IC | Δ |
| | **.1339** | 3.40 | **4.02** | 102.0 | 113.9 | 6 | **6.34** | 161 | 2.CD.300340.IC | ■ |
| | **.1358** | 3.45 | **4.07** | 103.5 | 115.6 | 6 | **6.34** | 161 | 2.CD.300345.IC | Δ |
| | **.1378** | 3.50 | **4.13** | 105.0 | 117.3 | 6 | **6.46** | 164 | 2.CD.300350.IC | ■ |
| | **.1398** | 3.55 | **4.19** | 106.5 | 118.9 | 6 | **6.46** | 164 | 2.CD.300355.IC | Δ |
| | **.1417** | 3.60 | **4.25** | 108.0 | 120.6 | 6 | **6.57** | 167 | 2.CD.300360.IC | ■ |
| | **.1437** | 3.65 | **4.31** | 109.5 | 122.3 | 6 | **6.57** | 167 | 2.CD.300365.IC | Δ |
| | **.1457** | 3.70 | **4.37** | 111.0 | 124.0 | 6 | **6.69** | 170 | 2.CD.300370.IC | ■ |
| | **.1476** | 3.75 | **4.43** | 112.5 | 125.6 | 6 | **6.69** | 170 | 2.CD.300375.IC | Δ |
| | **.1496** | 3.80 | **4.49** | 114.0 | 127.3 | 6 | **6.93** | 176 | 2.CD.300380.IC | ■ |
| | **.1516** | 3.85 | **4.55** | 115.5 | 129.0 | 6 | **6.93** | 176 | 2.CD.300385.IC | Δ |
| | **.1535** | 3.90 | **4.61** | 117.0 | 130.7 | 6 | **6.93** | 176 | 2.CD.300390.IC | ■ |
| | **.1555** | 3.95 | **4.67** | 118.5 | 132.3 | 6 | **6.93** | 176 | 2.CD.300395.IC | Δ |
| **5/32** | **.1562** | 3.968 | **4.72** | 120.0 | 134.0 | 6 | **6.93** | 176 | 2.CD.300F532.IC | ■ |
| | **.1575** | 4.00 | **4.72** | 120.0 | 134.0 | 6 | **6.93** | 176 | 2.CD.300400.IC | ■ |
| | **.1614** | 4.10 | **4.84** | 123.0 | 137.4 | 6 | **7.13** | 181 | 2.CD.300410.IC | ■ |
| | **.1654** | 4.20 | **4.96** | 126.0 | 140.7 | 6 | **7.24** | 184 | 2.CD.300420.IC | ■ |
| | **.1693** | 4.30 | **5.08** | 129.0 | 144.1 | 6 | **7.40** | 188 | 2.CD.300430.IC | ■ |
| | **.1732** | 4.40 | **5.20** | 132.0 | 147.4 | 6 | **7.56** | 192 | 2.CD.300440.IC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1772** | 4.50 | **5.31** | 135.0 | 150.8 | 6 | **7.72** | 196 | 2.CD.300450.IC | ■ |
| | **.1811** | 4.60 | **5.43** | 138.0 | 154.1 | 6 | **7.72** | 196 | 2.CD.300460.IC | ■ |
| | **.1850** | 4.70 | **5.55** | 141.0 | 157.5 | 6 | **7.91** | 201 | 2.CD.300470.IC | ■ |
| **3/16** | **.1875** | 4.762 | **5.67** | 144.0 | 160.8 | 6 | **8.07** | 205 | 2.CD.300F316.IC | ■ |
| | **.1890** | 4.80 | **5.67** | 144.0 | 160.8 | 6 | **8.07** | 205 | 2.CD.300480.IC | ■ |
| | **.1929** | 4.90 | **5.79** | 147.0 | 164.2 | 6 | **8.19** | 208 | 2.CD.300490.IC | ■ |
| | **.1969** | 5.00 | **5.91** | 150.0 | 167.5 | 6 | **8.31** | 211 | 2.CD.300500.IC | ■ |
| | **.2008** | 5.10 | **6.02** | 153.0 | 170.9 | 6 | **8.43** | 214 | 2.CD.300510.IC | ■ |
| | **.2047** | 5.20 | **6.14** | 156.0 | 174.2 | 6 | **8.70** | 221 | 2.CD.300520.IC | ■ |
| | **.2087** | 5.30 | **6.26** | 159.0 | 177.6 | 6 | **8.70** | 221 | 2.CD.300530.IC | ■ |
| | **.2126** | 5.40 | **6.38** | 162.0 | 180.9 | 6 | **8.78** | 223 | 2.CD.300540.IC | ■ |
| | **.2165** | 5.50 | **6.50** | 165.0 | 184.3 | 6 | **8.94** | 227 | 2.CD.300550.IC | ■ |
| **7/32** | **.2189** | 5.560 | **6.61** | 168.0 | 187.6 | 6 | **9.06** | 230 | 2.CD.300F732.IC | ■ |
| | **.2205** | 5.60 | **6.61** | 168.0 | 187.6 | 6 | **9.06** | 230 | 2.CD.300560.IC | ■ |
| | **.2244** | 5.70 | **6.73** | 171.0 | 191.0 | 6 | **9.17** | 233 | 2.CD.300570.IC | ■ |
| | **.2283** | 5.80 | **6.85** | 174.0 | 194.3 | 6 | **9.29** | 236 | 2.CD.300580.IC | ■ |
| | **.2323** | 5.90 | **6.97** | 177.0 | 197.7 | 6 | **9.49** | 241 | 2.CD.300590.IC | ■ |
| | **.2362** | 6.00 | **7.09** | 180.0 | 201.0 | 6 | **9.49** | 241 | 2.CD.300600.IC | ■ |
| **1/4** | **.2500** | 6.350 | **7.50** | 190.5 | 212.7 | 8 | **9.92** | 252 | 2.CD.300F14.IC | ■ |

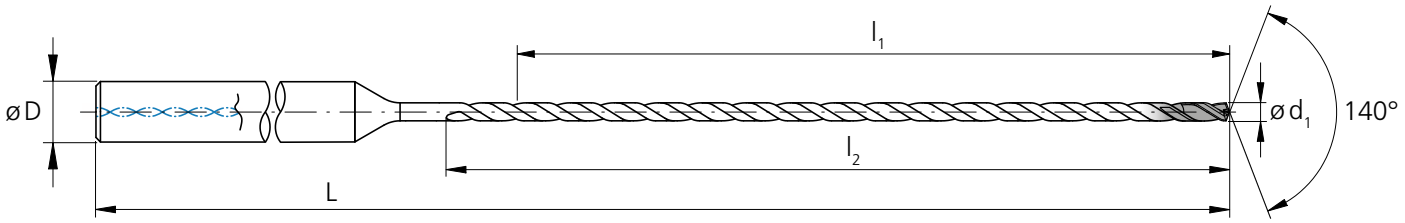
■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

**Complementary products**

CrazyDrill Coolpilot p.156
CrazyDrill Crosspilot p.146

# CrazyDrill Cool SST-Inox 40 x d

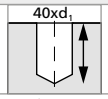
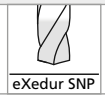
## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0787** | 2.00 | **3.15** | 80.0 | 87.0 | 4 | **5.20** | 132 | 2.CD.400200.IC | ■ |
| | **.0807** | 2.05 | **3.23** | 82.0 | 89.2 | 4 | **5.31** | 135 | 2.CD.400205.IC | Δ |
| | **.0827** | 2.10 | **3.31** | 84.0 | 91.4 | 4 | **5.31** | 135 | 2.CD.400210.IC | ■ |
| | **.0846** | 2.15 | **3.39** | 86.0 | 93.5 | 4 | **5.43** | 138 | 2.CD.400215.IC | Δ |
| | **.0866** | 2.20 | **3.46** | 88.0 | 95.7 | 4 | **5.63** | 143 | 2.CD.400220.IC | ■ |
| | **.0886** | 2.25 | **3.54** | 90.0 | 97.9 | 4 | **5.63** | 143 | 2.CD.400225.IC | Δ |
| | **.0906** | 2.30 | **3.62** | 92.0 | 100.1 | 4 | **5.71** | 145 | 2.CD.400230.IC | ■ |
| | **.0925** | 2.35 | **3.70** | 94.0 | 102.2 | 4 | **5.83** | 148 | 2.CD.400235.IC | Δ |
| **3/32** | **.0937** | 2.381 | **3.78** | 96.0 | 104.4 | 4 | **5.83** | 148 | 2.CD.400F332.IC | ■ |
| | **.0945** | 2.40 | **3.78** | 96.0 | 104.4 | 4 | **5.83** | 148 | 2.CD.400240.IC | ■ |
| | **.0965** | 2.45 | **3.86** | 98.0 | 106.6 | 4 | **5.94** | 151 | 2.CD.400245.IC | Δ |
| | **.0984** | 2.50 | **3.94** | 100.0 | 108.8 | 4 | **6.14** | 156 | 2.CD.400250.IC | ■ |
| | **.1004** | 2.55 | **4.02** | 102.0 | 110.9 | 4 | **6.14** | 156 | 2.CD.400255.IC | Δ |
| | **.1024** | 2.60 | **4.09** | 104.0 | 113.1 | 4 | **6.22** | 158 | 2.CD.400260.IC | ■ |
| | **.1043** | 2.65 | **4.17** | 106.0 | 115.3 | 4 | **6.30** | 160 | 2.CD.400265.IC | Δ |
| | **.1063** | 2.70 | **4.25** | 108.0 | 117.5 | 4 | **6.38** | 162 | 2.CD.400270.IC | ■ |
| | **.1083** | 2.75 | **4.33** | 110.0 | 119.6 | 4 | **6.38** | 162 | 2.CD.400275.IC | Δ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1102** | 2.80 | **4.41** | 112.0 | 121.8 | 4 | **6.50** | 165 | 2.CD.400280.IC | ■ |
| | **.1122** | 2.85 | **4.49** | 114.0 | 124.0 | 4 | **6.50** | 165 | 2.CD.400285.IC | Δ |
| | **.1142** | 2.90 | **4.57** | 116.0 | 126.2 | 4 | **6.77** | 172 | 2.CD.400290.IC | ■ |
| | **.1161** | 2.95 | **4.65** | 118.0 | 128.3 | 4 | **6.77** | 172 | 2.CD.400295.IC | Δ |
| | **.1181** | 3.00 | **4.72** | 120.0 | 130.5 | 6 | **7.01** | 178 | 2.CD.400300.IC | ■ |
| | **.1201** | 3.05 | **4.80** | 122.0 | 132.7 | 6 | **7.09** | 180 | 2.CD.400305.IC | Δ |
| | **.1220** | 3.10 | **4.88** | 124.0 | 134.9 | 6 | **7.17** | 182 | 2.CD.400310.IC | ■ |
| | **.1240** | 3.15 | **4.96** | 126.0 | 137.0 | 6 | **7.24** | 184 | 2.CD.400315.IC | Δ |
| **1/8** | **.1250** | 3.175 | **5.04** | 128.0 | 139.2 | 6 | **7.32** | 186 | 2.CD.400F18.IC | ■ |
| | **.1260** | 3.20 | **5.04** | 128.0 | 139.2 | 6 | **7.32** | 186 | 2.CD.400320.IC | ■ |
| | **.1280** | 3.25 | **5.12** | 130.0 | 141.4 | 6 | **7.40** | 188 | 2.CD.400325.IC | Δ |
| | **.1299** | 3.30 | **5.20** | 132.0 | 143.6 | 6 | **7.48** | 190 | 2.CD.400330.IC | ■ |
| | **.1319** | 3.35 | **5.28** | 134.0 | 145.7 | 6 | **7.56** | 192 | 2.CD.400335.IC | Δ |
| | **.1339** | 3.40 | **5.35** | 136.0 | 147.9 | 6 | **7.72** | 196 | 2.CD.400340.IC | ■ |
| | **.1358** | 3.45 | **5.43** | 138.0 | 150.1 | 6 | **7.72** | 196 | 2.CD.400345.IC | Δ |
| | **.1378** | 3.50 | **5.51** | 140.0 | 152.3 | 6 | **7.83** | 199 | 2.CD.400350.IC | ■ |
| | **.1398** | 3.55 | **5.59** | 142.0 | 154.4 | 6 | **7.91** | 201 | 2.CD.400355.IC | Δ |

■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide |   |   | Z2 |  |  

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | | **.240" - .394"** (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | **+ .00016"**<br>**0** | + 0.004 mm<br>0 | **+ .00024"**<br>**+ .00004"** | + 0.006 mm<br>+ 0.001 mm | **+ .00028"**<br>**+ .00004"** | + 0.007 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1417** | 3.60 | **5.67** | 144.0 | 156.6 | 6 | **7.99** | 203 | 2.CD.400360.IC | ■ |
| | **.1437** | 3.65 | **5.75** | 146.0 | 158.8 | 6 | **8.07** | 205 | 2.CD.400365.IC | Δ |
| | **.1457** | 3.70 | **5.83** | 148.0 | 161.0 | 6 | **8.15** | 207 | 2.CD.400370.IC | ■ |
| | **.1476** | 3.75 | **5.91** | 150.0 | 163.1 | 6 | **8.27** | 210 | 2.CD.400375.IC | Δ |
| | **.1496** | 3.80 | **5.98** | 152.0 | 165.3 | 6 | **8.35** | 212 | 2.CD.400380.IC | ■ |
| | **.1516** | 3.85 | **6.06** | 154.0 | 167.5 | 6 | **8.50** | 216 | 2.CD.400385.IC | Δ |
| | **.1535** | 3.90 | **6.14** | 156.0 | 169.7 | 6 | **8.50** | 216 | 2.CD.400390.IC | ■ |
| | **.1555** | 3.95 | **6.22** | 158.0 | 171.8 | 6 | **8.50** | 216 | 2.CD.400395.IC | Δ |
| **5/32** | **.1562** | 3.968 | **6.30** | 160.0 | 174.0 | 6 | **8.50** | 216 | 2.CD.400F532.IC | ■ |
| | **.1575** | 4.00 | **6.30** | 160.0 | 174.0 | 6 | **8.50** | 216 | 2.CD.400400.IC | ■ |
| | **.1614** | 4.10 | **6.46** | 164.0 | 178.4 | 6 | **8.82** | 224 | 2.CD.400410.IC | ■ |
| | **.1654** | 4.20 | **6.61** | 168.0 | 182.7 | 6 | **8.98** | 228 | 2.CD.400420.IC | ■ |
| | **.1693** | 4.30 | **6.77** | 172.0 | 187.1 | 6 | **9.13** | 232 | 2.CD.400430.IC | ■ |
| | **.1732** | 4.40 | **6.93** | 176.0 | 191.4 | 6 | **9.29** | 236 | 2.CD.400440.IC | ■ |
| | **.1772** | 4.50 | **7.09** | 180.0 | 195.8 | 6 | **9.49** | 241 | 2.CD.400450.IC | ■ |
| | **.1811** | 4.60 | **7.24** | 184.0 | 200.1 | 6 | **9.49** | 241 | 2.CD.400460.IC | ■ |
| | **.1850** | 4.70 | **7.40** | 188.0 | 204.5 | 6 | **9.84** | 250 | 2.CD.400470.IC | ■ |

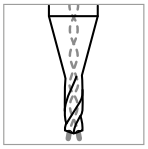
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **3/16** | **.1875** | 4.762 | **7.56** | 192.0 | 208.8 | 6 | **10.00** | 254 | 2.CD.400F316.IC | ■ |
| | **.1890** | 4.80 | **7.56** | 192.0 | 208.8 | 6 | **10.00** | 254 | 2.CD.400480.IC | ■ |
| | **.1929** | 4.90 | **7.72** | 196.0 | 213.2 | 6 | **10.16** | 258 | 2.CD.400490.IC | ■ |
| | **.1969** | 5.00 | **7.87** | 200.0 | 217.5 | 6 | **10.28** | 261 | 2.CD.400500.IC | ■ |
| | **.2008** | 5.10 | **8.03** | 204.0 | 221.9 | 6 | **10.51** | 267 | 2.CD.400510.IC | ■ |
| | **.2047** | 5.20 | **8.19** | 208.0 | 226.2 | 6 | **10.67** | 271 | 2.CD.400520.IC | ■ |
| | **.2087** | 5.30 | **8.35** | 212.0 | 230.6 | 6 | **10.67** | 271 | 2.CD.400530.IC | ■ |
| | **.2126** | 5.40 | **8.50** | 216.0 | 234.9 | 6 | **11.02** | 280 | 2.CD.400540.IC | ■ |
| | **.2165** | 5.50 | **8.66** | 220.0 | 239.3 | 6 | **11.18** | 284 | 2.CD.400550.IC | ■ |
| **7/32** | **.2189** | 5.560 | **8.82** | 224.0 | 243.6 | 6 | **11.34** | 288 | 2.CD.400F732.IC | ■ |
| | **.2205** | 5.60 | **8.82** | 224.0 | 243.6 | 6 | **11.34** | 288 | 2.CD.400560.IC | ■ |
| | **.2244** | 5.70 | **8.98** | 228.0 | 248.0 | 6 | **11.50** | 292 | 2.CD.400570.IC | ■ |
| | **.2283** | 5.80 | **9.13** | 232.0 | 252.3 | 6 | **11.65** | 296 | 2.CD.400580.IC | ■ |
| | **.2323** | 5.90 | **9.29** | 236.0 | 256.7 | 6 | **11.85** | 301 | 2.CD.400590.IC | ■ |
| | **.2362** | 6.00 | **9.45** | 240.0 | 261.0 | 6 | **11.85** | 301 | 2.CD.400600.IC | ■ |
| **1/4** | **.2500** | 6.350 | **10.00** | 254.0 | 276.2 | 8 | **12.40** | 315 | 2.CD.400F14.IC | ■ |

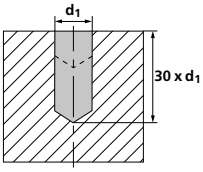
■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

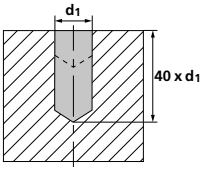
| Complementary products | |
|---|---|
| CrazyDrill Coolpilot | p.156 |
| CrazyDrill Crosspilot | p.146 |

# 30 x d - 40 x d

## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW

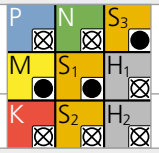





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Low | Mid | High |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 60 \| **197** | 80 \| **262** | 100 \| **328** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminum alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminum alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | |
| | | 2.1020 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 25 \| **82** | 35 \| **115** | 45 \| **148** |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 50 \| **164** | 70 \| **230** | 90 \| **295** |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| Ød1 | 1/16" 1.45 mm \| .057" | | | 2.0 mm \| .079" | | | 3/32" 2.5 mm \| .098" | | | 1/8" 3.0 mm \| .118" | | | 5/32" 4.0 mm \| .157" | | | 3/16" - 7/32" 5.0 mm \| .197" | | | 1/4" 6.0 mm \| .236" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High | Low | **Mid** | High |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | 0.015<br>**.0006** | 0.023<br>**.0009** | 0.030<br>**.0012** | 0.020<br>**.0008** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.025<br>**.0010** | 0.038<br>**.0015** | 0.050<br>**.0020** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.060<br>**.0024** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.050<br>**.0020** | 0.100<br>**.0039** | 0.100<br>**.0039** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.120<br>**.0047** |
| | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.060<br>**.0024** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.100<br>**.0039** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.120<br>**.0047** | 0.080<br>**.0031** | 0.120<br>**.0047** | 0.160<br>**.0063** | 0.100<br>**.0039** | 0.150<br>**.0059** | 0.200<br>**.0079** | 0.120<br>**.0047** | 0.180<br>**.0071** | 0.240<br>**.0094** |
| | 0.015<br>**.0006** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.020<br>**.0008** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.025<br>**.0010** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.030<br>**.0012** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.040<br>**.0016** | 0.080<br>**.0031** | 0.120<br>**.0047** | 0.050<br>**.0020** | 0.100<br>**.0039** | 0.150<br>**.0059** | 0.060<br>**.0024** | 0.120<br>**.0047** | 0.180<br>**.0071** |
| | 0.015<br>**.0006** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.020<br>**.0008** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.025<br>**.0010** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.030<br>**.0012** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.040<br>**.0016** | 0.080<br>**.0031** | 0.120<br>**.0047** | 0.050<br>**.0020** | 0.100<br>**.0039** | 0.150<br>**.0059** | 0.060<br>**.0024** | 0.120<br>**.0047** | 0.180<br>**.0071** |
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| | 0.015<br>**.0006** | 0.023<br>**.0009** | 0.030<br>**.0012** | 0.020<br>**.0008** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.025<br>**.0010** | 0.038<br>**.0015** | 0.050<br>**.0020** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.060<br>**.0024** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.100<br>**.0039** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.120<br>**.0047** |
| | | | | | | | | | | | | | | | | | | | | | |
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| | 0.015<br>**.0006** | 0.030<br>**.0012** | 0.045<br>**.0018** | 0.020<br>**.0008** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.025<br>**.0010** | 0.050<br>**.0020** | 0.075<br>**.0030** | 0.030<br>**.0012** | 0.060<br>**.0024** | 0.090<br>**.0035** | 0.040<br>**.0016** | 0.080<br>**.0031** | 0.120<br>**.0047** | 0.050<br>**.0020** | 0.100<br>**.0039** | 0.150<br>**.0059** | 0.060<br>**.0024** | 0.120<br>**.0047** | 0.180<br>**.0071** |
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# Drilling process CrazyDrill Cool SST-Inox

## ACCURATE AND QUICK DRILLING UP TO 40 X D

### Coolant type, pressure and filtration

#### Coolant type

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

**Filtration:** Good filter quality is very important when using through coolant drills. Dirt particles or residual chips can clog the coolant holes and consequently reduce dramatically the flowrate.
The following filter qualities must be adhered especially in small diameters:

- Drill with Ø < .079" (2 mm) filter quality ≤ .0004" (0.010 mm).
- Drill with Ø < .118" (3 mm) filter quality ≤ .0008" (0.020 mm).
- Drill with Ø < 1/4" (6.35 mm) filter quality ≤ .0020" (0.050 mm).

**Coolant pressure**: At least the coolant pressure mentioned in the chart is required for the CrazyDrill Cool SST-Inox to achieve reliable drilling. High pressure is generally better for the cooling and flushing effect.

| **Ø $d_1$ Tool** [mm] **\| [inch]** | | 1.0 mm - 2.0 mm **\| .039" - .079"** | | 2.0 mm - 4.0 mm **\| .079" - .156"** | | 4.0 mm - 6.35 mm **\| .156" - 1/4"** | |
|---|---|---|---|---|---|---|---|
| **Version** | | 6 - 10 x d | 15 - 30 x d | 6 - 10 x d | 15 - 40 x d | 6 - 10 x d | 15 - 40 x d |
| **Minimal pressure** | [bar] | 40 | 65 | 30 | 50 | 30 | 40 |
| | **[psi]** | **580** | **943** | **435** | **725** | **435** | **580** |

**CrazyDrill Cool SST-Inox 6 x d**

Because of the high degree of self-centering capability, CrazyDrill Cool SST-Inox can be used on regular and straight surfaces without a centering or pilot hole.

**Higher requirements:** For irregular, respectively rough or inclined surfaces or for the highest degree of position accuracy, Mikron Tool recommends:

- **CrazyDrill Coolpilot** as pilot drill
- **CrazyDrill Crosspilot** as pilot drill for inclined surfaces

**CrazyDrill Cool SST-Inox versions 10 x d, 15 x d, 20 x d, 30 x d and 40 x d**

We recommend pilot drilling with CrazyDrill Coolpilot or CrazyDrill Crosspilot on inclined surfaces.

**Pilot drilling and drilling**

Pilot drilling with CrazyDrill Coolpilot or CrazyDrill Crosspilot (on inclined surfaces) is the perfect starting point for accurate drilling (position and alignment accuracy). The drilling quality (no measurable transition from pilot drilling to follow-up drilling) is guaranteed due to predetermined tool tolerances.

# Drilling process CrazyDrill Cool SST-Inox

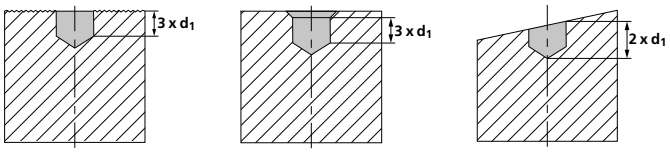
## DRILLING IN ONE STEP 6 X D, 10 X D, 15 X D AND 20 X D

### 1 | PILOT DRILLING

Turn on internal coolant.

With CrazyDrill Coolpilot (irregular or rough surfaces) up to 3 x d with simultaneous chamfer of 90°.

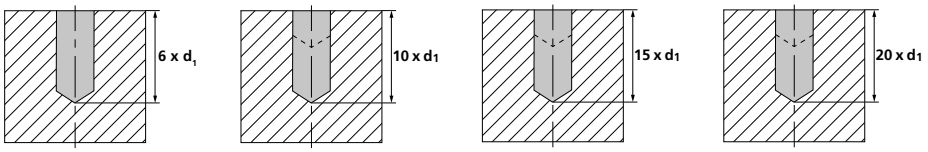
With CrazyDrill Crosspilot for all versions on inclined surfaces.




### 2 | DRILLING

Turn on internal coolant.

Drill with CrazyDrill Cool SST-Inox in one step with recommended drilling speed and feed (see cutting data chart).




Note:

After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position. With CrazyDrill Cool SST-Inox up to 20 x d is possible immediately get into the material and drill using the recommended cutting speed and feed.

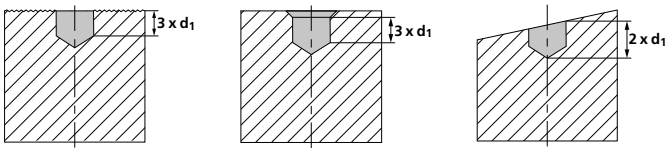
## DRILLING IN ONE STEP 30 X D AND 40 X D

### 1 | PILOT DRILLING

Turn on internal coolant.

With CrazyDrill Coolpilot up to 3 x d with simultaneous chamfer of 90°.

With CrazyDrill Crosspilot for all versions on inclined surfaces.



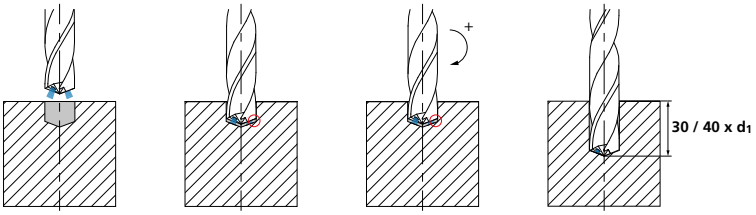

### 2 | DEEP HOLE DRILLING

Turn on coolant. Enter the hole at a maximum speed n = 500 rpm and $v_f$ = 39.37 IPM (1'000 mm/min), up to drilling depth 2.8 x d (drill should not touch the bottom of pilot hole).

Increase speed as per cutting data chart and wait until the desired drilling speed is reached.

Program dwell in case of slow spindle acceleration.

Drill in one step with recommended cutting speed and feed rate.

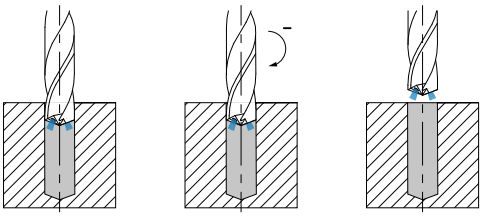



### 3 | EXIT FROM BORE

After the desired drilling depth is reached, return with the drill to drilling depth 3 x d at feed rate or reduced rapid traverse.

Reduce speed to n = 500 rpm.

Exit the bore at speed n = 500 rpm and $v_f$ = 39.37 IPM (1'000 mm/min).



# NEW CrazyDrill Cool Titanium ATC / PTC



NEW

CRAZYDRILL Cool Titanium

## FOR EACH TITANIUM ITS DRILL!



Mikron Tool introduces two new drills for titanium in the diameter range of .039" to 1/4" (1.0 mm to 6.35 mm):

- **CrazyDrill Cool Titanium ATC for titanium alloys**
- **CrazyDrill Cool Titanium PTC for pure titanium**

These drills, which are perfectly matched to the respective titanium grades, achieve maximum drilling performance combined with high process reliability. It is now even possible to drill titanium alloys up to 10 x d in a single step without multiple pecking for chip removal.

Recommendations of Mikron Tool:

- **Version ATC - 6 x d / PTC - 3 x d and 6 x d** - centering is not necessary on straight surfaces. We recommend pilot drilling only on irregular, rough or inclined surfaces and if a high position accuracy is requested.
- **Version ATC - 10 x d** - we recommend pilot drilling with CrazyDrill Coolpilot Titanium or CrazyDrill Crosspilot on inclined surfaces.

**Regrinding:** This product can be reground starting from Ø .055" (1.40 mm).

**Please note:** You couldn't find your suitable version of the CrazyDrill Cool Titanium (diameter, length, cutting direction…)? Ask us about our customized versions!

NEW

## Geometry ATC

CRAZYDRILL by Mikron Tool Cool Titanium ATC

### 6 x d




page 348

### 10 x d

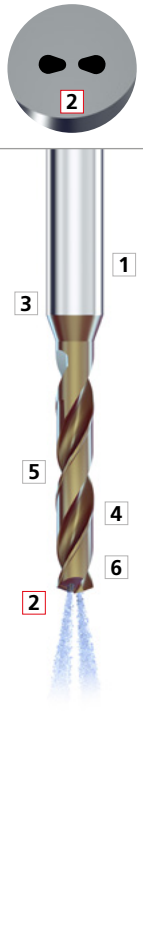



page 350

## Geometry PTC

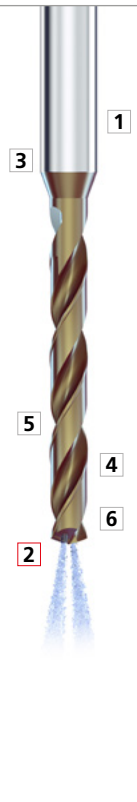
CRAZYDRILL by Mikron Tool Cool Titanium PTC

### 3 x d




page 352

### 6 x d




page 354

NEW

**1 | SHANK**
The reinforced solid carbide shank guarantees stability, high degree of concentricity and hence maximum drilling precision.

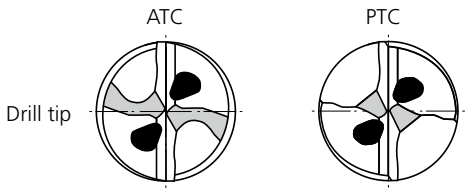
**2 | NEW GENERATION OF COOLING CHANNELS**
Due to a newly designed shape of helical cooling channels, up to four times more coolant volume reaches the drill tip. The result is continuous and efficient chip removal as well as constant and substantial cooling of cutting edges. A Powerchamber additionally guarantees sufficiently strong coolant flow for smaller diameters up to Ø .116" (2.95 mm).

**3 | CARBIDE**
A specially developed micro-grain solid carbide allows machining at high speeds.

**4 | NEW COATING**
The high-performance coating eXedur SNP is heat-resistant and wear-resistant, prevents build up edges and promotes uniform chip flushing. A very long tool life is given.

**5 | POLISHED FLUTES**
The polished flutes in versions ATC and PTC promote uniform chip flushing.

**6 | SINGLE GUIDING MARGIN AND THE NEWLY DESIGNED CHIP BARRIER MARGIN**
The particularly smooth surfaces of the guiding margin and the newly designed chip barrier margin on the PTC drill prevent material sticking and reduce the load on the tool. The result is to ensure the highest degree of precision (straightness) and surface quality.



CRAZYDRILL™ by Mikron Tool
Cool Titanium

# NEW Your benefits



NEW



## The most important features

- Two specific geometries: PTC for pure titanium and ATC for titanium alloys
- Innovative flute and tip geometry
- New: Chip barrier margin for PTC drill
- Specially designed cooling concept

## Your advantages

- Perfect performance for any titanium grade
- Low cutting pressure
- Prevention of chip jamming
- Excellent heat dissipation

## Your benefits

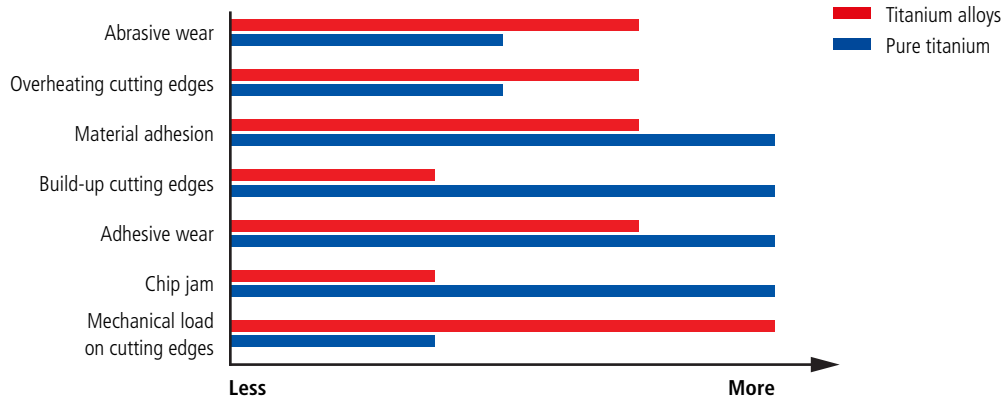
- Maximum drilling speed (e.g. 10 x d in one shot drilling with ATC)
- Excellent drilling quality
- Process reliability
- Up to 3 times longer tool life

# NEW Important features

## THE NEW HIGH-PERFORMANCE DRILLS FOR TITANIUM

### 1. Challenge

### Different properties of pure titanium and titanium alloys

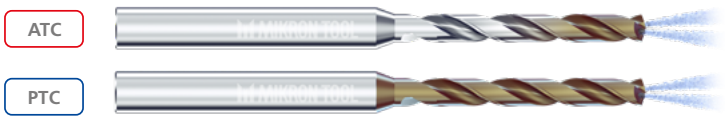



The material properties of pure and alloyed titanium differ significantly, which is of utmost importance for their industrial machining. Especially for drilling, the demands on tools in terms of machinability are very high.

### Solution

### Material-specific cutting edge geometries

Mikron Tool's solution for drilling different types of titanium consists of two material-specific cutting edge geometries. This is the only way to achieve controlled chip evacuation, high drilling speeds and repeatable processes with excellent hole quality.




**Geometry ATC** S2
**Titanium alloys**
Ti Gr.5 / Ti Gr.5 ELI / Ti Gr.Nb

**Geometry PTC** S2
**Pure Titan**
Ti Gr.2 - Ti Gr.4

## 2. Challenge

### High thermal load and chip jam

When drilling titanium, the high thermal load on the cutting edge is a challenge. This can lead to micro-chipping and eventually chipping on the cutting edge.
Furthermore, titanium chips tend to compact in the drill tip area, preventing further chips from flowing out. The result is uncontrolled drill breakage.

| Material | Thermal conductivity |
|---|---|
| Aluminum | 167 W/mK |
| Stainless steel | 21 W/mK |
| **Titanium alloy** | **7 W/mK** |

## Solution

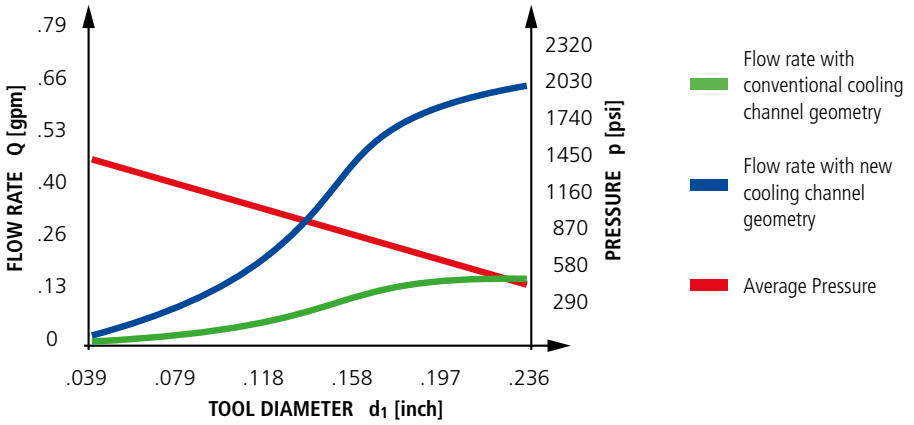
### Innovative cooling concept



Conventional



New



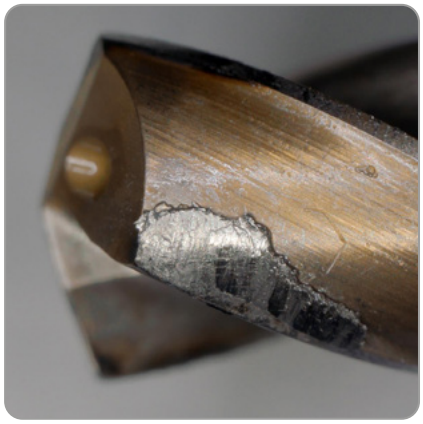

Two specially designed cooling channels with a very large cross-section guide massive amounts of cooling lubricant to the drill tip to avoid excessive thermal loads on the cutting edges. The patented special shape of the cooling channels allows up to 4 times more coolant (compared to conventional cooling channels) at the same pressure. At the same time, the massive coolant jet flushes the chips through the flutes and prevents any form of chip jamming.

# NEW Important features

## THE NEW HIGH-PERFORMANCE DRILLS FOR TITANIUM

3. Challenge

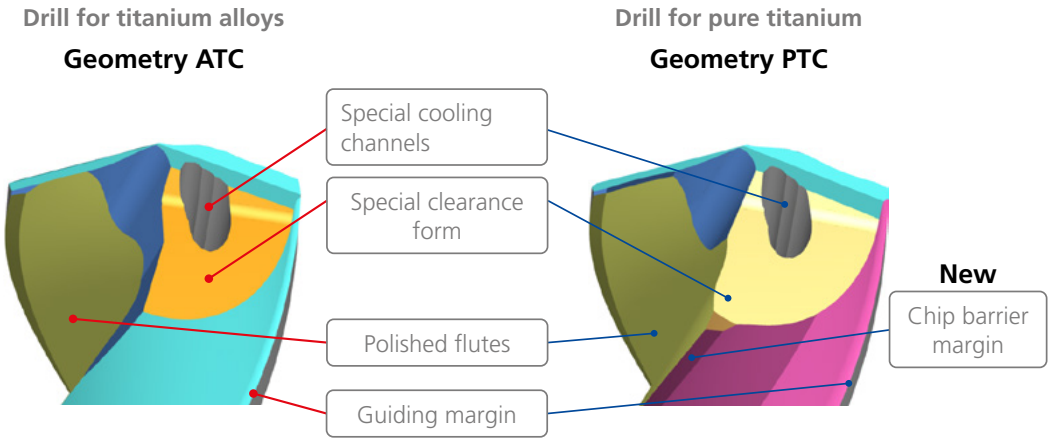
### Material adhesion



Material adhesions on guiding margin and the secondary margin have a negative effect on the hole quality.

Solution

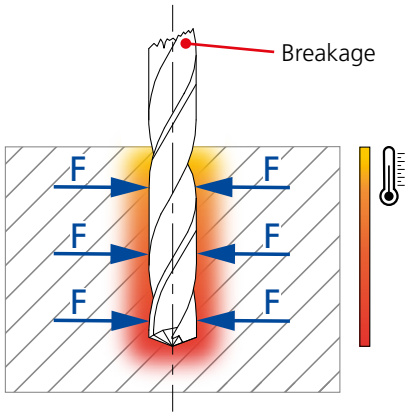
### Guiding margin and the newly designed chip barrier margin




The particularly smooth surfaces of the guiding margin and the newly designed chip barrier margin on the PTC drill prevent material sticking and reduce the load on the tool.

4. Challenge

## Tool jamming with increasing drilling depth




As the drilling depth increases, the extreme viscoplasticity of the titanium leads to jamming of the tool. The consequence is tool breakage.

Solution

## Special cutting edge geometry with optimum cutting performance and stability

| Cutting edge geometry | Cutting performance | Cutting edge stability |
|---|---|---|
| Sharp | ● | ● |
| Rounded | ● | ● |
| CrazyDrill Cool Titanium | ● | ● |

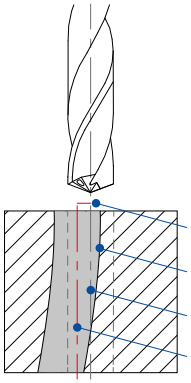
The solution is sharply ground cutting edges that must be stable at the same time - a contradiction in terms. A unique specific cutting edge geometry has been developed for titanium drills that masters this balance. As a result, cutting pressures and temperature are significantly reduced.

# NEW Important features

## THE NEW HIGH-PERFORMANCE DRILLS FOR TITANIUM

5. Challenge

### Position accuracy




Due to the viscoplastic properties of titanium, an accurate entry point and constant tool guidance during drilling cannot be guaranteed.

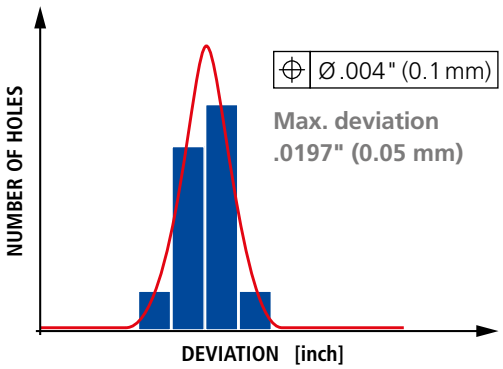
Solution

### Specific pilot drill

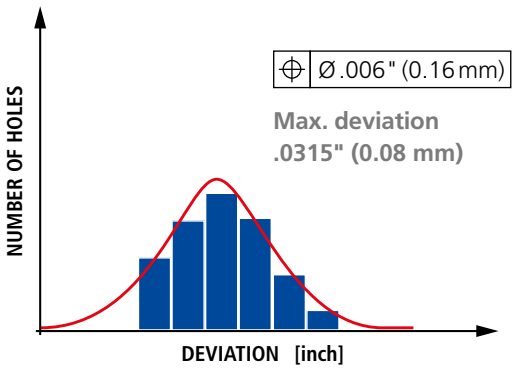
To achieve high position accuracy, the new pilot drill (with 90° chamfer) CrazyDrill Coolpilot Titanium ATC can be used.

Position accuracy

**With pilot drill**




**Without pilot drill**




**Material:** Ti Gr.5 / 3.7165 / ASTM F136; **Diameter:** 4 mm; **Drilling depth:** 10 x d; **Drill step:** 1;
**Coolant:** Emulsion 8%; **Cutting data:** vc = 197 SFM (60 m/min); f = .0031 IPR (0.08 mm/rev)

# Maximum performance guaranteed



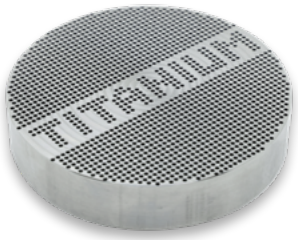
## EXAMPLE IN TITANIUM MACHINING IN COMPARISON

■ Example

### Longer tool life

**Machining:** Drilling in one shot
Drilling depth: .394" (10 mm);
Coolant: Emulsion 8%

**Titanium alloy:** Ti Gr.5 / 3.7165 / TiAl6V4 / ASTM B348 S2

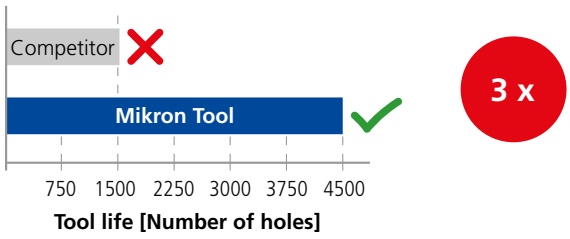



**Tool:** CrazyDrill Cool Titanium ATC
Diameter: .039" (1.0 mm)

**Cutting data:**

| Conventional titanium drill | | **CrazyDrill Cool Titanium ATC** | |
|---|---|---|---|
| $v_c$ = **197 SFM** 60 m/min | f = **.0008 IPR** 0.020 mm/rev | $v_c$ = **197 SFM** 60 m/min | f = **.0008 IPR** 0.020 mm/rev |

**Results:**




Competitor



**Breakage**

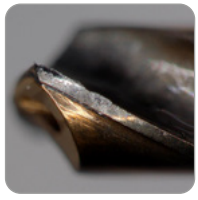
Mikron Tool



**Front view**



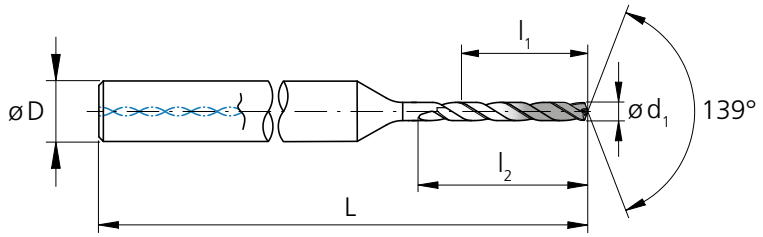
**Flute view**



**Guiding margin view**

# NEW CrazyDrill Cool Titanium ATC - 6 x d

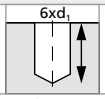
## DRILLING WITH INTERNAL COOLING




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.236** | 6.0 | 9.0 | 4 | **2.17** | 55 | 2.CD.060100.ATC | ■ |
| | **.0413** | 1.05 | **.248** | 6.3 | 9.5 | 4 | **2.17** | 55 | 2.CD.060105.ATC | ■ |
| | **.0433** | 1.10 | **.260** | 6.6 | 9.9 | 4 | **2.17** | 55 | 2.CD.060110.ATC | ■ |
| | **.0453** | 1.15 | **.272** | 6.9 | 10.4 | 4 | **2.17** | 55 | 2.CD.060115.ATC | ■ |
| | **.0472** | 1.20 | **.283** | 7.2 | 10.8 | 4 | **2.24** | 57 | 2.CD.060120.ATC | ■ |
| | **.0492** | 1.25 | **.295** | 7.5 | 11.3 | 4 | **2.24** | 57 | 2.CD.060125.ATC | ■ |
| | **.0512** | 1.30 | **.307** | 7.8 | 11.7 | 4 | **2.24** | 57 | 2.CD.060130.ATC | ■ |
| | **.0531** | 1.35 | **.319** | 8.1 | 12.2 | 4 | **2.24** | 57 | 2.CD.060135.ATC | ■ |
| | **.0551** | 1.40 | **.331** | 8.4 | 12.6 | 4 | **2.24** | 57 | 2.CD.060140.ATC | ■ |
| | **.0571** | 1.45 | **.343** | 8.7 | 13.1 | 4 | **2.28** | 58 | 2.CD.060145.ATC | ■ |
| | **.0591** | 1.50 | **.354** | 9.0 | 13.5 | 4 | **2.28** | 58 | 2.CD.060150.ATC | ■ |
| | **.0610** | 1.55 | **.366** | 9.3 | 14.0 | 4 | **2.28** | 58 | 2.CD.060155.ATC | ■ |
| **1/16** | **.0625** | 1.587 | **.375** | 9.5 | 14.3 | 4 | **2.28** | 58 | 2.CD.060F116.ATC | ■ |
| | **.0630** | 1.60 | **.378** | 9.6 | 14.4 | 4 | **2.28** | 58 | 2.CD.060160.ATC | ■ |
| | **.0650** | 1.65 | **.390** | 9.9 | 14.9 | 4 | **2.28** | 58 | 2.CD.060165.ATC | ■ |
| | **.0669** | 1.70 | **.402** | 10.2 | 15.3 | 4 | **2.36** | 60 | 2.CD.060170.ATC | ■ |
| | **.0689** | 1.75 | **.413** | 10.5 | 15.8 | 4 | **2.36** | 60 | 2.CD.060175.ATC | ■ |
| | **.0709** | 1.80 | **.425** | 10.8 | 16.2 | 4 | **2.36** | 60 | 2.CD.060180.ATC | ■ |
| | **.0728** | 1.85 | **.437** | 11.1 | 16.7 | 4 | **2.36** | 60 | 2.CD.060185.ATC | ■ |
| | **.0748** | 1.90 | **.449** | 11.4 | 17.1 | 4 | **2.36** | 60 | 2.CD.060190.ATC | ■ |
| | **.0768** | 1.95 | **.461** | 11.7 | 17.6 | 4 | **2.36** | 60 | 2.CD.060195.ATC | ■ |
| | **.0787** | 2.00 | **.472** | 12.0 | 18.0 | 4 | **2.48** | 63 | 2.CD.060200.ATC | ■ |

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0807** | 2.05 | **.484** | 12.3 | 18.5 | 4 | **2.48** | 63 | 2.CD.060205.ATC | ■ |
| | **.0827** | 2.10 | **.496** | 12.6 | 18.9 | 4 | **2.48** | 63 | 2.CD.060210.ATC | ■ |
| | **.0846** | 2.15 | **.508** | 12.9 | 19.4 | 4 | **2.48** | 63 | 2.CD.060215.ATC | ■ |
| | **.0866** | 2.20 | **.520** | 13.2 | 19.8 | 4 | **2.48** | 63 | 2.CD.060220.ATC | ■ |
| | **.0886** | 2.25 | **.531** | 13.5 | 20.3 | 4 | **2.48** | 63 | 2.CD.060225.ATC | ■ |
| | **.0906** | 2.30 | **.543** | 13.8 | 20.7 | 4 | **2.56** | 65 | 2.CD.060230.ATC | ■ |
| | **.0925** | 2.35 | **.555** | 14.1 | 21.2 | 4 | **2.56** | 65 | 2.CD.060235.ATC | ■ |
| **3/32** | **.0937** | 2.381 | **.563** | 14.3 | 21.4 | 4 | **2.56** | 65 | 2.CD.060F332.ATC | ■ |
| | **.0945** | 2.40 | **.567** | 14.4 | 21.6 | 4 | **2.56** | 65 | 2.CD.060240.ATC | ■ |
| | **.0965** | 2.45 | **.579** | 14.7 | 22.1 | 4 | **2.56** | 65 | 2.CD.060245.ATC | ■ |
| | **.0984** | 2.50 | **.591** | 15.0 | 22.5 | 4 | **2.56** | 65 | 2.CD.060250.ATC | ■ |
| | **.1004** | 2.55 | **.602** | 15.3 | 23.0 | 4 | **2.56** | 65 | 2.CD.060255.ATC | ■ |
| | **.1024** | 2.60 | **.614** | 15.6 | 23.4 | 4 | **2.68** | 68 | 2.CD.060260.ATC | ■ |
| | **.1043** | 2.65 | **.626** | 15.9 | 23.9 | 4 | **2.68** | 68 | 2.CD.060265.ATC | ■ |
| | **.1063** | 2.70 | **.638** | 16.2 | 24.3 | 4 | **2.68** | 68 | 2.CD.060270.ATC | ■ |
| | **.1083** | 2.75 | **.650** | 16.5 | 24.8 | 4 | **2.68** | 68 | 2.CD.060275.ATC | ■ |
| | **.1102** | 2.80 | **.661** | 16.8 | 25.2 | 4 | **2.68** | 68 | 2.CD.060280.ATC | ■ |
| | **.1122** | 2.85 | **.673** | 17.1 | 25.7 | 4 | **2.68** | 68 | 2.CD.060285.ATC | ■ |
| | **.1142** | 2.90 | **.685** | 17.4 | 26.1 | 4 | **2.68** | 68 | 2.CD.060290.ATC | ■ |
| | **.1161** | 2.95 | **.697** | 17.7 | 26.6 | 4 | **2.68** | 68 | 2.CD.060295.ATC | ■ |
| | **.1181** | 3.00 | **.709** | 18.0 | 27.0 | 6 | **2.91** | 74 | 2.CD.060300.ATC | ■ |
| | **.1201** | 3.05 | **.720** | 18.3 | 27.5 | 6 | **2.91** | 74 | 2.CD.060305.ATC | ■ |

■ Stock item

Carbide |  |  | Z2 |  | 

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | | **.240" - .394"** (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | **+ .00031"**<br>**0** | + 0.006 mm<br>0 | **+ .00035"**<br>**+ .00004"** | + 0.009 mm<br>+ 0.001 mm | **+ .00039"**<br>**+ .00004"** | + 0.010 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1220** | 3.10 | **.732** | 18.6 | 27.9 | 6 | **2.91** | 74 | 2.CD.060310.ATC | ■ |
| | **.1240** | 3.15 | **.744** | 18.9 | 28.4 | 6 | **2.91** | 74 | 2.CD.060315.ATC | ■ |
| **1/8** | **.1250** | 3.175 | **.750** | 19.1 | 28.6 | 6 | **2.91** | 74 | 2.CD.060F18.ATC | ■ |
| | **.1260** | 3.20 | **.756** | 19.2 | 28.8 | 6 | **2.91** | 74 | 2.CD.060320.ATC | ■ |
| | **.1280** | 3.25 | **.768** | 19.5 | 29.3 | 6 | **2.91** | 74 | 2.CD.060325.ATC | ■ |
| | **.1299** | 3.30 | **.780** | 19.8 | 29.7 | 6 | **2.91** | 74 | 2.CD.060330.ATC | ■ |
| | **.1319** | 3.35 | **.791** | 20.1 | 30.2 | 6 | **2.91** | 74 | 2.CD.060335.ATC | ■ |
| | **.1339** | 3.40 | **.803** | 20.4 | 30.6 | 6 | **2.91** | 74 | 2.CD.060340.ATC | ■ |
| | **.1358** | 3.45 | **.815** | 20.7 | 31.1 | 6 | **2.91** | 74 | 2.CD.060345.ATC | ■ |
| | **.1378** | 3.50 | **.827** | 21.0 | 31.5 | 6 | **3.07** | 78 | 2.CD.060350.ATC | ■ |
| | **.1398** | 3.55 | **.839** | 21.3 | 32.0 | 6 | **3.07** | 78 | 2.CD.060355.ATC | ■ |
| | **.1417** | 3.60 | **.850** | 21.6 | 32.4 | 6 | **3.07** | 78 | 2.CD.060360.ATC | ■ |
| | **.1437** | 3.65 | **.862** | 21.9 | 32.9 | 6 | **3.07** | 78 | 2.CD.060365.ATC | ■ |
| | **.1457** | 3.70 | **.874** | 22.2 | 33.3 | 6 | **3.07** | 78 | 2.CD.060370.ATC | ■ |
| | **.1476** | 3.75 | **.886** | 22.5 | 33.8 | 6 | **3.07** | 78 | 2.CD.060375.ATC | ■ |
| | **.1496** | 3.80 | **.898** | 22.8 | 34.2 | 6 | **3.07** | 78 | 2.CD.060380.ATC | ■ |
| | **.1516** | 3.85 | **.909** | 23.1 | 34.7 | 6 | **3.07** | 78 | 2.CD.060385.ATC | ■ |
| | **.1535** | 3.90 | **.921** | 23.4 | 35.1 | 6 | **3.07** | 78 | 2.CD.060390.ATC | ■ |
| | **.1555** | 3.95 | **.933** | 23.7 | 35.6 | 6 | **3.07** | 78 | 2.CD.060395.ATC | ■ |
| **5/32** | **.1562** | 3.968 | **.937** | 23.8 | 35.7 | 6 | **3.07** | 78 | 2.CD.060F532.ATC | ■ |
| | **.1575** | 4.00 | **.945** | 24.0 | 36.0 | 6 | **3.07** | 78 | 2.CD.060400.ATC | ■ |
| | **.1614** | 4.10 | **.969** | 24.6 | 36.9 | 6 | **3.15** | 80 | 2.CD.060410.ATC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1654** | 4.20 | **.992** | 25.2 | 37.8 | 6 | **3.15** | 80 | 2.CD.060420.ATC | ■ |
| | **.1693** | 4.30 | **1.02** | 25.8 | 38.7 | 6 | **3.15** | 80 | 2.CD.060430.ATC | ■ |
| | **.1732** | 4.40 | **1.04** | 26.4 | 39.6 | 6 | **3.15** | 80 | 2.CD.060440.ATC | ■ |
| | **.1772** | 4.50 | **1.06** | 27.0 | 40.5 | 6 | **3.15** | 80 | 2.CD.060450.ATC | ■ |
| | **.1811** | 4.60 | **1.09** | 27.6 | 41.4 | 6 | **3.15** | 80 | 2.CD.060460.ATC | ■ |
| | **.1850** | 4.70 | **1.11** | 28.2 | 42.3 | 6 | **3.31** | 84 | 2.CD.060470.ATC | ■ |
| **3/16** | **.1875** | 4.762 | **1.13** | 28.6 | 42.9 | 6 | **3.31** | 84 | 2.CD.060F316.ATC | ■ |
| | **.1890** | 4.80 | **1.13** | 28.8 | 43.2 | 6 | **3.31** | 84 | 2.CD.060480.ATC | ■ |
| | **.1929** | 4.90 | **1.16** | 29.4 | 44.1 | 6 | **3.31** | 84 | 2.CD.060490.ATC | ■ |
| | **.1969** | 5.00 | **1.18** | 30.0 | 45.0 | 6 | **3.31** | 84 | 2.CD.060500.ATC | ■ |
| | **.2008** | 5.10 | **1.20** | 30.6 | 45.9 | 6 | **3.31** | 84 | 2.CD.060510.ATC | ■ |
| | **.2047** | 5.20 | **1.23** | 31.2 | 46.8 | 6 | **3.31** | 84 | 2.CD.060520.ATC | ■ |
| | **.2087** | 5.30 | **1.25** | 31.8 | 47.7 | 6 | **3.31** | 84 | 2.CD.060530.ATC | ■ |
| | **.2126** | 5.40 | **1.28** | 32.4 | 48.6 | 6 | **3.46** | 88 | 2.CD.060540.ATC | ■ |
| | **.2165** | 5.50 | **1.30** | 33.0 | 49.5 | 6 | **3.46** | 88 | 2.CD.060550.ATC | ■ |
| **7/32** | **.2189** | 5.560 | **1.31** | 33.4 | 50.0 | 6 | **3.46** | 88 | 2.CD.060F732.ATC | ■ |
| | **.2205** | 5.60 | **1.32** | 33.6 | 50.4 | 6 | **3.46** | 88 | 2.CD.060560.ATC | ■ |
| | **.2244** | 5.70 | **1.35** | 34.2 | 51.3 | 6 | **3.46** | 88 | 2.CD.060570.ATC | ■ |
| | **.2283** | 5.80 | **1.37** | 34.8 | 52.2 | 6 | **3.46** | 88 | 2.CD.060580.ATC | ■ |
| | **.2323** | 5.90 | **1.39** | 35.4 | 53.1 | 6 | **3.46** | 88 | 2.CD.060590.ATC | ■ |
| | **.2362** | 6.00 | **1.42** | 36.0 | 54.0 | 6 | **3.46** | 88 | 2.CD.060600.ATC | ■ |
| **1/4** | **.2500** | 6.350 | **1.50** | 38.1 | 57.2 | 8 | **3.86** | 98 | 2.CD.060F14.ATC | ■ |

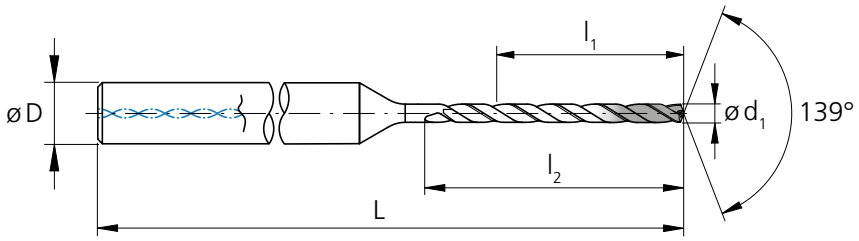
■ Stock item

Complementary products

CrazyDrill Coolpilot Titanium p.166
CrazyDrill Crosspilot p.146

# NEW CrazyDrill Cool Titanium ATC - 10 x d

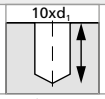
## DRILLING WITH INTERNAL COOLING




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.394** | 10.0 | 13.0 | 4 | **2.32** | 59 | 2.CD.100100.ATC | ■ |
| | **.0413** | 1.05 | **.413** | 10.5 | 13.7 | 4 | **2.32** | 59 | 2.CD.100105.ATC | ■ |
| | **.0433** | 1.10 | **.433** | 11.0 | 14.3 | 4 | **2.32** | 59 | 2.CD.100110.ATC | ■ |
| | **.0453** | 1.15 | **.453** | 11.5 | 15.0 | 4 | **2.32** | 59 | 2.CD.100115.ATC | ■ |
| | **.0472** | 1.20 | **.472** | 12.0 | 15.6 | 4 | **2.44** | 62 | 2.CD.100120.ATC | ■ |
| | **.0492** | 1.25 | **.492** | 12.5 | 16.3 | 4 | **2.44** | 62 | 2.CD.100125.ATC | ■ |
| | **.0512** | 1.30 | **.512** | 13.0 | 16.9 | 4 | **2.44** | 62 | 2.CD.100130.ATC | ■ |
| | **.0531** | 1.35 | **.531** | 13.5 | 17.6 | 4 | **2.44** | 62 | 2.CD.100135.ATC | ■ |
| | **.0551** | 1.40 | **.551** | 14.0 | 18.2 | 4 | **2.44** | 62 | 2.CD.100140.ATC | ■ |
| | **.0571** | 1.45 | **.571** | 14.5 | 18.9 | 4 | **2.56** | 65 | 2.CD.100145.ATC | ■ |
| | **.0591** | 1.50 | **.591** | 15.0 | 19.5 | 4 | **2.56** | 65 | 2.CD.100150.ATC | ■ |
| | **.0610** | 1.55 | **.610** | 15.5 | 20.2 | 4 | **2.56** | 65 | 2.CD.100155.ATC | ■ |
| **1/16** | **.0625** | 1.587 | **.625** | 15.9 | 20.6 | 4 | **2.56** | 65 | 2.CD.100F116.ATC | ■ |
| | **.0630** | 1.60 | **.630** | 16.0 | 20.8 | 4 | **2.56** | 65 | 2.CD.100160.ATC | ■ |
| | **.0650** | 1.65 | **.650** | 16.5 | 21.5 | 4 | **2.56** | 65 | 2.CD.100165.ATC | ■ |
| | **.0669** | 1.70 | **.669** | 17.0 | 22.1 | 4 | **2.64** | 67 | 2.CD.100170.ATC | ■ |
| | **.0689** | 1.75 | **.689** | 17.5 | 22.8 | 4 | **2.64** | 67 | 2.CD.100175.ATC | ■ |
| | **.0709** | 1.80 | **.709** | 18.0 | 23.4 | 4 | **2.64** | 67 | 2.CD.100180.ATC | ■ |
| | **.0728** | 1.85 | **.728** | 18.5 | 24.1 | 4 | **2.64** | 67 | 2.CD.100185.ATC | ■ |
| | **.0748** | 1.90 | **.748** | 19.0 | 24.7 | 4 | **2.64** | 67 | 2.CD.100190.ATC | ■ |
| | **.0768** | 1.95 | **.768** | 19.5 | 25.4 | 4 | **2.64** | 67 | 2.CD.100195.ATC | ■ |
| | **.0787** | 2.00 | **.787** | 20.0 | 26.0 | 4 | **2.76** | 70 | 2.CD.100200.ATC | ■ |

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0807** | 2.05 | **.807** | 20.5 | 26.7 | 4 | **2.76** | 70 | 2.CD.100205.ATC | ■ |
| | **.0827** | 2.10 | **.827** | 21.0 | 27.3 | 4 | **2.76** | 70 | 2.CD.100210.ATC | ■ |
| | **.0846** | 2.15 | **.846** | 21.5 | 28.0 | 4 | **2.76** | 70 | 2.CD.100215.ATC | ■ |
| | **.0866** | 2.20 | **.866** | 22.0 | 28.6 | 4 | **2.76** | 70 | 2.CD.100220.ATC | ■ |
| | **.0886** | 2.25 | **.886** | 22.5 | 29.3 | 4 | **2.76** | 70 | 2.CD.100225.ATC | ■ |
| | **.0906** | 2.30 | **.906** | 23.0 | 29.9 | 4 | **2.95** | 75 | 2.CD.100230.ATC | ■ |
| | **.0925** | 2.35 | **.925** | 23.5 | 30.6 | 4 | **2.95** | 75 | 2.CD.100235.ATC | ■ |
| **3/32** | **.0937** | 2.381 | **.937** | 23.8 | 31.0 | 4 | **2.95** | 75 | 2.CD.100F332.ATC | ■ |
| | **.0945** | 2.40 | **.945** | 24.0 | 31.2 | 4 | **2.95** | 75 | 2.CD.100240.ATC | ■ |
| | **.0965** | 2.45 | **.965** | 24.5 | 31.9 | 4 | **2.95** | 75 | 2.CD.100245.ATC | ■ |
| | **.0984** | 2.50 | **.984** | 25.0 | 32.5 | 4 | **2.95** | 75 | 2.CD.100250.ATC | ■ |
| | **.1004** | 2.55 | **1.00** | 25.5 | 33.2 | 4 | **2.95** | 75 | 2.CD.100255.ATC | ■ |
| | **.1024** | 2.60 | **1.02** | 26.0 | 33.8 | 4 | **3.15** | 80 | 2.CD.100260.ATC | ■ |
| | **.1043** | 2.65 | **1.04** | 26.5 | 34.5 | 4 | **3.15** | 80 | 2.CD.100265.ATC | ■ |
| | **.1063** | 2.70 | **1.06** | 27.0 | 35.1 | 4 | **3.15** | 80 | 2.CD.100270.ATC | ■ |
| | **.1083** | 2.75 | **1.08** | 27.5 | 35.8 | 4 | **3.15** | 80 | 2.CD.100275.ATC | ■ |
| | **.1102** | 2.80 | **1.10** | 28.0 | 36.4 | 4 | **3.15** | 80 | 2.CD.100280.ATC | ■ |
| | **.1122** | 2.85 | **1.12** | 28.5 | 37.1 | 4 | **3.15** | 80 | 2.CD.100285.ATC | ■ |
| | **.1142** | 2.90 | **1.14** | 29.0 | 37.7 | 4 | **3.15** | 80 | 2.CD.100290.ATC | ■ |
| | **.1161** | 2.95 | **1.16** | 29.5 | 38.4 | 4 | **3.15** | 80 | 2.CD.100295.ATC | ■ |
| | **.1181** | 3.00 | **1.18** | 30.0 | 39.0 | 6 | **3.43** | 87 | 2.CD.100300.ATC | ■ |
| | **.1201** | 3.05 | **1.20** | 30.5 | 39.7 | 6 | **3.43** | 87 | 2.CD.100305.ATC | ■ |

■ Stock item

Carbide |  |  | Z2 |  | 

| Ø $d_1$ | .004" - .118" (0.1 - 3.0 mm) | | .120" - .236" (3.05 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | + .00031"<br>0 | + 0.006 mm<br>0 | + .00035"<br>+ .00004" | + 0.009 mm<br>+ 0.001 mm | + .00039"<br>+ .00004" | + 0.010 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1220 | 3.10 | 1.22 | 31.0 | 40.3 | 6 | 3.43 | 87 | 2.CD.100310.ATC | ■ |
| | .1240 | 3.15 | 1.24 | 31.5 | 41.0 | 6 | 3.43 | 87 | 2.CD.100315.ATC | ■ |
| 1/8 | .1250 | 3.175 | 1.25 | 31.8 | 41.3 | 6 | 3.43 | 87 | 2.CD.100F18.ATC | ■ |
| | .1260 | 3.20 | 1.26 | 32.0 | 41.6 | 6 | 3.43 | 87 | 2.CD.100320.ATC | ■ |
| | .1280 | 3.25 | 1.28 | 32.5 | 42.3 | 6 | 3.43 | 87 | 2.CD.100325.ATC | ■ |
| | .1299 | 3.30 | 1.30 | 33.0 | 42.9 | 6 | 3.43 | 87 | 2.CD.100330.ATC | ■ |
| | .1319 | 3.35 | 1.32 | 33.5 | 43.6 | 6 | 3.43 | 87 | 2.CD.100335.ATC | ■ |
| | .1339 | 3.40 | 1.34 | 34.0 | 44.2 | 6 | 3.43 | 87 | 2.CD.100340.ATC | ■ |
| | .1358 | 3.45 | 1.36 | 34.5 | 44.9 | 6 | 3.43 | 87 | 2.CD.100345.ATC | ■ |
| | .1378 | 3.50 | 1.38 | 35.0 | 45.5 | 6 | 3.74 | 95 | 2.CD.100350.ATC | ■ |
| | .1398 | 3.55 | 1.40 | 35.5 | 46.2 | 6 | 3.74 | 95 | 2.CD.100355.ATC | ■ |
| | .1417 | 3.60 | 1.42 | 36.0 | 46.8 | 6 | 3.74 | 95 | 2.CD.100360.ATC | ■ |
| | .1437 | 3.65 | 1.44 | 36.5 | 47.5 | 6 | 3.74 | 95 | 2.CD.100365.ATC | ■ |
| | .1457 | 3.70 | 1.46 | 37.0 | 48.1 | 6 | 3.74 | 95 | 2.CD.100370.ATC | ■ |
| | .1476 | 3.75 | 1.48 | 37.5 | 48.8 | 6 | 3.74 | 95 | 2.CD.100375.ATC | ■ |
| | .1496 | 3.80 | 1.50 | 38.0 | 49.4 | 6 | 3.74 | 95 | 2.CD.100380.ATC | ■ |
| | .1516 | 3.85 | 1.52 | 38.5 | 50.1 | 6 | 3.74 | 95 | 2.CD.100385.ATC | ■ |
| | .1535 | 3.90 | 1.54 | 39.0 | 50.7 | 6 | 3.74 | 95 | 2.CD.100390.ATC | ■ |
| | .1555 | 3.95 | 1.56 | 39.5 | 51.4 | 6 | 3.74 | 95 | 2.CD.100395.ATC | ■ |
| 5/32 | .1562 | 3.968 | 1.56 | 39.7 | 51.6 | 6 | 3.74 | 95 | 2.CD.100F532.ATC | ■ |
| | .1575 | 4.00 | 1.57 | 40.0 | 52.0 | 6 | 3.74 | 95 | 2.CD.100400.ATC | ■ |
| | .1614 | 4.10 | 1.61 | 41.0 | 53.3 | 6 | 3.94 | 100 | 2.CD.100410.ATC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1654 | 4.20 | 1.65 | 42.0 | 54.6 | 6 | 3.94 | 100 | 2.CD.100420.ATC | ■ |
| | .1693 | 4.30 | 1.69 | 43.0 | 55.9 | 6 | 3.94 | 100 | 2.CD.100430.ATC | ■ |
| | .1732 | 4.40 | 1.73 | 44.0 | 57.2 | 6 | 3.94 | 100 | 2.CD.100440.ATC | ■ |
| | .1772 | 4.50 | 1.77 | 45.0 | 58.5 | 6 | 3.94 | 100 | 2.CD.100450.ATC | ■ |
| | .1811 | 4.60 | 1.81 | 46.0 | 59.8 | 6 | 3.94 | 100 | 2.CD.100460.ATC | ■ |
| | .1850 | 4.70 | 1.85 | 47.0 | 61.1 | 6 | 4.13 | 105 | 2.CD.100470.ATC | ■ |
| 3/16 | .1875 | 4.762 | 1.87 | 47.6 | 61.9 | 6 | 4.13 | 105 | 2.CD.100F316.ATC | ■ |
| | .1890 | 4.80 | 1.89 | 48.0 | 62.4 | 6 | 4.13 | 105 | 2.CD.100480.ATC | ■ |
| | .1929 | 4.90 | 1.93 | 49.0 | 63.7 | 6 | 4.13 | 105 | 2.CD.100490.ATC | ■ |
| | .1969 | 5.00 | 1.97 | 50.0 | 65.0 | 6 | 4.13 | 105 | 2.CD.100500.ATC | ■ |
| | .2008 | 5.10 | 2.01 | 51.0 | 66.3 | 6 | 4.13 | 105 | 2.CD.100510.ATC | ■ |
| | .2047 | 5.20 | 2.05 | 52.0 | 67.6 | 6 | 4.13 | 105 | 2.CD.100520.ATC | ■ |
| | .2087 | 5.30 | 2.09 | 53.0 | 68.9 | 6 | 4.13 | 105 | 2.CD.100530.ATC | ■ |
| | .2126 | 5.40 | 2.13 | 54.0 | 70.2 | 6 | 4.41 | 112 | 2.CD.100540.ATC | ■ |
| | .2165 | 5.50 | 2.17 | 55.0 | 71.5 | 6 | 4.41 | 112 | 2.CD.100550.ATC | ■ |
| 7/32 | .2189 | 5.560 | 2.19 | 55.6 | 72.3 | 6 | 4.41 | 112 | 2.CD.100F732.ATC | ■ |
| | .2205 | 5.60 | 2.20 | 56.0 | 72.8 | 6 | 4.41 | 112 | 2.CD.100560.ATC | ■ |
| | .2244 | 5.70 | 2.24 | 57.0 | 74.1 | 6 | 4.41 | 112 | 2.CD.100570.ATC | ■ |
| | .2283 | 5.80 | 2.28 | 58.0 | 75.4 | 6 | 4.41 | 112 | 2.CD.100580.ATC | ■ |
| | .2323 | 5.90 | 2.32 | 59.0 | 76.7 | 6 | 4.41 | 112 | 2.CD.100590.ATC | ■ |
| | .2362 | 6.00 | 2.36 | 60.0 | 78.0 | 6 | 4.41 | 112 | 2.CD.100600.ATC | ■ |
| 1/4 | .2500 | 6.350 | 2.50 | 63.5 | 82.6 | 8 | 4.92 | 125 | 2.CD.100F14.ATC | ■ |

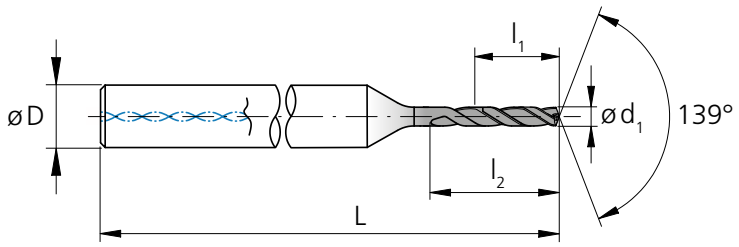
■ Stock item

Complementary products

CrazyDrill Coolpilot Titanium p.166
CrazyDrill Crosspilot p.146

# NEW CrazyDrill Cool Titanium PTC - 3 x d

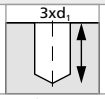
## DRILLING WITH INTERNAL COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.118** | 3.00 | 6.0 | 4 | **1.97** | 50 | 2.CD.030100.PTC | ■ |
| | **.0413** | 1.05 | **.124** | 3.15 | 6.3 | 4 | **1.97** | 50 | 2.CD.030105.PTC | ■ |
| | **.0433** | 1.10 | **.130** | 3.30 | 6.6 | 4 | **1.97** | 50 | 2.CD.030110.PTC | ■ |
| | **.0453** | 1.15 | **.136** | 3.45 | 6.9 | 4 | **1.97** | 50 | 2.CD.030115.PTC | ■ |
| | **.0472** | 1.20 | **.142** | 3.60 | 7.2 | 4 | **1.97** | 50 | 2.CD.030120.PTC | ■ |
| | **.0492** | 1.25 | **.148** | 3.75 | 7.5 | 4 | **1.97** | 50 | 2.CD.030125.PTC | ■ |
| | **.0512** | 1.30 | **.154** | 3.90 | 7.8 | 4 | **1.97** | 50 | 2.CD.030130.PTC | ■ |
| | **.0531** | 1.35 | **.159** | 4.05 | 8.1 | 4 | **1.97** | 50 | 2.CD.030135.PTC | ■ |
| | **.0551** | 1.40 | **.165** | 4.20 | 8.4 | 4 | **1.97** | 50 | 2.CD.030140.PTC | ■ |
| | **.0571** | 1.45 | **.171** | 4.35 | 8.7 | 4 | **1.97** | 50 | 2.CD.030145.PTC | ■ |
| | **.0591** | 1.50 | **.177** | 4.50 | 9.0 | 4 | **1.97** | 50 | 2.CD.030150.PTC | ■ |
| | **.0610** | 1.55 | **.183** | 4.65 | 9.3 | 4 | **1.97** | 50 | 2.CD.030155.PTC | ■ |
| **1/16** | **.0625** | 1.587 | **.187** | 4.76 | 9.5 | 4 | **1.97** | 50 | 2.CD.030F116.PTC | ■ |
| | **.0630** | 1.60 | **.189** | 4.80 | 9.6 | 4 | **1.97** | 50 | 2.CD.030160.PTC | ■ |
| | **.0650** | 1.65 | **.195** | 4.95 | 9.9 | 4 | **1.97** | 50 | 2.CD.030165.PTC | ■ |
| | **.0669** | 1.70 | **.201** | 5.10 | 10.2 | 4 | **2.09** | 53 | 2.CD.030170.PTC | ■ |
| | **.0689** | 1.75 | **.207** | 5.25 | 10.5 | 4 | **2.09** | 53 | 2.CD.030175.PTC | ■ |
| | **.0709** | 1.80 | **.213** | 5.40 | 10.8 | 4 | **2.09** | 53 | 2.CD.030180.PTC | ■ |
| | **.0728** | 1.85 | **.219** | 5.55 | 11.1 | 4 | **2.09** | 53 | 2.CD.030185.PTC | ■ |
| | **.0748** | 1.90 | **.224** | 5.70 | 11.4 | 4 | **2.09** | 53 | 2.CD.030190.PTC | ■ |
| | **.0768** | 1.95 | **.230** | 5.85 | 11.7 | 4 | **2.09** | 53 | 2.CD.030195.PTC | ■ |
| | **.0787** | 2.00 | **.236** | 6.00 | 12.0 | 4 | **2.17** | 55 | 2.CD.030200.PTC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0807** | 2.05 | **.242** | 6.15 | 12.3 | 4 | **2.17** | 55 | 2.CD.030205.PTC | ■ |
| | **.0827** | 2.10 | **.248** | 6.30 | 12.6 | 4 | **2.17** | 55 | 2.CD.030210.PTC | ■ |
| | **.0846** | 2.15 | **.254** | 6.45 | 12.9 | 4 | **2.17** | 55 | 2.CD.030215.PTC | ■ |
| | **.0866** | 2.20 | **.260** | 6.60 | 13.2 | 4 | **2.17** | 55 | 2.CD.030220.PTC | ■ |
| | **.0886** | 2.25 | **.266** | 6.75 | 13.5 | 4 | **2.17** | 55 | 2.CD.030225.PTC | ■ |
| | **.0906** | 2.30 | **.272** | 6.90 | 13.8 | 4 | **2.24** | 57 | 2.CD.030230.PTC | ■ |
| | **.0925** | 2.35 | **.278** | 7.05 | 14.1 | 4 | **2.24** | 57 | 2.CD.030235.PTC | ■ |
| **3/32** | **.0937** | 2.381 | **.281** | 7.14 | 14.3 | 4 | **2.24** | 57 | 2.CD.030F332.PTC | ■ |
| | **.0945** | 2.40 | **.283** | 7.20 | 14.4 | 4 | **2.24** | 57 | 2.CD.030240.PTC | ■ |
| | **.0965** | 2.45 | **.289** | 7.35 | 14.7 | 4 | **2.24** | 57 | 2.CD.030245.PTC | ■ |
| | **.0984** | 2.50 | **.295** | 7.50 | 15.0 | 4 | **2.24** | 57 | 2.CD.030250.PTC | ■ |
| | **.1004** | 2.55 | **.301** | 7.65 | 15.3 | 4 | **2.24** | 57 | 2.CD.030255.PTC | ■ |
| | **.1024** | 2.60 | **.307** | 7.80 | 15.6 | 4 | **2.24** | 57 | 2.CD.030260.PTC | ■ |
| | **.1043** | 2.65 | **.313** | 7.95 | 15.9 | 4 | **2.24** | 57 | 2.CD.030265.PTC | ■ |
| | **.1063** | 2.70 | **.319** | 8.10 | 16.2 | 4 | **2.24** | 57 | 2.CD.030270.PTC | ■ |
| | **.1083** | 2.75 | **.325** | 8.25 | 16.5 | 4 | **2.24** | 57 | 2.CD.030275.PTC | ■ |
| | **.1102** | 2.80 | **.331** | 8.40 | 16.8 | 4 | **2.24** | 57 | 2.CD.030280.PTC | ■ |
| | **.1122** | 2.85 | **.337** | 8.55 | 17.1 | 4 | **2.24** | 57 | 2.CD.030285.PTC | ■ |
| | **.1142** | 2.90 | **.343** | 8.70 | 17.4 | 4 | **2.24** | 57 | 2.CD.030290.PTC | ■ |
| | **.1161** | 2.95 | **.348** | 8.85 | 17.7 | 4 | **2.24** | 57 | 2.CD.030295.PTC | ■ |
| | **.1181** | 3.00 | **.354** | 9.00 | 18.0 | 6 | **2.56** | 65 | 2.CD.030300.PTC | ■ |
| | **.1201** | 3.05 | **.360** | 9.15 | 18.3 | 6 | **2.56** | 65 | 2.CD.030305.PTC | ■ |

■ Stock item

Carbide |  |  | Z2 |  | 

| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.120" - .236"** (3.05 - 6.0 mm) | | **.240" - .394"** (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | **+ .00031"**<br>**0** | + 0.006 mm<br>0 | **+ .00035"**<br>**+ .00004"** | + 0.009 mm<br>+ 0.001 mm | **+ .00039"**<br>**+ .00004"** | + 0.010 mm<br>+ 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1220** | 3.10 | **.366** | 9.30 | 18.6 | 6 | **2.56** | 65 | 2.CD.030310.PTC | ■ |
| | **.1240** | 3.15 | **.372** | 9.45 | 18.9 | 6 | **2.56** | 65 | 2.CD.030315.PTC | ■ |
| **1/8** | **.1250** | 3.175 | **.375** | 9.53 | 19.1 | 6 | **2.56** | 65 | 2.CD.030F18.PTC | ■ |
| | **.1260** | 3.20 | **.378** | 9.60 | 19.2 | 6 | **2.56** | 65 | 2.CD.030320.PTC | ■ |
| | **.1280** | 3.25 | **.384** | 9.75 | 19.5 | 6 | **2.56** | 65 | 2.CD.030325.PTC | ■ |
| | **.1299** | 3.30 | **.390** | 9.90 | 19.8 | 6 | **2.56** | 65 | 2.CD.030330.PTC | ■ |
| | **.1319** | 3.35 | **.396** | 10.05 | 20.1 | 6 | **2.56** | 65 | 2.CD.030335.PTC | ■ |
| | **.1339** | 3.40 | **.402** | 10.20 | 20.4 | 6 | **2.56** | 65 | 2.CD.030340.PTC | ■ |
| | **.1358** | 3.45 | **.407** | 10.35 | 20.7 | 6 | **2.56** | 65 | 2.CD.030345.PTC | ■ |
| | **.1378** | 3.50 | **.413** | 10.50 | 21.0 | 6 | **2.68** | 68 | 2.CD.030350.PTC | ■ |
| | **.1398** | 3.55 | **.419** | 10.65 | 21.3 | 6 | **2.68** | 68 | 2.CD.030355.PTC | ■ |
| | **.1417** | 3.60 | **.425** | 10.80 | 21.6 | 6 | **2.68** | 68 | 2.CD.030360.PTC | ■ |
| | **.1437** | 3.65 | **.431** | 10.95 | 21.9 | 6 | **2.68** | 68 | 2.CD.030365.PTC | ■ |
| | **.1457** | 3.70 | **.437** | 11.10 | 22.2 | 6 | **2.68** | 68 | 2.CD.030370.PTC | ■ |
| | **.1476** | 3.75 | **.443** | 11.25 | 22.5 | 6 | **2.68** | 68 | 2.CD.030375.PTC | ■ |
| | **.1496** | 3.80 | **.449** | 11.40 | 22.8 | 6 | **2.68** | 68 | 2.CD.030380.PTC | ■ |
| | **.1516** | 3.85 | **.455** | 11.55 | 23.1 | 6 | **2.68** | 68 | 2.CD.030385.PTC | ■ |
| | **.1535** | 3.90 | **.461** | 11.70 | 23.4 | 6 | **2.68** | 68 | 2.CD.030390.PTC | ■ |
| | **.1555** | 3.95 | **.467** | 11.85 | 23.7 | 6 | **2.68** | 68 | 2.CD.030395.PTC | ■ |
| **5/32** | **.1562** | 3.968 | **.469** | 11.90 | 23.8 | 6 | **2.68** | 68 | 2.CD.030F532.PTC | ■ |
| | **.1575** | 4.00 | **.472** | 12.00 | 24.0 | 6 | **2.68** | 68 | 2.CD.030400.PTC | ■ |
| | **.1614** | 4.10 | **.484** | 12.30 | 24.6 | 6 | **2.83** | 72 | 2.CD.030410.PTC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.1654** | 4.20 | **.496** | 12.60 | 25.2 | 6 | **2.83** | 72 | 2.CD.030420.PTC | ■ |
| | **.1693** | 4.30 | **.508** | 12.90 | 25.8 | 6 | **2.83** | 72 | 2.CD.030430.PTC | ■ |
| | **.1732** | 4.40 | **.520** | 13.20 | 26.4 | 6 | **2.83** | 72 | 2.CD.030440.PTC | ■ |
| | **.1772** | 4.50 | **.531** | 13.50 | 27.0 | 6 | **2.83** | 72 | 2.CD.030450.PTC | ■ |
| | **.1811** | 4.60 | **.543** | 13.80 | 27.6 | 6 | **2.83** | 72 | 2.CD.030460.PTC | ■ |
| | **.1850** | 4.70 | **.555** | 14.10 | 28.2 | 6 | **2.95** | 75 | 2.CD.030470.PTC | ■ |
| **3/16** | **.1875** | 4.762 | **.562** | 14.29 | 28.6 | 6 | **2.95** | 75 | 2.CD.030F316.PTC | ■ |
| | **.1890** | 4.80 | **.567** | 14.40 | 28.8 | 6 | **2.95** | 75 | 2.CD.030480.PTC | ■ |
| | **.1929** | 4.90 | **.579** | 14.70 | 29.4 | 6 | **2.95** | 75 | 2.CD.030490.PTC | ■ |
| | **.1969** | 5.00 | **.591** | 15.00 | 30.0 | 6 | **2.95** | 75 | 2.CD.030500.PTC | ■ |
| | **.2008** | 5.10 | **.602** | 15.30 | 30.6 | 6 | **2.95** | 75 | 2.CD.030510.PTC | ■ |
| | **.2047** | 5.20 | **.614** | 15.60 | 31.2 | 6 | **2.95** | 75 | 2.CD.030520.PTC | ■ |
| | **.2087** | 5.30 | **.626** | 15.90 | 31.8 | 6 | **2.95** | 75 | 2.CD.030530.PTC | ■ |
| | **.2126** | 5.40 | **.638** | 16.20 | 32.4 | 6 | **3.15** | 80 | 2.CD.030540.PTC | ■ |
| | **.2165** | 5.50 | **.650** | 16.50 | 33.0 | 6 | **3.15** | 80 | 2.CD.030550.PTC | ■ |
| **7/32** | **.2189** | 5.560 | **.657** | 16.68 | 33.4 | 6 | **3.15** | 80 | 2.CD.030F732.PTC | ■ |
| | **.2205** | 5.60 | **.661** | 16.80 | 33.6 | 6 | **3.15** | 80 | 2.CD.030560.PTC | ■ |
| | **.2244** | 5.70 | **.673** | 17.10 | 34.2 | 6 | **3.15** | 80 | 2.CD.030570.PTC | ■ |
| | **.2283** | 5.80 | **.685** | 17.40 | 34.8 | 6 | **3.15** | 80 | 2.CD.030580.PTC | ■ |
| | **.2323** | 5.90 | **.697** | 17.70 | 35.4 | 6 | **3.15** | 80 | 2.CD.030590.PTC | ■ |
| | **.2362** | 6.00 | **.709** | 18.00 | 36.0 | 6 | **3.15** | 80 | 2.CD.030600.PTC | ■ |
| **1/4** | **.2500** | 6.350 | **.750** | 19.05 | 38.1 | 8 | **3.15** | 80 | 2.CD.030F14.PTC | ■ |

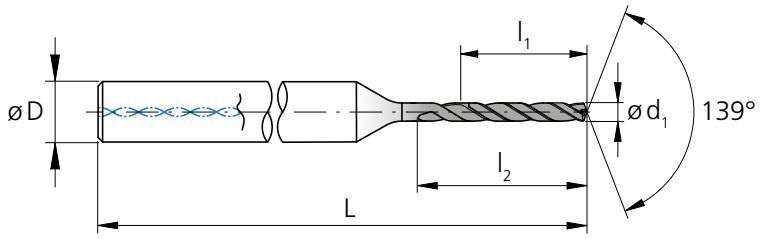
■ Stock item

Complementary products

CrazyDrill Cool Titanium PTC p.354
CrazyDrill Crosspilot p.146

# NEW CrazyDrill Cool Titanium PTC - 6 x d

## DRILLING WITH INTERNAL COOLING




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0394** | 1.00 | **.236** | 6.0 | 9.0 | 4 | **2.17** | 55 | 2.CD.060100.PTC | ■ |
| | **.0413** | 1.05 | **.248** | 6.3 | 9.5 | 4 | **2.17** | 55 | 2.CD.060105.PTC | ■ |
| | **.0433** | 1.10 | **.260** | 6.6 | 9.9 | 4 | **2.17** | 55 | 2.CD.060110.PTC | ■ |
| | **.0453** | 1.15 | **.272** | 6.9 | 10.4 | 4 | **2.17** | 55 | 2.CD.060115.PTC | ■ |
| | **.0472** | 1.20 | **.283** | 7.2 | 10.8 | 4 | **2.24** | 57 | 2.CD.060120.PTC | ■ |
| | **.0492** | 1.25 | **.295** | 7.5 | 11.3 | 4 | **2.24** | 57 | 2.CD.060125.PTC | ■ |
| | **.0512** | 1.30 | **.307** | 7.8 | 11.7 | 4 | **2.24** | 57 | 2.CD.060130.PTC | ■ |
| | **.0531** | 1.35 | **.319** | 8.1 | 12.2 | 4 | **2.24** | 57 | 2.CD.060135.PTC | ■ |
| | **.0551** | 1.40 | **.331** | 8.4 | 12.6 | 4 | **2.24** | 57 | 2.CD.060140.PTC | ■ |
| | **.0571** | 1.45 | **.343** | 8.7 | 13.1 | 4 | **2.28** | 58 | 2.CD.060145.PTC | ■ |
| | **.0591** | 1.50 | **.354** | 9.0 | 13.5 | 4 | **2.28** | 58 | 2.CD.060150.PTC | ■ |
| | **.0610** | 1.55 | **.366** | 9.3 | 14.0 | 4 | **2.28** | 58 | 2.CD.060155.PTC | ■ |
| **1/16** | **.0625** | 1.587 | **.375** | 9.5 | 14.3 | 4 | **2.28** | 58 | 2.CD.060F116.PTC | ■ |
| | **.0630** | 1.60 | **.378** | 9.6 | 14.4 | 4 | **2.28** | 58 | 2.CD.060160.PTC | ■ |
| | **.0650** | 1.65 | **.390** | 9.9 | 14.9 | 4 | **2.28** | 58 | 2.CD.060165.PTC | ■ |
| | **.0669** | 1.70 | **.402** | 10.2 | 15.3 | 4 | **2.36** | 60 | 2.CD.060170.PTC | ■ |
| | **.0689** | 1.75 | **.413** | 10.5 | 15.8 | 4 | **2.36** | 60 | 2.CD.060175.PTC | ■ |
| | **.0709** | 1.80 | **.425** | 10.8 | 16.2 | 4 | **2.36** | 60 | 2.CD.060180.PTC | ■ |
| | **.0728** | 1.85 | **.437** | 11.1 | 16.7 | 4 | **2.36** | 60 | 2.CD.060185.PTC | ■ |
| | **.0748** | 1.90 | **.449** | 11.4 | 17.1 | 4 | **2.36** | 60 | 2.CD.060190.PTC | ■ |
| | **.0768** | 1.95 | **.461** | 11.7 | 17.6 | 4 | **2.36** | 60 | 2.CD.060195.PTC | ■ |
| | **.0787** | 2.00 | **.472** | 12.0 | 18.0 | 4 | **2.48** | 63 | 2.CD.060200.PTC | ■ |

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.0807** | 2.05 | **.484** | 12.3 | 18.5 | 4 | **2.48** | 63 | 2.CD.060205.PTC | ■ |
| | **.0827** | 2.10 | **.496** | 12.6 | 18.9 | 4 | **2.48** | 63 | 2.CD.060210.PTC | ■ |
| | **.0846** | 2.15 | **.508** | 12.9 | 19.4 | 4 | **2.48** | 63 | 2.CD.060215.PTC | ■ |
| | **.0866** | 2.20 | **.520** | 13.2 | 19.8 | 4 | **2.48** | 63 | 2.CD.060220.PTC | ■ |
| | **.0886** | 2.25 | **.531** | 13.5 | 20.3 | 4 | **2.48** | 63 | 2.CD.060225.PTC | ■ |
| | **.0906** | 2.30 | **.543** | 13.8 | 20.7 | 4 | **2.56** | 65 | 2.CD.060230.PTC | ■ |
| | **.0925** | 2.35 | **.555** | 14.1 | 21.2 | 4 | **2.56** | 65 | 2.CD.060235.PTC | ■ |
| **3/32** | **.0937** | 2.381 | **.562** | 14.3 | 21.4 | 4 | **2.56** | 65 | 2.CD.060F332.PTC | ■ |
| | **.0945** | 2.40 | **.567** | 14.4 | 21.6 | 4 | **2.56** | 65 | 2.CD.060240.PTC | ■ |
| | **.0965** | 2.45 | **.579** | 14.7 | 22.1 | 4 | **2.56** | 65 | 2.CD.060245.PTC | ■ |
| | **.0984** | 2.50 | **.591** | 15.0 | 22.5 | 4 | **2.56** | 65 | 2.CD.060250.PTC | ■ |
| | **.1004** | 2.55 | **.602** | 15.3 | 23.0 | 4 | **2.56** | 65 | 2.CD.060255.PTC | ■ |
| | **.1024** | 2.60 | **.614** | 15.6 | 23.4 | 4 | **2.68** | 68 | 2.CD.060260.PTC | ■ |
| | **.1043** | 2.65 | **.626** | 15.9 | 23.9 | 4 | **2.68** | 68 | 2.CD.060265.PTC | ■ |
| | **.1063** | 2.70 | **.638** | 16.2 | 24.3 | 4 | **2.68** | 68 | 2.CD.060270.PTC | ■ |
| | **.1083** | 2.75 | **.650** | 16.5 | 24.8 | 4 | **2.68** | 68 | 2.CD.060275.PTC | ■ |
| | **.1102** | 2.80 | **.661** | 16.8 | 25.2 | 4 | **2.68** | 68 | 2.CD.060280.PTC | ■ |
| | **.1122** | 2.85 | **.673** | 17.1 | 25.7 | 4 | **2.68** | 68 | 2.CD.060285.PTC | ■ |
| | **.1142** | 2.90 | **.685** | 17.4 | 26.1 | 4 | **2.68** | 68 | 2.CD.060290.PTC | ■ |
| | **.1161** | 2.95 | **.697** | 17.7 | 26.6 | 4 | **2.68** | 68 | 2.CD.060295.PTC | ■ |
| | **.1181** | 3.00 | **.709** | 18.0 | 27.0 | 6 | **2.91** | 74 | 2.CD.060300.PTC | ■ |
| | **.1201** | 3.05 | **.720** | 18.3 | 27.5 | 6 | **2.91** | 74 | 2.CD.060305.PTC | ■ |

■ Stock item

Carbide | 6xd1 | 139° | Z2 | eXedur SNP

| Ø $d_1$ | .004" - .118" (0.1 - 3.0 mm) | | .120" - .236" (3.05 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | + .00031" / 0 | + 0.006 mm / 0 | + .00035" / + .00004" | + 0.009 mm / + 0.001 mm | + .00039" / + .00004" | + 0.010 mm / + 0.001 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1220 | 3.10 | .732 | 18.6 | 27.9 | 6 | 2.91 | 74 | 2.CD.060310.PTC | ■ |
| | .1240 | 3.15 | .744 | 18.9 | 28.4 | 6 | 2.91 | 74 | 2.CD.060315.PTC | ■ |
| 1/8 | .1250 | 3.175 | .756 | 19.1 | 28.6 | 6 | 2.91 | 74 | 2.CD.060F18.PTC | ■ |
| | .1260 | 3.20 | .750 | 19.2 | 28.8 | 6 | 2.91 | 74 | 2.CD.060320.PTC | ■ |
| | .1280 | 3.25 | .768 | 19.5 | 29.3 | 6 | 2.91 | 74 | 2.CD.060325.PTC | ■ |
| | .1299 | 3.30 | .780 | 19.8 | 29.7 | 6 | 2.91 | 74 | 2.CD.060330.PTC | ■ |
| | .1319 | 3.35 | .791 | 20.1 | 30.2 | 6 | 2.91 | 74 | 2.CD.060335.PTC | ■ |
| | .1339 | 3.40 | .803 | 20.4 | 30.6 | 6 | 2.91 | 74 | 2.CD.060340.PTC | ■ |
| | .1358 | 3.45 | .815 | 20.7 | 31.1 | 6 | 2.91 | 74 | 2.CD.060345.PTC | ■ |
| | .1378 | 3.50 | .827 | 21.0 | 31.5 | 6 | 3.07 | 78 | 2.CD.060350.PTC | ■ |
| | .1398 | 3.55 | .839 | 21.3 | 32.0 | 6 | 3.07 | 78 | 2.CD.060355.PTC | ■ |
| | .1417 | 3.60 | .850 | 21.6 | 32.4 | 6 | 3.07 | 78 | 2.CD.060360.PTC | ■ |
| | .1437 | 3.65 | .862 | 21.9 | 32.9 | 6 | 3.07 | 78 | 2.CD.060365.PTC | ■ |
| | .1457 | 3.70 | .874 | 22.2 | 33.3 | 6 | 3.07 | 78 | 2.CD.060370.PTC | ■ |
| | .1476 | 3.75 | .886 | 22.5 | 33.8 | 6 | 3.07 | 78 | 2.CD.060375.PTC | ■ |
| | .1496 | 3.80 | .898 | 22.8 | 34.2 | 6 | 3.07 | 78 | 2.CD.060380.PTC | ■ |
| | .1516 | 3.85 | .909 | 23.1 | 34.7 | 6 | 3.07 | 78 | 2.CD.060385.PTC | ■ |
| | .1535 | 3.90 | .921 | 23.4 | 35.1 | 6 | 3.07 | 78 | 2.CD.060390.PTC | ■ |
| | .1555 | 3.95 | .933 | 23.7 | 35.6 | 6 | 3.07 | 78 | 2.CD.060395.PTC | ■ |
| 5/32 | .1562 | 3.968 | .945 | 23.8 | 35.7 | 6 | 3.07 | 78 | 2.CD.060F532.PTC | ■ |
| | .1575 | 4.00 | .945 | 24.0 | 36.0 | 6 | 3.07 | 78 | 2.CD.060400.PTC | ■ |
| | .1614 | 4.10 | .969 | 24.6 | 36.9 | 6 | 3.15 | 80 | 2.CD.060410.PTC | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .1654 | 4.20 | .992 | 25.2 | 37.8 | 6 | 3.15 | 80 | 2.CD.060420.PTC | ■ |
| | .1693 | 4.30 | 1.02 | 25.8 | 38.7 | 6 | 3.15 | 80 | 2.CD.060430.PTC | ■ |
| | .1732 | 4.40 | 1.04 | 26.4 | 39.6 | 6 | 3.15 | 80 | 2.CD.060440.PTC | ■ |
| | .1772 | 4.50 | 1.06 | 27.0 | 40.5 | 6 | 3.15 | 80 | 2.CD.060450.PTC | ■ |
| | .1811 | 4.60 | 1.09 | 27.6 | 41.4 | 6 | 3.15 | 80 | 2.CD.060460.PTC | ■ |
| | .1850 | 4.70 | 1.11 | 28.2 | 42.3 | 6 | 3.31 | 84 | 2.CD.060470.PTC | ■ |
| 3/16 | .1875 | 4.762 | 1.12 | 28.6 | 42.9 | 6 | 3.31 | 84 | 2.CD.060F316.PTC | ■ |
| | .1890 | 4.80 | 1.13 | 28.8 | 43.2 | 6 | 3.31 | 84 | 2.CD.060480.PTC | ■ |
| | .1929 | 4.90 | 1.16 | 29.4 | 44.1 | 6 | 3.31 | 84 | 2.CD.060490.PTC | ■ |
| | .1969 | 5.00 | 1.18 | 30.0 | 45.0 | 6 | 3.31 | 84 | 2.CD.060500.PTC | ■ |
| | .2008 | 5.10 | 1.20 | 30.6 | 45.9 | 6 | 3.31 | 84 | 2.CD.060510.PTC | ■ |
| | .2047 | 5.20 | 1.23 | 31.2 | 46.8 | 6 | 3.31 | 84 | 2.CD.060520.PTC | ■ |
| | .2087 | 5.30 | 1.25 | 31.8 | 47.7 | 6 | 3.31 | 84 | 2.CD.060530.PTC | ■ |
| | .2126 | 5.40 | 1.28 | 32.4 | 48.6 | 6 | 3.46 | 88 | 2.CD.060540.PTC | ■ |
| | .2165 | 5.50 | 1.30 | 33.0 | 49.5 | 6 | 3.46 | 88 | 2.CD.060550.PTC | ■ |
| 7/32 | .2189 | 5.560 | 1.31 | 33.4 | 50.0 | 6 | 3.46 | 88 | 2.CD.060F732.PTC | ■ |
| | .2205 | 5.60 | 1.32 | 33.6 | 50.4 | 6 | 3.46 | 88 | 2.CD.060560.PTC | ■ |
| | .2244 | 5.70 | 1.35 | 34.2 | 51.3 | 6 | 3.46 | 88 | 2.CD.060570.PTC | ■ |
| | .2283 | 5.80 | 1.37 | 34.8 | 52.2 | 6 | 3.46 | 88 | 2.CD.060580.PTC | ■ |
| | .2323 | 5.90 | 1.39 | 35.4 | 53.1 | 6 | 3.46 | 88 | 2.CD.060590.PTC | ■ |
| | .2362 | 6.00 | 1.42 | 36.0 | 54.0 | 6 | 3.46 | 88 | 2.CD.060600.PTC | ■ |
| 1/4 | .2500 | 6.350 | 1.50 | 38.1 | 57.2 | 8 | 3.86 | 98 | 2.CD.060F14.PTC | ■ |

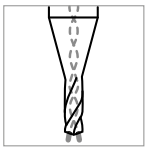
■ Stock item

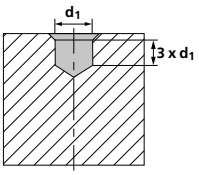
Complementary products

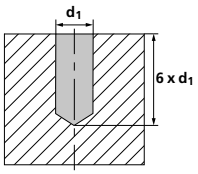
CrazyDrill Cool Titanium PTC p.352
CrazyDrill Crosspilot p.146

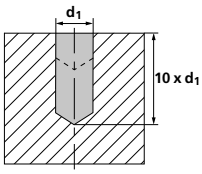
# NEW ATC - 6 x d - 10 x d

## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW

| | Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High |
|---|---|---|---|---|---|---|---|
|  | $S_2$ | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 40 \| **131** | 60 \| **197** |
| | | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |

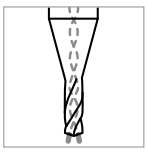


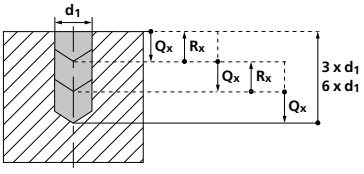




# NEW PTC - 3 x d - 6 x d

## DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW

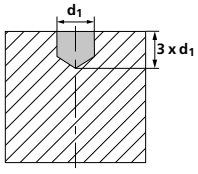
| | Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Mid | $v_c$ [m/min] \| [SFM] High | $Q_x$ [mm] \| [inch] | $R_x$ [mm] \| [inch] |
|---|---|---|---|---|---|---|---|---|---|
|  | $S_2$ | Pure titanium | 3.7035 | Ti Gr.2 | ASTM B348 / F67 | 30 \| **98** | 60 \| **197** | 0.2 - 0.5 x d1 | 0.2 - 0.5 x d1 |
| | | | 3.7065 | Ti Gr.4 | ASTM B348 / F68 | | | - | - |

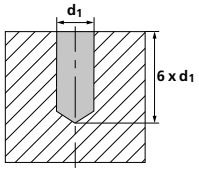
**For Ti Gr.2**



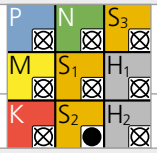

Chip breaking cycle (e.g.: G73)

**For Ti Gr.4**



RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




**f** [mm/rev] **| [IPR]**

| | **Ød1** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.0 mm **\| .039"** | | 1.25 mm **\| .049"** | | **1/16"** 1.5 mm **\| .059"** | | **3/32"** 2.0 mm **\| .079"** | | 2.5 mm **\| .098"** | | **1/8"** 3.0 mm **\| .118"** | | **5/32"** 4.0 mm **\| .158"** | | **3/16" - 7/32"** 5.0 mm **\| .197"** | | **1/4"** 6.0 mm **\| .236"** | |
| | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High |
| | 0.020<br>**.0008** | 0.025<br>**.0010** | 0.025<br>**.0010** | 0.030<br>**.0012** | 0.030<br>**.0012** | 0.035<br>**.0014** | 0.035<br>**.0014** | 0.045<br>**.0018** | 0.045<br>**.0018** | 0.055<br>**.0022** | 0.050<br>**.0020** | 0.065<br>**.0026** | 0.060<br>**.0024** | 0.075<br>**.0030** | 0.070<br>**.0028** | 0.085<br>**.0033** | 0.075<br>**.0030** | 0.090<br>**.0035** |

06

**f** [mm/rev] **| [IPR]**

| | **Ød1** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.0 mm **\| .039"** | | 1.25 mm **\| .049"** | | **1/16"** 1.5 mm **\| .059"** | | **3/32"** 2.0 mm **\| .079"** | | 2.5 mm **\| .098"** | | **1/8"** 3.0 mm **\| .118"** | | **5/32"** 4.0 mm **\| .158"** | | **3/16" - 7/32"** 5.0 mm **\| .197"** | | **1/4"** 6.0 mm **\| .236"** | |
| | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High | **Mid** | High |
| | 0.010<br>**.0004** | 0.020<br>**.0008** | 0.013<br>**.0005** | 0.025<br>**.0010** | 0.015<br>**.0006** | 0.030<br>**.0012** | 0.020<br>**.0008** | 0.040<br>**.0016** | 0.025<br>**.0010** | 0.050<br>**.0020** | 0.030<br>**.0012** | 0.055<br>**.0022** | 0.040<br>**.0016** | 0.070<br>**.0028** | 0.050<br>**.0020** | 0.080<br>**.0031** | 0.060<br>**.0024** | 0.090<br>**.0035** |



CRAZYDRILL by Mikron Tool Cool Titanium

# NEW Drilling process CrazyDrill Cool Titanium

## PRECISE AND FAST DRILLING UP TO 10 X D IN TITANIUM ALLOYS

### Coolant type, pressure and filtration

#### Coolant type

For best results, Mikron Tool recommends the use of 8% emulsion with EP-Additives (Extreme-Pressure-Additives) as coolant fluid. Alternatively, cutting oil can be used with good results as well.

**Filtration:** Good filter quality is very important when using through coolant drills. Dirt particles or residual chips can clog the coolant holes and consequently dramatically reduce the flowrate.
The following filter qualities must be adhered especially in small diameters:

- Drill with Ø < .079" (2 mm) filter quality ≤ .0004" (0.010 mm).
- Drill with Ø < .118" (3 mm) filter quality ≤ .0008" (0.020 mm).
- Drill with Ø < .236" (6 mm) filter quality ≤ .0020" (0.050 mm).

**Coolant pressure:** The minimum coolant pressure mentioned in the chart is required for the CrazyDrill Cool Titanium to achieve reliable drilling. Higher pressure is generally better for the cooling and flushing effect.

| **Ø $d_1$ Tool** | [mm] **\| [inch]** | 1.0 mm - 2.0 mm **\| .039" - .079"** | 2.0 mm - 4.0 mm **\| .079" - .156"** | 4.0 mm - 6.35 mm **\| .156" - 1/4"** |
|---|---|---|---|---|
| **Version** | | **3 - 6 - 10 x d** | **3 - 6 - 10 x d** | **3 - 6 - 10 x d** |
| **Minimal pressure** | [bar] | 40 | 30 | 30 |
| | **[psi]** | **580** | **435** | **435** |

**CrazyDrill Cool Titanium ATC 6 x d**

Because of the high degree of self-centering capability, CrazyDrill Cool Titanium ATC 6 x d can be used on regular and straight surfaces without a centering or pilot hole.

**Higher requirements:** For irregular, respectively rough or inclined surfaces or for the highest degree of position accuracy, Mikron Tool recommends:

- **CrazyDrill Coolpilot Titanium ATC** as pilot drill
- **CrazyDrill Crosspilot** as pilot drill for inclined surfaces

**CrazyDrill Cool Titanium ATC 10 x d**

We recommend pilot drilling with CrazyDrill Coolpilot Titanium ATC or CrazyDrill Crosspilot on inclined surfaces.

**CrazyDrill Cool Titanium PTC 3 x d**

Because of the high degree of self-centering capability, CrazyDrill Cool Titanium PTC 3 x d can be used on regular and straight surfaces without a centering or pilot hole.

**CrazyDrill Cool Titanium PTC 6 x d**

Because of the high degree of self-centering capability, CrazyDrill Cool Titanium PTC 6 x d can be used on regular and straight surfaces without a centering or pilot hole.

**Higher requirements:** For irregular, respectively rough or inclined surfaces or for the highest degree of position accuracy, Mikron Tool recommends:

- **CrazyDrill Cool Titanium PTC 3 x d** as pilot drill
- **CrazyDrill Crosspilot** as pilot drill for inclined surfaces

**Pilot drilling and drilling**

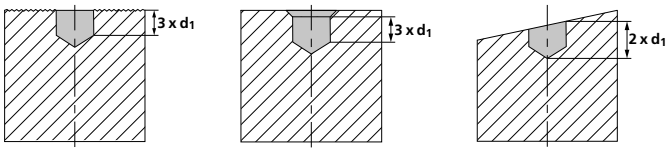
Pilot drilling with CrazyDrill Coolpilot Titanium ATC or CrazyDrill Crosspilot (on inclined surfaces) is the perfect starting point for accurate drilling (position and alignment accuracy). The drilling quality (no measurable transition from pilot drilling to follow-up drilling) is guaranteed due to predetermined tool tolerances.

CRAZYDRILL by Mikron Tool
Cool Titanium

# NEW Drilling process of titanium alloy Gr.5 / Gr.Nb

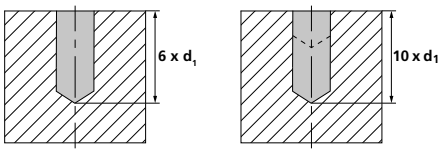
## 1 | PILOT DRILLING

- Turn on internal coolant.
- Drill with CrazyDrill Coolpilot Titanium ATC up to 3 x d, on irregular or rough surfaces.
  With simultaneous chamfer of 90°.
  Drill with CrazyDrill Crosspilot on inclined surfaces.




## 2 | DRILLING

- Turn on internal coolant.
- Drill with CrazyDrill Cool Titanium ATC in one step with recommended drilling speed and feed (see cutting data chart).




Note:
After the drill has reached the desired cutting depth, return at increased feed rate to safety position. With CrazyDrill Cool Titanium ATC it is possible enter the material and drill up to 10 x d using the recommended cutting speed and feed.

# Drilling process of pure titanium Gr.2



**Drilling as per DIN 66025 / PAL**

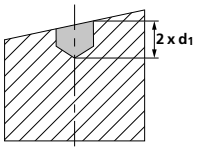
G73 chip breaking drilling cycle

$Q_X$ = depth of the respective peck

$R_X$ = retract value

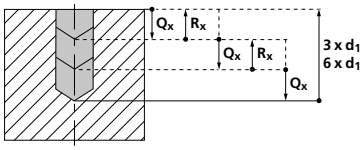
**1 | PILOT DRILLING (ONLY ON INCLINED SURFACES)**

- Drill with CrazyDrill Crosspilot on inclined surfaces.




**2 | DRILLING**

- Turn on internal coolant.
- Drill with CrazyDrill Cool Titanium PTC in a chip breaking drilling cycle with recommended drilling speed and feed (see cutting data chart).



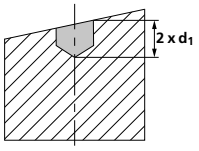

Note:

After the drill has reached the desired cutting depth, return at increased feed rate to safety position. With CrazyDrill Cool Titanium PTC it is possible enter the material and drill up to 6 x d using the recommended cutting speed and feed.

# NEW Drilling process of pure titanium Gr.4

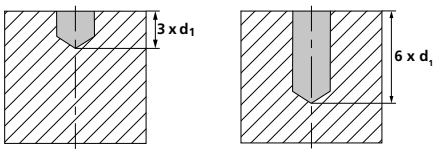
## 1 | PILOT DRILLING (ONLY ON INCLINED SURFACES)

- Drill with CrazyDrill Crosspilot on inclined surfaces.




## 2 | DRILLING

- Turn on internal coolant.
- Drill with CrazyDrill Cool Titanium PTC in one step with recommended drilling speed and feed (see cutting data chart).

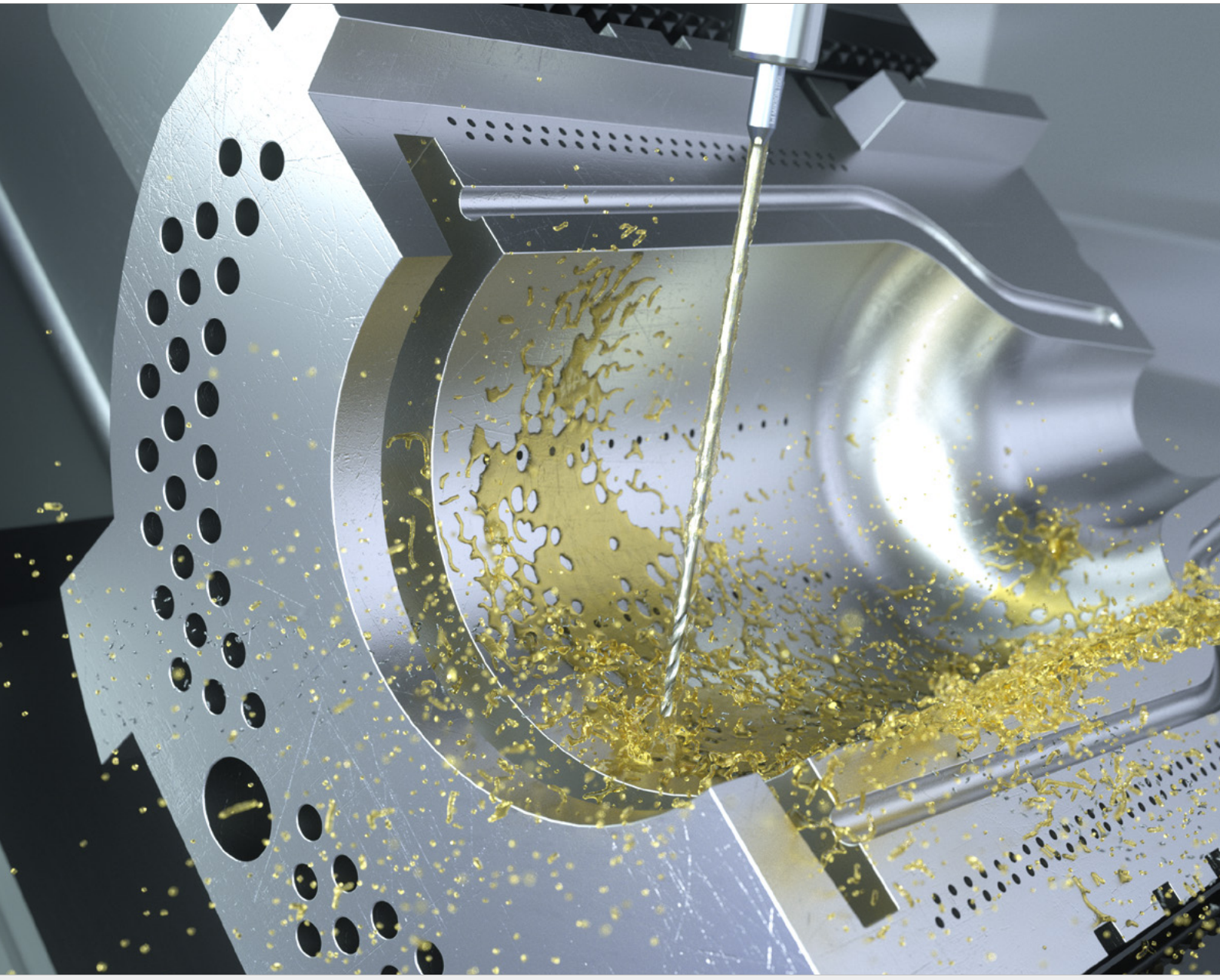



Note:
After the drill has reached the desired cutting depth, return at increased feed rate to safety position. With CrazyDrill Cool Titanium PTC it is possible enter the material and drill up to 6 x d using the recommended cutting speed and feed.



PATENTED

# CrazyDrill Flex



CRAZYDRILL Flex

## FLEXIBILITY AND SOLID CARBIDE: NO CONTRARIETY



Mikron Tool offers with CrazyDrill Flex a solid carbide drill for deep hole drilling up to 50 x d. Diameter range from .004" to .079" (0.1 to 2.0 mm) with versions for:

- **CrazyDrill Flex Steel - coated / uncoated:** Steels, cast iron, aluminum alloys, brass and bronze. It is used with external cooling and through coolant channels integrated in the shank (only for version 50 x d).
- **CrazyDrill Flex Titanium - uncoated:** Long-chip materials as titanium, titanium alloys and copper. It is used with external cooling.
- **CrazyDrill Flex SST-Inox - coated:** Stainless, acid and heat resistant steels. It is used with e through coolant channels integrated in the shank.

The extended neck ensures the flexibility required in order to enable a reliable drilling process even under difficult conditions. It can compensate a center offset of up to 40% of its diameter. Until now, this was only possible with HSS drills. In the variant for non-corrosive materials, the degressive helical groove ensures good chip breaking and removal.

Thanks to the special web thinning, a feed force reduced by 50% is achieved. Additionally the straight connecting element between the cutting body and the shaft (neck) gives the carbide drill CrazyDrill Flex the length required for drilling deep holes up to a bore depth of 50 x d and makes it very robust. It allows a much shorter drilling time than drilling with single-lip drills, micro-erosion, or laser methods.

We recommend for all verions a pilot drilling with CrazyDrill Flexpilot Steel / CrazyDrill Flexpilot Titanium / CrazyDrill Pilot SST-Inox or CrazyDrill Crosspilot on inclined surfaces.

**Regrinding:** This product is not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the CrazyDrill Flex (diameter, length, cutting direction…)? Ask us about our customized versions!

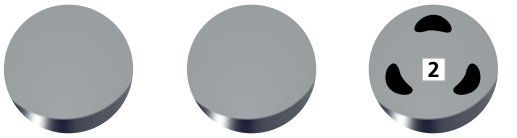
CRAZYDRILL™ by Mikron Tool Flex

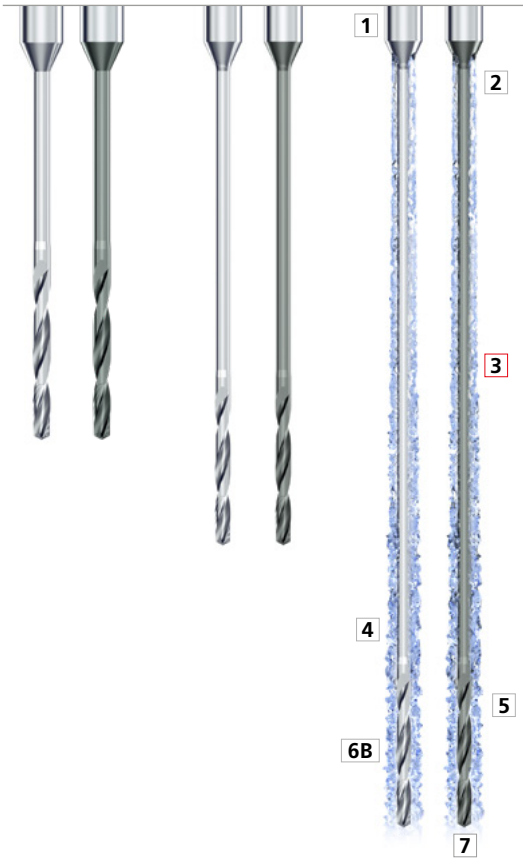
PATENTED

## Steel

20 / 30 / 50 x d

- Integrated / External cooling
- Coated / Uncoated
- Ø .008" - 079" (0.2 - 2.0 mm) with coating
  Ø .004" - 047" (0.1 - 1.2 mm) without coating



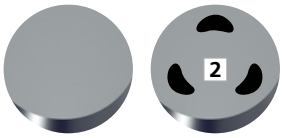




page 370 | page 376 | page 382

## Titanium

30 / 50 x d

- Integrated / External cooling
- Uncoated
- Ø .004" - 047" (0.1 - 1.2 mm)





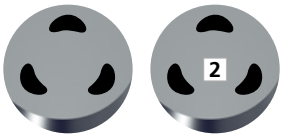


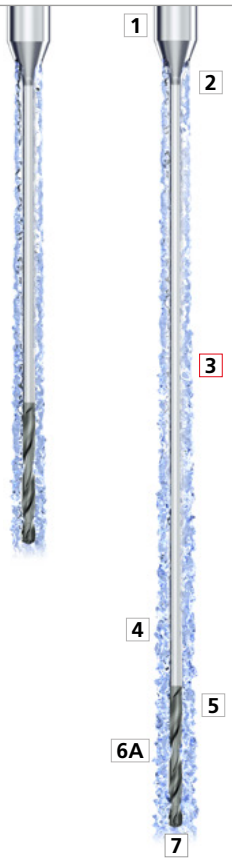
page 388 | page 392

## SST-Inox

30 / 50 x d

- Integrated cooling
- Coated
- Ø .008" - 079" (0.2 - 2.0 mm)




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**1 | SHAFT**
The sturdy carbide shaft guarantees high circular accuracy and thus top drilling precision.

**2 | COOLING**
All of the 50 x d versions and the Flex SST-Inox feature integrated cooling channels in the shaft. These guarantee continuous targeted cooling of the cutting edges from just 15 bar (218 psi). The special arrangement and shape produce a concentrated jet even at high speeds, which guarantees regular and significant cooling of the drill tip and flushes the chips from the flutes.

**3 | CENTER PIECE: FLEXIBILITY AND STABILITY - PATENTED**
A flexible center piece with a reduced cross-section ensures elasticity (flection) and provides at the same time higher rigidity (torsion/compression) compared to drilling with a through flute. The micro deep-hole drill can easily compensate center offsets of up to 40% of its diameter without breaking off. Until now, this was only possible with HSS tools.

**4 | SOLID CARBIDE**
The fine grained solid carbide developed for the CrazyDrill Flex is very tough and resistant to heat shock, thus easily meeting the requirements for the machining of steels, titanium, and non-corrosive and heat-resistant alloys.

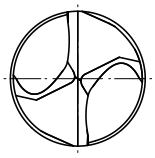
**5 | COATING**
The high-performance coating eXedur RIP is resistant to heat and wear. It prevents chips from adhering and supports their smooth removal. The result is a long tool life.

**6A | DEGRESSIVE HELICAL GROOVE - PATENTED**
The degressive helical groove of the CrazyDrill Flex SST-Inox with its unique and patented geometry guarantees high tool stability. It ensures good chip breaking in the front part and quick chip removal in the rear.

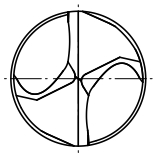
**6B | HELICAL GROOVES**
The geometry of the helical grooves for the steel and titanium versions are adapted to the materials machined. Good chip breaking and quick chip removal are guaranteed.

**7 | GEOMETRY**
The tip geometry is specially developed to guarantee high cutting stability, self-centering, and short chips. Thanks to the clever web thinning, less penetration force is required when drilling.

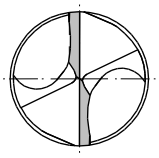
Drill tip



CrazyDrill Flex Steel



CrazyDrill Flex Titanium



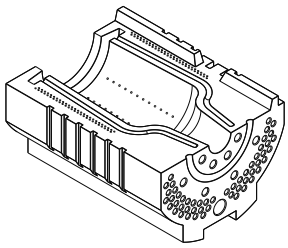
CrazyDrill Flex SST-Inox

CRAZYDRILL by Mikron Tool Flex

# Features and benefits

## THE SMALL DRILL WITH INTEGRATED COOLING FOR DRILLING DEEP HOLES

- **SHORT MACHINING TIME** | up to 10 times faster
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to flexible center piece
- **HIGH DEGREE OF PRECISION** | due to small tolerances



**COMPONENT**
Air vent hole for glass form mould

**MATERIAL**
CuAl11Fe4Ni4 / 2.0975 / UNS C95800

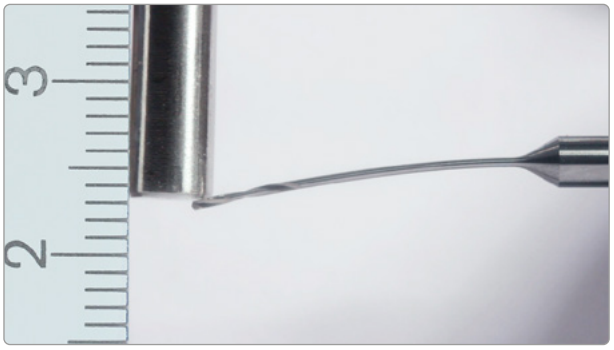
**MACHINING**
- 100 air vent holes
- d = 0.5 mm **| .020"**
- Drilling depth 15 mm **| .591"**

**DRILLING TOOL**
Mikron Tool - CrazyDrill Flex Steel - 30 x d

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyDrill Flex Steel<br>- Carbide<br>- Coated<br>- External cooling |
| Item number | 2.CFS.30050.1 |
| Cutting data | $v_c$ = 40 m/min **\| 131 SFM**<br>f = 0.012 mm/rev **\| .00047 IPR**<br>$Q_1$ = 1.25 mm **\| .049"**<br>$Q_x$ = 0.25 mm **\| .010"** |
| Machining time | 30 min |

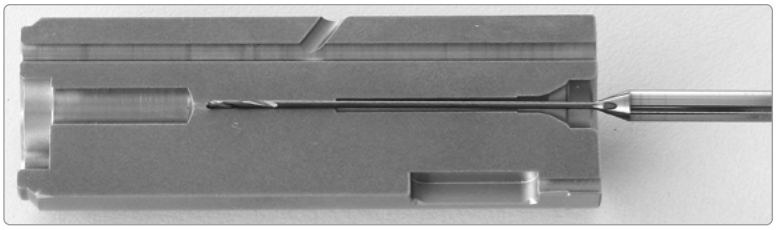
## ■ Flexibility

A flexible center piece ensures flexibility. Therefore the drill can compensate center offsets without breaking off.




## ■ Drilling up to 50 x d

The unique drill design (web thinning for low feed force, neck without flutes for high stability) enables deep hole drilling up to 50 x d.



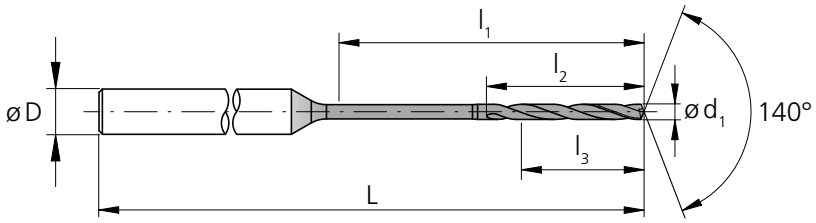
CRAZYDRILL™ by Mikron Tool Flex STEEL

# Steel - 20 x d - coated / uncoated

## DRILLING WITH EXTERNAL COOLING

.1 eXedur RIP

.0 Uncoated




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | l3 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0039 | 0.10 | .079 | 2.0 | 1.1 | 0.8 | 3 | 1.57 | 40 | 2.CFS.20010 | - | .0 | ◪ |
| | .0043 | 0.11 | .087 | 2.2 | 1.2 | 0.9 | 3 | 1.57 | 40 | 2.CFS.20011 | - | .0 | Δ |
| | .0047 | 0.12 | .094 | 2.4 | 1.3 | 1.0 | 3 | 1.57 | 40 | 2.CFS.20012 | - | .0 | Δ |
| | .0051 | 0.13 | .102 | 2.6 | 1.4 | 1.0 | 3 | 1.57 | 40 | 2.CFS.20013 | - | .0 | Δ |
| | .0055 | 0.14 | .110 | 2.8 | 1.5 | 1.1 | 3 | 1.57 | 40 | 2.CFS.20014 | - | .0 | Δ |
| | .0059 | 0.15 | .118 | 3.0 | 1.6 | 1.2 | 3 | 1.57 | 40 | 2.CFS.20015 | - | .0 | ◪ |
| | .0063 | 0.16 | .126 | 3.2 | 1.7 | 1.3 | 3 | 1.57 | 40 | 2.CFS.20016 | - | .0 | Δ |
| | .0067 | 0.17 | .134 | 3.4 | 1.8 | 1.4 | 3 | 1.57 | 40 | 2.CFS.20017 | - | .0 | Δ |
| | .0071 | 0.18 | .142 | 3.6 | 1.9 | 1.4 | 3 | 1.57 | 40 | 2.CFS.20018 | - | .0 | Δ |
| | .0075 | 0.19 | .150 | 3.8 | 2.0 | 1.5 | 3 | 1.57 | 40 | 2.CFS.20019 | - | .0 | Δ |
| | .0079 | 0.20 | .157 | 4.0 | 2.1 | 1.6 | 3 | 1.77 | 45 | 2.CFS.20020 | .1 | .0 | ■ |
| | .0083 | 0.21 | .165 | 4.2 | 2.2 | 1.7 | 3 | 1.77 | 45 | 2.CFS.20021 | .1 | .0 | Δ |
| | .0087 | 0.22 | .173 | 4.4 | 2.3 | 1.8 | 3 | 1.77 | 45 | 2.CFS.20022 | .1 | .0 | Δ |
| | .0091 | 0.23 | .181 | 4.6 | 2.4 | 1.8 | 3 | 1.77 | 45 | 2.CFS.20023 | .1 | .0 | Δ |
| | .0094 | 0.24 | .189 | 4.8 | 2.5 | 1.9 | 3 | 1.77 | 45 | 2.CFS.20024 | .1 | .0 | Δ |
| | .0098 | 0.25 | .197 | 5.0 | 2.6 | 2.0 | 3 | 1.77 | 45 | 2.CFS.20025 | .1 | .0 | ■ |
| | .0102 | 0.26 | .205 | 5.2 | 2.7 | 2.1 | 3 | 1.77 | 45 | 2.CFS.20026 | .1 | .0 | Δ |
| | .0106 | 0.27 | .213 | 5.4 | 2.8 | 2.2 | 3 | 1.77 | 45 | 2.CFS.20027 | .1 | .0 | Δ |
| | .0110 | 0.28 | .220 | 5.6 | 2.9 | 2.2 | 3 | 1.77 | 45 | 2.CFS.20028 | .1 | .0 | Δ |
| | .0114 | 0.29 | .228 | 5.8 | 3.0 | 2.3 | 3 | 1.77 | 45 | 2.CFS.20029 | .1 | .0 | Δ |
| | .0118 | 0.30 | .236 | 6.0 | 3.2 | 2.4 | 3 | 1.77 | 45 | 2.CFS.20030 | .1 | .0 | ■ |
| | .0122 | 0.31 | .244 | 6.2 | 3.3 | 2.5 | 3 | 1.77 | 45 | 2.CFS.20031 | .1 | .0 | Δ |
| | .0126 | 0.32 | .252 | 6.4 | 3.4 | 2.6 | 3 | 1.77 | 45 | 2.CFS.20032 | .1 | .0 | Δ |
| | .0130 | 0.33 | .260 | 6.6 | 3.5 | 2.6 | 3 | 1.77 | 45 | 2.CFS.20033 | .1 | .0 | Δ |
| | .0134 | 0.34 | .268 | 6.8 | 3.6 | 2.7 | 3 | 1.77 | 45 | 2.CFS.20034 | .1 | .0 | Δ |
| | .0138 | 0.35 | .276 | 7.0 | 3.7 | 2.8 | 3 | 1.77 | 45 | 2.CFS.20035 | .1 | .0 | ■ |
| | .0142 | 0.36 | .283 | 7.2 | 3.8 | 2.9 | 3 | 1.77 | 45 | 2.CFS.20036 | .1 | .0 | Δ |
| | .0146 | 0.37 | .291 | 7.4 | 3.9 | 3.0 | 3 | 1.77 | 45 | 2.CFS.20037 | .1 | .0 | Δ |
| | .0150 | 0.38 | .299 | 7.6 | 4.0 | 3.0 | 3 | 1.77 | 45 | 2.CFS.20038 | .1 | .0 | Δ |

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | l3 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0154 | 0.39 | .307 | 7.8 | 4.1 | 3.1 | 3 | 1.77 | 45 | 2.CFS.20039 | .1 | .0 | Δ |
| 1/64 | .0156 | 0.396 | .315 | 8.0 | 4.2 | 3.2 | 3 | 1.77 | 45 | 2.CFS.20F164 | .1 | - | ◪ |
| | .0157 | 0.40 | .315 | 8.0 | 4.2 | 3.2 | 3 | 1.77 | 45 | 2.CFS.20040 | .1 | .0 | ■ |
| | .0161 | 0.41 | .323 | 8.2 | 4.3 | 3.3 | 3 | 1.77 | 45 | 2.CFS.20041 | .1 | .0 | Δ |
| | .0165 | 0.42 | .331 | 8.4 | 4.4 | 3.4 | 3 | 1.77 | 45 | 2.CFS.20042 | .1 | .0 | Δ |
| | .0169 | 0.43 | .339 | 8.6 | 4.5 | 3.4 | 3 | 1.77 | 45 | 2.CFS.20043 | .1 | .0 | Δ |
| | .0173 | 0.44 | .346 | 8.8 | 4.6 | 3.5 | 3 | 1.77 | 45 | 2.CFS.20044 | .1 | .0 | Δ |
| | .0177 | 0.45 | .354 | 9.0 | 4.7 | 3.6 | 3 | 1.77 | 45 | 2.CFS.20045 | .1 | .0 | ■ |
| | .0181 | 0.46 | .362 | 9.2 | 4.8 | 3.7 | 3 | 1.77 | 45 | 2.CFS.20046 | .1 | .0 | Δ |
| | .0185 | 0.47 | .370 | 9.4 | 4.9 | 3.8 | 3 | 1.77 | 45 | 2.CFS.20047 | .1 | .0 | Δ |
| | .0189 | 0.48 | .378 | 9.6 | 5.0 | 3.8 | 3 | 1.77 | 45 | 2.CFS.20048 | .1 | .0 | Δ |
| | .0193 | 0.49 | .386 | 9.8 | 5.1 | 3.9 | 3 | 1.77 | 45 | 2.CFS.20049 | .1 | .0 | Δ |
| | .0197 | 0.50 | .394 | 10.0 | 5.3 | 4.0 | 3 | 1.97 | 50 | 2.CFS.20050 | .1 | .0 | ■ |
| | .0201 | 0.51 | .402 | 10.2 | 5.4 | 4.1 | 3 | 1.97 | 50 | 2.CFS.20051 | .1 | .0 | Δ |
| | .0205 | 0.52 | .409 | 10.4 | 5.5 | 4.2 | 3 | 1.97 | 50 | 2.CFS.20052 | .1 | .0 | Δ |
| | .0209 | 0.53 | .417 | 10.6 | 5.6 | 4.2 | 3 | 1.97 | 50 | 2.CFS.20053 | .1 | .0 | Δ |
| | .0213 | 0.54 | .425 | 10.8 | 5.7 | 4.3 | 3 | 1.97 | 50 | 2.CFS.20054 | .1 | .0 | Δ |
| | .0217 | 0.55 | .433 | 11.0 | 5.8 | 4.4 | 3 | 1.97 | 50 | 2.CFS.20055 | .1 | .0 | ■ |
| | .0220 | 0.56 | .441 | 11.2 | 5.9 | 4.5 | 3 | 1.97 | 50 | 2.CFS.20056 | .1 | .0 | Δ |
| | .0224 | 0.57 | .449 | 11.4 | 6.0 | 4.6 | 3 | 1.97 | 50 | 2.CFS.20057 | .1 | .0 | Δ |
| | .0228 | 0.58 | .457 | 11.6 | 6.1 | 4.6 | 3 | 1.97 | 50 | 2.CFS.20058 | .1 | .0 | Δ |
| | .0232 | 0.59 | .465 | 11.8 | 6.2 | 4.7 | 3 | 1.97 | 50 | 2.CFS.20059 | .1 | .0 | Δ |
| | .0236 | 0.60 | .472 | 12.0 | 6.3 | 4.8 | 3 | 1.97 | 50 | 2.CFS.20060 | .1 | .0 | ■ |
| | .0240 | 0.61 | .480 | 12.2 | 6.4 | 4.9 | 3 | 1.97 | 50 | 2.CFS.20061 | .1 | .0 | Δ |
| | .0244 | 0.62 | .488 | 12.4 | 6.5 | 5.0 | 3 | 1.97 | 50 | 2.CFS.20062 | .1 | .0 | Δ |
| | .0248 | 0.63 | .496 | 12.6 | 6.6 | 5.0 | 3 | 1.97 | 50 | 2.CFS.20063 | .1 | .0 | Δ |
| | .0252 | 0.64 | .504 | 12.8 | 6.7 | 5.1 | 3 | 1.97 | 50 | 2.CFS.20064 | .1 | .0 | Δ |
| | .0256 | 0.65 | .512 | 13.0 | 6.8 | 5.2 | 3 | 1.97 | 50 | 2.CFS.20065 | .1 | .0 | ■ |
| | .0260 | 0.66 | .520 | 13.2 | 6.9 | 5.3 | 3 | 1.97 | 50 | 2.CFS.20066 | .1 | .0 | Δ |

■ Stock item
◪ Stock item only in one version
Δ Delivery term upon request, minumum purchase order quantity 5 pcs.

Carbide | 20xd1 | 140° | Z2

| | | |
|---|---|---|
| Ø $d_1$ | **.004" - .047"** (0.1 - 1.2 mm) | |
| Tolerance | **- .00012"**<br>**- .00024"** | - 0.003 mm<br>- 0.006 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0264** | 0.67 | **.528** | 13.4 | 7.0 | 5.4 | 3 | **1.97** | 50 | 2.CFS.20067 | .1 | .0 | Δ |
| | **.0268** | 0.68 | **.535** | 13.6 | 7.1 | 5.4 | 3 | **1.97** | 50 | 2.CFS.20068 | .1 | .0 | Δ |
| | **.0272** | 0.69 | **.543** | 13.8 | 7.2 | 5.5 | 3 | **1.97** | 50 | 2.CFS.20069 | .1 | .0 | Δ |
| | **.0276** | 0.70 | **.551** | 14.0 | 7.4 | 5.6 | 3 | **2.09** | 53 | 2.CFS.20070 | .1 | .0 | ■ |
| | **.0280** | 0.71 | **.559** | 14.2 | 7.5 | 5.7 | 3 | **2.09** | 53 | 2.CFS.20071 | .1 | .0 | Δ |
| | **.0283** | 0.72 | **.567** | 14.4 | 7.6 | 5.8 | 3 | **2.09** | 53 | 2.CFS.20072 | .1 | .0 | Δ |
| | **.0287** | 0.73 | **.575** | 14.6 | 7.7 | 5.8 | 3 | **2.09** | 53 | 2.CFS.20073 | .1 | .0 | Δ |
| | **.0291** | 0.74 | **.583** | 14.8 | 7.8 | 5.9 | 3 | **2.09** | 53 | 2.CFS.20074 | .1 | .0 | Δ |
| | **.0295** | 0.75 | **.591** | 15.0 | 7.9 | 6.0 | 3 | **2.09** | 53 | 2.CFS.20075 | .1 | .0 | ■ |
| | **.0299** | 0.76 | **.598** | 15.2 | 8.0 | 6.1 | 3 | **2.09** | 53 | 2.CFS.20076 | .1 | .0 | Δ |
| | **.0303** | 0.77 | **.606** | 15.4 | 8.1 | 6.2 | 3 | **2.09** | 53 | 2.CFS.20077 | .1 | .0 | Δ |
| | **.0307** | 0.78 | **.614** | 15.6 | 8.2 | 6.2 | 3 | **2.09** | 53 | 2.CFS.20078 | .1 | .0 | Δ |
| | **.0311** | 0.79 | **.622** | 15.8 | 8.3 | 6.3 | 3 | **2.09** | 53 | 2.CFS.20079 | .1 | .0 | Δ |
| **1/32** | **.0312** | 0.793 | **.630** | 16.0 | 8.4 | 6.4 | 3 | **2.09** | 53 | 2.CFS.20F132 | .1 | - | ◪ |
| | **.0315** | 0.80 | **.630** | 16.0 | 8.4 | 6.4 | 3 | **2.09** | 53 | 2.CFS.20080 | .1 | .0 | ■ |
| | **.0319** | 0.81 | **.638** | 16.2 | 8.5 | 6.5 | 3 | **2.09** | 53 | 2.CFS.20081 | .1 | .0 | Δ |
| | **.0323** | 0.82 | **.646** | 16.4 | 8.6 | 6.6 | 3 | **2.09** | 53 | 2.CFS.20082 | .1 | .0 | Δ |
| | **.0327** | 0.83 | **.654** | 16.6 | 8.7 | 6.6 | 3 | **2.09** | 53 | 2.CFS.20083 | .1 | .0 | Δ |
| | **.0331** | 0.84 | **.661** | 16.8 | 8.8 | 6.7 | 3 | **2.09** | 53 | 2.CFS.20084 | .1 | .0 | Δ |
| | **.0335** | 0.85 | **.669** | 17.0 | 8.9 | 6.8 | 3 | **2.13** | 54 | 2.CFS.20085 | .1 | .0 | ■ |
| | **.0339** | 0.86 | **.677** | 17.2 | 9.0 | 6.9 | 3 | **2.13** | 54 | 2.CFS.20086 | .1 | .0 | Δ |
| | **.0343** | 0.87 | **.685** | 17.4 | 9.1 | 7.0 | 3 | **2.09** | 53 | 2.CFS.20087 | .1 | .0 | Δ |
| | **.0346** | 0.88 | **.693** | 17.6 | 9.2 | 7.0 | 3 | **2.09** | 53 | 2.CFS.20088 | .1 | .0 | Δ |
| | **.0350** | 0.89 | **.701** | 17.8 | 9.3 | 7.1 | 3 | **2.09** | 53 | 2.CFS.20089 | .1 | .0 | Δ |
| | **.0354** | 0.90 | **.709** | 18.0 | 9.5 | 7.2 | 3 | **2.09** | 53 | 2.CFS.20090 | .1 | .0 | ■ |
| | **.0358** | 0.91 | **.717** | 18.2 | 9.6 | 7.3 | 3 | **2.09** | 53 | 2.CFS.20091 | .1 | .0 | Δ |
| | **.0362** | 0.92 | **.724** | 18.4 | 9.7 | 7.4 | 3 | **2.09** | 53 | 2.CFS.20092 | .1 | .0 | Δ |
| | **.0366** | 0.93 | **.732** | 18.6 | 9.8 | 7.4 | 3 | **2.09** | 53 | 2.CFS.20093 | .1 | .0 | Δ |
| | **.0370** | 0.94 | **.740** | 18.8 | 9.9 | 7.5 | 3 | **2.09** | 53 | 2.CFS.20094 | .1 | .0 | Δ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0374** | 0.95 | **.748** | 19.0 | 10.0 | 7.6 | 3 | **2.09** | 53 | 2.CFS.20095 | .1 | .0 | ■ |
| | **.0378** | 0.96 | **.756** | 19.2 | 10.1 | 7.7 | 3 | **2.09** | 53 | 2.CFS.20096 | .1 | .0 | Δ |
| | **.0382** | 0.97 | **.764** | 19.4 | 10.2 | 7.8 | 3 | **2.09** | 53 | 2.CFS.20097 | .1 | .0 | Δ |
| | **.0386** | 0.98 | **.772** | 19.6 | 10.3 | 7.8 | 3 | **2.09** | 53 | 2.CFS.20098 | .1 | .0 | Δ |
| | **.0390** | 0.99 | **.780** | 19.8 | 10.4 | 7.9 | 3 | **2.09** | 53 | 2.CFS.20099 | .1 | .0 | Δ |
| | **.0394** | 1.00 | **.787** | 20.0 | 10.5 | 8.0 | 3 | **2.36** | 60 | 2.CFS.20100 | .1 | .0 | ■ |
| | **.0398** | 1.01 | **.795** | 20.2 | 10.6 | 8.1 | 3 | **2.36** | 60 | 2.CFS.20101 | .1 | .0 | Δ |
| | **.0402** | 1.02 | **.803** | 20.4 | 10.7 | 8.2 | 3 | **2.36** | 60 | 2.CFS.20102 | .1 | .0 | Δ |
| | **.0406** | 1.03 | **.811** | 20.6 | 10.8 | 8.2 | 3 | **2.36** | 60 | 2.CFS.20103 | .1 | .0 | Δ |
| | **.0409** | 1.04 | **.819** | 20.8 | 10.9 | 8.3 | 3 | **2.36** | 60 | 2.CFS.20104 | .1 | .0 | Δ |
| | **.0413** | 1.05 | **.827** | 21.0 | 11.0 | 8.4 | 3 | **2.36** | 60 | 2.CFS.20105 | .1 | .0 | ■ |
| | **.0417** | 1.06 | **.835** | 21.2 | 11.1 | 8.5 | 3 | **2.36** | 60 | 2.CFS.20106 | .1 | .0 | Δ |
| | **.0421** | 1.07 | **.843** | 21.4 | 11.2 | 8.6 | 3 | **2.36** | 60 | 2.CFS.20107 | .1 | .0 | Δ |
| | **.0425** | 1.08 | **.850** | 21.6 | 11.3 | 8.6 | 3 | **2.36** | 60 | 2.CFS.20108 | .1 | .0 | Δ |
| | **.0429** | 1.09 | **.858** | 21.8 | 11.4 | 8.7 | 3 | **2.36** | 60 | 2.CFS.20109 | .1 | .0 | Δ |
| | **.0433** | 1.10 | **.866** | 22.0 | 11.6 | 8.8 | 3 | **2.36** | 60 | 2.CFS.20110 | .1 | .0 | ■ |
| | **.0437** | 1.11 | **.874** | 22.2 | 11.7 | 8.9 | 3 | **2.36** | 60 | 2.CFS.20111 | .1 | .0 | Δ |
| | **.0441** | 1.12 | **.882** | 22.4 | 11.8 | 9.0 | 3 | **2.36** | 60 | 2.CFS.20112 | .1 | .0 | Δ |
| | **.0445** | 1.13 | **.890** | 22.6 | 11.9 | 9.0 | 3 | **2.36** | 60 | 2.CFS.20113 | .1 | .0 | Δ |
| | **.0449** | 1.14 | **.898** | 22.8 | 12.0 | 9.1 | 3 | **2.36** | 60 | 2.CFS.20114 | .1 | .0 | Δ |
| | **.0453** | 1.15 | **.906** | 23.0 | 12.1 | 9.2 | 3 | **2.36** | 60 | 2.CFS.20115 | .1 | .0 | ■ |
| | **.0457** | 1.16 | **.913** | 23.2 | 12.2 | 9.3 | 3 | **2.36** | 60 | 2.CFS.20116 | .1 | .0 | Δ |
| | **.0461** | 1.17 | **.921** | 23.4 | 12.3 | 9.4 | 3 | **2.36** | 60 | 2.CFS.20117 | .1 | .0 | Δ |
| | **.0465** | 1.18 | **.929** | 23.6 | 12.4 | 9.4 | 3 | **2.36** | 60 | 2.CFS.20118 | .1 | .0 | Δ |
| | **.0469** | 1.19 | **.937** | 23.8 | 12.5 | 9.5 | 3 | **2.36** | 60 | 2.CFS.20119 | .1 | .0 | Δ |
| | **.0472** | 1.20 | **.945** | 24.0 | 12.6 | 9.6 | 3 | **2.36** | 60 | 2.CFS.20120 | .1 | .0 | ■ |

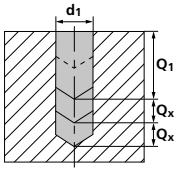
Complementary products
CrazyDrill Flexpilot Steel p.108
CrazyDrill Crosspilot p.146

CRAZYDRILL™ by Mikron Tool Flex STEEL

# Steel - 20 x d - coated

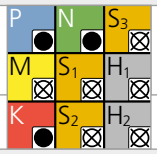
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 5 \| 16 | 40 \| 131 | 40 \| 131 | 60 \| 197 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 5 \| 16 | 25 \| 82 | 25 \| 82 | 50 \| 164 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 35 \| 115 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 5 \| 16 | 40 \| 131 | 5 \| 164 | 100 \| 328 |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | 40 \| 131 | 80 \| 262 |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 120 \| 394 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 5 \| 16 | 40 \| 131 | 50 \| 164 | 80 \| 262 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 100 \| 328 |
| | | 2.102 | CuSn6 | UNS C51900 | | | 40 \| 131 | 60 \| 197 |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 40 \| 131 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





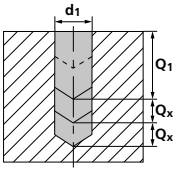

| | | **f** [mm/rev] **\| [IPR]** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Ød1** | | | | | |
| **$Q_1$** | **$Q_x$** | 0.2 mm **\| .008"** | 0.3 mm **\| .012"** | **1/64"** 0.4 mm **\| .016"** | 0.6 mm **\| .024"** | **1/32"** 0.8 mm **\| .032"** | 1.0 – 1.2 mm **\| .039" – .047"** |
| | | **f** | **f** | **f** | **f** | **f** | **f** |
| 2xd1 | 0.5xd1 | 0.005<br>**.0002** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.060<br>**.0024** |
| 2xd1 | 0.5xd1 | 0.003 – 0.005<br>**.00012 – .00020** | 0.008 – 0.010<br>**.0003 – .0004** | 0.012 – 0.015<br>**.0005 – .0006** | 0.020 – 0.025<br>**.0008 – .0010** | 0.035<br>**.0014** | 0.050<br>**.0020** |
| 2xd1 | 1xd1 | 0.004<br>**.00016** | 0.008<br>**.0003** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.025<br>**.0010** | 0.040<br>**.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | |
| 2xd1 | 1xd1 | 0.005<br>**.0002** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.020<br>**.0008** | 0.035<br>**.0014** | 0.050<br>**.0020** |
| 2xd1 | 1xd1 | 0.015<br>**.0006** | 0.040<br>**.0016** | 0.050<br>**.0020** | 0.080<br>**.0031** | 0.100<br>**.0039** | 0.120<br>**.0047** |
| 2xd1 | 1xd1 | 0.015<br>**.0006** | 0.040<br>**.0016** | 0.050<br>**.0020** | 0.080<br>**.0031** | 0.100<br>**.0039** | 0.120<br>**.0047** |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | |
| 2xd1 | 1xd1 | 0.010<br>**.0004** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.100<br>**.0039** |
| 2xd1 | 0.5xd1 | 0.004<br>**.00016** | 0.006<br>**.00024** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.025<br>**.0010** | 0.040<br>**.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | |

CRAZYDRILL™ by Mikron Tool Flex STEEL

# Steel - 20 x d - uncoated

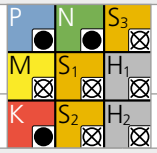
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 5 \| 16 | 40 \| 131 | 40 \| 131 | 60 \| 197 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 5 \| 16 | 25 \| 82 | 25 \| 82 | 50 \| 164 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 35 \| 115 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 5 \| 16 | 40 \| 131 | 5 \| 164 | 100 \| 328 |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | 40 \| 131 | 80 \| 262 |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 120 \| 394 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 5 \| 16 | 40 \| 131 | 50 \| 164 | 80 \| 262 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 100 \| 328 |
| | | 2.102 | CuSn6 | UNS C51900 | | | 40 \| 131 | 60 \| 197 |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 40 \| 131 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





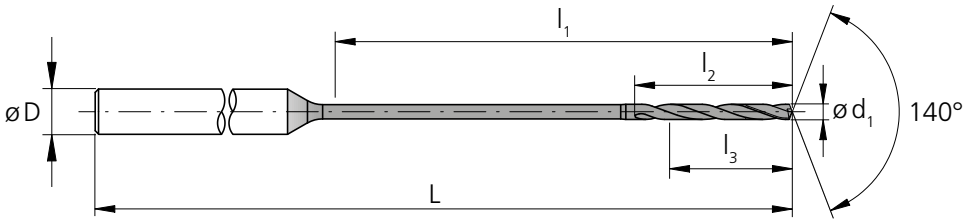

| | | **f** [mm/rev] **\| [IPR]** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **$Q_1$** | **$Q_x$** | | | | **Ød1** | | | |
| | | 0.1 mm **\| .004"** | 0.2 mm **\| .008"** | 0.3 mm **\| .012"** | **1/64"** 0.4 mm **\| .016"** | 0.6 mm **\| .024"** | **1/32"** 0.8 mm **\| .032"** | 1.0–1.2 mm **\| .039"–.047"** |
| | | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| 2xd1 | 0.5xd1 | 0.002 **.00008** | 0.005 **.0002** | 0.010 **.0004** | 0.015 **.0006** | 0.030 **.0012** | 0.040 **.0016** | 0.060 **.0024** |
| 2xd1 | 0.5xd1 | 0.002 **.00008** | 0.003 – 0.005 **.00012 – .00020** | 0.008 – 0.010 **.0003 – .0004** | 0.012 – 0.015 **.0005 – .0006** | 0.020 – 0.025 **.0008 – .0010** | 0.035 **.0014** | 0.050 **.0020** |
| 2xd1 | 1xd1 | 0.0005 **.00002** | 0.004 **.00016** | 0.008 **.0003** | 0.010 **.0004** | 0.015 **.0006** | 0.025 **.0010** | 0.040 **.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| 2xd1 | 1xd1 | 0.002 **.00008** | 0.005 **.0002** | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.035 **.0014** | 0.050 **.0020** |
| 2xd1 | 1xd1 | 0.003 **.00012** | 0.015 **.0006** | 0.040 **.0016** | 0.050 **.0020** | 0.080 **.0031** | 0.100 **.0039** | 0.120 **.0047** |
| 2xd1 | 1xd1 | 0.003 **.00012** | 0.015 **.0006** | 0.040 **.0016** | 0.050 **.0020** | 0.080 **.0031** | 0.100 **.0039** | 0.120 **.0047** |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| 2xd1 | 1xd1 | 0.004 **.00016** | 0.010 **.0004** | 0.030 **.0012** | 0.040 **.0016** | 0.060 **.0024** | 0.080 **.0031** | 0.100 **.0039** |
| 2xd1 | 0.5xd1 | 0.002 **.00008** | 0.004 **.00016** | 0.006 **.00024** | 0.010 **.0004** | 0.015 **.0006** | 0.025 **.0010** | 0.040 **.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |

CRAZYDRILL™ by Mikron Tool Flex STEEL

# Steel - 30 x d - coated / uncoated

## DRILLING WITH EXTERNAL COOLING

.1 eXedur RIP | .0 Uncoated




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0039 | 0.10 | .118 | 3.0 | 1.1 | 0.8 | 3 | 1.77 | 45 | 2.CFS.30010 | - | .0 | ◪ |
| | .0043 | 0.11 | .130 | 3.3 | 1.2 | 0.9 | 3 | 1.77 | 45 | 2.CFS.30011 | - | .0 | Δ |
| | .0047 | 0.12 | .142 | 3.6 | 1.3 | 1.0 | 3 | 1.77 | 45 | 2.CFS.30012 | - | .0 | Δ |
| | .0051 | 0.13 | .154 | 3.9 | 1.4 | 1.0 | 3 | 1.77 | 45 | 2.CFS.30013 | - | .0 | Δ |
| | .0055 | 0.14 | .165 | 4.2 | 1.5 | 1.1 | 3 | 1.77 | 45 | 2.CFS.30014 | - | .0 | Δ |
| | .0059 | 0.15 | .177 | 4.5 | 1.6 | 1.2 | 3 | 1.77 | 45 | 2.CFS.30015 | - | .0 | ◪ |
| | .0063 | 0.16 | .189 | 4.8 | 1.7 | 1.3 | 3 | 1.77 | 45 | 2.CFS.30016 | - | .0 | Δ |
| | .0067 | 0.17 | .201 | 5.1 | 1.8 | 1.4 | 3 | 1.77 | 45 | 2.CFS.30017 | - | .0 | Δ |
| | .0071 | 0.18 | .213 | 5.4 | 1.9 | 1.4 | 3 | 1.77 | 45 | 2.CFS.30018 | - | .0 | Δ |
| | .0075 | 0.19 | .224 | 5.7 | 2.0 | 1.5 | 3 | 1.77 | 45 | 2.CFS.30019 | - | .0 | Δ |
| | .0079 | 0.20 | .236 | 6.0 | 2.1 | 1.6 | 3 | 1.77 | 45 | 2.CFS.30020 | .1 | .0 | ■ |
| | .0083 | 0.21 | .248 | 6.3 | 2.2 | 1.7 | 3 | 1.77 | 45 | 2.CFS.30021 | .1 | .0 | Δ |
| | .0087 | 0.22 | .260 | 6.6 | 2.3 | 1.8 | 3 | 1.77 | 45 | 2.CFS.30022 | .1 | .0 | Δ |
| | .0091 | 0.23 | .272 | 6.9 | 2.4 | 1.8 | 3 | 1.77 | 45 | 2.CFS.30023 | .1 | .0 | Δ |
| | .0094 | 0.24 | .283 | 7.2 | 2.5 | 1.9 | 3 | 1.77 | 45 | 2.CFS.30024 | .1 | .0 | Δ |
| | .0098 | 0.25 | .295 | 7.5 | 2.6 | 2.0 | 3 | 1.77 | 45 | 2.CFS.30025 | .1 | .0 | ■ |
| | .0102 | 0.26 | .307 | 7.8 | 2.7 | 2.1 | 3 | 1.77 | 45 | 2.CFS.30026 | .1 | .0 | Δ |
| | .0106 | 0.27 | .319 | 8.1 | 2.8 | 2.2 | 3 | 1.77 | 45 | 2.CFS.30027 | .1 | .0 | Δ |
| | .0110 | 0.28 | .331 | 8.4 | 2.9 | 2.2 | 3 | 1.77 | 45 | 2.CFS.30028 | .1 | .0 | Δ |
| | .0114 | 0.29 | .343 | 8.7 | 3.0 | 2.3 | 3 | 1.77 | 45 | 2.CFS.30029 | .1 | .0 | Δ |
| | .0118 | 0.30 | .354 | 9.0 | 3.2 | 2.4 | 3 | 1.97 | 50 | 2.CFS.30030 | .1 | .0 | ■ |
| | .0122 | 0.31 | .366 | 9.3 | 3.3 | 2.5 | 3 | 1.97 | 50 | 2.CFS.30031 | .1 | .0 | Δ |
| | .0126 | 0.32 | .378 | 9.6 | 3.4 | 2.6 | 3 | 1.97 | 50 | 2.CFS.30032 | .1 | .0 | Δ |
| | .0130 | 0.33 | .390 | 9.9 | 3.5 | 2.6 | 3 | 1.97 | 50 | 2.CFS.30033 | .1 | .0 | Δ |
| | .0134 | 0.34 | .402 | 10.2 | 3.6 | 2.7 | 3 | 1.97 | 50 | 2.CFS.30034 | .1 | .0 | Δ |
| | .0138 | 0.35 | .413 | 10.5 | 3.7 | 2.8 | 3 | 1.97 | 50 | 2.CFS.30035 | .1 | .0 | ■ |
| | .0142 | 0.36 | .425 | 10.8 | 3.8 | 2.9 | 3 | 1.97 | 50 | 2.CFS.30036 | .1 | .0 | Δ |
| | .0146 | 0.37 | .437 | 11.1 | 3.9 | 3.0 | 3 | 1.97 | 50 | 2.CFS.30037 | .1 | .0 | Δ |
| | .0150 | 0.38 | .449 | 11.4 | 4.0 | 3.0 | 3 | 1.97 | 50 | 2.CFS.30038 | .1 | .0 | Δ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0154 | 0.39 | .461 | 11.7 | 4.1 | 3.1 | 3 | 1.97 | 50 | 2.CFS.30039 | .1 | .0 | Δ |
| 1/64 | .0156 | 0.396 | .472 | 12.0 | 4.2 | 3.2 | 3 | 1.97 | 50 | 2.CFS.30F164 | .1 | - | ◪ |
| | .0157 | 0.40 | .472 | 12.0 | 4.2 | 3.2 | 3 | 1.97 | 50 | 2.CFS.30040 | .1 | .0 | ■ |
| | .0161 | 0.41 | .484 | 12.3 | 4.3 | 3.3 | 3 | 1.97 | 50 | 2.CFS.30041 | .1 | .0 | Δ |
| | .0165 | 0.42 | .496 | 12.6 | 4.4 | 3.4 | 3 | 1.97 | 50 | 2.CFS.30042 | .1 | .0 | Δ |
| | .0169 | 0.43 | .508 | 12.9 | 4.5 | 3.4 | 3 | 1.97 | 50 | 2.CFS.30043 | .1 | .0 | Δ |
| | .0173 | 0.44 | .520 | 13.2 | 4.6 | 3.5 | 3 | 1.97 | 50 | 2.CFS.30044 | .1 | .0 | Δ |
| | .0177 | 0.45 | .531 | 13.5 | 4.7 | 3.6 | 3 | 1.97 | 50 | 2.CFS.30045 | .1 | .0 | ■ |
| | .0181 | 0.46 | .543 | 13.8 | 4.8 | 3.7 | 3 | 1.97 | 50 | 2.CFS.30046 | .1 | .0 | Δ |
| | .0185 | 0.47 | .555 | 14.1 | 4.9 | 3.8 | 3 | 1.97 | 50 | 2.CFS.30047 | .1 | .0 | Δ |
| | .0189 | 0.48 | .567 | 14.4 | 5.0 | 3.8 | 3 | 1.97 | 50 | 2.CFS.30048 | .1 | .0 | Δ |
| | .0193 | 0.49 | .579 | 14.7 | 5.1 | 3.9 | 3 | 1.97 | 50 | 2.CFS.30049 | .1 | .0 | Δ |
| | .0197 | 0.50 | .591 | 15.0 | 5.3 | 4.0 | 3 | 2.09 | 53 | 2.CFS.30050 | .1 | .0 | ■ |
| | .0201 | 0.51 | .602 | 15.3 | 5.4 | 4.1 | 3 | 2.09 | 53 | 2.CFS.30051 | .1 | .0 | Δ |
| | .0205 | 0.52 | .614 | 15.6 | 5.5 | 4.2 | 3 | 2.09 | 53 | 2.CFS.30052 | .1 | .0 | Δ |
| | .0209 | 0.53 | .626 | 15.9 | 5.6 | 4.2 | 3 | 2.09 | 53 | 2.CFS.30053 | .1 | .0 | Δ |
| | .0213 | 0.54 | .638 | 16.2 | 5.7 | 4.3 | 3 | 2.09 | 53 | 2.CFS.30054 | .1 | .0 | Δ |
| | .0217 | 0.55 | .650 | 16.5 | 5.8 | 4.4 | 3 | 2.09 | 53 | 2.CFS.30055 | .1 | .0 | ■ |
| | .0220 | 0.56 | .661 | 16.8 | 5.9 | 4.5 | 3 | 2.09 | 53 | 2.CFS.30056 | .1 | .0 | Δ |
| | .0224 | 0.57 | .673 | 17.1 | 6.0 | 4.6 | 3 | 2.09 | 53 | 2.CFS.30057 | .1 | .0 | Δ |
| | .0228 | 0.58 | .685 | 17.4 | 6.1 | 4.6 | 3 | 2.09 | 53 | 2.CFS.30058 | .1 | .0 | Δ |
| | .0232 | 0.59 | .697 | 17.7 | 6.2 | 4.7 | 3 | 2.09 | 53 | 2.CFS.30059 | .1 | .0 | Δ |
| | .0236 | 0.60 | .709 | 18.0 | 6.3 | 4.8 | 3 | 2.09 | 53 | 2.CFS.30060 | .1 | .0 | ■ |
| | .0240 | 0.61 | .720 | 18.3 | 6.4 | 4.9 | 3 | 2.09 | 53 | 2.CFS.30061 | .1 | .0 | Δ |
| | .0244 | 0.62 | .732 | 18.6 | 6.5 | 5.0 | 3 | 2.09 | 53 | 2.CFS.30062 | .1 | .0 | Δ |
| | .0248 | 0.63 | .744 | 18.9 | 6.6 | 5.0 | 3 | 2.09 | 53 | 2.CFS.30063 | .1 | .0 | Δ |
| | .0252 | 0.64 | .756 | 19.2 | 6.7 | 5.1 | 3 | 2.09 | 53 | 2.CFS.30064 | .1 | .0 | Δ |
| | .0256 | 0.65 | .768 | 19.5 | 6.8 | 5.2 | 3 | 2.09 | 53 | 2.CFS.30065 | .1 | .0 | ■ |
| | .0260 | 0.66 | .780 | 19.8 | 6.9 | 5.3 | 3 | 2.09 | 53 | 2.CFS.30066 | .1 | .0 | Δ |

■ Stock item
◪ Stock item only in one version
Δ Delivery term upon request, minumum purchase order quantity 5 pcs.

Carbide | 30xd1 | 140° | Z2

| | |
|---|---|
| Ø $d_1$ | **.004" - .047"** (0.1 - 1.2 mm) |
| Tolerance | **- .00012"** - 0.003 mm<br>**- .00024"** - 0.006 mm |



| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0264** | 0.67 | **.791** | 20.1 | 7.0 | 5.4 | 3 | **2.09** | 53 | 2.CFS.30067 | .1 | .0 | Δ |
| | **.0268** | 0.68 | **.803** | 20.4 | 7.1 | 5.4 | 3 | **2.09** | 53 | 2.CFS.30068 | .1 | .0 | Δ |
| | **.0272** | 0.69 | **.815** | 20.7 | 7.2 | 5.5 | 3 | **2.09** | 53 | 2.CFS.30069 | .1 | .0 | Δ |
| | **.0276** | 0.70 | **.827** | 21.0 | 7.4 | 5.6 | 3 | **2.36** | 60 | 2.CFS.30070 | .1 | .0 | ■ |
| | **.0280** | 0.71 | **.839** | 21.3 | 7.5 | 5.7 | 3 | **2.36** | 60 | 2.CFS.30071 | .1 | .0 | Δ |
| | **.0283** | 0.72 | **.850** | 21.6 | 7.6 | 5.8 | 3 | **2.36** | 60 | 2.CFS.30072 | .1 | .0 | Δ |
| | **.0287** | 0.73 | **.862** | 21.9 | 7.7 | 5.8 | 3 | **2.36** | 60 | 2.CFS.30073 | .1 | .0 | Δ |
| | **.0291** | 0.74 | **.874** | 22.2 | 7.8 | 5.9 | 3 | **2.36** | 60 | 2.CFS.30074 | .1 | .0 | Δ |
| | **.0295** | 0.75 | **.886** | 22.5 | 7.9 | 6.0 | 3 | **2.36** | 60 | 2.CFS.30075 | .1 | .0 | ■ |
| | **.0299** | 0.76 | **.898** | 22.8 | 8.0 | 6.1 | 3 | **2.36** | 60 | 2.CFS.30076 | .1 | .0 | Δ |
| | **.0303** | 0.77 | **.909** | 23.1 | 8.1 | 6.2 | 3 | **2.36** | 60 | 2.CFS.30077 | .1 | .0 | Δ |
| | **.0307** | 0.78 | **.921** | 23.4 | 8.2 | 6.2 | 3 | **2.36** | 60 | 2.CFS.30078 | .1 | .0 | Δ |
| | **.0311** | 0.79 | **.933** | 23.7 | 8.3 | 6.3 | 3 | **2.36** | 60 | 2.CFS.30079 | .1 | .0 | Δ |
| **1/32** | **.0312** | 0.793 | **.945** | 24.0 | 8.4 | 6.4 | 3 | **2.36** | 60 | 2.CFS.30F132 | .1 | - | ◪ |
| | **.0315** | 0.80 | **.945** | 24.0 | 8.4 | 6.4 | 3 | **2.36** | 60 | 2.CFS.30080 | .1 | .0 | ■ |
| | **.0319** | 0.81 | **.957** | 24.3 | 8.5 | 6.5 | 3 | **2.36** | 60 | 2.CFS.30081 | .1 | .0 | Δ |
| | **.0323** | 0.82 | **.969** | 24.6 | 8.6 | 6.6 | 3 | **2.36** | 60 | 2.CFS.30082 | .1 | .0 | Δ |
| | **.0327** | 0.83 | **.980** | 24.9 | 8.7 | 6.6 | 3 | **2.36** | 60 | 2.CFS.30083 | .1 | .0 | Δ |
| | **.0331** | 0.84 | **.992** | 25.2 | 8.8 | 6.7 | 3 | **2.36** | 60 | 2.CFS.30084 | .1 | .0 | Δ |
| | **.0335** | 0.85 | **1.00** | 25.5 | 8.9 | 6.8 | 3 | **2.52** | 64 | 2.CFS.30085 | .1 | .0 | ■ |
| | **.0339** | 0.86 | **1.02** | 25.8 | 9.0 | 6.9 | 3 | **2.52** | 64 | 2.CFS.30086 | .1 | .0 | Δ |
| | **.0343** | 0.87 | **1.03** | 26.1 | 9.1 | 7.0 | 3 | **2.52** | 64 | 2.CFS.30087 | .1 | .0 | Δ |
| | **.0346** | 0.88 | **1.04** | 26.4 | 9.2 | 7.0 | 3 | **2.52** | 64 | 2.CFS.30088 | .1 | .0 | Δ |
| | **.0350** | 0.89 | **1.05** | 26.7 | 9.3 | 7.1 | 3 | **2.52** | 64 | 2.CFS.30089 | .1 | .0 | Δ |
| | **.0354** | 0.90 | **1.06** | 27.0 | 9.5 | 7.2 | 3 | **2.52** | 64 | 2.CFS.30090 | .1 | .0 | ■ |
| | **.0358** | 0.91 | **1.07** | 27.3 | 9.6 | 7.3 | 3 | **2.52** | 64 | 2.CFS.30091 | .1 | .0 | Δ |
| | **.0362** | 0.92 | **1.09** | 27.6 | 9.7 | 7.4 | 3 | **2.52** | 64 | 2.CFS.30092 | .1 | .0 | Δ |
| | **.0366** | 0.93 | **1.10** | 27.9 | 9.8 | 7.4 | 3 | **2.52** | 64 | 2.CFS.30093 | .1 | .0 | Δ |
| | **.0370** | 0.94 | **1.11** | 28.2 | 9.9 | 7.5 | 3 | **2.52** | 64 | 2.CFS.30094 | .1 | .0 | Δ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0374** | 0.95 | **1.12** | 28.5 | 10.0 | 7.6 | 3 | **2.52** | 64 | 2.CFS.30095 | .1 | .0 | ■ |
| | **.0378** | 0.96 | **1.13** | 28.8 | 10.1 | 7.7 | 3 | **2.52** | 64 | 2.CFS.30096 | .1 | .0 | Δ |
| | **.0382** | 0.97 | **1.15** | 29.1 | 10.2 | 7.8 | 3 | **2.52** | 64 | 2.CFS.30097 | .1 | .0 | Δ |
| | **.0386** | 0.98 | **1.16** | 29.4 | 10.3 | 7.8 | 3 | **2.52** | 64 | 2.CFS.30098 | .1 | .0 | Δ |
| | **.0390** | 0.99 | **1.17** | 29.7 | 10.4 | 7.9 | 3 | **2.52** | 64 | 2.CFS.30099 | .1 | .0 | Δ |
| | **.0394** | 1.00 | **1.18** | 30.0 | 10.5 | 8.0 | 3 | **2.76** | 70 | 2.CFS.30100 | .1 | .0 | ■ |
| | **.0398** | 1.01 | **1.19** | 30.3 | 10.6 | 8.1 | 3 | **2.76** | 70 | 2.CFS.30101 | .1 | .0 | Δ |
| | **.0402** | 1.02 | **1.20** | 30.6 | 10.7 | 8.2 | 3 | **2.76** | 70 | 2.CFS.30102 | .1 | .0 | Δ |
| | **.0406** | 1.03 | **1.22** | 30.9 | 10.8 | 8.2 | 3 | **2.76** | 70 | 2.CFS.30103 | .1 | .0 | Δ |
| | **.0409** | 1.04 | **1.23** | 31.2 | 10.9 | 8.3 | 3 | **2.76** | 70 | 2.CFS.30104 | .1 | .0 | Δ |
| | **.0413** | 1.05 | **1.24** | 31.5 | 11.0 | 8.4 | 3 | **2.76** | 70 | 2.CFS.30105 | .1 | .0 | ■ |
| | **.0417** | 1.06 | **1.25** | 31.8 | 11.1 | 8.5 | 3 | **2.76** | 70 | 2.CFS.30106 | .1 | .0 | Δ |
| | **.0421** | 1.07 | **1.26** | 32.1 | 11.2 | 8.6 | 3 | **2.76** | 70 | 2.CFS.30107 | .1 | .0 | Δ |
| | **.0425** | 1.08 | **1.28** | 32.4 | 11.3 | 8.6 | 3 | **2.76** | 70 | 2.CFS.30108 | .1 | .0 | Δ |
| | **.0429** | 1.09 | **1.29** | 32.7 | 11.4 | 8.7 | 3 | **2.76** | 70 | 2.CFS.30109 | .1 | .0 | Δ |
| | **.0433** | 1.10 | **1.30** | 33.0 | 11.6 | 8.8 | 3 | **2.76** | 70 | 2.CFS.30110 | .1 | .0 | ■ |
| | **.0437** | 1.11 | **1.31** | 33.3 | 11.7 | 8.9 | 3 | **2.76** | 70 | 2.CFS.30111 | .1 | .0 | Δ |
| | **.0441** | 1.12 | **1.32** | 33.6 | 11.8 | 9.0 | 3 | **2.76** | 70 | 2.CFS.30112 | .1 | .0 | Δ |
| | **.0445** | 1.13 | **1.33** | 33.9 | 11.9 | 9.0 | 3 | **2.76** | 70 | 2.CFS.30113 | .1 | .0 | Δ |
| | **.0449** | 1.14 | **1.35** | 34.2 | 12.0 | 9.1 | 3 | **2.76** | 70 | 2.CFS.30114 | .1 | .0 | Δ |
| | **.0453** | 1.15 | **1.36** | 34.5 | 12.1 | 9.2 | 3 | **2.76** | 70 | 2.CFS.30115 | .1 | .0 | ■ |
| | **.0457** | 1.16 | **1.37** | 34.8 | 12.2 | 9.3 | 3 | **2.76** | 70 | 2.CFS.30116 | .1 | .0 | Δ |
| | **.0461** | 1.17 | **1.38** | 35.1 | 12.3 | 9.4 | 3 | **2.76** | 70 | 2.CFS.30117 | .1 | .0 | Δ |
| | **.0465** | 1.18 | **1.39** | 35.4 | 12.4 | 9.4 | 3 | **2.76** | 70 | 2.CFS.30118 | .1 | .0 | Δ |
| | **.0469** | 1.19 | **1.41** | 35.7 | 12.5 | 9.5 | 3 | **2.76** | 70 | 2.CFS.30119 | .1 | .0 | Δ |
| | **.0472** | 1.20 | **1.42** | 36.0 | 12.6 | 9.6 | 3 | **2.76** | 70 | 2.CFS.30120 | .1 | .0 | ■ |

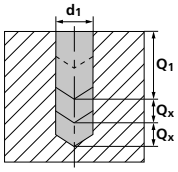
| Complementary products | |
|---|---|
| CrazyDrill Flexpilot Steel | p.108 |
| CrazyDrill Crosspilot | p.146 |

CRAZYDRILL™ by Mikron Tool Flex STEEL

# Steel - 30 x d - coated

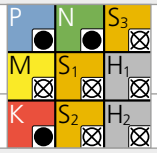
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 5 \| 16 | 40 \| 131 | 40 \| 131 | 60 \| 197 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 5 \| 16 | 25 \| 82 | 25 \| 82 | 50 \| 164 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 35 \| 115 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 5 \| 16 | 40 \| 131 | 5 \| 164 | 100 \| 328 |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | 40 \| 131 | 80 \| 262 |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 120 \| 394 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 5 \| 16 | 40 \| 131 | 50 \| 164 | 80 \| 262 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 100 \| 328 |
| | | 2.102 | CuSn6 | UNS C51900 | | | 40 \| 131 | 60 \| 197 |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 40 \| 131 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





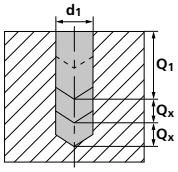

| | | **f** [mm/rev] **\| [IPR]** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Ød1** | | | | | |
| **$Q_1$** | **$Q_x$** | 0.2 mm **\| .008"** | 0.3 mm **\| .012"** | **1/64"** 0.4 mm **\| .016"** | 0.6 mm **\| .024"** | **1/32"** 0.8 mm **\| .032"** | 1.0 – 1.2 mm **\| .039" – .047"** |
| | | **f** | **f** | **f** | **f** | **f** | **f** |
| 2xd1 | 0.5xd1 | 0.005 **.0002** | 0.010 **.0004** | 0.015 **.0006** | 0.030 **.0012** | 0.040 **.0016** | 0.060 **.0024** |
| 2xd1 | 0.5xd1 | 0.003 – 0.005 **.00012 – .00020** | 0.008 – 0.010 **.0003 – .0004** | 0.012 – 0.015 **.0005 – .0006** | 0.020 – 0.025 **.0008 – .0010** | 0.035 **.0014** | 0.050 **.0020** |
| 2xd1 | 1xd1 | 0.004 **.00016** | 0.008 **.0003** | 0.010 **.0004** | 0.015 **.0006** | 0.025 **.0010** | 0.040 **.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | |
| 2xd1 | 1xd1 | 0.005 **.0002** | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.035 **.0014** | 0.050 **.0020** |
| 2xd1 | 1xd1 | 0.015 **.0006** | 0.040 **.0016** | 0.050 **.0020** | 0.080 **.0031** | 0.100 **.0039** | 0.120 **.0047** |
| 2xd1 | 1xd1 | 0.015 **.0006** | 0.040 **.0016** | 0.050 **.0020** | 0.080 **.0031** | 0.100 **.0039** | 0.120 **.0047** |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | |
| 2xd1 | 1xd1 | 0.010 **.0004** | 0.030 **.0012** | 0.040 **.0016** | 0.060 **.0024** | 0.080 **.0031** | 0.100 **.0039** |
| 2xd1 | 0.5xd1 | 0.004 **.00016** | 0.006 **.00024** | 0.010 **.0004** | 0.015 **.0006** | 0.025 **.0010** | 0.040 **.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | |

CRAZYDRILL™ by Mikron Tool Flex STEEL

# Steel - 30 x d - uncoated

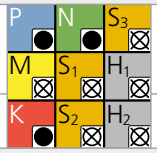
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 5 \| 16 | 40 \| 131 | 40 \| 131 | 60 \| 197 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 5 \| 16 | 25 \| 82 | 25 \| 82 | 50 \| 164 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 35 \| 115 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 5 \| 16 | 40 \| 131 | 5 \| 164 | 100 \| 328 |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | 40 \| 131 | 80 \| 262 |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 120 \| 394 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 5 \| 16 | 40 \| 131 | 50 \| 164 | 80 \| 262 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 100 \| 328 |
| | | 2.102 | CuSn6 | UNS C51900 | | | 40 \| 131 | 60 \| 197 |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 40 \| 131 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






| | | **f** [mm/rev] **\| [IPR]** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **$Q_1$** | **$Q_x$** | | | | **Ød1** | | | |
| | | 0.1 mm **\| .004"** | 0.2 mm **\| .008"** | 0.3 mm **\| .012"** | **1/64"** 0.4 mm **\| .016"** | 0.6 mm **\| .024"** | **1/32"** 0.8 mm **\| .032"** | 1.0–1.2 mm **\| .039"–.047"** |
| | | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| 2xd1 | 0.5xd1 | 0.002 **.00008** | 0.005 **.0002** | 0.010 **.0004** | 0.015 **.0006** | 0.030 **.0012** | 0.040 **.0016** | 0.060 **.0024** |
| 2xd1 | 0.5xd1 | 0.002 **.00008** | 0.003 – 0.005 **.00012 – .00020** | 0.008 – 0.010 **.0003 – .0004** | 0.012 – 0.015 **.0005 – .0006** | 0.020 – 0.025 **.0008 – .0010** | 0.035 **.0014** | 0.050 **.0020** |
| 2xd1 | 1xd1 | 0.0005 **.00002** | 0.004 **.00016** | 0.008 **.0003** | 0.010 **.0004** | 0.015 **.0006** | 0.025 **.0010** | 0.040 **.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| 2xd1 | 1xd1 | 0.002 **.00008** | 0.005 **.0002** | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.035 **.0014** | 0.050 **.0020** |
| 2xd1 | 1xd1 | 0.003 **.00012** | 0.015 **.0006** | 0.040 **.0016** | 0.050 **.0020** | 0.080 **.0031** | 0.100 **.0039** | 0.120 **.0047** |
| 2xd1 | 1xd1 | 0.003 **.00012** | 0.015 **.0006** | 0.040 **.0016** | 0.050 **.0020** | 0.080 **.0031** | 0.100 **.0039** | 0.120 **.0047** |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| 2xd1 | 1xd1 | 0.004 **.00016** | 0.010 **.0004** | 0.030 **.0012** | 0.040 **.0016** | 0.060 **.0024** | 0.080 **.0031** | 0.100 **.0039** |
| 2xd1 | 0.5xd1 | 0.002 **.00008** | 0.004 **.00016** | 0.006 **.00024** | 0.010 **.0004** | 0.015 **.0006** | 0.025 **.0010** | 0.040 **.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |

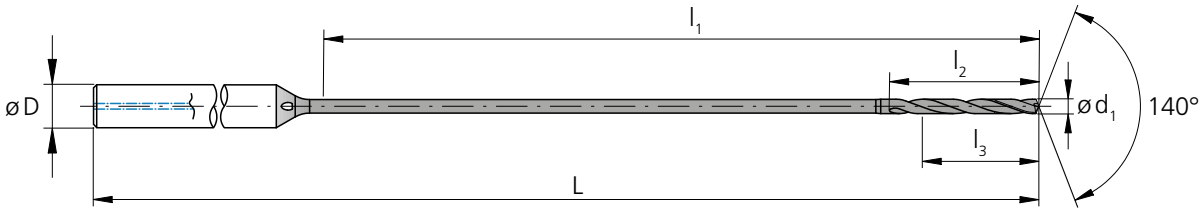
CRAZYDRILL™ by Mikron Tool Flex STEEL

# Steel - 50 x d - coated / uncoated

## DRILLING WITH INTEGRATED COOLING

.1 eXedur RIP

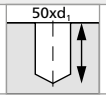
.0 Uncoated




| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | l3 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0118 | 0.30 | .591 | 15.0 | 3.2 | 2.4 | 3 | 2.09 | 53 | 2.CFS.50030.IK | .1 | .0 | ■ |
| | .0122 | 0.31 | .610 | 15.5 | 3.3 | 2.5 | 3 | 2.09 | 53 | 2.CFS.50031.IK | .1 | .0 | Δ |
| | .0126 | 0.32 | .630 | 16.0 | 3.4 | 2.6 | 3 | 2.09 | 53 | 2.CFS.50032.IK | .1 | .0 | Δ |
| | .0130 | 0.33 | .650 | 16.5 | 3.5 | 2.6 | 3 | 2.09 | 53 | 2.CFS.50033.IK | .1 | .0 | Δ |
| | .0134 | 0.34 | .669 | 17.0 | 3.6 | 2.7 | 3 | 2.09 | 53 | 2.CFS.50034.IK | .1 | .0 | Δ |
| | .0138 | 0.35 | .689 | 17.5 | 3.7 | 2.8 | 3 | 2.36 | 60 | 2.CFS.50035.IK | .1 | .0 | ■ |
| | .0142 | 0.36 | .709 | 18.0 | 3.8 | 2.9 | 3 | 2.36 | 60 | 2.CFS.50036.IK | .1 | .0 | Δ |
| | .0146 | 0.37 | .728 | 18.5 | 3.9 | 3.0 | 3 | 2.36 | 60 | 2.CFS.50037.IK | .1 | .0 | Δ |
| | .0150 | 0.38 | .748 | 19.0 | 4.0 | 3.0 | 3 | 2.36 | 60 | 2.CFS.50038.IK | .1 | .0 | Δ |
| | .0154 | 0.39 | .768 | 19.5 | 4.1 | 3.1 | 3 | 2.36 | 60 | 2.CFS.50039.IK | .1 | .0 | Δ |
| 1/64 | .0156 | 0.396 | .787 | 20.0 | 4.2 | 3.2 | 3 | 2.36 | 60 | 2.CFS.50F164.IK | .1 | - | ◪ |
| | .0157 | 0.40 | .787 | 20.0 | 4.2 | 3.2 | 3 | 2.36 | 60 | 2.CFS.50040.IK | .1 | .0 | ■ |
| | .0161 | 0.41 | .807 | 20.5 | 4.3 | 3.3 | 3 | 2.36 | 60 | 2.CFS.50041.IK | .1 | .0 | Δ |
| | .0165 | 0.42 | .827 | 21.0 | 4.4 | 3.4 | 3 | 2.36 | 60 | 2.CFS.50042.IK | .1 | .0 | Δ |
| | .0169 | 0.43 | .846 | 21.5 | 4.5 | 3.4 | 3 | 2.36 | 60 | 2.CFS.50043.IK | .1 | .0 | Δ |
| | .0173 | 0.44 | .866 | 22.0 | 4.6 | 3.5 | 3 | 2.36 | 60 | 2.CFS.50044.IK | .1 | .0 | Δ |
| | .0177 | 0.45 | .886 | 22.5 | 4.7 | 3.6 | 3 | 2.36 | 60 | 2.CFS.50045.IK | .1 | .0 | ■ |
| | .0181 | 0.46 | .906 | 23.0 | 4.8 | 3.7 | 3 | 2.36 | 60 | 2.CFS.50046.IK | .1 | .0 | Δ |
| | .0185 | 0.47 | .925 | 23.5 | 4.9 | 3.8 | 3 | 2.36 | 60 | 2.CFS.50047.IK | .1 | .0 | Δ |
| | .0189 | 0.48 | .945 | 24.0 | 5.0 | 3.8 | 3 | 2.36 | 60 | 2.CFS.50048.IK | .1 | .0 | Δ |
| | .0193 | 0.49 | .965 | 24.5 | 5.1 | 3.9 | 3 | 2.36 | 60 | 2.CFS.50049.IK | .1 | .0 | Δ |
| | .0197 | 0.50 | .984 | 25.0 | 5.3 | 4.0 | 3 | 2.52 | 64 | 2.CFS.50050.IK | .1 | .0 | ■ |
| | .0201 | 0.51 | 1.00 | 25.5 | 5.4 | 4.1 | 3 | 2.52 | 64 | 2.CFS.50051.IK | .1 | .0 | Δ |
| | .0205 | 0.52 | 1.02 | 26.0 | 5.5 | 4.2 | 3 | 2.52 | 64 | 2.CFS.50052.IK | .1 | .0 | Δ |
| | .0209 | 0.53 | 1.04 | 26.5 | 5.6 | 4.2 | 3 | 2.52 | 64 | 2.CFS.50053.IK | .1 | .0 | Δ |
| | .0213 | 0.54 | 1.06 | 27.0 | 5.7 | 4.3 | 3 | 2.52 | 64 | 2.CFS.50054.IK | .1 | .0 | Δ |
| | .0217 | 0.55 | 1.08 | 27.5 | 5.8 | 4.4 | 3 | 2.52 | 64 | 2.CFS.50055.IK | .1 | .0 | ■ |
| | .0220 | 0.56 | 1.10 | 28.0 | 5.9 | 4.5 | 3 | 2.52 | 64 | 2.CFS.50056.IK | .1 | .0 | Δ |
| | .0224 | 0.57 | 1.12 | 28.5 | 6.0 | 4.6 | 3 | 2.52 | 64 | 2.CFS.50057.IK | .1 | .0 | Δ |

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | l3 [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated | Uncoated | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0228 | 0.58 | 1.14 | 29.0 | 6.1 | 4.6 | 3 | 2.52 | 64 | 2.CFS.50058.IK | .1 | .0 | Δ |
| | .0232 | 0.59 | 1.16 | 29.5 | 6.2 | 4.7 | 3 | 2.52 | 64 | 2.CFS.50059.IK | .1 | .0 | Δ |
| | .0236 | 0.60 | 1.18 | 30.0 | 6.3 | 4.8 | 3 | 2.76 | 70 | 2.CFS.50060.IK | .1 | .0 | ■ |
| | .0240 | 0.61 | 1.20 | 30.5 | 6.4 | 4.9 | 3 | 2.76 | 70 | 2.CFS.50061.IK | .1 | .0 | Δ |
| | .0244 | 0.62 | 1.22 | 31.0 | 6.5 | 5.0 | 3 | 2.76 | 70 | 2.CFS.50062.IK | .1 | .0 | Δ |
| | .0248 | 0.63 | 1.24 | 31.5 | 6.6 | 5.0 | 3 | 2.76 | 70 | 2.CFS.50063.IK | .1 | .0 | Δ |
| | .0252 | 0.64 | 1.26 | 32.0 | 6.7 | 5.1 | 3 | 2.76 | 70 | 2.CFS.50064.IK | .1 | .0 | Δ |
| | .0256 | 0.65 | 1.28 | 32.5 | 6.8 | 5.2 | 3 | 2.76 | 70 | 2.CFS.50065.IK | .1 | .0 | ■ |
| | .0260 | 0.66 | 1.30 | 33.0 | 6.9 | 5.3 | 3 | 2.76 | 70 | 2.CFS.50066.IK | .1 | .0 | Δ |
| | .0264 | 0.67 | 1.32 | 33.5 | 7.0 | 5.4 | 3 | 2.76 | 70 | 2.CFS.50067.IK | .1 | .0 | Δ |
| | .0268 | 0.68 | 1.34 | 34.0 | 7.1 | 5.4 | 3 | 2.76 | 70 | 2.CFS.50068.IK | .1 | .0 | Δ |
| | .0272 | 0.69 | 1.36 | 34.5 | 7.2 | 5.5 | 3 | 2.76 | 70 | 2.CFS.50069.IK | .1 | .0 | Δ |
| | .0276 | 0.70 | 1.38 | 35.0 | 7.4 | 5.6 | 3 | 2.95 | 75 | 2.CFS.50070.IK | .1 | .0 | ■ |
| | .0280 | 0.71 | 1.40 | 35.5 | 7.5 | 5.7 | 3 | 2.95 | 75 | 2.CFS.50071.IK | .1 | .0 | Δ |
| | .0283 | 0.72 | 1.42 | 36.0 | 7.6 | 5.8 | 3 | 2.95 | 75 | 2.CFS.50072.IK | .1 | .0 | Δ |
| | .0287 | 0.73 | 1.44 | 36.5 | 7.7 | 5.8 | 3 | 2.95 | 75 | 2.CFS.50073.IK | .1 | .0 | Δ |
| | .0291 | 0.74 | 1.46 | 37.0 | 7.8 | 5.9 | 3 | 2.95 | 75 | 2.CFS.50074.IK | .1 | .0 | Δ |
| | .0295 | 0.75 | 1.48 | 37.5 | 7.9 | 6.0 | 3 | 2.95 | 75 | 2.CFS.50075.IK | .1 | .0 | ■ |
| | .0299 | 0.76 | 1.50 | 38.0 | 8.0 | 6.1 | 3 | 2.95 | 75 | 2.CFS.50076.IK | .1 | .0 | Δ |
| | .0303 | 0.77 | 1.52 | 38.5 | 8.1 | 6.2 | 3 | 2.95 | 75 | 2.CFS.50077.IK | .1 | .0 | Δ |
| | .0307 | 0.78 | 1.54 | 39.0 | 8.2 | 6.2 | 3 | 2.95 | 75 | 2.CFS.50078.IK | .1 | .0 | Δ |
| | .0311 | 0.79 | 1.56 | 39.5 | 8.3 | 6.3 | 3 | 2.95 | 75 | 2.CFS.50079.IK | .1 | .0 | Δ |
| 1/32 | .0312 | 0.793 | 1.57 | 40.0 | 8.4 | 6.4 | 3 | 3.15 | 80 | 2.CFS.50F132.IK | .1 | - | ◪ |
| | .0315 | 0.80 | 1.57 | 40.0 | 8.4 | 6.4 | 3 | 3.15 | 80 | 2.CFS.50080.IK | .1 | .0 | ■ |
| | .0319 | 0.81 | 1.59 | 40.5 | 8.5 | 6.5 | 3 | 3.15 | 80 | 2.CFS.50081.IK | .1 | .0 | Δ |
| | .0323 | 0.82 | 1.61 | 41.0 | 8.6 | 6.6 | 3 | 3.15 | 80 | 2.CFS.50082.IK | .1 | .0 | Δ |
| | .0327 | 0.83 | 1.63 | 41.5 | 8.7 | 6.6 | 3 | 3.15 | 80 | 2.CFS.50083.IK | .1 | .0 | Δ |
| | .0331 | 0.84 | 1.65 | 42.0 | 8.8 | 6.7 | 3 | 3.15 | 80 | 2.CFS.50084.IK | .1 | .0 | Δ |
| | .0335 | 0.85 | 1.67 | 42.5 | 8.9 | 6.8 | 3 | 3.15 | 80 | 2.CFS.50085.IK | .1 | .0 | ■ |

■ Stock item
◪ Stock item only in one version
Δ Delivery term upon request, minumum purchase order quantity 5 pcs.

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.012" - .079"** (0.3 - 2.0 mm) | |
| Tolerance | **- .00012"** | - 0.003 mm |
| | **- .00024"** | - 0.006 mm |



| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0339** | 0.86 | **1.69** | 43.0 | 9.0 | 6.9 | 3 | **3.15** | 80 | 2.CFS.50086.IK | .1 | .0 | Δ |
| | **.0343** | 0.87 | **1.71** | 43.5 | 9.1 | 7.0 | 3 | **3.15** | 80 | 2.CFS.50087.IK | .1 | .0 | Δ |
| | **.0346** | 0.88 | **1.73** | 44.0 | 9.2 | 7.0 | 3 | **3.15** | 80 | 2.CFS.50088.IK | .1 | .0 | Δ |
| | **.0350** | 0.89 | **1.75** | 44.5 | 9.3 | 7.1 | 3 | **3.15** | 80 | 2.CFS.50089.IK | .1 | .0 | Δ |
| | **.0354** | 0.90 | **1.77** | 45.0 | 9.5 | 7.2 | 3 | **3.35** | 85 | 2.CFS.50090.IK | .1 | .0 | ■ |
| | **.0358** | 0.91 | **1.79** | 45.5 | 9.6 | 7.3 | 3 | **3.35** | 80 | 2.CFS.50091.IK | .1 | .0 | Δ |
| | **.0362** | 0.92 | **1.81** | 46.0 | 9.7 | 7.4 | 3 | **3.35** | 80 | 2.CFS.50092.IK | .1 | .0 | Δ |
| | **.0366** | 0.93 | **1.83** | 46.5 | 9.8 | 7.4 | 3 | **3.35** | 85 | 2.CFS.50093.IK | .1 | .0 | Δ |
| | **.0370** | 0.94 | **1.85** | 47.0 | 9.9 | 7.5 | 3 | **3.35** | 70 | 2.CFS.50094.IK | .1 | .0 | Δ |
| | **.0374** | 0.95 | **1.87** | 47.5 | 10.0 | 7.6 | 3 | **3.35** | 70 | 2.CFS.50095.IK | .1 | .0 | ■ |
| | **.0378** | 0.96 | **1.89** | 48.0 | 10.1 | 7.7 | 3 | **3.35** | 70 | 2.CFS.50096.IK | .1 | .0 | Δ |
| | **.0382** | 0.97 | **1.91** | 48.5 | 10.2 | 7.8 | 3 | **3.35** | 85 | 2.CFS.50097.IK | .1 | .0 | Δ |
| | **.0386** | 0.98 | **1.93** | 49.0 | 10.3 | 7.8 | 3 | **3.35** | 85 | 2.CFS.50098.IK | .1 | .0 | Δ |
| | **.0390** | 0.99 | **1.95** | 49.5 | 10.4 | 7.9 | 3 | **3.35** | 85 | 2.CFS.50099.IK | .1 | .0 | Δ |
| | **.0394** | 1.00 | **1.97** | 50.0 | 10.5 | 8.0 | 3 | **3.54** | 90 | 2.CFS.50100.IK | .1 | .0 | ■ |
| | **.0398** | 1.01 | **1.99** | 50.5 | 10.6 | 8.1 | 3 | **3.54** | 90 | 2.CFS.50101.IK | .1 | .0 | Δ |
| | **.0402** | 1.02 | **2.01** | 51.0 | 10.7 | 8.2 | 3 | **3.54** | 90 | 2.CFS.50102.IK | .1 | .0 | Δ |
| | **.0406** | 1.03 | **2.03** | 51.5 | 10.8 | 8.2 | 3 | **3.54** | 90 | 2.CFS.50103.IK | .1 | .0 | Δ |
| | **.0409** | 1.04 | **2.05** | 52.0 | 10.9 | 8.3 | 3 | **3.54** | 90 | 2.CFS.50104.IK | .1 | .0 | Δ |
| | **.0413** | 1.05 | **2.07** | 52.5 | 11.0 | 8.4 | 3 | **3.54** | 90 | 2.CFS.50105.IK | .1 | .0 | ■ |
| | **.0417** | 1.06 | **2.09** | 53.0 | 11.1 | 8.5 | 3 | **3.54** | 90 | 2.CFS.50106.IK | .1 | .0 | Δ |
| | **.0421** | 1.07 | **2.11** | 53.5 | 11.2 | 8.6 | 3 | **3.54** | 90 | 2.CFS.50107.IK | .1 | .0 | Δ |
| | **.0425** | 1.08 | **2.13** | 54.0 | 11.3 | 8.6 | 3 | **3.54** | 90 | 2.CFS.50108.IK | .1 | .0 | Δ |
| | **.0429** | 1.09 | **2.15** | 54.5 | 11.4 | 8.7 | 3 | **3.54** | 90 | 2.CFS.50109.IK | .1 | .0 | Δ |
| | **.0433** | 1.10 | **2.17** | 55.0 | 11.6 | 8.8 | 3 | **3.74** | 95 | 2.CFS.50110.IK | .1 | .0 | ■ |
| | **.0437** | 1.11 | **2.19** | 55.5 | 11.7 | 8.9 | 3 | **3.74** | 95 | 2.CFS.50111.IK | .1 | .0 | Δ |
| | **.0441** | 1.12 | **2.20** | 56.0 | 11.8 | 9.0 | 3 | **3.74** | 95 | 2.CFS.50112.IK | .1 | .0 | Δ |
| | **.0445** | 1.13 | **2.22** | 56.5 | 11.9 | 9.0 | 3 | **3.74** | 95 | 2.CFS.50113.IK | .1 | .0 | Δ |
| | **.0449** | 1.14 | **2.24** | 57.0 | 12.0 | 9.1 | 3 | **3.74** | 95 | 2.CFS.50114.IK | .1 | .0 | Δ |

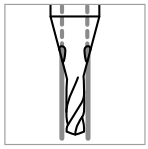
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Coated .1 | Uncoated .0 | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0453** | 1.15 | **2.26** | 57.5 | 12.1 | 9.2 | 3 | **3.74** | 95 | 2.CFS.50115.IK | .1 | .0 | ■ |
| | **.0457** | 1.16 | **2.28** | 58.0 | 12.2 | 9.3 | 3 | **3.74** | 95 | 2.CFS.50116.IK | .1 | .0 | Δ |
| | **.0461** | 1.17 | **2.30** | 58.5 | 12.3 | 9.4 | 3 | **3.74** | 95 | 2.CFS.50117.IK | .1 | .0 | Δ |
| | **.0465** | 1.18 | **2.32** | 59.0 | 12.4 | 9.4 | 3 | **3.74** | 95 | 2.CFS.50118.IK | .1 | .0 | Δ |
| | **.0469** | 1.19 | **2.34** | 59.5 | 12.5 | 9.5 | 3 | **3.74** | 95 | 2.CFS.50119.IK | .1 | .0 | Δ |
| | **.0472** | 1.20 | **2.36** | 60.0 | 12.6 | 9.6 | 3 | **3.74** | 95 | 2.CFS.50120.IK | .1 | .0 | ■ |
| | **.0492** | 1.25 | **2.46** | 62.5 | 13.1 | 10.0 | 4 | **4.13** | 105 | 2.CFS.50125.IK | .1 | - | ◪ |
| | **.0512** | 1.30 | **2.56** | 65.0 | 13.7 | 10.4 | 4 | **4.13** | 105 | 2.CFS.50130.IK | .1 | - | ◪ |
| | **.0531** | 1.35 | **2.66** | 67.5 | 14.2 | 10.8 | 4 | **4.13** | 105 | 2.CFS.50135.IK | .1 | - | ◪ |
| | **.0551** | 1.40 | **2.76** | 70.0 | 14.7 | 11.2 | 4 | **4.33** | 110 | 2.CFS.50140.IK | .1 | - | ◪ |
| | **.0571** | 1.45 | **2.85** | 72.5 | 15.2 | 11.6 | 4 | **4.53** | 115 | 2.CFS.50145.IK | .1 | - | ◪ |
| | **.0591** | 1.50 | **2.95** | 75.0 | 15.8 | 12.0 | 4 | **4.53** | 115 | 2.CFS.50150.IK | .1 | - | ◪ |
| | **.0610** | 1.55 | **3.05** | 77.5 | 16.3 | 12.4 | 4 | **4.53** | 115 | 2.CFS.50155.IK | .1 | - | ◪ |
| **1/16** | **.0625** | 1.587 | **3.15** | 80.0 | 16.8 | 12.8 | 4 | **4.72** | 120 | 2.CFS.50F116.IK | .1 | - | ◪ |
| | **.0630** | 1.60 | **3.15** | 80.0 | 16.8 | 12.8 | 4 | **4.72** | 120 | 2.CFS.50160.IK | .1 | - | ◪ |
| | **.0650** | 1.65 | **3.25** | 82.5 | 17.3 | 13.2 | 4 | **4.72** | 120 | 2.CFS.50165.IK | .1 | - | ◪ |
| | **.0669** | 1.70 | **3.35** | 85.0 | 17.9 | 13.6 | 4 | **4.92** | 125 | 2.CFS.50170.IK | .1 | - | ◪ |
| | **.0689** | 1.75 | **3.44** | 87.5 | 18.4 | 14.0 | 4 | **5.12** | 130 | 2.CFS.50175.IK | .1 | - | ◪ |
| | **.0709** | 1.80 | **3.54** | 90.0 | 18.9 | 14.4 | 4 | **5.12** | 130 | 2.CFS.50180.IK | .1 | - | ◪ |
| | **.0728** | 1.85 | **3.64** | 92.5 | 19.4 | 14.8 | 4 | **5.31** | 135 | 2.CFS.50185.IK | .1 | - | ◪ |
| | **.0748** | 1.90 | **3.74** | 95.0 | 20.0 | 15.2 | 4 | **5.31** | 135 | 2.CFS.50190.IK | .1 | - | ◪ |
| | **.0768** | 1.95 | **3.84** | 97.5 | 20.5 | 15.6 | 4 | **5.51** | 140 | 2.CFS.50195.IK | .1 | - | ◪ |
| | **.0787** | 2.00 | **3.94** | 100.0 | 21.0 | 16.0 | 4 | **5.51** | 140 | 2.CFS.50200.IK | .1 | - | ◪ |

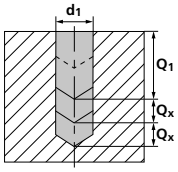
| Complementary products | |
|---|---|
| CrazyDrill Flexpilot Steel | p.108 |
| CrazyDrill Crosspilot | p.146 |

CRAZYDRILL™ by Mikron Tool Flex STEEL

# Steel - 50 x d - coated

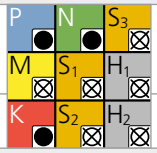
## DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 5 \| 16 | 40 \| 131 | 40 \| 131 | 60 \| 197 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 5 \| 16 | 25 \| 82 | 25 \| 82 | 50 \| 164 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 35 \| 115 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 5 \| 16 | 40 \| 131 | 5 \| 164 | 100 \| 328 |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | 40 \| 131 | 80 \| 262 |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 120 \| 394 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 5 \| 16 | 40 \| 131 | 50 \| 164 | 80 \| 262 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 100 \| 328 |
| | | 2.102 | CuSn6 | UNS C51900 | | | 40 \| 131 | 60 \| 197 |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 40 \| 131 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



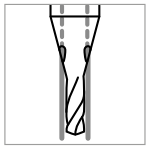


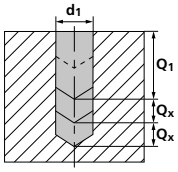

| | | f [mm/rev] \| [IPR] | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Ød1 | | | |
| $Q_1$ | $Q_x$ | 0.3 mm \| **.012"** | **1/64"** 0.4 mm \| **.016"** | 0.6 mm \| **.024"** | **1/32"** 0.8 mm \| **.032"** | 1.0 mm \| **.039"** | **1/16"** 1.5–2.0 mm \| **.059"–.079"** |
| | | f | f | f | f | f | f |
| 2xd1 | 0.5xd1 | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** |
| 2xd1 | 0.5xd1 | 0.008 – 0.010<br>**.0003 – .0004** | 0.012 – 0.015<br>**.0005 – .0006** | 0.020 – 0.025<br>**.0008 – .0010** | 0.035<br>**.0014** | 0.050<br>**.0020** | 0.070<br>**.0028** |
| 2xd1 | 1xd1 | 0.008<br>**.0003** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.025<br>**.0010** | 0.040<br>**.0016** | 0.060<br>**.0024** |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | | |
| 2xd1 | 1xd1 | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.020<br>**.0008** | 0.035<br>**.0014** | 0.050<br>**.0020** | 0.070<br>**.0028** |
| 2xd1 | 1xd1 | 0.040<br>**.0016** | 0.050<br>**.0020** | 0.080<br>**.0031** | 0.100<br>**.0039** | 0.120<br>**.0047** | 0.150<br>**.0059** |
| 2xd1 | 1xd1 | 0.040<br>**.0016** | 0.050<br>**.0020** | 0.080<br>**.0031** | 0.100<br>**.0039** | 0.120<br>**.0047** | 0.150<br>**.0059** |
| | | Recommended: CrazyDrill Flex Titanium 50 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | | |
| 2xd1 | 1xd1 | 0.030<br>**.0012** | 0.040<br>**.0016** | 0.060<br>**.0024** | 0.080<br>**.0031** | 0.100<br>**.0039** | 0.120<br>**.0047** |
| 2xd1 | 0.5xd1 | 0.006<br>**.00024** | 0.010<br>**.0004** | 0.015<br>**.0006** | 0.025<br>**.0010** | 0.040<br>**.0016** | 0.060<br>**.0024** |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 50 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex Titanium 50 x d1 | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | | |

CRAZYDRILL™ by Mikron Tool Flex STEEL

# Steel - 50 x d - uncoated

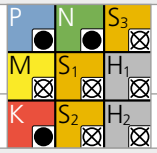
## DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 5 \| 16 | 40 \| 131 | 40 \| 131 | 60 \| 197 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 5 \| 16 | 25 \| 82 | 25 \| 82 | 50 \| 164 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 35 \| 115 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 5 \| 16 | 40 \| 131 | 5 \| 164 | 100 \| 328 |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | 40 \| 131 | 80 \| 262 |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 120 \| 394 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 5 \| 16 | 40 \| 131 | 50 \| 164 | 80 \| 262 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | | | | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 5 \| 16 | 40 \| 131 | 60 \| 197 | 100 \| 328 |
| | | 2.102 | CuSn6 | UNS C51900 | | | 40 \| 131 | 60 \| 197 |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 5 \| 16 | 20 \| 66 | 20 \| 66 | 40 \| 131 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



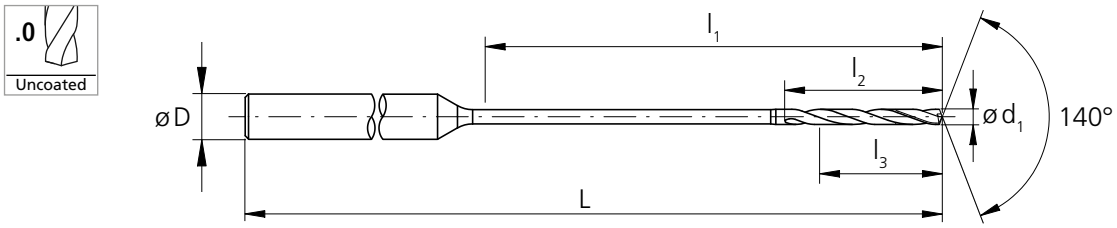



| | | f [mm/rev] \| [IPR] | | | | |
|---|---|---|---|---|---|---|
| $Q_1$ | $Q_x$ | 0.3 mm \| .012" | 1/64" 0.4 mm \| .016" | Ød1 0.6 mm \| .024" | 1/32" 0.8 mm \| .032" | 1.0–1.2 mm \| .039"–.047" |
| | | f | f | f | f | f |
| 2xd1 | 0.5xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.030 **.0012** | 0.040 **.0016** | 0.060 **.0024** |
| 2xd1 | 0.5xd1 | 0.008 – 0.010 **.0003 – .0004** | 0.012 – 0.015 **.0005 – .0006** | 0.020 – 0.025 **.0008 – .0010** | 0.035 **.0014** | 0.050 **.0020** |
| 2xd1 | 1xd1 | 0.008 **.0003** | 0.010 **.0004** | 0.015 **.0006** | 0.025 **.0010** | 0.040 **.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | |
| 2xd1 | 1xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.035 **.0014** | 0.050 **.0020** |
| 2xd1 | 1xd1 | 0.040 **.0016** | 0.050 **.0020** | 0.080 **.0031** | 0.100 **.0039** | 0.120 **.0047** |
| 2xd1 | 1xd1 | 0.040 **.0016** | 0.050 **.0020** | 0.080 **.0031** | 0.100 **.0039** | 0.120 **.0047** |
| | | Recommended: CrazyDrill Flex Titanium 50 x d1 | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | |
| 2xd1 | 1xd1 | 0.030 **.0012** | 0.040 **.0016** | 0.060 **.0024** | 0.080 **.0031** | 0.100 **.0039** |
| 2xd1 | 0.5xd1 | 0.006 **.00024** | 0.010 **.0004** | 0.015 **.0006** | 0.025 **.0010** | 0.040 **.0016** |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | |
| | | Recommended: CrazyDrill Flex Titanium 50 x d1 | | | | |
| | | Recommended: CrazyDrill Flex Titanium 50 x d1 | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | |

CRAZYDRILL™ by Mikron Tool Flex TITANIUM

# Titanium - 30 x d

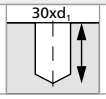
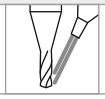
## DRILLING WITH EXTERNAL COOLING




| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **.0039** | 0.10 | **.118** | 3.0 | 1.1 | 0.8 | 3 | **1.77** | 45 | 2.CFT.30010.0 | ■ |
| **.0043** | 0.11 | **.130** | 3.3 | 1.2 | 0.9 | 3 | **1.77** | 45 | 2.CFT.30011.0 | Δ |
| **.0047** | 0.12 | **.142** | 3.6 | 1.3 | 1.0 | 3 | **1.77** | 45 | 2.CFT.30012.0 | Δ |
| **.0051** | 0.13 | **.154** | 3.9 | 1.4 | 1.0 | 3 | **1.77** | 45 | 2.CFT.30013.0 | Δ |
| **.0055** | 0.14 | **.165** | 4.2 | 1.5 | 1.1 | 3 | **1.77** | 45 | 2.CFT.30014.0 | Δ |
| **.0059** | 0.15 | **.177** | 4.5 | 1.6 | 1.2 | 3 | **1.77** | 45 | 2.CFT.30015.0 | ■ |
| **.0063** | 0.16 | **.189** | 4.8 | 1.7 | 1.3 | 3 | **1.77** | 45 | 2.CFT.30016.0 | Δ |
| **.0067** | 0.17 | **.201** | 5.1 | 1.8 | 1.4 | 3 | **1.77** | 45 | 2.CFT.30017.0 | Δ |
| **.0071** | 0.18 | **.213** | 5.4 | 1.9 | 1.4 | 3 | **1.77** | 45 | 2.CFT.30018.0 | Δ |
| **.0075** | 0.19 | **.224** | 5.7 | 2.0 | 1.5 | 3 | **1.77** | 45 | 2.CFT.30019.0 | Δ |
| **.0079** | 0.20 | **.236** | 6.0 | 2.1 | 1.6 | 3 | **1.77** | 45 | 2.CFT.30020.0 | ■ |
| **.0083** | 0.21 | **.248** | 6.3 | 2.2 | 1.7 | 3 | **1.77** | 45 | 2.CFT.30021.0 | Δ |
| **.0087** | 0.22 | **.260** | 6.6 | 2.3 | 1.8 | 3 | **1.77** | 45 | 2.CFT.30022.0 | Δ |
| **.0091** | 0.23 | **.272** | 6.9 | 2.4 | 1.8 | 3 | **1.77** | 45 | 2.CFT.30023.0 | Δ |
| **.0094** | 0.24 | **.283** | 7.2 | 2.5 | 1.9 | 3 | **1.77** | 45 | 2.CFT.30024.0 | Δ |
| **.0098** | 0.25 | **.295** | 7.5 | 2.6 | 2.0 | 3 | **1.77** | 45 | 2.CFT.30025.0 | ■ |
| **.0102** | 0.26 | **.307** | 7.8 | 2.7 | 2.1 | 3 | **1.77** | 45 | 2.CFT.30026.0 | Δ |
| **.0106** | 0.27 | **.319** | 8.1 | 2.8 | 2.2 | 3 | **1.77** | 45 | 2.CFT.30027.0 | Δ |
| **.0110** | 0.28 | **.331** | 8.4 | 2.9 | 2.2 | 3 | **1.77** | 45 | 2.CFT.30028.0 | Δ |
| **.0114** | 0.29 | **.343** | 8.7 | 3.0 | 2.3 | 3 | **1.77** | 45 | 2.CFT.30029.0 | Δ |
| **.0118** | 0.30 | **.354** | 9.0 | 3.2 | 2.4 | 3 | **1.97** | 50 | 2.CFT.30030.0 | ■ |
| **.0122** | 0.31 | **.366** | 9.3 | 3.3 | 2.5 | 3 | **1.97** | 50 | 2.CFT.30031.0 | Δ |
| **.0126** | 0.32 | **.378** | 9.6 | 3.4 | 2.6 | 3 | **1.97** | 50 | 2.CFT.30032.0 | Δ |
| **.0130** | 0.33 | **.390** | 9.9 | 3.5 | 2.6 | 3 | **1.97** | 50 | 2.CFT.30033.0 | Δ |
| **.0134** | 0.34 | **.402** | 10.2 | 3.6 | 2.7 | 3 | **1.97** | 50 | 2.CFT.30034.0 | Δ |
| **.0138** | 0.35 | **.413** | 10.5 | 3.7 | 2.8 | 3 | **1.97** | 50 | 2.CFT.30035.0 | ■ |
| **.0142** | 0.36 | **.425** | 10.8 | 3.8 | 2.9 | 3 | **1.97** | 50 | 2.CFT.30036.0 | Δ |
| **.0146** | 0.37 | **.437** | 11.1 | 3.9 | 3.0 | 3 | **1.97** | 50 | 2.CFT.30037.0 | Δ |
| **.0150** | 0.38 | **.449** | 11.4 | 4.0 | 3.0 | 3 | **1.97** | 50 | 2.CFT.30038.0 | Δ |

| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **.0154** | 0.39 | **.461** | 11.7 | 4.1 | 3.1 | 3 | **1.97** | 50 | 2.CFT.30039.0 | Δ |
| **.0157** | 0.40 | **.472** | 12.0 | 4.2 | 3.2 | 3 | **1.97** | 50 | 2.CFT.30040.0 | ■ |
| **.0161** | 0.41 | **.484** | 12.3 | 4.3 | 3.3 | 3 | **1.97** | 50 | 2.CFT.30041.0 | Δ |
| **.0165** | 0.42 | **.496** | 12.6 | 4.4 | 3.4 | 3 | **1.97** | 50 | 2.CFT.30042.0 | Δ |
| **.0169** | 0.43 | **.508** | 12.9 | 4.5 | 3.4 | 3 | **1.97** | 50 | 2.CFT.30043.0 | Δ |
| **.0173** | 0.44 | **.520** | 13.2 | 4.6 | 3.5 | 3 | **1.97** | 50 | 2.CFT.30044.0 | Δ |
| **.0177** | 0.45 | **.531** | 13.5 | 4.7 | 3.6 | 3 | **1.97** | 50 | 2.CFT.30045.0 | ■ |
| **.0181** | 0.46 | **.543** | 13.8 | 4.8 | 3.7 | 3 | **1.97** | 50 | 2.CFT.30046.0 | Δ |
| **.0185** | 0.47 | **.555** | 14.1 | 4.9 | 3.8 | 3 | **1.97** | 50 | 2.CFT.30047.0 | Δ |
| **.0189** | 0.48 | **.567** | 14.4 | 5.0 | 3.8 | 3 | **1.97** | 50 | 2.CFT.30048.0 | Δ |
| **.0193** | 0.49 | **.579** | 14.7 | 5.1 | 3.9 | 3 | **1.97** | 50 | 2.CFT.30049.0 | Δ |
| **.0197** | 0.50 | **.591** | 15.0 | 5.3 | 4.0 | 3 | **2.09** | 53 | 2.CFT.30050.0 | ■ |
| **.0201** | 0.51 | **.602** | 15.3 | 5.4 | 4.1 | 3 | **2.09** | 53 | 2.CFT.30051.0 | Δ |
| **.0205** | 0.52 | **.614** | 15.6 | 5.5 | 4.2 | 3 | **2.09** | 53 | 2.CFT.30052.0 | Δ |
| **.0209** | 0.53 | **.626** | 15.9 | 5.6 | 4.2 | 3 | **2.09** | 53 | 2.CFT.30053.0 | Δ |
| **.0213** | 0.54 | **.638** | 16.2 | 5.7 | 4.3 | 3 | **2.09** | 53 | 2.CFT.30054.0 | Δ |
| **.0217** | 0.55 | **.650** | 16.5 | 5.8 | 4.4 | 3 | **2.09** | 53 | 2.CFT.30055.0 | ■ |
| **.0220** | 0.56 | **.661** | 16.8 | 5.9 | 4.5 | 3 | **2.09** | 53 | 2.CFT.30056.0 | Δ |
| **.0224** | 0.57 | **.673** | 17.1 | 6.0 | 4.6 | 3 | **2.09** | 53 | 2.CFT.30057.0 | Δ |
| **.0228** | 0.58 | **.685** | 17.4 | 6.1 | 4.6 | 3 | **2.09** | 53 | 2.CFT.30058.0 | Δ |
| **.0232** | 0.59 | **.697** | 17.7 | 6.2 | 4.7 | 3 | **2.09** | 53 | 2.CFT.30059.0 | Δ |
| **.0236** | 0.60 | **.709** | 18.0 | 6.3 | 4.8 | 3 | **2.09** | 53 | 2.CFT.30060.0 | ■ |
| **.0240** | 0.61 | **.720** | 18.3 | 6.4 | 4.9 | 3 | **2.09** | 53 | 2.CFT.30061.0 | Δ |
| **.0244** | 0.62 | **.732** | 18.6 | 6.5 | 5.0 | 3 | **2.09** | 53 | 2.CFT.30062.0 | Δ |
| **.0248** | 0.63 | **.744** | 18.9 | 6.6 | 5.0 | 3 | **2.09** | 53 | 2.CFT.30063.0 | Δ |
| **.0252** | 0.64 | **.756** | 19.2 | 6.7 | 5.1 | 3 | **2.09** | 53 | 2.CFT.30064.0 | Δ |
| **.0256** | 0.65 | **.768** | 19.5 | 6.8 | 5.2 | 3 | **2.09** | 53 | 2.CFT.30065.0 | ■ |
| **.0260** | 0.66 | **.780** | 19.8 | 6.9 | 5.3 | 3 | **2.09** | 53 | 2.CFT.30066.0 | Δ |
| **.0264** | 0.67 | **.791** | 20.1 | 7.0 | 5.4 | 3 | **2.09** | 53 | 2.CFT.30067.0 | Δ |

■ Stock item
Δ Delivery term upon request, minumum purchase order quantity 5 pcs.

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.004" - .047"** (0.1 - 1.2 mm) | |
| Tolerance | **- .00012"**<br>**- .00024"** | - 0.003 mm<br>- 0.006 mm |



| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **.0268** | 0.68 | **.803** | 20.4 | 7.1 | 5.4 | 3 | **2.09** | 53 | 2.CFT.30068.0 | Δ |
| **.0272** | 0.69 | **.815** | 20.7 | 7.2 | 5.5 | 3 | **2.09** | 53 | 2.CFT.30069.0 | Δ |
| **.0276** | 0.70 | **.827** | 21.0 | 7.4 | 5.6 | 3 | **2.36** | 60 | 2.CFT.30070.0 | ■ |
| **.0280** | 0.71 | **.839** | 21.3 | 7.5 | 5.7 | 3 | **2.36** | 60 | 2.CFT.30071.0 | Δ |
| **.0283** | 0.72 | **.850** | 21.6 | 7.6 | 5.8 | 3 | **2.36** | 60 | 2.CFT.30072.0 | Δ |
| **.0287** | 0.73 | **.862** | 21.9 | 7.7 | 5.8 | 3 | **2.36** | 60 | 2.CFT.30073.0 | Δ |
| **.0291** | 0.74 | **.874** | 22.2 | 7.8 | 5.9 | 3 | **2.36** | 60 | 2.CFT.30074.0 | Δ |
| **.0295** | 0.75 | **.886** | 22.5 | 7.9 | 6.0 | 3 | **2.36** | 60 | 2.CFT.30075.0 | ■ |
| **.0299** | 0.76 | **.898** | 22.8 | 8.0 | 6.1 | 3 | **2.36** | 60 | 2.CFT.30076.0 | Δ |
| **.0303** | 0.77 | **.909** | 23.1 | 8.1 | 6.2 | 3 | **2.36** | 60 | 2.CFT.30077.0 | Δ |
| **.0307** | 0.78 | **.921** | 23.4 | 8.2 | 6.2 | 3 | **2.36** | 60 | 2.CFT.30078.0 | Δ |
| **.0311** | 0.79 | **.933** | 23.7 | 8.3 | 6.3 | 3 | **2.36** | 60 | 2.CFT.30079.0 | Δ |
| **.0315** | 0.80 | **.945** | 24.0 | 8.4 | 6.4 | 3 | **2.36** | 60 | 2.CFT.30080.0 | ■ |
| **.0319** | 0.81 | **.957** | 24.3 | 8.5 | 6.5 | 3 | **2.36** | 60 | 2.CFT.30081.0 | Δ |
| **.0323** | 0.82 | **.969** | 24.6 | 8.6 | 6.6 | 3 | **2.36** | 60 | 2.CFT.30082.0 | Δ |
| **.0327** | 0.83 | **.980** | 24.9 | 8.7 | 6.6 | 3 | **2.36** | 60 | 2.CFT.30083.0 | Δ |
| **.0331** | 0.84 | **.992** | 25.2 | 8.8 | 6.7 | 3 | **2.36** | 60 | 2.CFT.30084.0 | Δ |
| **.0335** | 0.85 | **1.00** | 25.5 | 8.9 | 6.8 | 3 | **2.52** | 64 | 2.CFT.30085.0 | ■ |
| **.0339** | 0.86 | **1.02** | 25.8 | 9.0 | 6.9 | 3 | **2.52** | 64 | 2.CFT.30086.0 | Δ |
| **.0343** | 0.87 | **1.03** | 26.1 | 9.1 | 7.0 | 3 | **2.52** | 64 | 2.CFT.30087.0 | Δ |
| **.0346** | 0.88 | **1.04** | 26.4 | 9.2 | 7.0 | 3 | **2.52** | 64 | 2.CFT.30088.0 | Δ |
| **.0350** | 0.89 | **1.05** | 26.7 | 9.3 | 7.1 | 3 | **2.52** | 64 | 2.CFT.30089.0 | Δ |
| **.0354** | 0.90 | **1.06** | 27.0 | 9.5 | 7.2 | 3 | **2.52** | 64 | 2.CFT.30090.0 | ■ |
| **.0358** | 0.91 | **1.07** | 27.3 | 9.6 | 7.3 | 3 | **2.52** | 64 | 2.CFT.30091.0 | Δ |
| **.0362** | 0.92 | **1.09** | 27.6 | 9.7 | 7.4 | 3 | **2.52** | 64 | 2.CFT.30092.0 | Δ |
| **.0366** | 0.93 | **1.10** | 27.9 | 9.8 | 7.4 | 3 | **2.52** | 64 | 2.CFT.30093.0 | Δ |
| **.0370** | 0.94 | **1.11** | 28.2 | 9.9 | 7.5 | 3 | **2.52** | 64 | 2.CFT.30094.0 | Δ |
| **.0374** | 0.95 | **1.12** | 28.5 | 10.0 | 7.6 | 3 | **2.52** | 64 | 2.CFT.30095.0 | ■ |
| **.0378** | 0.96 | **1.13** | 28.8 | 10.1 | 7.7 | 3 | **2.52** | 64 | 2.CFT.30096.0 | Δ |

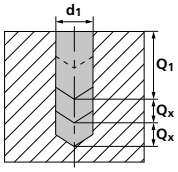
| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **.0382** | 0.97 | **1.15** | 29.1 | 10.2 | 7.8 | 3 | **2.52** | 64 | 2.CFT.30097.0 | Δ |
| **.0386** | 0.98 | **1.16** | 29.4 | 10.3 | 7.8 | 3 | **2.52** | 64 | 2.CFT.30098.0 | Δ |
| **.0390** | 0.99 | **1.17** | 29.7 | 10.4 | 7.9 | 3 | **2.52** | 64 | 2.CFT.30099.0 | Δ |
| **.0394** | 1.00 | **1.18** | 30.0 | 10.5 | 8.0 | 3 | **2.76** | 70 | 2.CFT.30100.0 | ■ |
| **.0398** | 1.01 | **1.19** | 30.3 | 10.6 | 8.1 | 3 | **2.76** | 70 | 2.CFT.30101.0 | Δ |
| **.0402** | 1.02 | **1.20** | 30.6 | 10.7 | 8.2 | 3 | **2.76** | 70 | 2.CFT.30102.0 | Δ |
| **.0406** | 1.03 | **1.22** | 30.9 | 10.8 | 8.2 | 3 | **2.76** | 70 | 2.CFT.30103.0 | Δ |
| **.0409** | 1.04 | **1.23** | 31.2 | 10.9 | 8.3 | 3 | **2.76** | 70 | 2.CFT.30104.0 | Δ |
| **.0413** | 1.05 | **1.24** | 31.5 | 11.0 | 8.4 | 3 | **2.76** | 70 | 2.CFT.30105.0 | ■ |
| **.0417** | 1.06 | **1.25** | 31.8 | 11.1 | 8.5 | 3 | **2.76** | 70 | 2.CFT.30106.0 | Δ |
| **.0421** | 1.07 | **1.26** | 32.1 | 11.2 | 8.6 | 3 | **2.76** | 70 | 2.CFT.30107.0 | Δ |
| **.0425** | 1.08 | **1.28** | 32.4 | 11.3 | 8.6 | 3 | **2.76** | 70 | 2.CFT.30108.0 | Δ |
| **.0429** | 1.09 | **1.29** | 32.7 | 11.4 | 8.7 | 3 | **2.76** | 70 | 2.CFT.30109.0 | Δ |
| **.0433** | 1.10 | **1.30** | 33.0 | 11.6 | 8.8 | 3 | **2.76** | 70 | 2.CFT.30110.0 | ■ |
| **.0437** | 1.11 | **1.31** | 33.3 | 11.7 | 8.9 | 3 | **2.76** | 70 | 2.CFT.30111.0 | Δ |
| **.0441** | 1.12 | **1.32** | 33.6 | 11.8 | 9.0 | 3 | **2.76** | 70 | 2.CFT.30112.0 | Δ |
| **.0445** | 1.13 | **1.33** | 33.9 | 11.9 | 9.0 | 3 | **2.76** | 70 | 2.CFT.30113.0 | Δ |
| **.0449** | 1.14 | **1.35** | 34.2 | 12.0 | 9.1 | 3 | **2.76** | 70 | 2.CFT.30114.0 | Δ |
| **.0453** | 1.15 | **1.36** | 34.5 | 12.1 | 9.2 | 3 | **2.76** | 70 | 2.CFT.30115.0 | ■ |
| **.0457** | 1.16 | **1.37** | 34.8 | 12.2 | 9.3 | 3 | **2.76** | 70 | 2.CFT.30116.0 | Δ |
| **.0461** | 1.17 | **1.38** | 35.1 | 12.3 | 9.4 | 3 | **2.76** | 70 | 2.CFT.30117.0 | Δ |
| **.0465** | 1.18 | **1.39** | 35.4 | 12.4 | 9.4 | 3 | **2.76** | 70 | 2.CFT.30118.0 | Δ |
| **.0469** | 1.19 | **1.41** | 35.7 | 12.5 | 9.5 | 3 | **2.76** | 70 | 2.CFT.30119.0 | Δ |
| **.0472** | 1.20 | **1.42** | 36.0 | 12.6 | 9.6 | 3 | **2.76** | 70 | 2.CFT.30120.0 | ■ |

| Complementary products | |
|---|---|
| CrazyDrill Flexpilot Titanium | p.112 |
| CrazyDrill Crosspilot | p.146 |

# Titanium - 30 x d

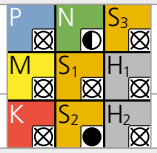
## DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | | |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 5 \| **16** | 40 \| **131** | 20 \| **66** | 40 \| **131** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 5 \| **16** | 20 \| **66** | 20 \| **66** | 30 \| **98** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 5 \| **16** | 20 \| **66** | 20 \| **66** | 40 \| **131** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





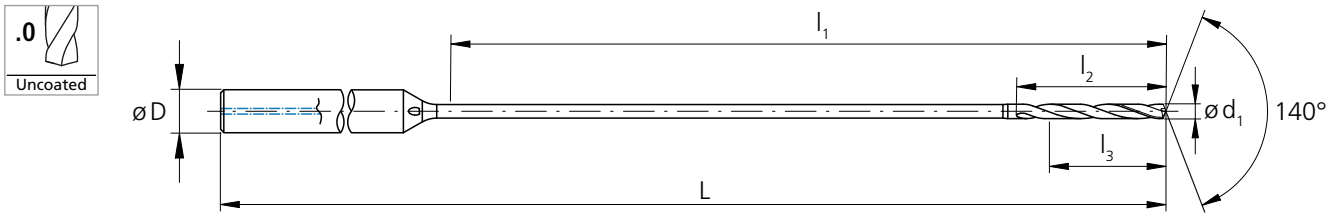

**f** [mm/rev] | **[IPR]**

| $Q_1$ | $Q_x$ | Ød1 0.1 mm \| .004" f | 0.2 mm \| .008" f | 0.3 mm \| .012" f | 0.4 mm \| .016" f | 0.6 mm \| .024" f | 0.8 mm \| .032" f | 1.0–1.2 mm \| .039"–.047" f |
|---|---|---|---|---|---|---|---|---|
| | | Recommended: CrazyDrill Flex Steel 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex Steel 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex Steel 30 x d1 | | | | | | |
| 2xd1 | 0.5xd1 | 0.005 **.00020** | 0.010 **.00039** | 0.015 **.00059** | 0.020 **.00079** | 0.030 **.00118** | 0.040 **.00157** | 0.060 **.00236** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex Steel 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| 2xd1 | 0.25xd1 | 0.001 **.00004** | 0.002 **.00008** | 0.003 **.00012** | 0.004 **.00016** | 0.006 **.00024** | 0.008 **.00031** | 0.012 **.00047** |
| 2xd1 | 0.25xd1 | 0.002 **.00006** | 0.003 **.00012** | 0.005 **.00018** | 0.006 **.00024** | 0.009 **.00035** | 0.012 **.00047** | 0.018 **.00071** |
| | | Recommended: CrazyDrill Flex SST-Inox 30 x d1 | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

CRAZYDRILL™ by Mikron Tool Flex TITANIUM

# Titanium - 50 x d

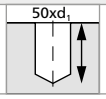
## DRILLING WITH INTEGRATED COOLING




| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **.0118** | 0.30 | **.591** | 15.0 | 3.2 | 2.4 | 3 | **2.09** | 53 | 2.CFT.50030.IK.0 | ■ |
| **.0122** | 0.31 | **.610** | 15.5 | 3.3 | 2.5 | 3 | **2.09** | 53 | 2.CFT.50031.IK.0 | Δ |
| **.0126** | 0.32 | **.630** | 16.0 | 3.4 | 2.6 | 3 | **2.09** | 53 | 2.CFT.50032.IK.0 | Δ |
| **.0130** | 0.33 | **.650** | 16.5 | 3.5 | 2.6 | 3 | **2.09** | 53 | 2.CFT.50033.IK.0 | Δ |
| **.0134** | 0.34 | **.669** | 17.0 | 3.6 | 2.7 | 3 | **2.09** | 53 | 2.CFT.50034.IK.0 | Δ |
| **.0138** | 0.35 | **.689** | 17.5 | 3.7 | 2.8 | 3 | **2.36** | 60 | 2.CFT.50035.IK.0 | ■ |
| **.0142** | 0.36 | **.709** | 18.0 | 3.8 | 2.9 | 3 | **2.36** | 60 | 2.CFT.50036.IK.0 | Δ |
| **.0146** | 0.37 | **.728** | 18.5 | 3.9 | 3.0 | 3 | **2.36** | 60 | 2.CFT.50037.IK.0 | Δ |
| **.0150** | 0.38 | **.748** | 19.0 | 4.0 | 3.0 | 3 | **2.36** | 60 | 2.CFT.50038.IK.0 | Δ |
| **.0154** | 0.39 | **.768** | 19.5 | 4.1 | 3.1 | 3 | **2.36** | 60 | 2.CFT.50039.IK.0 | Δ |
| **.0157** | 0.40 | **.787** | 20.0 | 4.2 | 3.2 | 3 | **2.36** | 60 | 2.CFT.50040.IK.0 | ■ |
| **.0161** | 0.41 | **.807** | 20.5 | 4.3 | 3.3 | 3 | **2.36** | 60 | 2.CFT.50041.IK.0 | Δ |
| **.0165** | 0.42 | **.827** | 21.0 | 4.4 | 3.4 | 3 | **2.36** | 60 | 2.CFT.50042.IK.0 | Δ |
| **.0169** | 0.43 | **.846** | 21.5 | 4.5 | 3.4 | 3 | **2.36** | 60 | 2.CFT.50043.IK.0 | Δ |
| **.0173** | 0.44 | **.866** | 22.0 | 4.6 | 3.5 | 3 | **2.36** | 60 | 2.CFT.50044.IK.0 | Δ |
| **.0177** | 0.45 | **.886** | 22.5 | 4.7 | 3.6 | 3 | **2.36** | 60 | 2.CFT.50045.IK.0 | ■ |
| **.0181** | 0.46 | **.906** | 23.0 | 4.8 | 3.7 | 3 | **2.36** | 60 | 2.CFT.50046.IK.0 | Δ |
| **.0185** | 0.47 | **.925** | 23.5 | 4.9 | 3.8 | 3 | **2.36** | 60 | 2.CFT.50047.IK.0 | Δ |
| **.0189** | 0.48 | **.945** | 24.0 | 5.0 | 3.8 | 3 | **2.36** | 60 | 2.CFT.50048.IK.0 | Δ |
| **.0193** | 0.49 | **.965** | 24.5 | 5.1 | 3.9 | 3 | **2.36** | 60 | 2.CFT.50049.IK.0 | Δ |
| **.0197** | 0.50 | **.984** | 25.0 | 5.3 | 4.0 | 3 | **2.52** | 64 | 2.CFT.50050.IK.0 | ■ |
| **.0201** | 0.51 | **1.00** | 25.5 | 5.4 | 4.1 | 3 | **2.52** | 64 | 2.CFT.50051.IK.0 | Δ |
| **.0205** | 0.52 | **1.02** | 26.0 | 5.5 | 4.2 | 3 | **2.52** | 64 | 2.CFT.50052.IK.0 | Δ |
| **.0209** | 0.53 | **1.04** | 26.5 | 5.6 | 4.2 | 3 | **2.52** | 64 | 2.CFT.50053.IK.0 | Δ |

| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **.0213** | 0.54 | **1.06** | 27.0 | 5.7 | 4.3 | 3 | **2.52** | 64 | 2.CFT.50054.IK.0 | Δ |
| **.0217** | 0.55 | **1.08** | 27.5 | 5.8 | 4.4 | 3 | **2.52** | 64 | 2.CFT.50055.IK.0 | ■ |
| **.0220** | 0.56 | **1.10** | 28.0 | 5.9 | 4.5 | 3 | **2.52** | 64 | 2.CFT.50056.IK.0 | Δ |
| **.0224** | 0.57 | **1.12** | 28.5 | 6.0 | 4.6 | 3 | **2.52** | 64 | 2.CFT.50057.IK.0 | Δ |
| **.0228** | 0.58 | **1.14** | 29.0 | 6.1 | 4.6 | 3 | **2.52** | 64 | 2.CFT.50058.IK.0 | Δ |
| **.0232** | 0.59 | **1.16** | 29.5 | 6.2 | 4.7 | 3 | **2.52** | 64 | 2.CFT.50059.IK.0 | Δ |
| **.0236** | 0.60 | **1.18** | 30.0 | 6.3 | 4.8 | 3 | **2.76** | 70 | 2.CFT.50060.IK.0 | ■ |
| **.0240** | 0.61 | **1.20** | 30.5 | 6.4 | 4.9 | 3 | **2.76** | 70 | 2.CFT.50061.IK.0 | Δ |
| **.0244** | 0.62 | **1.22** | 31.0 | 6.5 | 5.0 | 3 | **2.76** | 70 | 2.CFT.50062.IK.0 | Δ |
| **.0248** | 0.63 | **1.24** | 31.5 | 6.6 | 5.0 | 3 | **2.76** | 70 | 2.CFT.50063.IK.0 | Δ |
| **.0252** | 0.64 | **1.26** | 32.0 | 6.7 | 5.1 | 3 | **2.76** | 70 | 2.CFT.50064.IK.0 | Δ |
| **.0256** | 0.65 | **1.28** | 32.5 | 6.8 | 5.2 | 3 | **2.76** | 70 | 2.CFT.50065.IK.0 | ■ |
| **.0260** | 0.66 | **1.30** | 33.0 | 6.9 | 5.3 | 3 | **2.76** | 70 | 2.CFT.50066.IK.0 | Δ |
| **.0264** | 0.67 | **1.32** | 33.5 | 7.0 | 5.4 | 3 | **2.76** | 70 | 2.CFT.50067.IK.0 | Δ |
| **.0268** | 0.68 | **1.34** | 34.0 | 7.1 | 5.4 | 3 | **2.76** | 70 | 2.CFT.50068.IK.0 | Δ |
| **.0272** | 0.69 | **1.36** | 34.5 | 7.2 | 5.5 | 3 | **2.76** | 70 | 2.CFT.50069.IK.0 | Δ |
| **.0276** | 0.70 | **1.38** | 35.0 | 7.4 | 5.6 | 3 | **2.95** | 75 | 2.CFT.50070.IK.0 | ■ |
| **.0280** | 0.71 | **1.40** | 35.5 | 7.5 | 5.7 | 3 | **2.95** | 75 | 2.CFT.50071.IK.0 | Δ |
| **.0283** | 0.72 | **1.42** | 36.0 | 7.6 | 5.8 | 3 | **2.95** | 75 | 2.CFT.50072.IK.0 | Δ |
| **.0287** | 0.73 | **1.44** | 36.5 | 7.7 | 5.8 | 3 | **2.95** | 75 | 2.CFT.50073.IK.0 | Δ |
| **.0291** | 0.74 | **1.46** | 37.0 | 7.8 | 5.9 | 3 | **2.95** | 75 | 2.CFT.50074.IK.0 | Δ |
| **.0295** | 0.75 | **1.48** | 37.5 | 7.9 | 6.0 | 3 | **2.95** | 75 | 2.CFT.50075.IK.0 | ■ |
| **.0299** | 0.76 | **1.50** | 38.0 | 8.0 | 6.1 | 3 | **2.95** | 75 | 2.CFT.50076.IK.0 | Δ |
| **.0303** | 0.77 | **1.52** | 38.5 | 8.1 | 6.2 | 3 | **2.95** | 75 | 2.CFT.50077.IK.0 | Δ |

■ Stock item
Δ Delivery term upon request, minumum purchase order quantity 5 pcs.

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.012" - .047"** (0.3 - 1.2 mm) | |
| Tolerance | **- .00012"** | - 0.003 mm |
| | **- .00024"** | - 0.006 mm |



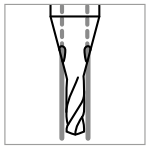
| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **.0307** | 0.78 | **1.54** | 39.0 | 8.2 | 6.2 | 3 | **2.95** | 75 | 2.CFT.50078.IK.0 | Δ |
| **.0311** | 0.79 | **1.56** | 39.5 | 8.3 | 6.3 | 3 | **2.95** | 75 | 2.CFT.50079.IK.0 | Δ |
| **.0315** | 0.80 | **1.57** | 40.0 | 8.4 | 6.4 | 3 | **3.15** | 80 | 2.CFT.50080.IK.0 | ■ |
| **.0319** | 0.81 | **1.59** | 40.5 | 8.5 | 6.5 | 3 | **3.15** | 80 | 2.CFT.50081.IK.0 | Δ |
| **.0323** | 0.82 | **1.61** | 41.0 | 8.6 | 6.6 | 3 | **3.15** | 80 | 2.CFT.50082.IK.0 | Δ |
| **.0327** | 0.83 | **1.63** | 41.5 | 8.7 | 6.6 | 3 | **3.15** | 80 | 2.CFT.50083.IK.0 | Δ |
| **.0331** | 0.84 | **1.65** | 42.0 | 8.8 | 6.7 | 3 | **3.15** | 80 | 2.CFT.50084.IK.0 | Δ |
| **.0335** | 0.85 | **1.67** | 42.5 | 8.9 | 6.8 | 3 | **3.15** | 80 | 2.CFT.50085.IK.0 | ■ |
| **.0339** | 0.86 | **1.69** | 43.0 | 9.0 | 6.9 | 3 | **3.15** | 80 | 2.CFT.50086.IK.0 | Δ |
| **.0343** | 0.87 | **1.71** | 43.5 | 9.1 | 7.0 | 3 | **3.15** | 80 | 2.CFT.50087.IK.0 | Δ |
| **.0346** | 0.88 | **1.73** | 44.0 | 9.2 | 7.0 | 3 | **3.15** | 80 | 2.CFT.50088.IK.0 | Δ |
| **.0350** | 0.89 | **1.75** | 44.5 | 9.3 | 7.1 | 3 | **3.15** | 80 | 2.CFT.50089.IK.0 | Δ |
| **.0354** | 0.90 | **1.77** | 45.0 | 9.5 | 7.2 | 3 | **3.35** | 85 | 2.CFT.50090.IK.0 | ■ |
| **.0358** | 0.91 | **1.79** | 45.5 | 9.6 | 7.3 | 3 | **3.35** | 80 | 2.CFT.50091.IK.0 | Δ |
| **.0362** | 0.92 | **1.81** | 46.0 | 9.7 | 7.4 | 3 | **3.35** | 80 | 2.CFT.50092.IK.0 | Δ |
| **.0366** | 0.93 | **1.83** | 46.5 | 9.8 | 7.4 | 3 | **3.35** | 85 | 2.CFT.50093.IK.0 | Δ |
| **.0370** | 0.94 | **1.85** | 47.0 | 9.9 | 7.5 | 3 | **3.35** | 70 | 2.CFT.50094.IK.0 | Δ |
| **.0374** | 0.95 | **1.87** | 47.5 | 10.0 | 7.6 | 3 | **3.35** | 70 | 2.CFT.50095.IK.0 | ■ |
| **.0378** | 0.96 | **1.89** | 48.0 | 10.1 | 7.7 | 3 | **3.35** | 70 | 2.CFT.50096.IK.0 | Δ |
| **.0382** | 0.97 | **1.91** | 48.5 | 10.2 | 7.8 | 3 | **3.35** | 85 | 2.CFT.50097.IK.0 | Δ |
| **.0386** | 0.98 | **1.93** | 49.0 | 10.3 | 7.8 | 3 | **3.35** | 85 | 2.CFT.50098.IK.0 | Δ |
| **.0390** | 0.99 | **1.95** | 49.5 | 10.4 | 7.9 | 3 | **3.35** | 85 | 2.CFT.50099.IK.0 | Δ |
| **.0394** | 1.00 | **1.97** | 50.0 | 10.5 | 8.0 | 3 | **3.54** | 90 | 2.CFT.50100.IK.0 | ■ |
| **.0398** | 1.01 | **1.99** | 50.5 | 10.6 | 8.1 | 3 | **3.54** | 90 | 2.CFT.50101.IK.0 | Δ |

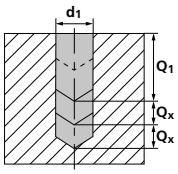
| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **.0402** | 1.02 | **2.01** | 51.0 | 10.7 | 8.2 | 3 | **3.54** | 90 | 2.CFT.50102.IK.0 | Δ |
| **.0406** | 1.03 | **2.03** | 51.5 | 10.8 | 8.2 | 3 | **3.54** | 90 | 2.CFT.50103.IK.0 | Δ |
| **.0409** | 1.04 | **2.05** | 52.0 | 10.9 | 8.3 | 3 | **3.54** | 90 | 2.CFT.50104.IK.0 | Δ |
| **.0413** | 1.05 | **2.07** | 52.5 | 11.0 | 8.4 | 3 | **3.54** | 90 | 2.CFT.50105.IK.0 | ■ |
| **.0417** | 1.06 | **2.09** | 53.0 | 11.1 | 8.5 | 3 | **3.54** | 90 | 2.CFT.50106.IK.0 | Δ |
| **.0421** | 1.07 | **2.11** | 53.5 | 11.2 | 8.6 | 3 | **3.54** | 90 | 2.CFT.50107.IK.0 | Δ |
| **.0425** | 1.08 | **2.13** | 54.0 | 11.3 | 8.6 | 3 | **3.54** | 90 | 2.CFT.50108.IK.0 | Δ |
| **.0429** | 1.09 | **2.15** | 54.5 | 11.4 | 8.7 | 3 | **3.54** | 90 | 2.CFT.50109.IK.0 | Δ |
| **.0433** | 1.10 | **2.17** | 55.0 | 11.6 | 8.8 | 3 | **3.74** | 95 | 2.CFT.50110.IK.0 | ■ |
| **.0437** | 1.11 | **2.19** | 55.5 | 11.7 | 8.9 | 3 | **3.74** | 95 | 2.CFT.50111.IK.0 | Δ |
| **.0441** | 1.12 | **2.20** | 56.0 | 11.8 | 9.0 | 3 | **3.74** | 95 | 2.CFT.50112.IK.0 | Δ |
| **.0445** | 1.13 | **2.22** | 56.5 | 11.9 | 9.0 | 3 | **3.74** | 95 | 2.CFT.50113.IK.0 | Δ |
| **.0449** | 1.14 | **2.24** | 57.0 | 12.0 | 9.1 | 3 | **3.74** | 95 | 2.CFT.50114.IK.0 | Δ |
| **.0453** | 1.15 | **2.26** | 57.5 | 12.1 | 9.2 | 3 | **3.74** | 95 | 2.CFT.50115.IK.0 | ■ |
| **.0457** | 1.16 | **2.28** | 58.0 | 12.2 | 9.3 | 3 | **3.74** | 95 | 2.CFT.50116.IK.0 | Δ |
| **.0461** | 1.17 | **2.30** | 58.5 | 12.3 | 9.4 | 3 | **3.74** | 95 | 2.CFT.50117.IK.0 | Δ |
| **.0465** | 1.18 | **2.32** | 59.0 | 12.4 | 9.4 | 3 | **3.74** | 95 | 2.CFT.50118.IK.0 | Δ |
| **.0469** | 1.19 | **2.34** | 59.5 | 12.5 | 9.5 | 3 | **3.74** | 95 | 2.CFT.50119.IK.0 | Δ |
| **.0472** | 1.20 | **2.36** | 60.0 | 12.6 | 9.6 | 3 | **3.74** | 95 | 2.CFT.50120.IK.0 | ■ |

| Complementary products | |
|---|---|
| CrazyDrill Flexpilot Titanium | p.112 |
| CrazyDrill Crosspilot | p.146 |

# Titanium - 50 x d

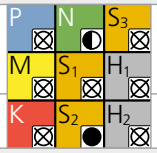
## DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | | |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | | | | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | | | | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | | | | |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 5 \| **16** | 40 \| **131** | 20 \| **66** | 40 \| **131** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | | | | |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | | | | |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 5 \| **16** | 20 \| **66** | 20 \| **66** | 30 \| **98** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 5 \| **16** | 20 \| **66** | 20 \| **66** | 40 \| **131** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | | | | |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



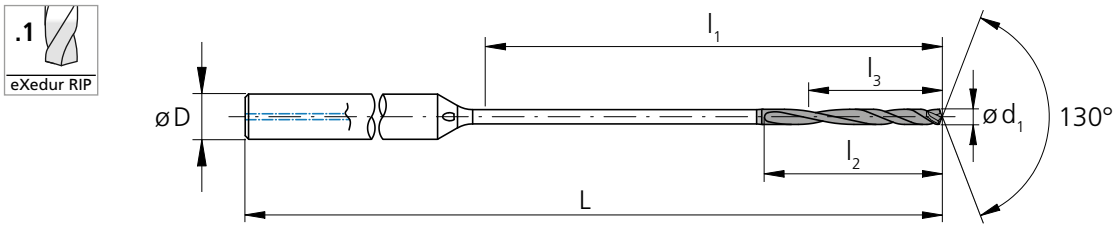



| | | **f** [mm/rev] **\| [IPR]** | | | | |
|---|---|---|---|---|---|---|
| **$Q_1$** | **$Q_x$** | **Ød1** | | | | |
| | | 0.3 mm **\| .012"** | 0.4 mm **\| .016"** | 0.6 mm **\| .024"** | 0.8 mm **\| .032"** | 1.0–1.2 mm **\| .039"–.047"** |
| | | **f** | **f** | **f** | **f** | **f** |
| | | Recommended: CrazyDrill Flex Steel 50 x d1 | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | |
| | | Recommended: CrazyDrill Flex Steel 50 x d1 | | | | |
| | | Recommended: CrazyDrill Flex Steel 50 x d1 | | | | |
| 2xd1 | 0.5xd1 | 0.015 **.00059** | 0.020 **.00079** | 0.030 **.00118** | 0.040 **.00157** | 0.060 **.00236** |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | |
| | | Recommended: CrazyDrill Flex Steel 50 x d1 | | | | |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | |
| 2xd1 | 0.25xd1 | 0.003 **.00012** | 0.004 **.00016** | 0.006 **.00024** | 0.008 **.00031** | 0.012 **.00047** |
| 2xd1 | 0.25xd1 | 0.005 **.00018** | 0.006 **.00024** | 0.009 **.00035** | 0.012 **.00047** | 0.018 **.00071** |
| | | Recommended: CrazyDrill Flex SST-Inox 50 x d1 | | | | |
| | | | | | | |
| | | | | | | |

CRAZYDRILL™ by Mikron Tool Flex SST-INOX

# SST-Inox - 30 x d

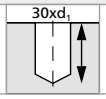
## DRILLING WITH INTEGRATED COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0079** | 0.20 | **.236** | 6.0 | 2.0 | 1.6 | 3 | **1.77** | 45 | 2.CFI.30020.IK.1 | ■ |
| | **.0083** | 0.21 | **.248** | 6.3 | 2.1 | 1.7 | 3 | **1.77** | 45 | 2.CFI.30021.IK.1 | Δ |
| | **.0087** | 0.22 | **.260** | 6.6 | 2.2 | 1.8 | 3 | **1.77** | 45 | 2.CFI.30022.IK.1 | Δ |
| | **.0091** | 0.23 | **.272** | 6.9 | 2.3 | 1.8 | 3 | **1.77** | 45 | 2.CFI.30023.IK.1 | Δ |
| | **.0094** | 0.24 | **.283** | 7.2 | 2.4 | 1.9 | 3 | **1.77** | 45 | 2.CFI.30024.IK.1 | Δ |
| | **.0098** | 0.25 | **.295** | 7.5 | 2.5 | 2.0 | 3 | **1.77** | 45 | 2.CFI.30025.IK.1 | ■ |
| | **.0102** | 0.26 | **.307** | 7.8 | 2.5 | 2.1 | 3 | **1.77** | 45 | 2.CFI.30026.IK.1 | Δ |
| | **.0106** | 0.27 | **.319** | 8.1 | 2.6 | 2.2 | 3 | **1.77** | 45 | 2.CFI.30027.IK.1 | Δ |
| | **.0110** | 0.28 | **.331** | 8.4 | 2.7 | 2.2 | 3 | **1.77** | 45 | 2.CFI.30028.IK.1 | Δ |
| | **.0114** | 0.29 | **.343** | 8.7 | 2.8 | 2.3 | 3 | **1.77** | 45 | 2.CFI.30029.IK.1 | Δ |
| | **.0118** | 0.30 | **.354** | 9.0 | 2.9 | 2.4 | 3 | **1.97** | 50 | 2.CFI.30030.IK.1 | ■ |
| | **.0122** | 0.31 | **.366** | 9.3 | 3.0 | 2.5 | 3 | **1.97** | 50 | 2.CFI.30031.IK.1 | Δ |
| | **.0126** | 0.32 | **.378** | 9.6 | 3.1 | 2.6 | 3 | **1.97** | 50 | 2.CFI.30032.IK.1 | Δ |
| | **.0130** | 0.33 | **.390** | 9.9 | 3.2 | 2.6 | 3 | **1.97** | 50 | 2.CFI.30033.IK.1 | Δ |
| | **.0134** | 0.34 | **.402** | 10.2 | 3.3 | 2.7 | 3 | **1.97** | 50 | 2.CFI.30034.IK.1 | Δ |
| | **.0138** | 0.35 | **.413** | 10.5 | 3.4 | 2.8 | 3 | **1.97** | 50 | 2.CFI.30035.IK.1 | ■ |
| | **.0142** | 0.36 | **.425** | 10.8 | 3.5 | 2.9 | 3 | **1.97** | 50 | 2.CFI.30036.IK.1 | Δ |
| | **.0146** | 0.37 | **.437** | 11.1 | 3.6 | 3.0 | 3 | **1.97** | 50 | 2.CFI.30037.IK.1 | Δ |
| | **.0150** | 0.38 | **.449** | 11.4 | 3.7 | 3.0 | 3 | **1.97** | 50 | 2.CFI.30038.IK.1 | Δ |
| | **.0154** | 0.39 | **.461** | 11.7 | 3.8 | 3.1 | 3 | **1.97** | 50 | 2.CFI.30039.IK.1 | Δ |
| **1/64** | **.0156** | 0.396 | **.472** | 12.0 | 3.9 | 3.2 | 3 | **1.97** | 50 | 2.CFI.30F164.IK.1 | ◪ |
| | **.0157** | 0.40 | **.472** | 12.0 | 3.9 | 3.2 | 3 | **1.97** | 50 | 2.CFI.30040.IK.1 | ■ |
| | **.0161** | 0.41 | **.484** | 12.3 | 4.0 | 3.3 | 3 | **1.97** | 50 | 2.CFI.30041.IK.1 | Δ |
| | **.0165** | 0.42 | **.496** | 12.6 | 4.1 | 3.4 | 3 | **1.97** | 50 | 2.CFI.30042.IK.1 | Δ |
| | **.0169** | 0.43 | **.508** | 12.9 | 4.2 | 3.4 | 3 | **1.97** | 50 | 2.CFI.30043.IK.1 | Δ |
| | **.0173** | 0.44 | **.520** | 13.2 | 4.3 | 3.5 | 3 | **1.97** | 50 | 2.CFI.30044.IK.1 | Δ |
| | **.0177** | 0.45 | **.531** | 13.5 | 4.4 | 3.6 | 3 | **1.97** | 50 | 2.CFI.30045.IK.1 | ■ |
| | **.0181** | 0.46 | **.543** | 13.8 | 4.5 | 3.7 | 3 | **1.97** | 50 | 2.CFI.30046.IK.1 | Δ |
| | **.0185** | 0.47 | **.555** | 14.1 | 4.6 | 3.8 | 3 | **1.97** | 50 | 2.CFI.30047.IK.1 | Δ |
| | **.0189** | 0.48 | **.567** | 14.4 | 4.7 | 3.8 | 3 | **1.97** | 50 | 2.CFI.30048.IK.1 | Δ |
| | **.0193** | 0.49 | **.579** | 14.7 | 4.8 | 3.9 | 3 | **1.97** | 50 | 2.CFI.30049.IK.1 | Δ |
| | **.0197** | 0.50 | **.591** | 15.0 | 4.9 | 4.0 | 3 | **2.09** | 53 | 2.CFI.30050.IK.1 | ■ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0201** | 0.51 | **.602** | 15.3 | 5.0 | 4.1 | 3 | **2.09** | 53 | 2.CFI.30051.IK.1 | Δ |
| | **.0205** | 0.52 | **.614** | 15.6 | 5.1 | 4.2 | 3 | **2.09** | 53 | 2.CFI.30052.IK.1 | Δ |
| | **.0209** | 0.53 | **.626** | 15.9 | 5.2 | 4.2 | 3 | **2.09** | 53 | 2.CFI.30053.IK.1 | Δ |
| | **.0213** | 0.54 | **.638** | 16.2 | 5.3 | 4.3 | 3 | **2.09** | 53 | 2.CFI.30054.IK.1 | Δ |
| | **.0217** | 0.55 | **.650** | 16.5 | 5.4 | 4.4 | 3 | **2.09** | 53 | 2.CFI.30055.IK.1 | ■ |
| | **.0220** | 0.56 | **.661** | 16.8 | 5.5 | 4.5 | 3 | **2.09** | 53 | 2.CFI.30056.IK.1 | Δ |
| | **.0224** | 0.57 | **.673** | 17.1 | 5.6 | 4.6 | 3 | **2.09** | 53 | 2.CFI.30057.IK.1 | Δ |
| | **.0228** | 0.58 | **.685** | 17.4 | 5.7 | 4.6 | 3 | **2.09** | 53 | 2.CFI.30058.IK.1 | Δ |
| | **.0232** | 0.59 | **.697** | 17.7 | 5.8 | 4.7 | 3 | **2.09** | 53 | 2.CFI.30059.IK.1 | Δ |
| | **.0236** | 0.60 | **.709** | 18.0 | 5.9 | 4.8 | 3 | **2.09** | 53 | 2.CFI.30060.IK.1 | ■ |
| | **.0240** | 0.61 | **.720** | 18.3 | 6.0 | 4.9 | 3 | **2.09** | 53 | 2.CFI.30061.IK.1 | Δ |
| | **.0244** | 0.62 | **.732** | 18.6 | 6.1 | 5.0 | 3 | **2.09** | 53 | 2.CFI.30062.IK.1 | Δ |
| | **.0248** | 0.63 | **.744** | 18.9 | 6.2 | 5.0 | 3 | **2.09** | 53 | 2.CFI.30063.IK.1 | Δ |
| | **.0252** | 0.64 | **.756** | 19.2 | 6.3 | 5.1 | 3 | **2.09** | 53 | 2.CFI.30064.IK.1 | Δ |
| | **.0256** | 0.65 | **.768** | 19.5 | 6.4 | 5.2 | 3 | **2.09** | 53 | 2.CFI.30065.IK.1 | ■ |
| | **.0260** | 0.66 | **.780** | 19.8 | 6.5 | 5.3 | 3 | **2.09** | 53 | 2.CFI.30066.IK.1 | Δ |
| | **.0264** | 0.67 | **.791** | 20.1 | 6.6 | 5.4 | 3 | **2.09** | 53 | 2.CFI.30067.IK.1 | Δ |
| | **.0268** | 0.68 | **.803** | 20.4 | 6.7 | 5.4 | 3 | **2.09** | 53 | 2.CFI.30068.IK.1 | Δ |
| | **.0272** | 0.69 | **.815** | 20.7 | 6.8 | 5.5 | 3 | **2.09** | 53 | 2.CFI.30069.IK.1 | Δ |
| | **.0276** | 0.70 | **.827** | 21.0 | 6.9 | 5.6 | 3 | **2.36** | 60 | 2.CFI.30070.IK.1 | ■ |
| | **.0280** | 0.71 | **.839** | 21.3 | 7.0 | 5.7 | 3 | **2.36** | 60 | 2.CFI.30071.IK.1 | Δ |
| | **.0283** | 0.72 | **.850** | 21.6 | 7.1 | 5.8 | 3 | **2.36** | 60 | 2.CFI.30072.IK.1 | Δ |
| | **.0287** | 0.73 | **.862** | 21.9 | 7.2 | 5.8 | 3 | **2.36** | 60 | 2.CFI.30073.IK.1 | Δ |
| | **.0291** | 0.74 | **.874** | 22.2 | 7.3 | 5.9 | 3 | **2.36** | 60 | 2.CFI.30074.IK.1 | Δ |
| | **.0295** | 0.75 | **.886** | 22.5 | 7.4 | 6.0 | 3 | **2.36** | 60 | 2.CFI.30075.IK.1 | ■ |
| | **.0299** | 0.76 | **.898** | 22.8 | 7.4 | 6.1 | 3 | **2.36** | 60 | 2.CFI.30076.IK.1 | Δ |
| | **.0303** | 0.77 | **.909** | 23.1 | 7.5 | 6.2 | 3 | **2.36** | 60 | 2.CFI.30077.IK.1 | Δ |
| | **.0307** | 0.78 | **.921** | 23.4 | 7.6 | 6.2 | 3 | **2.36** | 60 | 2.CFI.30078.IK.1 | Δ |
| | **.0311** | 0.79 | **.933** | 23.7 | 7.7 | 6.3 | 3 | **2.36** | 60 | 2.CFI.30079.IK.1 | Δ |
| **1/32** | **.0312** | 0.793 | **.945** | 24.0 | 7.8 | 6.4 | 3 | **2.36** | 60 | 2.CFI.30F132.IK.1 | ◪ |
| | **.0315** | 0.80 | **.945** | 24.0 | 7.8 | 6.4 | 3 | **2.36** | 60 | 2.CFI.30080.IK.1 | ■ |
| | **.0319** | 0.81 | **.957** | 24.3 | 7.9 | 6.5 | 3 | **2.36** | 60 | 2.CFI.30081.IK.1 | Δ |

■ Stock item
Δ Delivery term upon request, minumum purchase order quantity 5 pcs.

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| | | |
|---|---|---|
| Ø $d_1$ | **.008" - .079"** (0.2 - 2.0 mm) | |
| Tolerance | **- .00012"**<br>**- .00024"** | - 0.003 mm<br>- 0.006 mm |



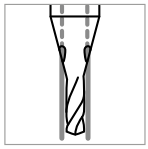
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0323** | 0.82 | **.969** | 24.6 | 8.0 | 6.6 | 3 | **2.36** | 60 | 2.CFI.30082.IK.1 | Δ |
| | **.0327** | 0.83 | **.980** | 24.9 | 8.1 | 6.6 | 3 | **2.36** | 60 | 2.CFI.30083.IK.1 | Δ |
| | **.0331** | 0.84 | **.992** | 25.2 | 8.2 | 6.7 | 3 | **2.36** | 60 | 2.CFI.30084.IK.1 | Δ |
| | **.0335** | 0.85 | **1.00** | 25.5 | 8.3 | 6.8 | 3 | **2.52** | 64 | 2.CFI.30085.IK.1 | ■ |
| | **.0339** | 0.86 | **1.02** | 25.8 | 8.4 | 6.9 | 3 | **2.52** | 64 | 2.CFI.30086.IK.1 | Δ |
| | **.0343** | 0.87 | **1.03** | 26.1 | 8.5 | 7.0 | 3 | **2.52** | 64 | 2.CFI.30087.IK.1 | Δ |
| | **.0346** | 0.88 | **1.04** | 26.4 | 8.6 | 7.0 | 3 | **2.52** | 64 | 2.CFI.30088.IK.1 | Δ |
| | **.0350** | 0.89 | **1.05** | 26.7 | 8.7 | 7.1 | 3 | **2.52** | 64 | 2.CFI.30089.IK.1 | Δ |
| | **.0354** | 0.90 | **1.06** | 27.0 | 8.8 | 7.2 | 3 | **2.52** | 64 | 2.CFI.30090.IK.1 | ■ |
| | **.0358** | 0.91 | **1.07** | 27.3 | 8.9 | 7.3 | 3 | **2.52** | 64 | 2.CFI.30091.IK.1 | Δ |
| | **.0362** | 0.92 | **1.09** | 27.6 | 9.0 | 7.4 | 3 | **2.52** | 64 | 2.CFI.30092.IK.1 | Δ |
| | **.0366** | 0.93 | **1.10** | 27.9 | 9.1 | 7.4 | 3 | **2.52** | 64 | 2.CFI.30093.IK.1 | Δ |
| | **.0370** | 0.94 | **1.11** | 28.2 | 9.2 | 7.5 | 3 | **2.52** | 64 | 2.CFI.30094.IK.1 | Δ |
| | **.0374** | 0.95 | **1.12** | 28.5 | 9.3 | 7.6 | 3 | **2.52** | 64 | 2.CFI.30095.IK.1 | ■ |
| | **.0378** | 0.96 | **1.13** | 28.8 | 9.4 | 7.7 | 3 | **2.52** | 64 | 2.CFI.30096.IK.1 | Δ |
| | **.0382** | 0.97 | **1.15** | 29.1 | 9.5 | 7.8 | 3 | **2.52** | 64 | 2.CFI.30097.IK.1 | Δ |
| | **.0386** | 0.98 | **1.16** | 29.4 | 9.6 | 7.8 | 3 | **2.52** | 64 | 2.CFI.30098.IK.1 | Δ |
| | **.0390** | 0.99 | **1.17** | 29.7 | 9.7 | 7.9 | 3 | **2.52** | 64 | 2.CFI.30099.IK.1 | Δ |
| | **.0394** | 1.00 | **1.18** | 30.0 | 9.8 | 8.0 | 3 | **2.76** | 70 | 2.CFI.30100.IK.1 | ■ |
| | **.0398** | 1.01 | **1.19** | 30.3 | 9.9 | 8.1 | 3 | **2.76** | 70 | 2.CFI.30101.IK.1 | Δ |
| | **.0402** | 1.02 | **1.20** | 30.6 | 10.0 | 8.2 | 3 | **2.76** | 70 | 2.CFI.30102.IK.1 | Δ |
| | **.0406** | 1.03 | **1.22** | 30.9 | 10.1 | 8.2 | 3 | **2.76** | 70 | 2.CFI.30103.IK.1 | Δ |
| | **.0409** | 1.04 | **1.23** | 31.2 | 10.2 | 8.3 | 3 | **2.76** | 70 | 2.CFI.30104.IK.1 | Δ |
| | **.0413** | 1.05 | **1.24** | 31.5 | 10.3 | 8.4 | 3 | **2.76** | 70 | 2.CFI.30105.IK.1 | ■ |
| | **.0417** | 1.06 | **1.25** | 31.8 | 10.4 | 8.5 | 3 | **2.76** | 70 | 2.CFI.30106.IK.1 | Δ |
| | **.0421** | 1.07 | **1.26** | 32.1 | 10.5 | 8.6 | 3 | **2.76** | 70 | 2.CFI.30107.IK.1 | Δ |
| | **.0425** | 1.08 | **1.28** | 32.4 | 10.6 | 8.6 | 3 | **2.76** | 70 | 2.CFI.30108.IK.1 | Δ |
| | **.0429** | 1.09 | **1.29** | 32.7 | 10.7 | 8.7 | 3 | **2.76** | 70 | 2.CFI.30109.IK.1 | Δ |
| | **.0433** | 1.10 | **1.30** | 33.0 | 10.8 | 8.8 | 3 | **2.76** | 70 | 2.CFI.30110.IK.1 | ■ |
| | **.0437** | 1.11 | **1.31** | 33.3 | 10.9 | 8.9 | 3 | **2.76** | 70 | 2.CFI.30111.IK.1 | Δ |
| | **.0441** | 1.12 | **1.32** | 33.6 | 11.0 | 9.0 | 3 | **2.76** | 70 | 2.CFI.30112.IK.1 | Δ |
| | **.0445** | 1.13 | **1.33** | 33.9 | 11.1 | 9.0 | 3 | **2.76** | 70 | 2.CFI.30113.IK.1 | Δ |

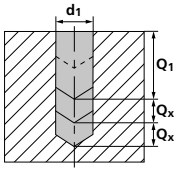
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0449** | 1.14 | **1.35** | 34.2 | 11.2 | 9.1 | 3 | **2.76** | 70 | 2.CFI.30114.IK.1 | Δ |
| | **.0453** | 1.15 | **1.36** | 34.5 | 11.3 | 9.2 | 3 | **2.76** | 70 | 2.CFI.30115.IK.1 | ■ |
| | **.0457** | 1.16 | **1.37** | 34.8 | 11.4 | 9.3 | 3 | **2.76** | 70 | 2.CFI.30116.IK.1 | Δ |
| | **.0461** | 1.17 | **1.38** | 35.1 | 11.5 | 9.4 | 3 | **2.76** | 70 | 2.CFI.30117.IK.1 | Δ |
| | **.0465** | 1.18 | **1.39** | 35.4 | 11.6 | 9.4 | 3 | **2.76** | 70 | 2.CFI.30118.IK.1 | Δ |
| | **.0469** | 1.19 | **1.41** | 35.7 | 11.7 | 9.5 | 3 | **2.76** | 70 | 2.CFI.30119.IK.1 | Δ |
| | **.0472** | 1.20 | **1.42** | 36.0 | 11.8 | 9.6 | 3 | **2.76** | 70 | 2.CFI.30120.IK.1 | ■ |
| | **.0492** | 1.25 | **1.48** | 37.5 | 12.3 | 10.0 | 4 | **2.95** | 75 | 2.CFI.30125.IK.1 | ■ |
| | **.0512** | 1.30 | **1.54** | 39.0 | 12.7 | 10.4 | 4 | **2.95** | 75 | 2.CFI.30130.IK.1 | ■ |
| | **.0531** | 1.35 | **1.59** | 40.5 | 13.2 | 10.8 | 4 | **2.95** | 75 | 2.CFI.30135.IK.1 | ■ |
| | **.0551** | 1.40 | **1.65** | 42.0 | 13.7 | 11.2 | 4 | **3.15** | 80 | 2.CFI.30140.IK.1 | ■ |
| | **.0571** | 1.45 | **1.71** | 43.5 | 14.2 | 11.6 | 4 | **3.35** | 85 | 2.CFI.30145.IK.1 | ■ |
| | **.0591** | 1.50 | **1.77** | 45.0 | 14.7 | 12.0 | 4 | **3.35** | 85 | 2.CFI.30150.IK.1 | ■ |
| | **.0610** | 1.55 | **1.83** | 46.5 | 15.2 | 12.4 | 4 | **3.35** | 85 | 2.CFI.30155.IK.1 | ■ |
| **1/16** | **.0625** | 1.587 | **1.89** | 48.0 | 15.7 | 12.8 | 4 | **3.35** | 85 | 2.CFI.30F116.IK.1 | ■ |
| | **.0630** | 1.60 | **1.89** | 48.0 | 15.7 | 12.8 | 4 | **3.35** | 85 | 2.CFI.30160.IK.1 | ■ |
| | **.0650** | 1.65 | **1.95** | 49.5 | 16.2 | 13.2 | 4 | **3.35** | 85 | 2.CFI.30165.IK.1 | ■ |
| | **.0669** | 1.70 | **2.01** | 51.0 | 16.7 | 13.6 | 4 | **3.54** | 90 | 2.CFI.30170.IK.1 | ■ |
| | **.0689** | 1.75 | **2.07** | 52.5 | 17.2 | 14.0 | 4 | **3.54** | 90 | 2.CFI.30175.IK.1 | ■ |
| | **.0709** | 1.80 | **2.13** | 54.0 | 17.6 | 14.4 | 4 | **3.54** | 90 | 2.CFI.30180.IK.1 | ■ |
| | **.0728** | 1.85 | **2.19** | 55.5 | 18.1 | 14.8 | 4 | **3.74** | 95 | 2.CFI.30185.IK.1 | ■ |
| | **.0748** | 1.90 | **2.24** | 57.0 | 18.6 | 15.2 | 4 | **3.74** | 95 | 2.CFI.30190.IK.1 | ■ |
| | **.0768** | 1.95 | **2.30** | 58.5 | 19.1 | 15.6 | 4 | **3.94** | 100 | 2.CFI.30195.IK.1 | ■ |
| | **.0787** | 2.00 | **2.36** | 60.0 | 19.6 | 16.0 | 4 | **3.94** | 100 | 2.CFI.30200.IK.1 | ■ |

| Complementary products | |
|---|---|
| CrazyDrill Pilot SST-Inox | p.122 |
| CrazyDrill Crosspilot | p.146 |

# SST-Inox - 30 x d

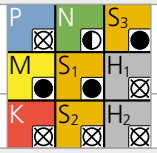
## DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | | |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 15 \| 49 | 35 \| 115 | 35 \| 115 | 40 \| 131 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 15 \| 49 | 30 \| 98 | 35 \| 115 | 40 \| 131 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 15 \| 49 | 30 \| 98 | 35 \| 115 | 40 \| 131 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 15 \| 49 | 30 \| 98 | 35 \| 115 | 40 \| 131 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 15 \| 49 | 30 \| 98 | 35 \| 115 | 60 \| 197 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 15 \| 49 | 30 \| 98 | 35 \| 115 | 60 \| 197 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 10 \| 33 | 20 \| 66 | 20 \| 66 | 30 \| 98 |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 15 \| 49 | 30 \| 98 | 30 \| 98 | 40 \| 131 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



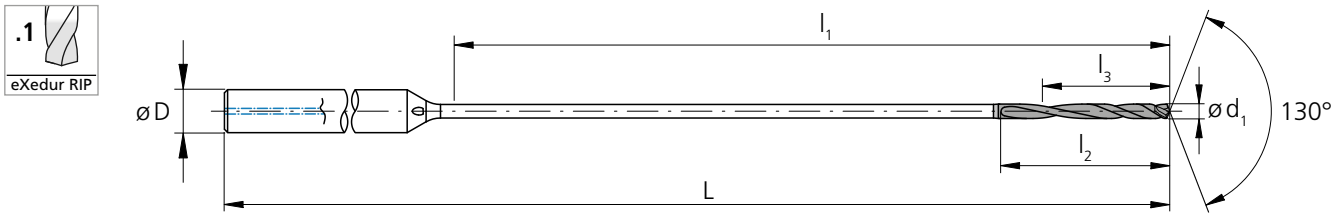



**f** [mm/rev] | **[IPR]**

| $Q_1$ | $Q_x$ | 0.2 mm \| **.008"** | 0.4 mm \| **.016"** | 0.6 mm \| **.024"** | Ød1 0.8 mm \| **.032"** | 1.0 mm \| **.039"** | 1.5 mm \| **.059"** | 2.0 mm \| **.079"** |
|---|---|---|---|---|---|---|---|---|
| | | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| | | Recommended: CrazyDrill Flex Steel 30 x d1 | | | | | | |
| 2xd1 | 0.5xd1 | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** | 0.060 **.0024** |
| 2xd1 | 0.5xd1 | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** | 0.060 **.0024** |
| 2xd1 | 0.5xd1 | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** | 0.060 **.0024** |
| 2xd1 | 0.5xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** |
| | | Recommended: CrazyDrill Flex Steel 30 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex Steel 30 x d1 | | | | | | |
| 2xd1 | 0.5xd1 | 0.040 **.0016** | 0.045 **.0018** | 0.050 **.0020** | 0.060 **.0024** | 0.070 **.0028** | 0.080 **.0031** | 0.100 **.0039** |
| 2xd1 | 0.5xd1 | 0.040 **.0016** | 0.045 **.0018** | 0.050 **.0020** | 0.060 **.0024** | 0.070 **.0028** | 0.080 **.0031** | 0.100 **.0039** |
| | | Recommended: CrazyDrill Flex Steel 30 x d1 | | | | | | |
| 2xd1 | 0.2xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** |
| | | Recommended: CrazyDrill Flex Titanium 30 x d1 | | | | | | |
| 2xd1 | 0.5xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** |
| | | | | | | | | |
| | | | | | | | | |

# SST-Inox - 50 x d

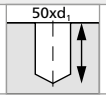
## DRILLING WITH INTEGRATED COOLING




| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0118** | 0.30 | **.591** | 15.0 | 2.9 | 2.4 | 3 | **2.09** | 53 | 2.CFI.50030.IK.1 | ■ |
| | **.0122** | 0.31 | **.610** | 15.5 | 3.0 | 2.5 | 3 | **2.09** | 53 | 2.CFI.50031.IK.1 | Δ |
| | **.0126** | 0.32 | **.630** | 16.0 | 3.1 | 2.6 | 3 | **2.09** | 53 | 2.CFI.50032.IK.1 | Δ |
| | **.0130** | 0.33 | **.650** | 16.5 | 3.2 | 2.6 | 3 | **2.09** | 53 | 2.CFI.50033.IK.1 | Δ |
| | **.0134** | 0.34 | **.669** | 17.0 | 3.3 | 2.7 | 3 | **2.09** | 53 | 2.CFI.50034.IK.1 | Δ |
| | **.0138** | 0.35 | **.689** | 17.5 | 3.4 | 2.8 | 3 | **2.36** | 60 | 2.CFI.50035.IK.1 | ■ |
| | **.0142** | 0.36 | **.709** | 18.0 | 3.5 | 2.9 | 3 | **2.36** | 60 | 2.CFI.50036.IK.1 | Δ |
| | **.0146** | 0.37 | **.728** | 18.5 | 3.6 | 3.0 | 3 | **2.36** | 60 | 2.CFI.50037.IK.1 | Δ |
| | **.0150** | 0.38 | **.748** | 19.0 | 3.7 | 3.0 | 3 | **2.36** | 60 | 2.CFI.50038.IK.1 | Δ |
| | **.0154** | 0.39 | **.768** | 19.5 | 3.8 | 3.1 | 3 | **2.36** | 60 | 2.CFI.50039.IK.1 | Δ |
| **1/64** | **.0156** | 0.396 | **.787** | 20.0 | 3.9 | 3.2 | 3 | **2.36** | 60 | 2.CFI.50F164.IK.1 | ■ |
| | **.0157** | 0.40 | **.787** | 20.0 | 3.9 | 3.2 | 3 | **2.36** | 60 | 2.CFI.50040.IK.1 | ■ |
| | **.0161** | 0.41 | **.807** | 20.5 | 4.0 | 3.3 | 3 | **2.36** | 60 | 2.CFI.50041.IK.1 | Δ |
| | **.0165** | 0.42 | **.827** | 21.0 | 4.1 | 3.4 | 3 | **2.36** | 60 | 2.CFI.50042.IK.1 | Δ |
| | **.0169** | 0.43 | **.846** | 21.5 | 4.2 | 3.4 | 3 | **2.36** | 60 | 2.CFI.50043.IK.1 | Δ |
| | **.0173** | 0.44 | **.866** | 22.0 | 4.3 | 3.5 | 3 | **2.36** | 60 | 2.CFI.50044.IK.1 | Δ |
| | **.0177** | 0.45 | **.886** | 22.5 | 4.4 | 3.6 | 3 | **2.36** | 60 | 2.CFI.50045.IK.1 | ■ |
| | **.0181** | 0.46 | **.906** | 23.0 | 4.5 | 3.7 | 3 | **2.36** | 60 | 2.CFI.50046.IK.1 | Δ |
| | **.0185** | 0.47 | **.925** | 23.5 | 4.6 | 3.8 | 3 | **2.36** | 60 | 2.CFI.50047.IK.1 | Δ |
| | **.0189** | 0.48 | **.945** | 24.0 | 4.7 | 3.8 | 3 | **2.36** | 60 | 2.CFI.50048.IK.1 | Δ |
| | **.0193** | 0.49 | **.965** | 24.5 | 4.8 | 3.9 | 3 | **2.36** | 60 | 2.CFI.50049.IK.1 | Δ |
| | **.0197** | 0.50 | **.984** | 25.0 | 4.9 | 4.0 | 3 | **2.52** | 64 | 2.CFI.50050.IK.1 | ■ |
| | **.0201** | 0.51 | **1.00** | 25.5 | 5.0 | 4.1 | 3 | **2.52** | 64 | 2.CFI.50051.IK.1 | Δ |
| | **.0205** | 0.52 | **1.02** | 26.0 | 5.1 | 4.2 | 3 | **2.52** | 64 | 2.CFI.50052.IK.1 | Δ |
| | **.0209** | 0.53 | **1.04** | 26.5 | 5.2 | 4.2 | 3 | **2.52** | 64 | 2.CFI.50053.IK.1 | Δ |
| | **.0213** | 0.54 | **1.06** | 27.0 | 5.3 | 4.3 | 3 | **2.52** | 64 | 2.CFI.50054.IK.1 | Δ |
| | **.0217** | 0.55 | **1.08** | 27.5 | 5.4 | 4.4 | 3 | **2.52** | 64 | 2.CFI.50055.IK.1 | ■ |
| | **.0220** | 0.56 | **1.10** | 28.0 | 5.5 | 4.5 | 3 | **2.52** | 64 | 2.CFI.50056.IK.1 | Δ |
| | **.0224** | 0.57 | **1.12** | 28.5 | 5.6 | 4.6 | 3 | **2.52** | 64 | 2.CFI.50057.IK.1 | Δ |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0228** | 0.58 | **1.14** | 29.0 | 5.7 | 4.6 | 3 | **2.52** | 64 | 2.CFI.50058.IK.1 | Δ |
| | **.0232** | 0.59 | **1.16** | 29.5 | 5.8 | 4.7 | 3 | **2.52** | 64 | 2.CFI.50059.IK.1 | Δ |
| | **.0236** | 0.60 | **1.18** | 30.0 | 5.9 | 4.8 | 3 | **2.76** | 70 | 2.CFI.50060.IK.1 | ■ |
| | **.0240** | 0.61 | **1.20** | 30.5 | 6.0 | 4.9 | 3 | **2.76** | 70 | 2.CFI.50061.IK.1 | Δ |
| | **.0244** | 0.62 | **1.22** | 31.0 | 6.1 | 5.0 | 3 | **2.76** | 70 | 2.CFI.50062.IK.1 | Δ |
| | **.0248** | 0.63 | **1.24** | 31.5 | 6.2 | 5.0 | 3 | **2.76** | 70 | 2.CFI.50063.IK.1 | Δ |
| | **.0252** | 0.64 | **1.26** | 32.0 | 6.3 | 5.1 | 3 | **2.76** | 70 | 2.CFI.50064.IK.1 | Δ |
| | **.0256** | 0.65 | **1.28** | 32.5 | 6.4 | 5.2 | 3 | **2.76** | 70 | 2.CFI.50065.IK.1 | ■ |
| | **.0260** | 0.66 | **1.30** | 33.0 | 6.5 | 5.3 | 3 | **2.76** | 70 | 2.CFI.50066.IK.1 | Δ |
| | **.0264** | 0.67 | **1.32** | 33.5 | 6.6 | 5.4 | 3 | **2.76** | 70 | 2.CFI.50067.IK.1 | Δ |
| | **.0268** | 0.68 | **1.34** | 34.0 | 6.7 | 5.4 | 3 | **2.76** | 70 | 2.CFI.50068.IK.1 | Δ |
| | **.0272** | 0.69 | **1.36** | 34.5 | 6.8 | 5.5 | 3 | **2.76** | 70 | 2.CFI.50069.IK.1 | Δ |
| | **.0276** | 0.70 | **1.38** | 35.0 | 6.9 | 5.6 | 3 | **2.95** | 75 | 2.CFI.50070.IK.1 | ■ |
| | **.0280** | 0.71 | **1.40** | 35.5 | 7.0 | 5.7 | 3 | **2.95** | 75 | 2.CFI.50071.IK.1 | Δ |
| | **.0283** | 0.72 | **1.42** | 36.0 | 7.1 | 5.8 | 3 | **2.95** | 75 | 2.CFI.50072.IK.1 | Δ |
| | **.0287** | 0.73 | **1.44** | 36.5 | 7.2 | 5.8 | 3 | **2.95** | 75 | 2.CFI.50073.IK.1 | Δ |
| | **.0291** | 0.74 | **1.46** | 37.0 | 7.3 | 5.9 | 3 | **2.95** | 75 | 2.CFI.50074.IK.1 | Δ |
| | **.0295** | 0.75 | **1.48** | 37.5 | 7.4 | 6.0 | 3 | **2.95** | 75 | 2.CFI.50075.IK.1 | ■ |
| | **.0299** | 0.76 | **1.50** | 38.0 | 7.4 | 6.1 | 3 | **2.95** | 75 | 2.CFI.50076.IK.1 | Δ |
| | **.0303** | 0.77 | **1.52** | 38.5 | 7.5 | 6.2 | 3 | **2.95** | 75 | 2.CFI.50077.IK.1 | Δ |
| | **.0307** | 0.78 | **1.54** | 39.0 | 7.6 | 6.2 | 3 | **2.95** | 75 | 2.CFI.50078.IK.1 | Δ |
| | **.0311** | 0.79 | **1.56** | 39.5 | 7.7 | 6.3 | 3 | **2.95** | 75 | 2.CFI.50079.IK.1 | Δ |
| **1/32** | **.0312** | 0.793 | **1.57** | 40.0 | 7.8 | 6.4 | 3 | **3.15** | 80 | 2.CFI.50F132.IK.1 | ■ |
| | **.0315** | 0.80 | **1.57** | 40.0 | 7.8 | 6.4 | 3 | **3.15** | 80 | 2.CFI.50080.IK.1 | ■ |
| | **.0319** | 0.81 | **1.59** | 40.5 | 7.9 | 6.5 | 3 | **3.15** | 80 | 2.CFI.50081.IK.1 | Δ |
| | **.0323** | 0.82 | **1.61** | 41.0 | 8.0 | 6.6 | 3 | **3.15** | 80 | 2.CFI.50082.IK.1 | Δ |
| | **.0327** | 0.83 | **1.63** | 41.5 | 8.1 | 6.6 | 3 | **3.15** | 80 | 2.CFI.50083.IK.1 | Δ |
| | **.0331** | 0.84 | **1.65** | 42.0 | 8.2 | 6.7 | 3 | **3.15** | 80 | 2.CFI.50084.IK.1 | Δ |
| | **.0335** | 0.85 | **1.67** | 42.5 | 8.3 | 6.8 | 3 | **3.15** | 80 | 2.CFI.50085.IK.1 | ■ |

■ Stock item
Δ Delivery term upon request, minumum purchase order quantity 5 pcs.

| Carbide |   |   | Z2 |  |
|---|---|---|---|---|

| Ø $d_1$ | **.012" - .079"** (0.3 - 2.0 mm) | |
|---|---|---|
| Tolerance | **- .00012"**<br>**- .00024"** | - 0.003 mm<br>- 0.006 mm |



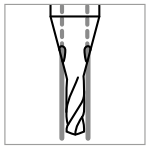
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0339** | 0.86 | **1.69** | 43.0 | 8.4 | 6.9 | 3 | **3.15** | 80 | 2.CFI.50086.IK.1 | Δ |
| | **.0343** | 0.87 | **1.71** | 43.5 | 8.5 | 7.0 | 3 | **3.15** | 80 | 2.CFI.50087.IK.1 | Δ |
| | **.0346** | 0.88 | **1.73** | 44.0 | 8.6 | 7.0 | 3 | **3.15** | 80 | 2.CFI.50088.IK.1 | Δ |
| | **.0350** | 0.89 | **1.75** | 44.5 | 8.7 | 7.1 | 3 | **3.15** | 80 | 2.CFI.50089.IK.1 | Δ |
| | **.0354** | 0.90 | **1.77** | 45.0 | 8.8 | 7.2 | 3 | **3.35** | 85 | 2.CFI.50090.IK.1 | ■ |
| | **.0358** | 0.91 | **1.79** | 45.5 | 8.9 | 7.3 | 3 | **3.35** | 80 | 2.CFI.50091.IK.1 | Δ |
| | **.0362** | 0.92 | **1.81** | 46.0 | 9.0 | 7.4 | 3 | **3.35** | 80 | 2.CFI.50092.IK.1 | Δ |
| | **.0366** | 0.93 | **1.83** | 46.5 | 9.1 | 7.4 | 3 | **3.35** | 85 | 2.CFI.50093.IK.1 | Δ |
| | **.0370** | 0.94 | **1.85** | 47.0 | 9.2 | 7.5 | 3 | **3.35** | 70 | 2.CFI.50094.IK.1 | Δ |
| | **.0374** | 0.95 | **1.87** | 47.5 | 9.3 | 7.6 | 3 | **3.35** | 70 | 2.CFI.50095.IK.1 | ■ |
| | **.0378** | 0.96 | **1.89** | 48.0 | 9.4 | 7.7 | 3 | **3.35** | 70 | 2.CFI.50096.IK.1 | Δ |
| | **.0382** | 0.97 | **1.91** | 48.5 | 9.5 | 7.8 | 3 | **3.35** | 85 | 2.CFI.50097.IK.1 | Δ |
| | **.0386** | 0.98 | **1.93** | 49.0 | 9.6 | 7.8 | 3 | **3.35** | 85 | 2.CFI.50098.IK.1 | Δ |
| | **.0390** | 0.99 | **1.95** | 49.5 | 9.7 | 7.9 | 3 | **3.35** | 85 | 2.CFI.50099.IK.1 | Δ |
| | **.0394** | 1.00 | **1.97** | 50.0 | 9.8 | 8.0 | 3 | **3.54** | 90 | 2.CFI.50100.IK.1 | ■ |
| | **.0398** | 1.01 | **1.99** | 50.5 | 9.9 | 8.1 | 3 | **3.54** | 90 | 2.CFI.50101.IK.1 | Δ |
| | **.0402** | 1.02 | **2.01** | 51.0 | 10.0 | 8.2 | 3 | **3.54** | 90 | 2.CFI.50102.IK.1 | Δ |
| | **.0406** | 1.03 | **2.03** | 51.5 | 10.1 | 8.2 | 3 | **3.54** | 90 | 2.CFI.50103.IK.1 | Δ |
| | **.0409** | 1.04 | **2.05** | 52.0 | 10.2 | 8.3 | 3 | **3.54** | 90 | 2.CFI.50104.IK.1 | Δ |
| | **.0413** | 1.05 | **2.07** | 52.5 | 10.3 | 8.4 | 3 | **3.54** | 90 | 2.CFI.50105.IK.1 | ■ |
| | **.0417** | 1.06 | **2.09** | 53.0 | 10.4 | 8.5 | 3 | **3.54** | 90 | 2.CFI.50106.IK.1 | Δ |
| | **.0421** | 1.07 | **2.11** | 53.5 | 10.5 | 8.6 | 3 | **3.54** | 90 | 2.CFI.50107.IK.1 | Δ |
| | **.0425** | 1.08 | **2.13** | 54.0 | 10.6 | 8.6 | 3 | **3.54** | 90 | 2.CFI.50108.IK.1 | Δ |
| | **.0429** | 1.09 | **2.15** | 54.5 | 10.7 | 8.7 | 3 | **3.54** | 90 | 2.CFI.50109.IK.1 | Δ |
| | **.0433** | 1.10 | **2.17** | 55.0 | 10.8 | 8.8 | 3 | **3.74** | 95 | 2.CFI.50110.IK.1 | ■ |
| | **.0437** | 1.11 | **2.19** | 55.5 | 10.9 | 8.9 | 3 | **3.74** | 95 | 2.CFI.50111.IK.1 | Δ |
| | **.0441** | 1.12 | **2.20** | 56.0 | 11.0 | 9.0 | 3 | **3.74** | 95 | 2.CFI.50112.IK.1 | Δ |
| | **.0445** | 1.13 | **2.22** | 56.5 | 11.1 | 9.0 | 3 | **3.74** | 95 | 2.CFI.50113.IK.1 | Δ |
| | **.0449** | 1.14 | **2.24** | 57.0 | 11.2 | 9.1 | 3 | **3.74** | 95 | 2.CFI.50114.IK.1 | Δ |

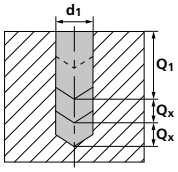
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $l_3$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0453** | 1.15 | **2.26** | 57.5 | 11.3 | 9.2 | 3 | **3.74** | 95 | 2.CFI.50115.IK.1 | ■ |
| | **.0457** | 1.16 | **2.28** | 58.0 | 11.4 | 9.3 | 3 | **3.74** | 95 | 2.CFI.50116.IK.1 | Δ |
| | **.0461** | 1.17 | **2.30** | 58.5 | 11.5 | 9.4 | 3 | **3.74** | 95 | 2.CFI.50117.IK.1 | Δ |
| | **.0465** | 1.18 | **2.32** | 59.0 | 11.6 | 9.4 | 3 | **3.74** | 95 | 2.CFI.50118.IK.1 | Δ |
| | **.0469** | 1.19 | **2.34** | 59.5 | 11.7 | 9.5 | 3 | **3.74** | 95 | 2.CFI.50119.IK.1 | Δ |
| | **.0472** | 1.20 | **2.36** | 60.0 | 11.8 | 9.6 | 3 | **3.74** | 95 | 2.CFI.50120.IK.1 | ■ |
| | **.0492** | 1.25 | **2.46** | 62.5 | 12.3 | 10.0 | 4 | **4.13** | 105 | 2.CFI.50125.IK.1 | ◪ |
| | **.0512** | 1.30 | **2.56** | 65.0 | 12.7 | 10.4 | 4 | **4.13** | 105 | 2.CFI.50130.IK.1 | ◪ |
| | **.0531** | 1.35 | **2.66** | 67.5 | 13.2 | 10.8 | 4 | **4.13** | 105 | 2.CFI.50135.IK.1 | ◪ |
| | **.0551** | 1.40 | **2.76** | 70.0 | 13.7 | 11.2 | 4 | **4.33** | 110 | 2.CFI.50140.IK.1 | ◪ |
| | **.0571** | 1.45 | **2.85** | 72.5 | 14.2 | 11.6 | 4 | **4.53** | 115 | 2.CFI.50145.IK.1 | ◪ |
| | **.0591** | 1.50 | **2.95** | 75.0 | 14.7 | 12.0 | 4 | **4.53** | 115 | 2.CFI.50150.IK.1 | ◪ |
| | **.0610** | 1.55 | **3.05** | 77.5 | 15.2 | 12.4 | 4 | **4.53** | 115 | 2.CFI.50155.IK.1 | ◪ |
| **1/16** | **.0625** | 1.587 | **3.15** | 80.0 | 15.7 | 12.8 | 4 | **4.72** | 120 | 2.CFI.50F116.IK.1 | ◪ |
| | **.0630** | 1.60 | **3.15** | 80.0 | 15.7 | 12.8 | 4 | **4.72** | 120 | 2.CFI.50160.IK.1 | ◪ |
| | **.0650** | 1.65 | **3.25** | 82.5 | 16.2 | 13.2 | 4 | **4.72** | 120 | 2.CFI.50165.IK.1 | ◪ |
| | **.0669** | 1.70 | **3.35** | 85.0 | 16.7 | 13.6 | 4 | **4.92** | 125 | 2.CFI.50170.IK.1 | ◪ |
| | **.0689** | 1.75 | **3.44** | 87.5 | 17.2 | 14.0 | 4 | **5.12** | 130 | 2.CFI.50175.IK.1 | ◪ |
| | **.0709** | 1.80 | **3.54** | 90.0 | 17.6 | 14.4 | 4 | **5.12** | 130 | 2.CFI.50180.IK.1 | ◪ |
| | **.0728** | 1.85 | **3.64** | 92.5 | 18.1 | 14.8 | 4 | **5.31** | 135 | 2.CFI.50185.IK.1 | ◪ |
| | **.0748** | 1.90 | **3.74** | 95.0 | 18.6 | 15.2 | 4 | **5.31** | 135 | 2.CFI.50190.IK.1 | ◪ |
| | **.0768** | 1.95 | **3.84** | 97.5 | 19.1 | 15.6 | 4 | **5.51** | 140 | 2.CFI.50195.IK.1 | ◪ |
| | **.0787** | 2.00 | **3.94** | 100.0 | 19.6 | 16.0 | 4 | **5.51** | 140 | 2.CFI.50200.IK.1 | ◪ |

| Complementary products | |
|---|---|
| CrazyDrill Pilot SST-Inox | p.122 |
| CrazyDrill Crosspilot | p.146 |

# SST-Inox - 50 x d

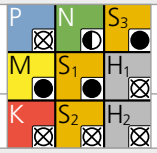
## DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] Ød1 ≤ 0.4 \| .016" Mid | Ød1 ≤ 0.4 \| .016" High | Ød1 > 0.4 \| .016" Mid | Ød1 > 0.4 \| .016" High |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | | |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 15 \| 49 | 35 \| 115 | 35 \| 115 | 40 \| 131 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 15 \| 49 | 30 \| 98 | 35 \| 115 | 40 \| 131 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 15 \| 49 | 30 \| 98 | 35 \| 115 | 40 \| 131 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 15 \| 49 | 30 \| 98 | 35 \| 115 | 40 \| 131 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | | |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 15 \| 49 | 30 \| 98 | 35 \| 115 | 60 \| 197 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 15 \| 49 | 30 \| 98 | 35 \| 115 | 60 \| 197 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | | |
| | | 2.102 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | | | |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 10 \| 33 | 20 \| 66 | 20 \| 66 | 30 \| 98 |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | | | | |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 15 \| 49 | 30 \| 98 | 30 \| 98 | 40 \| 131 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






**f** [mm/rev] | **[IPR]**

| $Q_1$ | $Q_x$ | 0.3 mm \| **.012"** | 0.4 mm \| **.016"** | 0.6 mm \| **.024"** | 0.8 mm \| **.032"** | 1.0 mm \| **.039"** | 1.5 mm \| **.059"** | 2.0 mm \| **.079"** |
|---|---|---|---|---|---|---|---|---|
| | | **f** | **f** | **f** | **f** | **f** | **f** | **f** |
| | | Recommended: CrazyDrill Flex Steel 50x d1 | | | | | | |
| 2xd1 | 0.5xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** |
| 2xd1 | 0.5xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** |
| 2xd1 | 0.5xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** |
| 2xd1 | 0.5xd1 | 0.005 **.0002** | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** |
| | | Recommended: CrazyDrill Flex Steel 50 x d1 | | | | | | |
| | | Recommended: CrazyDrill Flex Steel 50 x d1 | | | | | | |
| 2xd1 | 0.5xd1 | 0.040 **.0016** | 0.045 **.0018** | 0.050 **.0020** | 0.060 **.0024** | 0.070 **.0028** | 0.080 **.0031** | 0.100 **.0039** |
| 2xd1 | 0.5xd1 | 0.040 **.0016** | 0.045 **.0018** | 0.050 **.0020** | 0.060 **.0024** | 0.070 **.0028** | 0.080 **.0031** | 0.100 **.0039** |
| | | Recommended: CrazyDrill Flex Steel 50 x d1 | | | | | | |
| 2xd1 | 0.2xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** |
| | | Recommended: CrazyDrill Flex Titanium 50 x d1 | | | | | | |
| 2xd1 | 0.5xd1 | 0.010 **.0004** | 0.015 **.0006** | 0.020 **.0008** | 0.025 **.0010** | 0.030 **.0012** | 0.040 **.0016** | 0.050 **.0020** |
| | | | | | | | | |
| | | | | | | | | |



# Drilling process CrazyDrill Flex

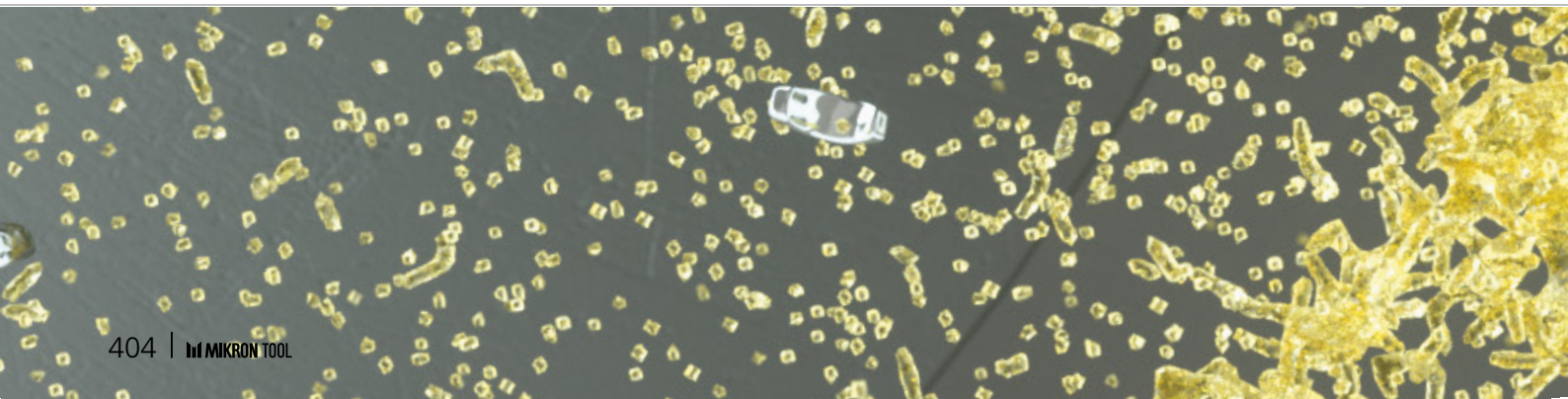
## PRECISE AND EFFICIENT DRILLING FROM Ø .004" (0.1 MM)

### Coolant type, pressure and filtration

**Coolant type:** For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

**Filter:** The large cooling channels allow a standard filter. Filter quality ≤ .002" (0.050 mm).

For tools with external cooling no specific parameters have to be considered concerning filter.



**Coolant pressure:** To ensure a reliable drilling process, the following minimal pressures are needed (see chart). Higher pressure is generally better for the cooling and flushing effect.

| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
|---|---|---|---|
| **Minimal pressure** | [bar] | 15 | 30 |
| | **[psi]** | **218** | **435** |

For tools with external cooling no specific parameters have to be considered concerning coolant pressure. But it must be ensured that the coolant is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical information".



# Drilling process CrazyDrill Flex

## PRECISE AND EFFICIENT DRILLING FROM Ø .004" (0.1 MM)

**CrazyDrill Flex 20 x d, 30 x d, 50 x d**

Mikron Tool recommends pilot drilling for all types of CrazyDrill Flex:

**CrazyDrill Flex SST-Inox**

- **CrazyDrill Pilot SST-Inox** as pilot drill
- **CrazyDrill Crosspilot** as pilot drill on inclined surfaces

**CrazyDrill Flex Steel**

- **CrazyDrill Flexpilot Steel** as pilot drill
- **CrazyDrill Crosspilot** as pilot drill on inclined surfaces

**CrazyDrill Flex Titanium**

- **CrazyDrill Flexpilot Titanium** as pilot drill
- **CrazyDrill Crosspilot** as pilot drill on inclined surfaces

**Pilot drilling and drilling**

Pilot drilling with CrazyDrill Flexpilot / CrazyDrill Pilot SST-Inox is the perfect starting point for accurate drilling (position and alignment accuracy) and a stable machining process. This is also valid for the pilot drill CrazyDrill Crosspilot on inclined surfaces.

The quality of drilling (position and alignment accuracy, no measurable transition from pilot hole to follow-up hole) and a stable machining process are guaranteed by means of a predetermined tool.

## DRILLING PROCESS

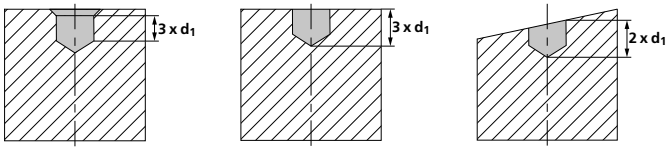
**Drilling as per DIN 66025 / PAL**

G83 deep-drilling cycle with chip break and chip removal (pecks)

Q = depth of the respective peck

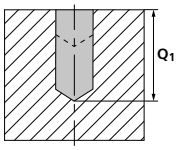
### 1 | PILOT DRILLING

- With CrazyDrill Pilot SST-Inox (straight surfaces) or CrazyDrill Crosspilot (inclined surfaces) for the version CrazyDrill Flex SST-Inox.
- With CrazyDrill Flexpilot Steel resp. Titanium (straight surfaces) or CrazyDrill Crosspilot (inclined surfaces) for the version CrazyDrill Flex Steel resp. Titanium.

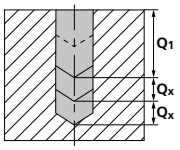



### 2 | DRILLING

- Drilling with CrazyDrill Flex SST-Inox / CrazyDrill Flex Steel / Titanium up to maximum drilling depth $Q_1$ in one step (see cutting data table),with subsequent chip removal.



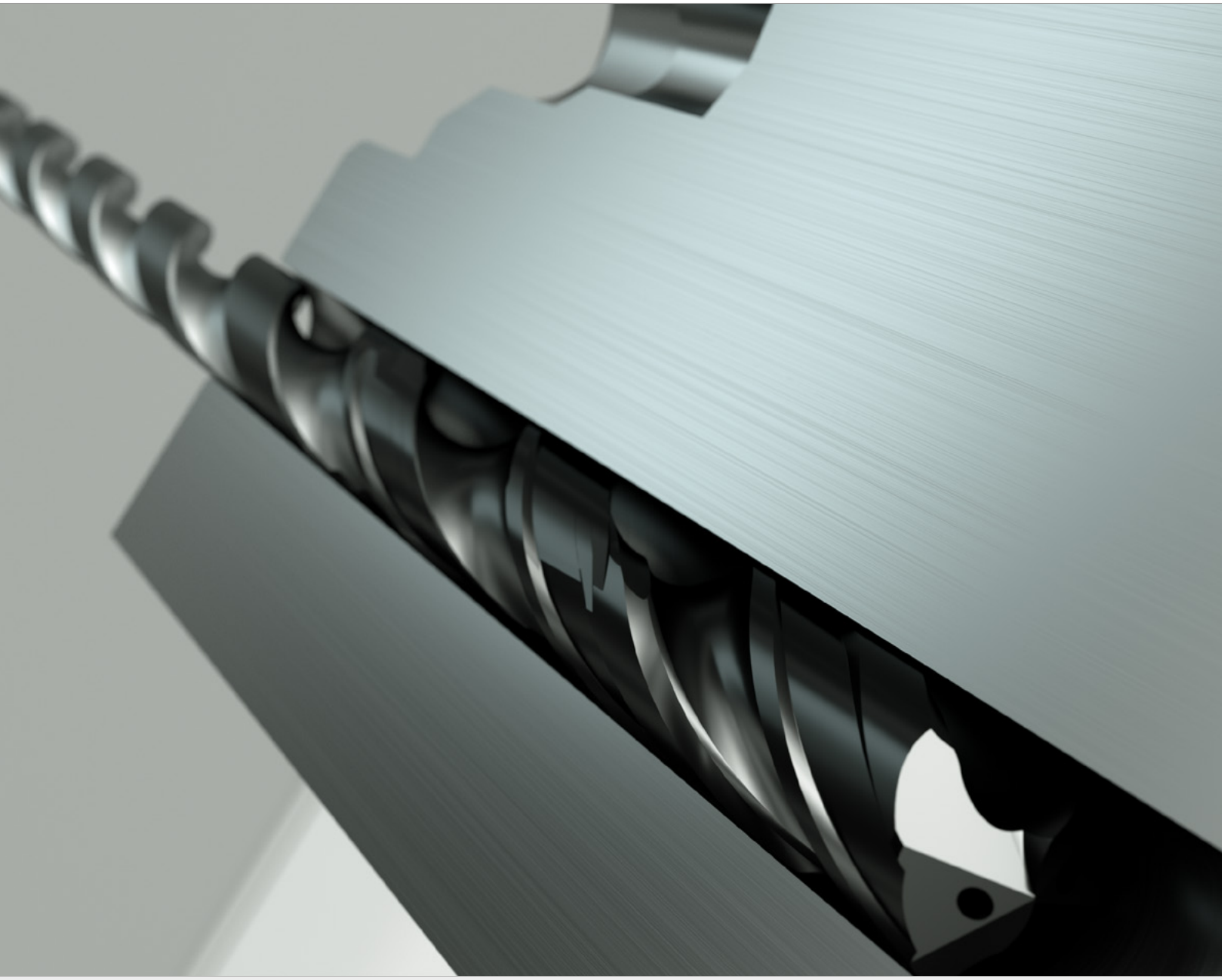

- Further drilling steps $Q_X$ as per cutting data table, with subsequent chip removal.




Note:

Between the drilling steps, the drill may exit completely from the bore. Do not take the drill completely out from the bore in case of resonant vibration. After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

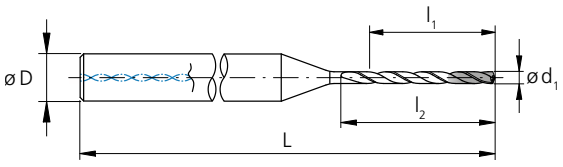
# Customized drills



**Mikron Tool produces solid carbide drills according to your needs and requirements and within the following range:**

## CHARACTERISTICS

- Diameter min.: .0039" (0.1 mm)
- Diameter max.: 1.26" (32.0 mm), please contact us for larger diameters
- Drilling depth max.: 50 x d
- Maximum tool length: 16.34" (415 mm)
- Tool diameter tolerance max.: ± 20 µin (0.5 µm)
- Chamfer and point angle as per customer need
- Step drill: see customer-specific step drill
- Concentricity between shank and diameters max.: ≤ 79 µin (2 µm)
- Number of cutting edges: 1, 2 or 3
- Cutting direction: right-hand drill or left-hand drill
- Conical and cylindrical drill
- Drill material: tungsten carbide, grade selection depending on application




## COATINGS

Various choice according to application

## COOLING

- Drill with internal cooling through holes following the helix up to the drill tip
- Drill with through coolant channels integrated in the shank
- Drill for external coolant supply

## TYPE OF SHAFT

- Cylindrical as per DIN 6535 HA
- Cylindrical as per DIN 6535 HE (Whistle Notch)
- Cylindrical as per DIN 6535 HB (Weldon)
- More upon request

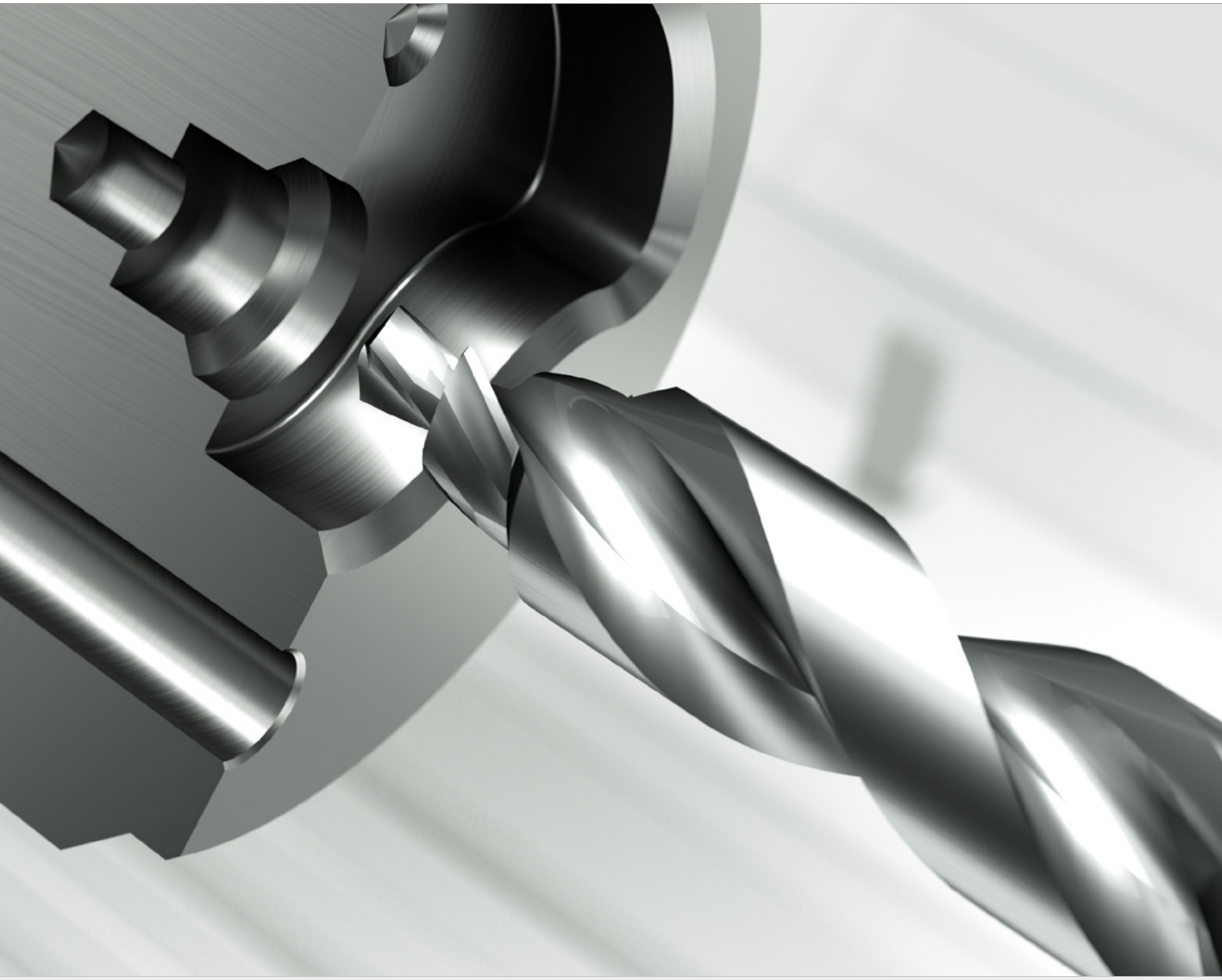
## MATERIAL TO BE MACHINED

Drills for steel, corrosion-resistant steels, i.e. stainless steels, titanium / titanium alloys, super alloys or heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, drills for hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

## TREATMENTS

Cutting edge preparation, polishing of flutes

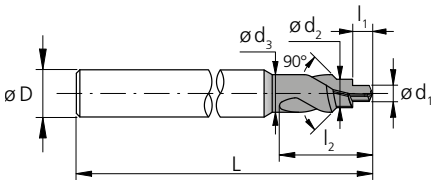
# Customized step drills



**Mikron Tool produces solid carbide step drills according to your needs and requirements and within the following range:**

## CHARACTERISTICS

- Diameter min.: .0039" (0.1 mm)
- Diameter max.: 1.26" (32.0 mm), please contact us for larger diameters
- Drilling depth max.: depending on application
- Maximum tool length: 13" (330 mm)
- Tool diameter tolerance max.: ± 20 µin (0.5 µm)
- Chamfer and point angle as per customer need
- Concentricity between shank and diameters max.: ≤ 79 µin (2 µm)
- Number of cutting edges: 2
- Cutting direction: right-hand drill or left-hand drill
- Shapes: conical drills, cylindrical drills, etc.
- Drill material: tungsten carbide, grade selection depending on application




## COATINGS

Various choice according to application

## COOLING

- Drill with internal cooling through holes following the helix up to the drill tip
- Drill with internal cooling through straight holes in the shaft
- Drill for external coolant supply

## TYPE OF SHAFT

- Cylindrical as per DIN 6535 HA
- Cylindrical as per DIN 6535 HE (Whistle Notch)
- Cylindrical as per DIN 6535 HB (Weldon)
- More upon request

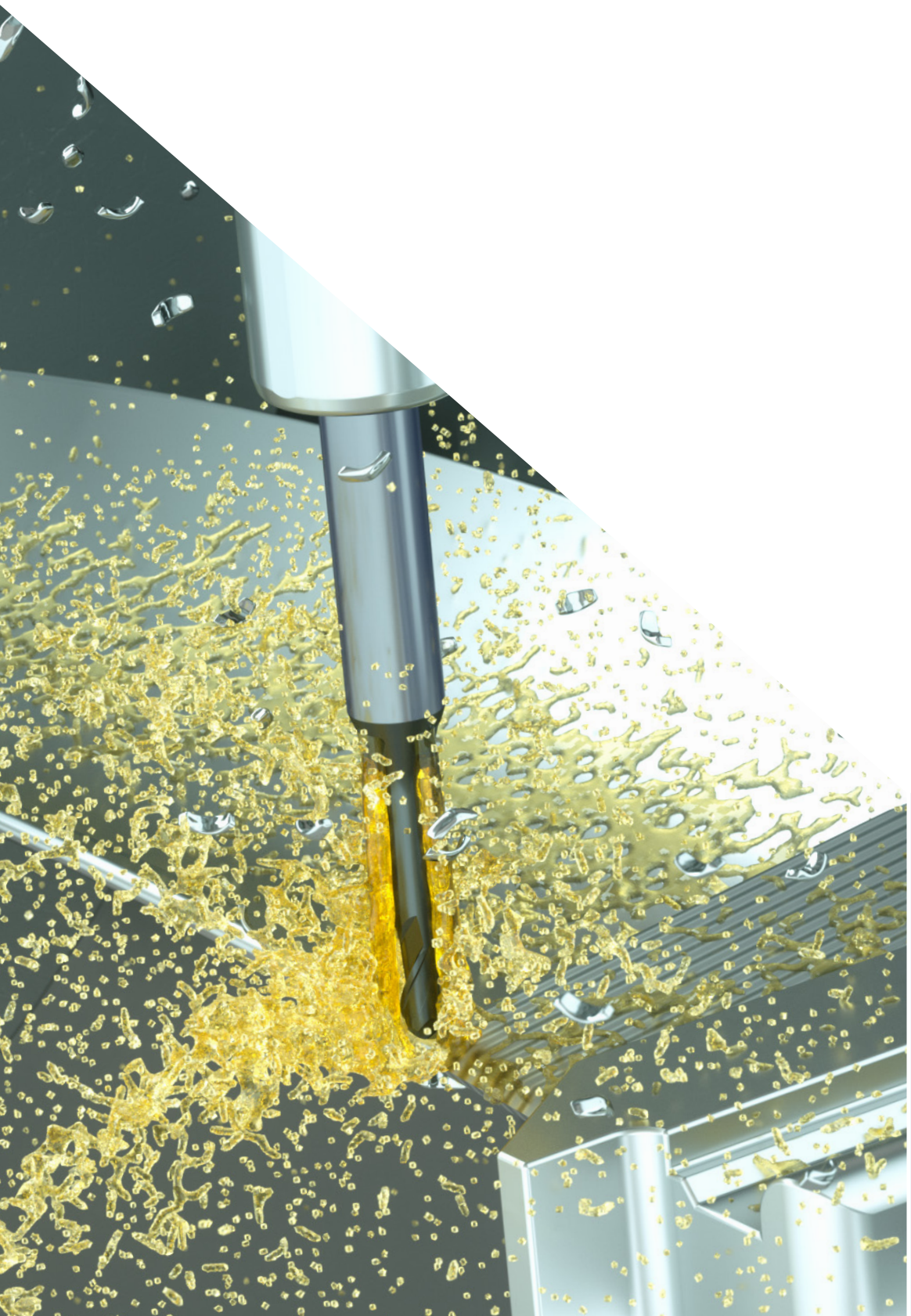
## MATERIAL TO BE MACHINED

Drills for steel, corrosion-resistant steels, i.e. stainless steels, titanium / titanium alloys, super alloys or heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, drills for hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

## TREATMENTS

Cutting edge preparation, polishing of flutes

# crazy about milling



# 07


**OVERVIEW** **414**

CODIFICATION KEY 416

CRAZYMILL COOL MICRO 418
Depth 3 x d, 5 x d
Ø 0.2 mm - 1.0 mm | **.008" – .039"**

CRAZYMILL COOL SQUARE/CORNER RADIUS-Z2 452
Depth 1.5 x d, 3 x d, 5 x d
Ø 0.3 mm - 6.35 mm | **.012" – 1/4"**

CRAZYMILL COOL SQUARE/CORNER RADIUS-Z4 478
Depth 2 x d, 3 x d, 4 x d, 5 x d
Ø 1 mm - 8 mm | **.039" – .315"**

CRAZYMILL HEXALOBE 512
Micro milling, depth 3.5 x d or 5 x d
Ø 0.2 mm - 1 mm | **.008" – .039"**

CRAZYMILL COOL P&S SQUARE/CORNER RADIUS-Z3 526
Plunge and slot milling, depth 2.5 x d or 5 x d
Ø 1 mm - 8 mm | **.039" – .315"**

CRAZYMILL COOL BALL-Z2 566
Depth 2 x d, 3 x d, 5 x d
Ø 0.3 mm - 8 mm | **.012" – .315"**

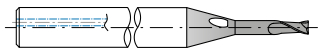
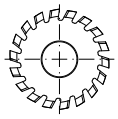
CRAZYMILL COOL BALL-Z4 594
Depth 2 x d, 3 x d, 3.5 x d, 4.5 x d, 5 x d
Ø 1 mm - 8 mm | **.039" – .315"**

CUSTOMIZED MILLING CUTTERS 630

CUSTOMIZED PROFILE MILLING CUTTERS 632

# Overview

## CUTTING TOOL SOLUTIONS

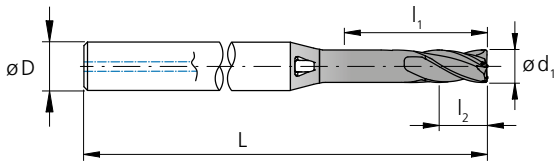
| | | | |
|---|---|---|---|
| NEW | CRAZYMILL Cool Micro | Micro<br>Square - Z3 / Z4 |  |
| | CRAZYMILL Cool | Square - Z2 |  |
| | CRAZYMILL Cool | Corner radius - Z2 |  |
| | CRAZYMILL Cool | Square - Z4 |  |
| | CRAZYMILL Cool | Corner radius - Z4 |  |
| NEW | CRAZYMILL Hexalobe | Hexalobe |  |
| | CRAZYMILL Cool | Plunge&Slot<br>Square - Z3 |  |
| NEW | CRAZYMILL Cool | Plunge&Slot<br>Corner radius - Z3 |  |
| | CRAZYMILL Cool | Ball - Z2 |  |
| | CRAZYMILL Cool | Ball - Z4 |  |
| | **Customized milling cutters** | |  |
| | **Customized profile milling cutters** | |  |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended

| ø - range [mm] \| [inch] | max. depth | Cooling Int. | Cooling Ext. | P Unalloyed and alloyed steel | M Stainless steel | K Cast iron | N Non ferrous metals | $S_1$ Super alloys | $S_2$ Titanium (pure and alloyed) | $S_3$ CrCo alloys | $H_1$ Hardened steel <55 HRC | $H_2$ Hardened steel ≥55 HRC | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.2 – 1.0<br>**.008" – .039"** | 3 x d<br>5 x d | ✔ | | ● | ● | ● | ● | ● | ● | ● | ⊠ | ⊠ | **418** |
| 0.3 – 6.35<br>**.012" – 1/4"** | 1.5 x d<br>3 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **452** |
| 0.3 – 6.35<br>**.012" – 1/4"** | 1.5 x d<br>3 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **452** |
| 1.0 – 8.0<br>**.039" – .315"** | 2 x d<br>3 x d<br>4 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ⊠ | ⊠ | **478** |
| 1.0 – 8.0<br>**.039" – .315"** | 2 x d<br>3 x d<br>4 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ⊠ | ⊠ | **478** |
| 0.2 – 1.0<br>**.008" – .039"** | 3.5 x d<br>5 x d | – | ✔ | ⊠ | ● | ⊠ | ⊠ | ⊠ | ● | ● | ⊠ | ⊠ | **512** |
| 1.0 – 8.0<br>**.039" – .315"** | 2.5 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ⊠ | ⊠ | **526** |
| 1.0 – 8.0<br>**.039" – .315"** | 2.5 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ⊠ | ⊠ | **526** |
| 0.3 – 8.0<br>**.012" – .315"** | 2 x d<br>3 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **566** |
| 1.0 – 8.0<br>**.039" – .315"** | 2 x d<br>3 x d<br>3.5 x d<br>4.5 x d<br>5 x d | ✔ | – | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **594** |
| 0.2 – 32.0<br>**.008" – 1.26"** | as required | ✔ | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **630** |
| Bore<br>2.0 – 40.0<br>**.079" – 1.58"**<br>Thickness<br>1.0 – 30.0<br>**.039" – 1.18"** | – | – | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **632** |

# Codification key

## ITEM NUMBER EASY TO UNDERSTAND




**2.CMC42.C1Z4.400.1**

**Division number**
- 2 = Mikron Tool SA Agno

**CrazyMill family**
- CMC = CrazyMill Cool
- CMT = CrazyMill Hexalobe Titanium
- CMI = CrazyMill Hexalobe Inox
- CMR = CrazyMill Hexalobe CoCr

**Flute angle**
- 42 = 42°

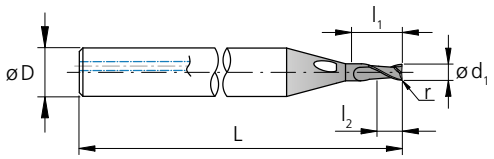
**Tool type**
- A = Type A - Short milling depth
- B = Type B - Medium milling depth
- C = Type C - Long milling depth
- M = Type M - Medium cutting length
- N = Type N - Long cutting length

**Coating**
- 1 = Coated

**Cutting diameter $d_1$**
- 400 = Ø 4 mm (.158")

**Flutes number**
- Z4 = 4 flute

**Endmill geometry**
- 1 / 8 = Square
- 2 = Corner radius with radius small
- 3 = Corner radius with radius medium
- 4 = Corner radius with radius big
- 5 = Ball




# 2.CMC.RB3Z2.F732

**Division number**
- 2 = Mikron Tool SA Agno

**CrazyMill Cool family**

**Endmill geometry**
- S = Square
- R = Corner radius
- PSS = Plunge&Slot Square
- B = Ball

**Tool type**
- A = Type A - Short milling depth
- B = Type B - Medium milling depth
- C = Type C - Long milling depth
- M = Type M - Medium cutting length
- N = Type N - Long cutting length

**Radius r**
- 2 = Radius small
- 3 = Radius medium
- 4 = Radius big

**Flutes number**
- Z2 = 2 flute

**Cutting diameter in fractional inches $d_1$**
- F732 = Ø 7/32"

PATENTED

# CrazyMill Cool Micro



NEW

CRAZYMILL Cool Micro

## THE NEW HIGH-PERFORMANCE MICRO-ENDMILL FOR DIFFICULT-TO-MACHINE MATERIALS



With CrazyMill Cool, Mikron Tool is presenting its new high-performance micro milling cutter designed for roughing and finishing the most difficult-to-machine materials. The new CrazyMill Cool Micro Z3 / Z4 is the smallest with integrated cooling and the first with material-specific cutting edge geometries. Two versions of micro endmill are available in the diameters from .008" to .039" (0.2 mm to 1.0 mm) with a milling depth of up to 5 x d:

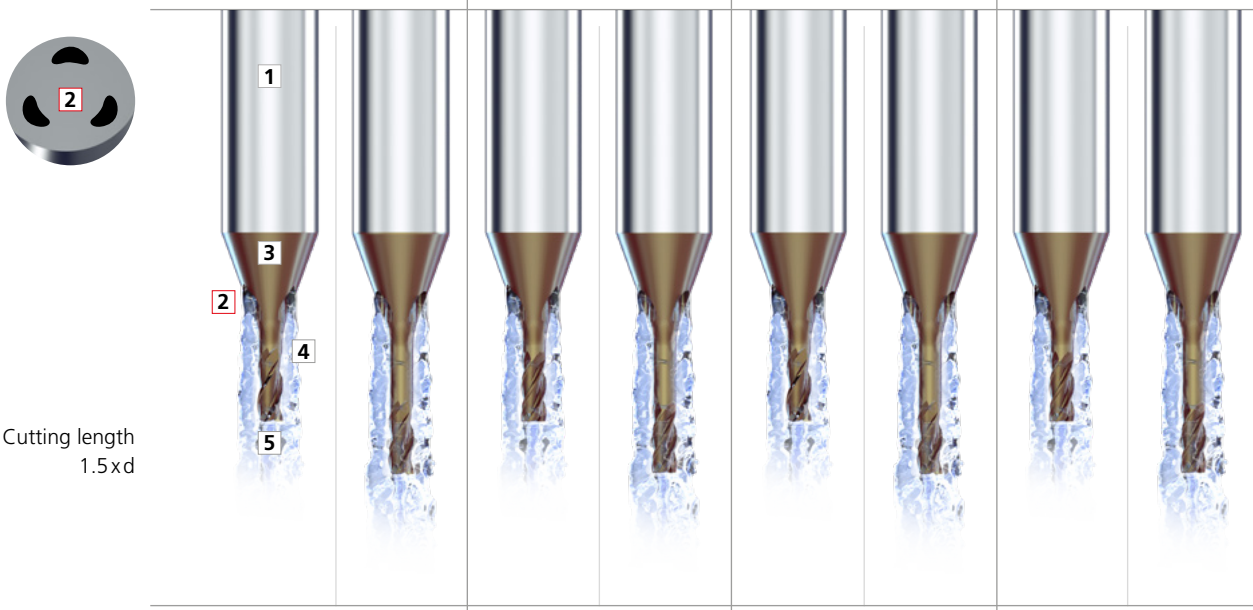
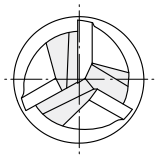
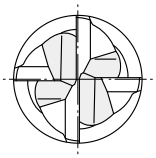
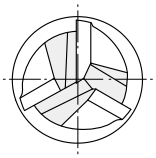
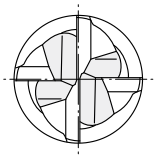
- **Geometry S** - specially developed for stainless steels, structural steels, non-ferrous metals and titanium alloys. It is characterized by a higher cutting capacity for materials with a specific cutting force of less than 326'335 psi (2250 N/mm²).
- **Geometry SX** - featuring a special cutting edge protection, is suitable for materials with a specific cutting force greater than 326'335 psi (2250 N/mm²) such as heat-resistant alloys and CoCr alloys.

Designed for high-performance materials, it offers a significant increase in performance and maximum process reliability compared to conventional standard products. Above all, it demonstrates its strengths in side and slot milling as well as in milling with spiral interpolation. The new features of this roughing and finishing cutter include not only the solid carbide, coating, and geometry, but especially the unique cooling system with cooling channels integrated in the shaft, which achieve constant and extensive cooling of the cutting edges

**Regrinding:** This product is not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the CrazyMill Cool Micro Square - Z3 / Z4 (diameter, length, cutting direction…)? Ask us about our customized versions!

NEW

| | Geometry S | | | | Geometry SX | | | |
|---|---|---|---|---|---|---|---|---|
| | Z3 | | Z4 | | Z3 | | Z4 | |
| Effective length | 3 x d | 5 x d | 3 x d | 5 x d | 3 x d | 5 x d | 3 x d | 5 x d |
| | Type B | Type C | Type B | Type C | Type B | Type C | Type B | Type C |
| |  | | | | | | | |
| Cutting length 1.5 x d |  | |  | |  | |  | |
| | Diameter range **Ø .008" - .039"** (0.2 - 1.0 mm) | | Diameter range **Ø .016" - .039"** (0.4 - 1.0 mm) | | Diameter range **Ø .008" - .039"** (0.2 - 1.0 mm) | | Diameter range **Ø .016" - .039"** (0.4 - 1.0 mm) | |
| | page 432 | page 433 | page 432 | page 433 | page 432 | page 433 | page 432 | page 433 |

**Geometry S:** Stainless steels, steels, cast irons, non-ferrous metals, titanium alloys

**Geometry SX:** Heat-resistant alloys (Inconel, Monel, Nilo, Hastelloy, etc.), CoCr alloys

**1 | SHANK**
The robust solid carbide shank guarantees stable and vibration free milling. High precision and extraordinary surface quality are reached.

**2 | INTEGRATED COOLING - PATENTED**
The integrated cooling channels guarantee constant and maximal cooling of the cutting edges and optimal chip removal. The results are no overheating of the cutting edges and a chip-free milling zone.

**3 | CARBIDE**
A specially micro-grain ultra fine carbide with high stiffness and edge chipping resistence has been developed to perfectly meet all requirements in terms of mechanical properties.

**4 | COATING**
The high-performance SNP coating is heat and wear-resistant, prevents build up edges and guarantees optimum chip flushing. The result is long tool life.

**5 | MATERIAL-SPECIFIC CUTTING GEOMETRY**
Two material-specific geometries have been developed for the machining of:

- **Geometry S** M P K N $S_2$
  Stainless steels, structural steels, cast iron, non-ferrous metals and titanium alloys
- **Geometry SX** $S_1$ $S_3$
  Heat-resistant alloys (e.g. Inconel, Monel, Nilo, Hastelloy) and CoCr alloys

# NEW Important features

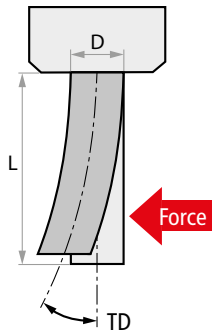
## THE NEW HIGH-PERFORMANCE MICRO-ENDMILL FOR DIFFICULT-TO-MACHINE MATERIALS

CrazyMill Cool Micro is a new micro-milling tool specially developed for difficult and very difficult-to-machine materials. It is available in diameters ranging from .008" - .039" (0.2 mm - 1.0 mm) for a maximum milling depth of 5 x d.

By developing this new product, the engineers at Mikron Tool were the first to succeed in transferring complex high-performance cutting geometries to micro-endmill. The new CrazyMill Cool Micro set unprecedented benchmarks.

### 1. Challenge

### Tool deflection




Tool deflection constitutes a significant problem for small diameter milling operations, which is further exacerbated when processing difficult-to-machine materials due to the higher cutting forces involved.

### Solution

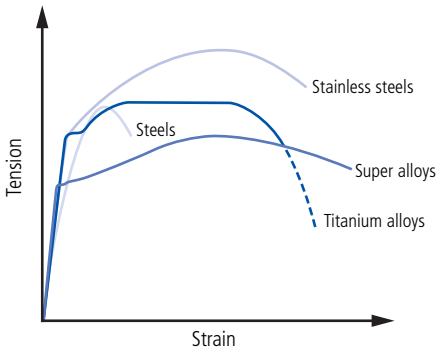
### Custom geometry for optimum cutting performance and stability

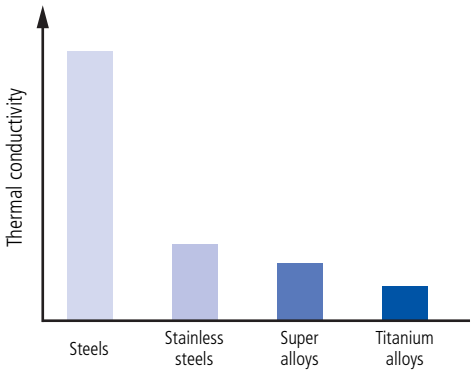
| Cutting edge type | Deflection | Cutting-edge stability |
|---|---|---|
| Sharp | ● | ● |
| Rounded | ● | ● |
| CrazyMill Cool Micro | ● | ● |

The newly developed geometry combines cutting performance with robustness, minimising tool deflection and thus increasing tool stability. That results in a significantly higher material removal rate whilst maintaining a consistent shape and ensuring a longer tool life.

## 2. Challenge

### Difficult-to-machine materials

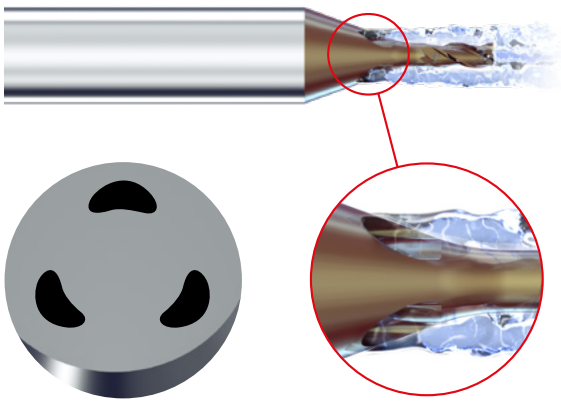



Titanium and heat-resistant alloys are notable for their high toughness and low thermal conductivity. Machining produces extreme temperatures on the cutting edges, resulting in high tool wear.

## Solution

### Innovative cooling concept



The innovative, patented cooling concept solves this problem. The cooling lubricant is applied directly and extensively to the cutting edges, thereby allowing the heat to dissipate. The result is higher cutting speeds and a significantly higher material removal rate.

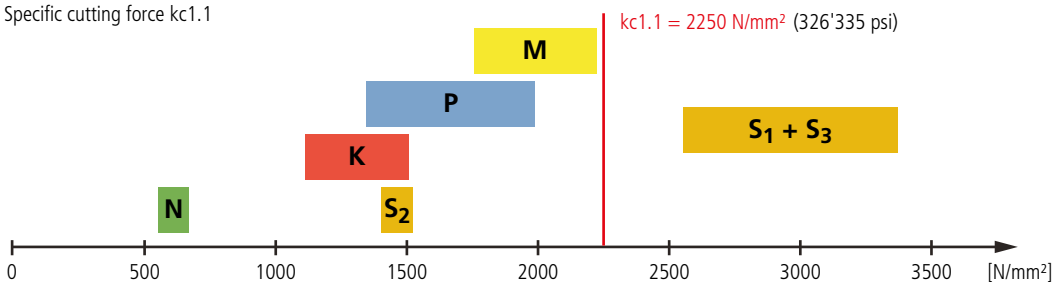
The continuous coolant jet ensures that the chips are continuously flushed out of the milling zone. This prevents them from being milled several times, which would damage the milling tool and the milled surface. This ensures a long tool life and an excellent surface finish.

# NEW Important features

## THE NEW HIGH-PERFORMANCE MICRO-ENDMILL FOR DIFFICULT-TO-MACHINE MATERIALS

### 3. Challenge

### Different material-specific properties

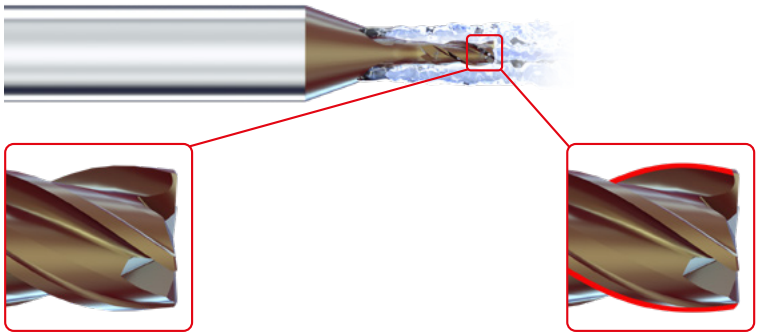



Close attention must be paid to the different mechanical properties of various material categories* in micro-machining. The cutting forces of superalloys and CoCr alloys are up to 45% higher than those of stainless steel and titanium (kc1.1 values). As a result, the cutting edge is subjected to high mechanical stress, leading to chipping.

*See page 434: Material groups

### Solution

### Material-specific cutting-edge geometries



**Geometry S** M P K N $S_2$

Stainless steels, structural steels, cast iron, non-ferrous metals and titanium alloys

Geometry with higher cutting performance for materials with a specific cutting force lower than 326'335 psi (2250 N/mm²).

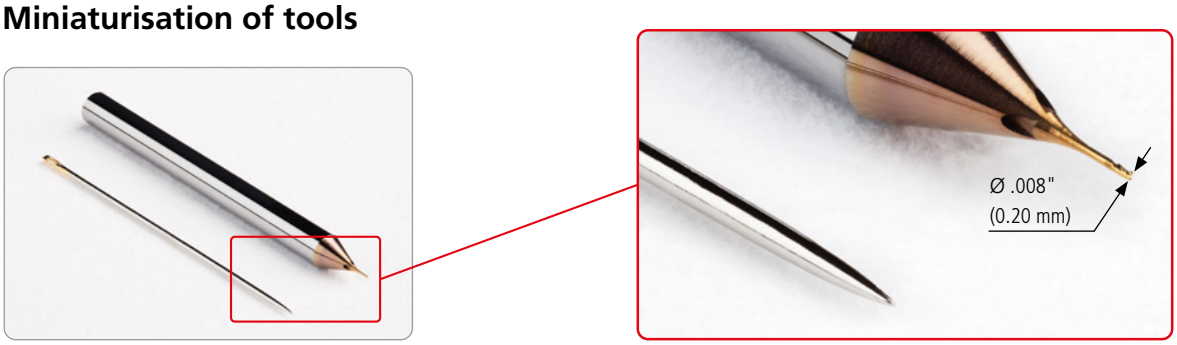
**Geometry SX** $S_1$ $S_3$

Heat-resistant alloys (e.g. Inconel, Monel, Nilo, Hastelloy) and CoCr alloys

Geometry with dedicated cutting edge protection for materials with a specific cutting force higher than 326'335 psi (2250 N/mm²).

4. Challenge

## Miniaturisation of tools




Miniaturisation presents the challenge of realising complex geometries with diameters less than .039" (1 mm). The smaller the tool's cross-section, the more challenging it becomes to mill complex geometries while ensuring that quality requirements and tolerances are met.

Solution

## Suitable production equipment



State-of-the-art grinders with hydrostatic bearings and grinding wheels that meet the latest technological standards are crucial for this purpose. High-precision digital measuring instruments that detect deviations up to a micrometre guarantee perfect results.

The team at Mikron Tool is well trained in using such equipments and producing micro tools that meet the highest precision requirements.

# NEW Important features

**THE NEW HIGH-PERFORMANCE MICRO-ENDMILL FOR DIFFICULT-TO-MACHINE MATERIALS**

5. Challenge

## Carbide and coating



With regard to **carbide** – especially with micro tools, the biggest challenge is to strike a balance between high ultimate strength and wear resistance. Moreover, it must be suitable for delicate geometries and high-precision cutting edges.

Even the **coating** has to meet the highest requirements. It must withstand high temperatures to prevent the material from sticking. High surface finishing and perfect geometry profile must also be ensured while avoiding rounding of the cutting edges.

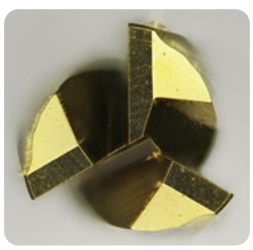
Solution

## Ultra-fine carbide grade and state-of-the-art coating technology

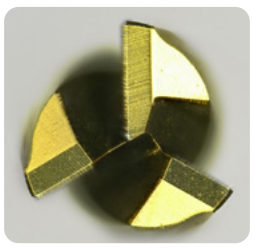
To meet the stringent requirements, Mikron Tool uses state-of-the-art ultra-fine carbide grades offering high wear resistance coupled with fracture toughness with grain sizes below 20 µin (0.5 µm).

The revolutionary eXedur SNP coating of the micro-milling tools provides excellent wear resistance even at extreme operating temperatures. High layer smoothness and precise layer thickness protect all contours and cutting edges evenly. The result: high process reliability. This coating significantly increases tool life without compromising cutting performance.

**Mikron Tool micro-milling tool**



New

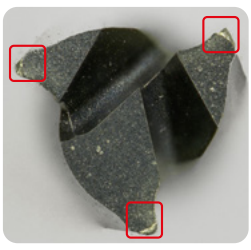


Edge wear
after 787" (20 m)
in CoCr alloy

**Conventional micro-milling tool**



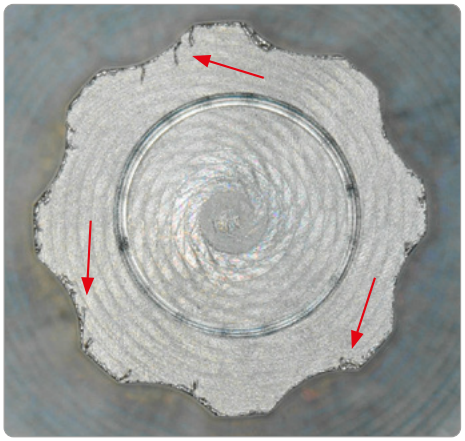
New



Edge wear
after 276" (7 m)
in CoCr alloy

6. Challenge

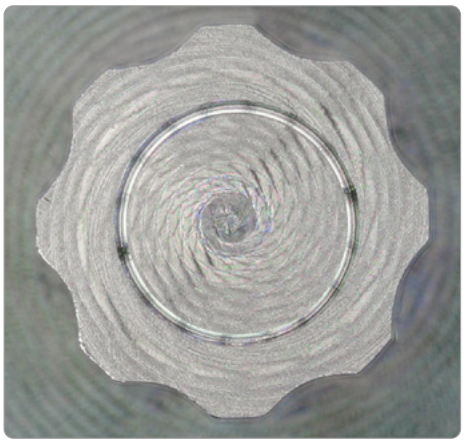
## Burr formation



Another challenge is the massive burr formation, which is more pronounced when milling challenging materials.

Solution

## Nearly burr free



The material-specific cutting geometries machine the material so perfectly that burr formation is nearly avoided.

CRAZYMILL by Mikron Tool Cool Micro

NEW

# Features and benefits

## SEMI-FINISHING AND FINISHING WITH THROUGH-TOOL COOLING CHANNELS

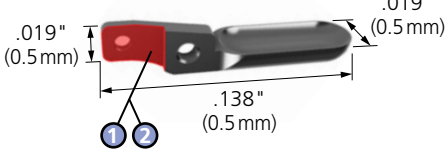
- **EXCELLENT SURFACE QUALITY** | milling with high profile precision
- **SHORT MILLING PROCESS** | material-specific cutting geometry
- **LONG TOOL LIFE** | internal cooling
- **HIGH DEGREE OF PROCESS RELIABILITY** | high cutting-edge stability and robustness



Scale 1:1



Scale 10:1




**COMPONENT**
Biopsy forcep

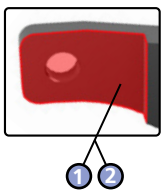
**MATERIAL**
X20Cr13 / 1.4021 / S42000

**MACHINING**
- 1 Semi-finishing
- 2 Finishing
- Diameter endmill = **.020"** | 0.5 mm
- Width = **.020"** | 0.5 mm
- Depth = **.030"** | 0.75 mm
- Length = **.039"** | 1 mm

**MACHINE CONDITIONS**
- $n_{max}$: 40'000 rpm
- Pressure: **580 psi** | 40 bar
- Internal cooling: Oil

**MILLING TOOL**
Mikron Tool - CrazyMill Cool Micro Square Z4 - Type B

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyMill Cool Micro Square - Z4<br>- Carbide<br>- Coated<br>- Integrated cooling |
| Item number | 2.CMC35.B1Z4.050.1 |
| Cutting data | 1 Semi-finishing<br>$v_c$ = **197 SFM** \| 60 m/min<br>$f_z$ = **.00051 IPT** \| 0.013 mm<br>$a_{p,\,max}$ = 1.5 x d<br>$a_e$ = **.0020"** \| 0.05 mm<br>Q = **.0046 in³/min** \| 75 mm³/min<br>**Time= 3 sec**<br><br>2 Finishing<br>$v_c$ = **197 SFM** \| 60 m/min<br>$f_z$ = **.00039 IPT** \| 0.010 mm<br>$a_{p,\,max}$ = 1.5 x d<br>$a_e$ = **.0004"** \| 0.01 mm<br>Q = **.0009 in³/min** \| 15 mm³/min<br>**Time= 1 sec** |





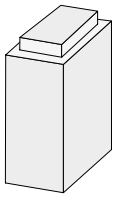
# NEW Guaranteed maximum performance

## COMPARISON OF MICRO-MACHINING EXAMPLES

### Example 1

### Longer tool life when milling a support

**Processing:** Side milling;
Milling depth: **.049"** (1.25 mm);
Milling width: **.039"** (1 mm);
Total length: **2.36"** (60 mm);
Coolant: Cutting oil



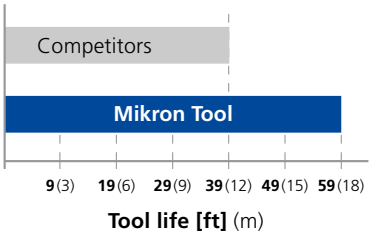
**Titanium alloy:** 3.7165 / TiAl6V4 / ASTM B348 S2

**Tool:** CrazyMill Cool Micro – **Geometry S**
Diameter: **.020"** (0.5 mm)

**Cutting data:**

| Conventional micro-endmill | CrazyMill Cool Micro |
|---|---|
| $v_c$ = **131 SFM** \| 40 m/min $f_z$ = **.00031 IPT** \| 0.008 mm<br>$a_p$ = **.0157"** \| 0.40 mm $a_e$ = **.0031"** \| 0.08 mm | $v_c$ = **197 SFM** \| 60 m/min $f_z$ = **.00039 IPT** \| 0.010 mm<br>$a_p$ = **.0197"** \| 0.50 mm $a_e$ = **0040"** \| 0.10 mm |

**Results:**




**Tool life [ft]** (m)

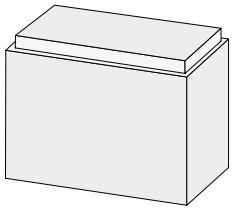
| | No. pieces |
|---|---|
| Conventional micro-endmill | **4** |
| CrazyMill Cool Micro | **10** |

**2 x**

## Example 2

## Shorter milling time with a thermocouple

**Processing:** Side milling;
Milling depth: **.059"** (1.5 mm);
Milling width: **.020"** (0.5 mm);
Total length: **3.94"** (100 mm);
Coolant: Cutting oil



**CoCr alloy:** 2.4964 / CoCr20W15Ni / Haynes 25 **S3**

**Tool:** CrazyMill Cool Micro – **Geometry SX**
Diameter: **.020"** (0.5 mm)

**Cutting data:**

| Conventional micro-endmill | CrazyMill Cool Micro |
|---|---|
| $v_c$ = **197 SFM** \| 60 m/min $f_z$ = **.00024 IPT** \| 0.006 mm<br>$a_p$ = **.0016"** \| 0.04 mm $a_e$ = **.0118"** \| 0.30 mm | $v_c$ = **197 SFM** \| 60 m/min $f_z$ = **.00020 IPT** \| 0.005 mm<br>$a_p$ = **.0197"** \| 0.50 mm $a_e$ = **0040"** \| 0.10 mm |

**Results:**

| | Material removal rate | Time |
|---|---|---|
| Conventional micro-endmill | **.0007 in³ / min** \| 11 mm³/min | **4 min 30 sec** |
| CrazyMill Cool Micro | **.0017 in³ / min** \| 28.6 mm³/min | **1 min 35 sec** |

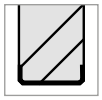
**3 x**

The unique SX cutting geometry of the CrazyMill Cool Micro is perfect for machining CoCr and heat-resistant alloys. It significantly reduces machining time compared to conventional milling tools.

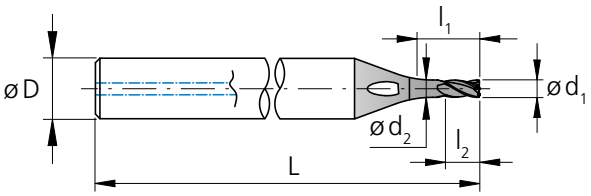
# NEW Type B - 3 x d

Carbide | 35° | eXedur SNP

**Square**



protection phase of 45°




| Ø $d_1$ | **.008" - .039"** (0.2 - 1.0 mm) | |
|---|---|---|
| Tolerance | **0 - .00039"** | 0 - 0.01 mm |

$l_1$ = Effective length
$l_2$ = Cutting length

## Z3

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Geometry S | Geometry SX | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0079** | 0.2 | **.0236** | 0.60 | 0.3 | 0.19 | 3 | **1.50** | 38 | 2.CMC35.B1Z3.020 | .1 | .C | ■ |
| | **.0118** | 0.3 | **.0354** | 0.90 | 0.5 | 0.28 | 3 | **1.50** | 38 | 2.CMC35.B1Z3.030 | .1 | .C | ■ |
| **1/64** | **.0156** | 0.396 | **.0468** | 1.19 | 0.6 | 0.37 | 3 | **1.50** | 38 | 2.CMC.SB1Z3.F164 | | .C | ■ |
| | **.0157** | 0.4 | **.0472** | 1.20 | 0.6 | 0.38 | 3 | **1.50** | 38 | 2.CMC35.B1Z3.040 | .1 | .C | ■ |
| | **.0197** | 0.5 | **.0591** | 1.50 | 0.8 | 0.47 | 3 | **1.50** | 38 | 2.CMC35.B1Z3.050 | .1 | .C | ■ |
| | **.0236** | 0.6 | **.0709** | 1.80 | 0.9 | 0.56 | 3 | **1.50** | 38 | 2.CMC35.B1Z3.060 | .1 | .C | ■ |
| | **.0276** | 0.7 | **.0827** | 2.10 | 1.1 | 0.66 | 3 | **1.50** | 38 | 2.CMC35.B1Z3.070 | .1 | .C | ■ |
| **1/32** | **.0312** | 0.793 | **.0937** | 2.38 | 1.2 | 0.75 | 3 | **1.50** | 38 | 2.CMC.SB1Z3.F132 | | .C | ■ |
| | **.0315** | 0.8 | **.0945** | 2.40 | 1.2 | 0.75 | 3 | **1.50** | 38 | 2.CMC35.B1Z3.080 | .1 | .C | ■ |
| | **.0354** | 0.9 | **.1063** | 2.70 | 1.4 | 0.85 | 3 | **1.50** | 38 | 2.CMC35.B1Z3.090 | .1 | .C | ■ |
| | **.0394** | 1.0 | **.1969** | 3.00 | 1.5 | 0.94 | 4 | **1.57** | 40 | 2.CMC35.B1Z3.100 | .1 | .C | ■ |

## Z4

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Geometry S | Geometry SX | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1/64** | **.0156** | 0.396 | **.0468** | 1.19 | 0.6 | 0.37 | 3 | **1.50** | 38 | 2.CMC.SB1Z4.F164 | | .C | ■ |
| | **.0157** | 0.4 | **.0472** | 1.20 | 0.6 | 0.38 | 3 | **1.50** | 38 | 2.CMC35.B1Z4.040 | .1 | .C | ■ |
| | **.0197** | 0.5 | **.0591** | 1.50 | 0.8 | 0.47 | 3 | **1.50** | 38 | 2.CMC35.B1Z4.050 | .1 | .C | ■ |
| | **.0236** | 0.6 | **.0709** | 1.80 | 0.9 | 0.56 | 3 | **1.50** | 38 | 2.CMC35.B1Z4.060 | .1 | .C | ■ |
| | **.0276** | 0.7 | **.0827** | 2.10 | 1.1 | 0.66 | 3 | **1.50** | 38 | 2.CMC35.B1Z4.070 | .1 | .C | ■ |
| **1/32** | **.0312** | 0.793 | **.0937** | 2.38 | 1.2 | 0.75 | 3 | **1.50** | 38 | 2.CMC.SB1Z4.F132 | | .C | ■ |
| | **.0315** | 0.8 | **.0945** | 2.40 | 1.2 | 0.75 | 3 | **1.50** | 38 | 2.CMC35.B1Z4.080 | .1 | .C | ■ |
| | **.0354** | 0.9 | **.1063** | 2.70 | 1.4 | 0.85 | 3 | **1.50** | 38 | 2.CMC35.B1Z4.090 | .1 | .C | ■ |
| | **.0394** | 1.0 | **.1969** | 3.00 | 1.5 | 0.94 | 4 | **1.57** | 40 | 2.CMC35.B1Z4.100 | .1 | .C | ■ |

■ Stock item

**Geometry S:** Stainless steels, steels, cast irons, non-ferrous metals, titanium alloys

**Geometry SX:** Heat-resistant alloys (Inconel, Monel, Nilo, Hastelloy, etc.), CoCr alloys

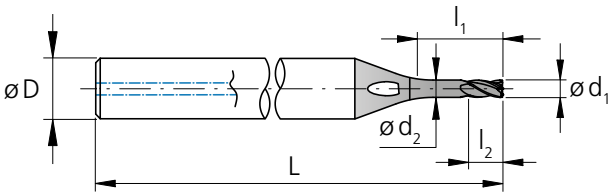
# Type C - 5 x d

Carbide | 35° | eXedur SNP

**Square**



protection phase of 45°




| Ø $d_1$ | **.008" - .039"** (0.2 - 1.0 mm) | |
|---|---|---|
| Tolerance | **0 - .00039"** | 0 - 0.01 mm |

$l_1$ = Effective length
$l_2$ = Cutting length

## Z3

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Geometry S | Geometry SX | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.0079** | 0.2 | **.0394** | 1.00 | 0.3 | 0.19 | 3 | **1.50** | 38 | 2.CMC35.C1Z3.020 | .1 | .C | ■ |
| | **.0118** | 0.3 | **.0591** | 1.50 | 0.5 | 0.28 | 3 | **1.50** | 38 | 2.CMC35.C1Z3.030 | .1 | .C | ■ |
| **1/64** | **.0156** | 0.396 | **.0780** | 1.98 | 0.6 | 0.37 | 3 | **1.50** | 38 | 2.CMC.SC1Z3.F164 | | .C | ■ |
| | **.0157** | 0.4 | **.0787** | 2.00 | 0.6 | 0.38 | 3 | **1.50** | 38 | 2.CMC35.C1Z3.040 | .1 | .C | ■ |
| | **.0197** | 0.5 | **.0984** | 2.50 | 0.8 | 0.47 | 3 | **1.50** | 38 | 2.CMC35.C1Z3.050 | .1 | .C | ■ |
| | **.0236** | 0.6 | **.1181** | 3.00 | 0.9 | 0.56 | 3 | **1.50** | 38 | 2.CMC35.C1Z3.060 | .1 | .C | ■ |
| | **.0276** | 0.7 | **.1378** | 3.50 | 1.1 | 0.66 | 3 | **1.50** | 38 | 2.CMC35.C1Z3.070 | .1 | .C | ■ |
| **1/32** | **.0312** | 0.793 | **.1563** | 3.97 | 1.2 | 0.75 | 3 | **1.50** | 38 | 2.CMC.SC1Z3.F132 | | .C | ■ |
| | **.0315** | 0.8 | **.1575** | 4.00 | 1.2 | 0.75 | 3 | **1.50** | 38 | 2.CMC35.C1Z3.080 | .1 | .C | ■ |
| | **.0354** | 0.9 | **.1772** | 4.50 | 1.4 | 0.85 | 3 | **1.50** | 38 | 2.CMC35.C1Z3.090 | .1 | .C | ■ |
| | **.0394** | 1.0 | **.1969** | 5.00 | 1.5 | 0.94 | 4 | **1.57** | 40 | 2.CMC35.C1Z3.100 | .1 | .C | ■ |

## Z4

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Geometry S | Geometry SX | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1/64** | **.0156** | 0.396 | **.0780** | 1.98 | 0.6 | 0.37 | 3 | **1.50** | 38 | 2.CMC.SC1Z4.F164 | | .C | ■ |
| | **.0157** | 0.4 | **.0787** | 2.00 | 0.6 | 0.38 | 3 | **1.50** | 38 | 2.CMC35.C1Z4.040 | .1 | .C | ■ |
| | **.0197** | 0.5 | **.0984** | 2.50 | 0.8 | 0.47 | 3 | **1.50** | 38 | 2.CMC35.C1Z4.050 | .1 | .C | ■ |
| | **.0236** | 0.6 | **.1181** | 3.00 | 0.9 | 0.56 | 3 | **1.50** | 38 | 2.CMC35.C1Z4.060 | .1 | .C | ■ |
| | **.0276** | 0.7 | **.1378** | 3.50 | 1.1 | 0.66 | 3 | **1.50** | 38 | 2.CMC35.C1Z4.070 | .1 | .C | ■ |
| **1/32** | **.0312** | 0.793 | **.1563** | 3.97 | 1.2 | 0.75 | 3 | **1.50** | 38 | 2.CMC.SC1Z4.F132 | | .C | ■ |
| | **.0315** | 0.8 | **.1575** | 4.00 | 1.2 | 0.75 | 3 | **1.50** | 38 | 2.CMC35.C1Z4.080 | .1 | .C | ■ |
| | **.0354** | 0.9 | **.1772** | 4.50 | 1.4 | 0.85 | 3 | **1.50** | 38 | 2.CMC35.C1Z4.090 | .1 | .C | ■ |
| | **.0394** | 1.0 | **.1969** | 5.00 | 1.5 | 0.94 | 4 | **1.57** | 40 | 2.CMC35.C1Z4.100 | .1 | .C | ■ |

■ Stock item

**Geometry S:** Stainless steels, steels, cast irons, non-ferrous metals, titanium alloys

**Geometry SX:** Heat-resistant alloys (Inconel, Monel, Nilo, Hastelloy, etc.), CoCr alloys

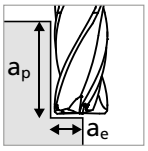
CRAZYMILL by Mikron Tool Cool Micro

# NEW Type B - Z3 - Side milling - Roughing

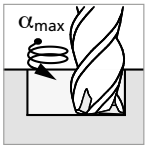
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Side milling**

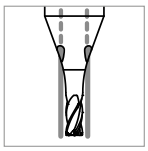
**Roughing**

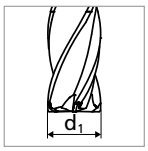



- $a_p = 1 \times d_1$
- $a_e = 0.2 \times d_1$




**Note:**
In case of helical interpolation milling see $\alpha_{max}$ on page 451

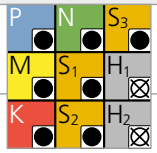





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | Cutting edge geometry |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | GEOMETRY S |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | GEOMETRY S |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | GEOMETRY S |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | GEOMETRY S |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | |
| | | 2.1020 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | GEOMETRY SX |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | GEOMETRY S |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | GEOMETRY S |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CoCr alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | GEOMETRY SX |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



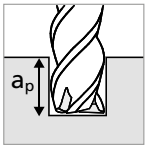


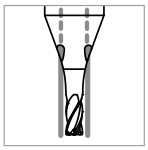

| Ød1 | .008" \| 0.2 mm | | .012" \| 0.3 mm | | 1/64" .016" \| 0.4 mm | | .020" \| 0.5 mm | | .024" \| 0.6 mm | | .028" \| 0.7 mm | | 1/32" .031" \| 0.8 mm | | .035" - .039" \| 0.9 - 1.0 mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00012**<br>0.003 | **82 - 164**<br>25 - 50 | **.00016**<br>0.004 | **98 - 213**<br>30 - 65 | **.00020**<br>0.005 | **131 - 246**<br>40 - 75 | **.00028**<br>0.007 | **148 - 295**<br>45 - 90 | **.00031**<br>0.008 | **164 - 328**<br>50 - 100 | **.00035**<br>0.009 | **180 - 377**<br>55 - 115 | **.00039**<br>0.010 |
| | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00012**<br>0.003 | **82 - 164**<br>25 - 50 | **.00016**<br>0.004 | **98 - 213**<br>30 - 65 | **.00020**<br>0.005 | **131 - 246**<br>40 - 75 | **.00028**<br>0.007 | **148 - 295**<br>45 - 90 | **.00031**<br>0.008 | **164 - 328**<br>50 - 100 | **.00035**<br>0.009 | **180 - 377**<br>55 - 115 | **.00039**<br>0.010 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

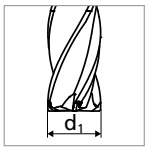
# NEW Type B - Z3 - Slot milling

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Slot milling**



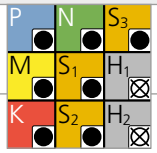






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | Cutting edge geometry |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | GEOMETRY S |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | GEOMETRY S |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | GEOMETRY S |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | GEOMETRY S |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | |
| | | 2.1020 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | GEOMETRY SX |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | GEOMETRY S |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | GEOMETRY S |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CoCr alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | GEOMETRY SX |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| $a_p$ | Ød$_1$ | .008" \| 0.2 mm | | .012" \| 0.3 mm | | 1/64" .016" \| 0.4 mm | | .020" \| 0.5 mm | | .024" \| 0.6 mm | | .028" \| 0.7 mm | | 1/32" .031" \| 0.8 mm | | .035" - .039" \| 0.9 - 1.0 mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.25 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00012**<br>0.003 | **82 - 164**<br>25 - 50 | **.00016**<br>0.004 | **98 - 213**<br>30 - 65 | **.00020**<br>0.005 | **131 - 246**<br>40 - 75 | **.00028**<br>0.007 | **148 - 295**<br>45 - 90 | **.00031**<br>0.008 | **164 - 328**<br>50 - 100 | **.00035**<br>0.009 | **180 - 377**<br>55 - 115 | **.00039**<br>0.010 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.5 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00012**<br>0.003 | **82 - 164**<br>25 - 50 | **.00016**<br>0.004 | **98 - 213**<br>30 - 65 | **.00020**<br>0.005 | **131 - 246**<br>40 - 75 | **.00028**<br>0.007 | **148 - 295**<br>45 - 90 | **.00031**<br>0.008 | **164 - 328**<br>50 - 100 | **.00035**<br>0.009 | **180 - 377**<br>55 - 115 | **.00039**<br>0.010 |

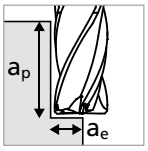
CRAZYMILL by Mikron Tool Cool Micro

# NEW Type B - Z4 - Side milling - Semi-finishing

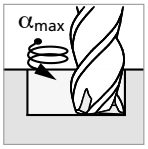
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Side milling**

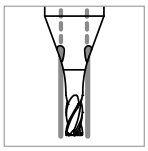
**Semi-finishing**

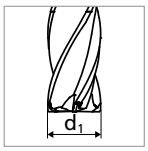



- $a_p = 1.5 \times d_1$
- $a_e = 0.1 \times d_1$




**Note:**
In case of helical interpolation milling see $\alpha_{max}$ on page 451

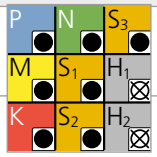





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | Cutting edge geometry |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | GEOMETRY S |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | GEOMETRY S |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | GEOMETRY S |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | GEOMETRY S |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | |
| | | 2.1020 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | GEOMETRY SX |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | GEOMETRY S |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | GEOMETRY S |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CoCr alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | GEOMETRY SX |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





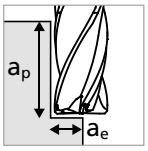

| Ød$_1$ | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/64" | | .020" \| 0.5 mm | | .024" \| 0.6 mm | | .028" \| 0.7 mm | | 1/32" | | .035" - .039" \| 0.9 - 1.0 mm | |
| .016" \| 0.4 mm | | | | | | | | .031" \| 0.8 mm | | | |
| $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| **148 - 246**<br>45 - 75 | **.00043**<br>0.011 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00043**<br>0.011 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00039**<br>0.010 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00039**<br>0.010 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00039**<br>0.010 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00028**<br>0.007 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00043**<br>0.011 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00063**<br>0.016 | **295 - 492**<br>90 - 150 | **.00067**<br>0.017 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00063**<br>0.016 | **295 - 492**<br>90 - 150 | **.00067**<br>0.017 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00063**<br>0.016 | **295 - 492**<br>90 - 150 | **.00067**<br>0.017 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00063**<br>0.016 | **295 - 492**<br>90 - 150 | **.00067**<br>0.017 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00051**<br>0.013 | **213 - 377**<br>65 - 115 | **.00059**<br>0.015 | **246 - 426**<br>75 - 130 | **.00063**<br>0.016 | **295 - 492**<br>90 - 150 | **.00067**<br>0.017 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00020**<br>0.005 | **180 - 312**<br>55 - 95 | **.00028**<br>0.007 | **213 - 377**<br>65 - 115 | **.00031**<br>0.008 | **246 - 426**<br>75 - 130 | **.00035**<br>0.009 | **295 - 492**<br>90 - 150 | **.00039**<br>0.010 | **328 - 558**<br>100 - 170 | **.00043**<br>0.011 |
| **148 - 246**<br>45 - 75 | **.00028**<br>0.007 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00028**<br>0.007 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00020**<br>0.005 | **180 - 312**<br>55 - 95 | **.00028**<br>0.007 | **213 - 377**<br>65 - 115 | **.00031**<br>0.008 | **246 - 426**<br>75 - 130 | **.00035**<br>0.009 | **295 - 492**<br>90 - 150 | **.00039**<br>0.010 | **328 - 558**<br>100 - 170 | **.00043**<br>0.011 |

# NEW Type B - Z4 - Side milling - Finishing

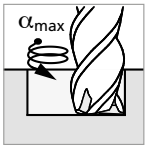
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Side milling**

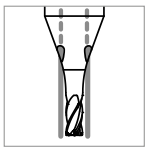
**Finishing**

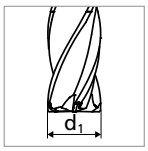



- $a_p = 1.5 \times d_1$
- $a_e = 0.02 \times d_1$




**Note:**
In case of helical interpolation milling see $\alpha_{max}$ on page 451

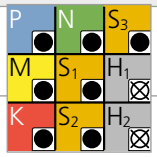





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | Cutting edge geometry |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | GEOMETRY S |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | GEOMETRY S |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | GEOMETRY S |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | GEOMETRY S |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | |
| | | 2.1020 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | GEOMETRY SX |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | GEOMETRY S |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | GEOMETRY S |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CoCr alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | GEOMETRY SX |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






| Ød$_1$ | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/64" | | .020" \| 0.5 mm | | .024" \| 0.6 mm | | .028" \| 0.7 mm | | 1/32" | | .035" - .039" \| 0.9 - 1.0 mm | |
| .016" \| 0.4 mm | | | | | | | | .031" \| 0.8 mm | | | |
| $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| **148 - 246**<br>45 - 75 | **.00035**<br>0.009 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00035**<br>0.009 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00024**<br>0.006 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00043**<br>0.011 | **295 - 492**<br>90 - 150 | **.00051**<br>0.013 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00024**<br>0.006 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00043**<br>0.011 | **295 - 492**<br>90 - 150 | **.00051**<br>0.013 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00035**<br>0.009 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00039**<br>0.010 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00051**<br>0.013 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00039**<br>0.010 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00051**<br>0.013 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00039**<br>0.010 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00051**<br>0.013 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00039**<br>0.010 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00051**<br>0.013 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00039**<br>0.010 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00051**<br>0.013 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00039**<br>0.010 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00051**<br>0.013 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00016**<br>0.004 | **180 - 312**<br>55 - 95 | **.00024**<br>0.006 | **213 - 377**<br>65 - 115 | **.00024**<br>0.006 | **246 - 426**<br>75 - 130 | **.00028**<br>0.007 | **295 - 492**<br>90 - 150 | **.00031**<br>0.008 | **328 - 558**<br>100 - 170 | **.00035**<br>0.009 |
| **148 - 246**<br>45 - 75 | **.00024**<br>0.006 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00043**<br>0.011 | **295 - 492**<br>90 - 150 | **.00051**<br>0.013 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00024**<br>0.006 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00043**<br>0.011 | **295 - 492**<br>90 - 150 | **.00051**<br>0.013 | **328 - 558**<br>100 - 170 | **.00055**<br>0.014 |
| **148 - 246**<br>45 - 75 | **.00016**<br>0.004 | **180 - 312**<br>55 - 95 | **.00024**<br>0.006 | **213 - 377**<br>65 - 115 | **.00024**<br>0.006 | **246 - 426**<br>75 - 130 | **.00028**<br>0.007 | **295 - 492**<br>90 - 150 | **.00031**<br>0.008 | **328 - 558**<br>100 - 170 | **.00035**<br>0.009 |

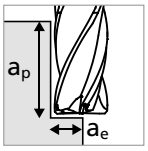
CRAZYMILL by Mikron Tool Cool Micro

# NEW Type C - Z3 - Side milling - Roughing

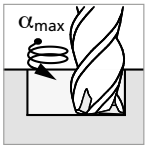
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Side milling**

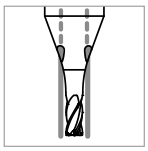
**Roughing**

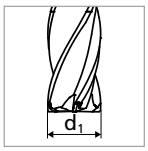



- $a_p = 1 \times d_1$
- $a_e = 0.1 \times d_1$




**Note:**
In case of helical interpolation milling see $\alpha_{max}$ on page 451

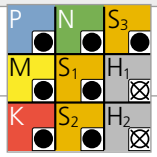





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | Cutting edge geometry |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | GEOMETRY S |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | GEOMETRY S |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | GEOMETRY S |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | GEOMETRY S |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | |
| | | 2.1020 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | GEOMETRY SX |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | GEOMETRY S |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | GEOMETRY S |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CoCr alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | GEOMETRY SX |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



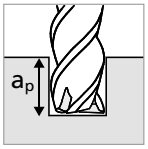


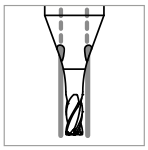

| Ød1 | .008" \| 0.2 mm | | .012" \| 0.3 mm | | 1/64" .016" \| 0.4 mm | | .020" \| 0.5 mm | | .024" \| 0.6 mm | | .028" \| 0.7 mm | | 1/32" .031" \| 0.8mm | | .035" - .039" \| 0.9 - 1.0 mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00024**<br>0.006 | **82 - 164**<br>25 - 50 | **.00039**<br>0.010 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00055**<br>0.014 | **148 - 295**<br>45 - 90 | **.00067**<br>0.017 | **164 - 328**<br>50 - 100 | **.00075**<br>0.019 | **180 - 377**<br>55 - 115 | **.00083**<br>0.021 |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00024**<br>0.006 | **82 - 164**<br>25 - 50 | **.00039**<br>0.010 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00055**<br>0.014 | **148 - 295**<br>45 - 90 | **.00067**<br>0.017 | **164 - 328**<br>50 - 100 | **.00075**<br>0.019 | **180 - 377**<br>55 - 115 | **.00083**<br>0.021 |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **00035**<br>0.009 | **131 - 246**<br>40 - 75 | **.00043**<br>0.011 | **148 - 295**<br>45 - 90 | **.00051**<br>0.013 | **164 - 328**<br>50 - 100 | **.00059**<br>0.015 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00024**<br>0.006 | **82 - 164**<br>25 - 50 | **.00039**<br>0.010 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00055**<br>0.014 | **148 - 295**<br>45 - 90 | **.00067**<br>0.017 | **164 - 328**<br>50 - 100 | **.00075**<br>0.019 | **180 - 377**<br>55 - 115 | **.00083**<br>0.021 |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00024**<br>0.006 | **82 - 164**<br>25 - 50 | **.00039**<br>0.010 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00055**<br>0.014 | **148 - 295**<br>45 - 90 | **.00067**<br>0.017 | **164 - 328**<br>50 - 100 | **.00075**<br>0.019 | **180 - 377**<br>55 - 115 | **.00083**<br>0.021 |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **00035**<br>0.009 | **131 - 246**<br>40 - 75 | **.00043**<br>0.011 | **148 - 295**<br>45 - 90 | **.00051**<br>0.013 | **164 - 328**<br>50 - 100 | **.00059**<br>0.015 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00035**<br>0.009 | **131 - 246**<br>40 - 75 | **.00043**<br>0.011 | **148 - 295**<br>45 - 90 | **.00051**<br>0.013 | **164 - 328**<br>50 - 100 | **.00059**<br>0.015 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00035**<br>0.009 | **131 - 246**<br>40 - 75 | **.00043**<br>0.011 | **148 - 295**<br>45 - 90 | **.00051**<br>0.013 | **164 - 328**<br>50 - 100 | **.00059**<br>0.015 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00024**<br>0.006 | **66 - 131**<br>20 - 40 | **.00031**<br>0.008 | **82 - 164**<br>25 - 50 | **.00043**<br>0.011 | **98 - 213**<br>30 - 65 | **.00063**<br>0.016 | **131 - 246**<br>40 - 75 | **.00071**<br>0.018 | **148 - 295**<br>45 - 90 | **.00075**<br>0.019 | **164 - 328**<br>50 - 100 | **.00083**<br>0.021 | **180 - 377**<br>55 - 115 | **.00087**<br>0.022 |
| | **49 - 82**<br>15 - 25 | **.00024**<br>0.006 | **66 - 131**<br>20 - 40 | **.00031**<br>0.008 | **82 - 164**<br>25 - 50 | **.00043**<br>0.011 | **98 - 213**<br>30 - 65 | **.00063**<br>0.016 | **131 - 246**<br>40 - 75 | **.00071**<br>0.018 | **148 - 295**<br>45 - 90 | **.00075**<br>0.019 | **164 - 328**<br>50 - 100 | **.00083**<br>0.021 | **180 - 377**<br>55 - 115 | **.00087**<br>0.022 |
| | **49 - 82**<br>15 - 25 | **.00024**<br>0.006 | **66 - 131**<br>20 - 40 | **.00031**<br>0.008 | **82 - 164**<br>25 - 50 | **.00043**<br>0.011 | **98 - 213**<br>30 - 65 | **.00063**<br>0.016 | **131 - 246**<br>40 - 75 | **.00071**<br>0.018 | **148 - 295**<br>45 - 90 | **.00075**<br>0.019 | **164 - 328**<br>50 - 100 | **.00083**<br>0.021 | **180 - 377**<br>55 - 115 | **.00087**<br>0.022 |
| | **49 - 82**<br>15 - 25 | **.00024**<br>0.006 | **66 - 131**<br>20 - 40 | **.00031**<br>0.008 | **82 - 164**<br>25 - 50 | **.00043**<br>0.011 | **98 - 213**<br>30 - 65 | **.00063**<br>0.016 | **131 - 246**<br>40 - 75 | **.00071**<br>0.018 | **148 - 295**<br>45 - 90 | **.00075**<br>0.019 | **164 - 328**<br>50 - 100 | **.00083**<br>0.021 | **180 - 377**<br>55 - 115 | **.00087**<br>0.022 |
| | **49 - 82**<br>15 - 25 | **.00024**<br>0.006 | **66 - 131**<br>20 - 40 | **.00031**<br>0.008 | **82 - 164**<br>25 - 50 | **.00043**<br>0.011 | **98 - 213**<br>30 - 65 | **.00063**<br>0.016 | **131 - 246**<br>40 - 75 | **.00071**<br>0.018 | **148 - 295**<br>45 - 90 | **.00075**<br>0.019 | **164 - 328**<br>50 - 100 | **.00083**<br>0.021 | **180 - 377**<br>55 - 115 | **.00087**<br>0.022 |
| | **49 - 82**<br>15 - 25 | **.00024**<br>0.006 | **66 - 131**<br>20 - 40 | **.00031**<br>0.008 | **82 - 164**<br>25 - 50 | **.00043**<br>0.011 | **98 - 213**<br>30 - 65 | **.00063**<br>0.016 | **131 - 246**<br>40 - 75 | **.00071**<br>0.018 | **148 - 295**<br>45 - 90 | **.00075**<br>0.019 | **164 - 328**<br>50 - 100 | **.00083**<br>0.021 | **180 - 377**<br>55 - 115 | **.00087**<br>0.022 |
| | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00039**<br>0.010 | **164 - 328**<br>50 - 100 | **.00047**<br>0.012 | **180 - 377**<br>55 - 115 | **.00055**<br>0.014 |
| | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00024**<br>0.006 | **82 - 164**<br>25 - 50 | **.00031**<br>0.008 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00059**<br>0.015 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00035**<br>0.009 | **131 - 246**<br>40 - 75 | **.00043**<br>0.011 | **148 - 295**<br>45 - 90 | **.00051**<br>0.013 | **164 - 328**<br>50 - 100 | **.00059**<br>0.015 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00039**<br>0.010 | **164 - 328**<br>50 - 100 | **.00047**<br>0.012 | **180 - 377**<br>55 - 115 | **.00055**<br>0.014 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

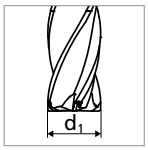
# NEW Type C - Z3 - Slot milling

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Slot milling**



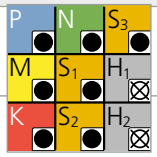






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | Cutting edge geometry |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | GEOMETRY S |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | GEOMETRY S |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | GEOMETRY S |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | GEOMETRY S |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | |
| | | 2.1020 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | GEOMETRY SX |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | GEOMETRY S |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | GEOMETRY S |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CoCr alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | GEOMETRY SX |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



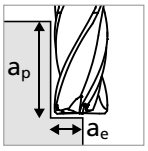

| $a_p$ | Ød$_1$ | .008" \| 0.2 mm | | .012" \| 0.3 mm | | 1/64" .016" \| 0.4 mm | | .020" \| 0.5 mm | | .024" \| 0.6 mm | | .028" \| 0.7 mm | | 1/32" .031" \| 0.8 mm | | .035" - .039" \| 0.9 - 1.0 mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **.00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00016**<br>0.004 | **66 - 131**<br>20 - 40 | **.00028**<br>0.007 | **82 - 164**<br>25 - 50 | **.00035**<br>0.009 | **98 - 213**<br>30 - 65 | **.00047**<br>0.012 | **131 - 246**<br>40 - 75 | **.00051**<br>0.013 | **148 - 295**<br>45 - 90 | **.00059**<br>0.015 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00067**<br>0.017 |
| | 0.1 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00012**<br>0.003 | **82 - 164**<br>25 - 50 | **.00016**<br>0.004 | **98 - 213**<br>30 - 65 | **.00020**<br>0.005 | **131 - 246**<br>40 - 75 | **.00028**<br>0.007 | **148 - 295**<br>45 - 90 | **.00031**<br>0.008 | **164 - 328**<br>50 - 100 | **.00035**<br>0.009 | **180 - 377**<br>55 - 115 | **.00039**<br>0.010 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00016**<br>0.004 | **82 - 164**<br>25 - 50 | **.00024**<br>0.006 | **98 - 213**<br>30 - 65 | **.00031**<br>0.008 | **131 - 246**<br>40 - 75 | **.00035**<br>0.009 | **148 - 295**<br>45 - 90 | **.00043**<br>0.011 | **164 - 328**<br>50 - 100 | **.00051**<br>0.013 | **180 - 377**<br>55 - 115 | **.00059**<br>0.015 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00012**<br>0.003 | **66 - 131**<br>20 - 40 | **.00020**<br>0.005 | **82 - 164**<br>25 - 50 | **.00028**<br>0.007 | **98 - 213**<br>30 - 65 | **.00039**<br>0.010 | **131 - 246**<br>40 - 75 | **.00047**<br>0.012 | **148 - 295**<br>45 - 90 | **00055**<br>0.014 | **164 - 328**<br>50 - 100 | **.00063**<br>0.016 | **180 - 377**<br>55 - 115 | **.00071**<br>0.018 |
| | 0.2 x d$_1$ | **49 - 82**<br>15 - 25 | **.00008**<br>0.002 | **66 - 131**<br>20 - 40 | **.00012**<br>0.003 | **82 - 164**<br>25 - 50 | **.00016**<br>0.004 | **98 - 213**<br>30 - 65 | **.00020**<br>0.005 | **131 - 246**<br>40 - 75 | **.00028**<br>0.007 | **148 - 295**<br>45 - 90 | **.00031**<br>0.008 | **164 - 328**<br>50 - 100 | **.00035**<br>0.009 | **180 - 377**<br>55 - 115 | **.00039**<br>0.010 |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

# NEW Type C - Z4 - Side milling - Semi-finishing

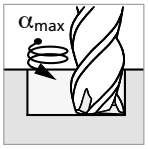
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Side milling**

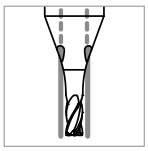
**Semi-finishing**

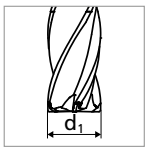



- $a_p = 1.5 \times d_1$
- $a_e = 0.05 \times d_1$




**Note:**
In case of helical interpolation milling see $\alpha_{max}$ on page 451

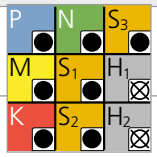





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | Cutting edge geometry |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | GEOMETRY S |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | GEOMETRY S |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | GEOMETRY S |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | GEOMETRY S |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | |
| | | 2.1020 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | GEOMETRY SX |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | GEOMETRY S |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | GEOMETRY S |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CoCr alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | GEOMETRY SX |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





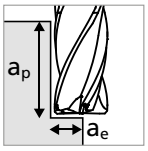

| Ød$_1$ | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/64" | | .020" \| 0.5 mm | | .024" \| 0.6 mm | | .028" \| 0.7 mm | | 1/32" | | .035" - .039" \| 0.9 - 1.0 mm | |
| .016" \| 0.4 mm | | | | | | | | .031" \| 0.8mm | | | |
| $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00071**<br>0.018 | **246 - 426**<br>75 - 130 | **.00083**<br>0.021 | **295 - 492**<br>90 - 150 | **.00094**<br>0.024 | **328 - 558**<br>100 - 170 | **.00106**<br>0.027 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00071**<br>0.018 | **246 - 426**<br>75 - 130 | **.00083**<br>0.021 | **295 - 492**<br>90 - 150 | **.00094**<br>0.024 | **328 - 558**<br>100 - 170 | **.00106**<br>0.027 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00043**<br>0.011 | **213 - 377**<br>65 - 115 | **.00055**<br>0.014 | **246 - 426**<br>75 - 130 | **.00063**<br>0.016 | **295 - 492**<br>90 - 150 | **.00075**<br>0.019 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00071**<br>0.018 | **246 - 426**<br>75 - 130 | **.00083**<br>0.021 | **295 - 492**<br>90 - 150 | **.00094**<br>0.024 | **328 - 558**<br>100 - 170 | **.00106**<br>0.027 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00071**<br>0.018 | **246 - 426**<br>75 - 130 | **.00083**<br>0.021 | **295 - 492**<br>90 - 150 | **.00094**<br>0.024 | **328 - 558**<br>100 - 170 | **.00106**<br>0.027 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00071**<br>0.018 | **246 - 426**<br>75 - 130 | **.00083**<br>0.021 | **295 - 492**<br>90 - 150 | **.00094**<br>0.024 | **328 - 558**<br>100 - 170 | **.00106**<br>0.027 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00043**<br>0.011 | **213 - 377**<br>65 - 115 | **00055**<br>0.014 | **246 - 426**<br>75 - 130 | **.00063**<br>0.016 | **295 - 492**<br>90 - 150 | **.00075**<br>0.019 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00047**<br>0.012 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00071**<br>0.018 | **246 - 426**<br>75 - 130 | **.00083**<br>0.021 | **295 - 492**<br>90 - 150 | **.00094**<br>0.024 | **328 - 558**<br>100 - 170 | **.00106**<br>0.027 |
| **148 - 246**<br>45 - 75 | **.00051**<br>0.013 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00063**<br>0.016 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00051**<br>0.013 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00063**<br>0.016 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00051**<br>0.013 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00063**<br>0.016 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00051**<br>0.013 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00063**<br>0.016 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00051**<br>0.013 | **180 - 312**<br>55 - 95 | **.00059**<br>0.015 | **213 - 377**<br>65 - 115 | **.00063**<br>0.016 | **246 - 426**<br>75 - 130 | **.00071**<br>0.018 | **295 - 492**<br>90 - 150 | **.00079**<br>0.020 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| **148 - 246**<br>45 - 75 | **.00035**<br>0.009 | **180 - 312**<br>55 - 95 | **.00043**<br>0.011 | **213 - 377**<br>65 - 115 | **.00055**<br>0.014 | **246 - 426**<br>75 - 130 | **.00063**<br>0.016 | **295 - 492**<br>90 - 150 | **.00075**<br>0.019 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00035**<br>0.009 | **180 - 312**<br>55 - 95 | **.00043**<br>0.011 | **213 - 377**<br>65 - 115 | **.00055**<br>0.014 | **246 - 426**<br>75 - 130 | **.00063**<br>0.016 | **295 - 492**<br>90 - 150 | **.00075**<br>0.019 | **328 - 558**<br>100 - 170 | **.00087**<br>0.022 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00039**<br>0.010 | **213 - 377**<br>65 - 115 | **.00047**<br>0.012 | **246 - 426**<br>75 - 130 | **.00055**<br>0.014 | **295 - 492**<br>90 - 150 | **.00063**<br>0.016 | **328 - 558**<br>100 - 170 | **.00071**<br>0.018 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

# NEW Type C - Z4 - Side milling - Finishing

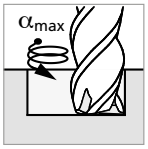
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Side milling**

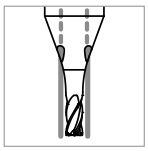
**Finishing**

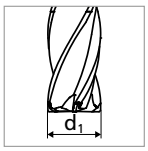



- $a_p = 1.5 \times d_1$
- $a_e = 0.02 \times d_1$




**Note:**
In case of helical interpolation milling see $\alpha_{max}$ on page 451

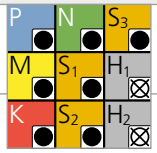





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | Cutting edge geometry |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | GEOMETRY S |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | GEOMETRY S |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | GEOMETRY S |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | GEOMETRY S |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | |
| | | 2.1020 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | GEOMETRY SX |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | GEOMETRY S |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | GEOMETRY S |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CoCr alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | GEOMETRY SX |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






| Ød1 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/64" | | .020" \| 0.5 mm | | .024" \| 0.6 mm | | .028" \| 0.7 mm | | 1/32" | | .035" - .039" \| 0.9 - 1.0 mm | |
| .016" \| 0.4 mm | | | | | | | | .031" \| 0.8mm | | | |
| $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| **148 - 246**<br>45 - 75 | **.00028**<br>0.007 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00047**<br>0.012 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00063**<br>0.016 |
| **148 - 246**<br>45 - 75 | **.00028**<br>0.007 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00047**<br>0.012 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00063**<br>0.016 |
| **148 - 246**<br>45 - 75 | **.00016**<br>0.004 | **180 - 312**<br>55 - 95 | **.00024**<br>0.006 | **213 - 377**<br>65 - 115 | **.00031**<br>0.008 | **246 - 426**<br>75 - 130 | **.00035**<br>0.009 | **295 - 492**<br>90 - 150 | **.00043**<br>0.011 | **328 - 558**<br>100 - 170 | **.00047**<br>0.012 |
| **148 - 246**<br>45 - 75 | **.00024**<br>0.006 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00047**<br>0.012 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00063**<br>0.016 |
| **148 - 246**<br>45 - 75 | **.00024**<br>0.006 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00047**<br>0.012 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00063**<br>0.016 |
| **148 - 246**<br>45 - 75 | **.00024**<br>0.006 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00047**<br>0.012 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00063**<br>0.016 |
| **148 - 246**<br>45 - 75 | **.00016**<br>0.004 | **180 - 312**<br>55 - 95 | **.00024**<br>0.006 | **213 - 377**<br>65 - 115 | **.00031**<br>0.008 | **246 - 426**<br>75 - 130 | **.00035**<br>0.009 | **295 - 492**<br>90 - 150 | **.00043**<br>0.011 | **328 - 558**<br>100 - 170 | **.00047**<br>0.012 |
| **148 - 246**<br>45 - 75 | **.00028**<br>0.007 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00047**<br>0.012 | **295 - 492**<br>90 - 150 | **.00055**<br>0.014 | **328 - 558**<br>100 - 170 | **.00063**<br>0.016 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00043**<br>0.011 | **295 - 492**<br>90 - 150 | **.00047**<br>0.012 | **328 - 558**<br>100 - 170 | **.00047**<br>0.012 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00043**<br>0.011 | **295 - 492**<br>90 - 150 | **.00047**<br>0.012 | **328 - 558**<br>100 - 170 | **.00047**<br>0.012 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00043**<br>0.011 | **295 - 492**<br>90 - 150 | **.00047**<br>0.012 | **328 - 558**<br>100 - 170 | **.00047**<br>0.012 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00043**<br>0.011 | **295 - 492**<br>90 - 150 | **.00047**<br>0.012 | **328 - 558**<br>100 - 170 | **.00047**<br>0.012 |
| **148 - 246**<br>45 - 75 | **.00031**<br>0.008 | **180 - 312**<br>55 - 95 | **.00031**<br>0.008 | **213 - 377**<br>65 - 115 | **.00039**<br>0.010 | **246 - 426**<br>75 - 130 | **.00043**<br>0.011 | **295 - 492**<br>90 - 150 | **.00047**<br>0.012 | **328 - 558**<br>100 - 170 | **.00047**<br>0.012 |
| **148 - 246**<br>45 - 75 | **.00008**<br>0.002 | **180 - 312**<br>55 - 95 | **.00016**<br>0.004 | **213 - 377**<br>65 - 115 | **.00016**<br>0.004 | **246 - 426**<br>75 - 130 | **.00020**<br>0.005 | **295 - 492**<br>90 - 150 | **.00024**<br>0.006 | **328 - 558**<br>100 - 170 | **.00028**<br>0.007 |
| **148 - 246**<br>45 - 75 | **.00016**<br>0.004 | **180 - 312**<br>55 - 95 | **.00024**<br>0.006 | **213 - 377**<br>65 - 115 | **.00031**<br>0.008 | **246 - 426**<br>75 - 130 | **.00035**<br>0.009 | **295 - 492**<br>90 - 150 | **.00043**<br>0.011 | **328 - 558**<br>100 - 170 | **.00047**<br>0.012 |
| **148 - 246**<br>45 - 75 | **.00016**<br>0.004 | **180 - 312**<br>55 - 95 | **.00024**<br>0.006 | **213 - 377**<br>65 - 115 | **.00031**<br>0.008 | **246 - 426**<br>75 - 130 | **.00035**<br>0.009 | **295 - 492**<br>90 - 150 | **.00043**<br>0.011 | **328 - 558**<br>100 - 170 | **.00047**<br>0.012 |
| **148 - 246**<br>45 - 75 | **.00008**<br>0.002 | **180 - 312**<br>55 - 95 | **.00016**<br>0.004 | **213 - 377**<br>65 - 115 | **.00016**<br>0.004 | **246 - 426**<br>75 - 130 | **.00020**<br>0.005 | **295 - 492**<br>90 - 150 | **.00024**<br>0.006 | **328 - 558**<br>100 - 170 | **.00028**<br>0.007 |

# NEW Process

## PRECISE AND EFFICIENT MILLING

### Coolant type, pressure and filtration

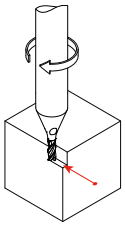
**Coolant:** for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

**Filter:** the large cooling channels permit the use of a standard filter with filter quality of ≤ 002" (0.05 mm).

**Coolant pressure:** at least 363 psi (25 bar) coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

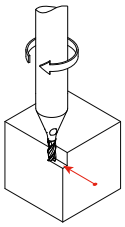
| | | | |
|---|---|---|---|
| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
| **Minimal pressure** | **[psi]** | **363** | **508** |
| | [bar] | 25 | 35 |

### Climb milling and conventional milling



For side milling, Mikron Tool recommends climb milling. The chip thickness is bigger at the beginning and decreases continuously so that the cutting forces remain low. With conventional milling, on the opposite, high cutting forces would push the milling tool away from the workpiece. Thus, the surface quality and precision of the workpiece decrease.

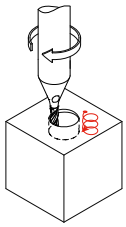
### Side milling



**Recommended cutting parameters**
$v_c$ and $f_z$: as specified in the cutting data table

| | Type B - Z3 | Type C - Z3 | Type B - Z4 | Type C - Z4 |
|---|---|---|---|---|
| **Roughing** | $a_p$ = 1 x d<br>$a_e$ = 0.2 x d | $a_p$ = 1 x d<br>$a_e$ = 0.1 x d | - | - |
| **Semi-finishing** | - | - | $a_p$ = 1.5 x d<br>$a_e$ = 0.1 x d | $a_p$ = 1.5 x d<br>$a_e$ = 0.05 x d |
| **Finishing** | - | - | $a_p$ = 1.5 x d<br>$a_e$ = 0.02 x d | $a_p$ = 1.5 x d<br>$a_e$ = 0.02 x d |

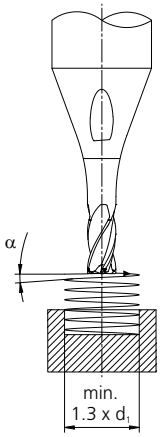
## Helical interpolation milling



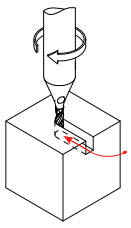
Helical interpolation offers the best and most gentle method of plunging. Note that the minimum diameter to be produced must be 1.3 x $d_1$. The minimum and maximum helical interpolation angle $\alpha$ depends on the material (see tables).

### Suggested helical interpolation angles (calculated on the endmill center)

| | Material | $\alpha$ - Helical interpolation min | max |
|---|---|---|---|
| P | Unalloyed and alloyed Steel | 5° | 15° |
| M | Stainless steels | 5° | 10° |
| K | Cast iron | 5° | 15° |
| N | Aluminum and non-ferrous metals | 10° | 30° |
| $S_1$ | Super alloys | 2° | 8° |
| $S_2$ | Titanium and titanium alloys | 2° | 8° |
| $S_3$ | CrCo alloys | 2° | 8° |




## Slot milling



For slot milling, Mikron Tool recommends **indirect entry**. During milling with direct entry into the material, very thick chips are produced and the milling tool is subject to asymmetrical stress until it is working with its entire diameter in the material. These stresses can affect the tool life of cutting edges.

### Recommended cutting parameters

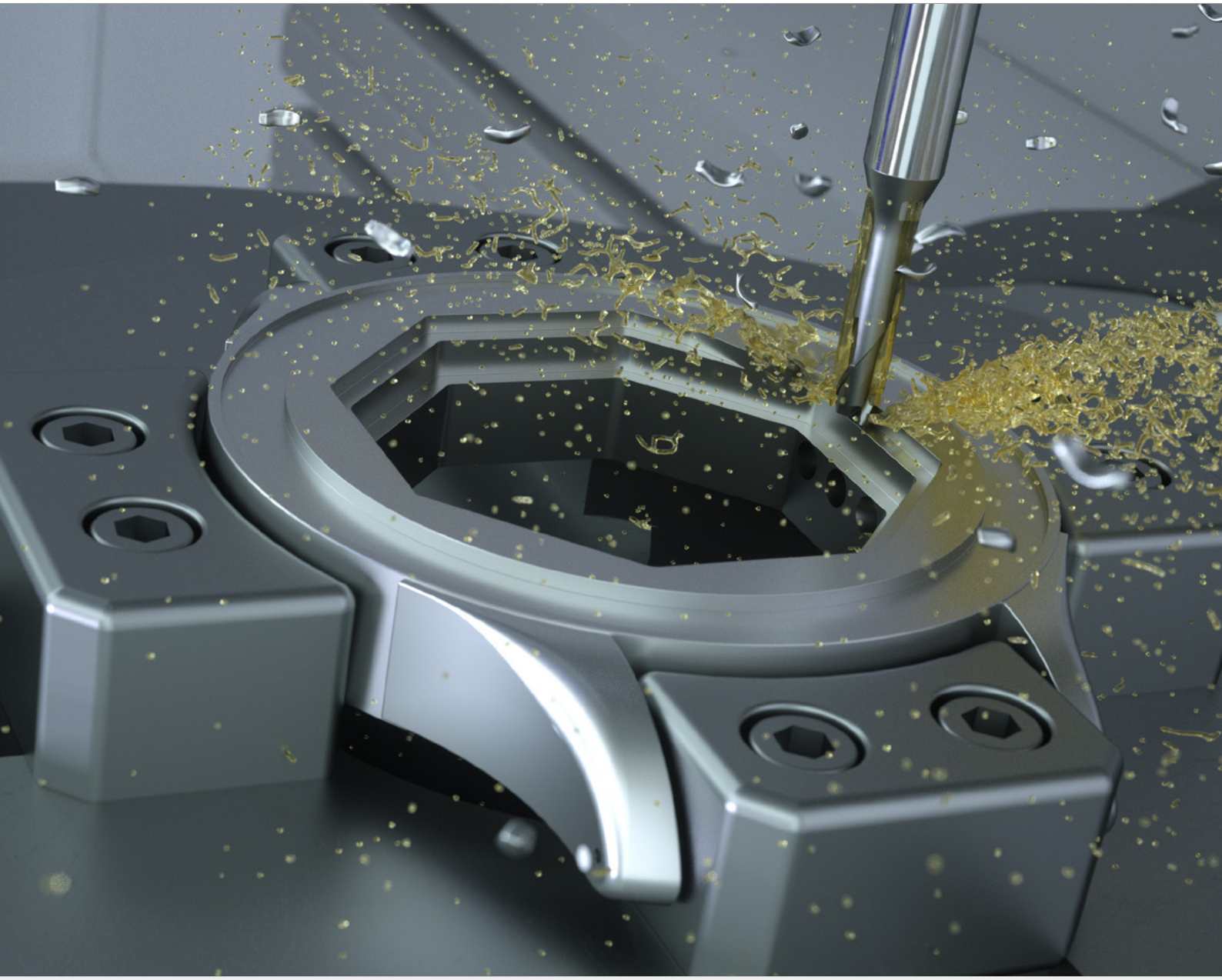
$v_c$ and $f_z$: as specified in the cutting data table

### Note

The recommended $a_{p,max}$ values should not be exceeded

PATENTED

# CrazyMill Cool Square / Corner radius - Z2



CRAZYMILL Cool

## HSPC-END MILL FOR DIFFICULT TO MACHINE MATERIALS



With CrazyMill Cool, Mikron Tool has achieved a quantum leap in the milling of stainless steel, titanium, chromium cobalt alloys, and superalloys. Two versions of micro endmill are available in diameters of .012" - 1/4" (0.3 - 6.35 mm):

- **Variant square** - sharp-edged with small, defined protection phase of 45°, for a maximum machining depth of 5 x d and with a cutting length of 1.5 x d.
- **Variant corner radius** - sharp-edged with a corner radius for a maximum machining depth of 5 x d and with a cutting length of 1.5 x d.

CrazyMill Cool is setting new standards for the milling of grooves, pockets and walls with regard to cutting speeds, feed, performance, tool life, and surface quality. It combines HSC (high-speed cutting) and HPC (high-performance cutting), thus becoming an HSPC (high-speed performance cutting) milling tool. The new features of this roughing and finishing cutter include not only the solid carbide, coating, and geometry, but especially the unique cooling system with cooling channels integrated in the shaft, which achieve constant and extensive cooling of the cutting edges, thus enabling the highest cutting speeds and maximum feed.

The milling tools have three to five integrated cooling channels depending on the shaft diameter.

**Regrinding:** This product is not suitable for regrinding.

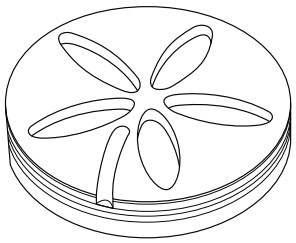
**Please note:** You couldn't find your suitable version of the CrazyMill Cool Square / Corner radius - Z2 (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYMILL by Mikron Tool Cool

# Features and benefits

## ROUGHING AND FINISHING CUTTER WITH THROUGH-TOOL COOLING, FROM 0.3 MM (.012")

- **SHORT MACHINING TIME** | highest chip removal rate
- **LONG TOOL LIFE** | due to efficient patented cooling
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to internal cooling
- **HIGH SURFACE QUALITY** | due to special geometry



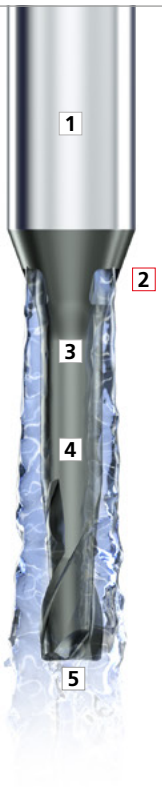
**COMPONENT**
Demo flower

**MATERIAL**
X2CrNiMo 18-14-3 / 1.4435 / AISI 316L

**MACHINING**
- Slot milling
- d = 1.5 mm **| .059"**

**MILLING TOOL**
Mikron Tool - CrazyMill Cool Corner radius Z2 - Type A

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyMill Cool Corner radius - Z2<br>- Carbide<br>- Coated<br>- Internal cooling |
| Item number | 2.CMC30.A3Z2.150.1 |
| Cutting data | $v_c$ = 180 m/min **| 591 SFM**<br>$f_z$ = 0.016 mm **| .0006 IPT**<br>$a_p$ = 1.5 mm **| .059"**<br>r = 0.2 mm **| .008 IPT** |

| 1.5 x d | 3 x d | 5 x d |
|---|---|---|
| Type A | Type B | Type C |
| Coated<br>Integrated cooling<br>$l_1$: 1.5xd, $l_2$: 1.5xd | Coated<br>Integrated cooling<br>$l_1$: 3xd, $l_2$: 1.5xd | Coated<br>Integrated cooling<br>$l_1$: 5xd, $l_2$: 1.5xd |
|  |  |  |
|  |  |  |
| page 456 | page 462 | page 468 |

## PATENTED

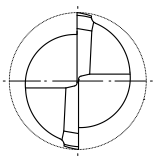
**1 | SHANK**
The robust carbide shank guarantees stable and vibration-free milling. A high degree of precision and excellent surface quality are achieved.

**2 | INTEGRATED COOLING - PATENTED**
The integrated cooling channels guarantee constant and maximal cooling of the cutting edges and optimal chip removal. The result is higher cutting speed and depth as well as improved surface quality.

**3 | CARBIDE**
The specially developed micro-grain carbide meets all requirements in terms of mechanical properties.

**4 | COATING**
The high-performance RIP coating is heat-resistant and wear-resistant, prevents build up edges and guarantees optimum chip flushing. The result is long tool life.

**5 | CUTTING GEOMETRY**
Developed for the machining of difficult-to-machine materials such as stainless steels, titanium, titanium alloys and heat-resistant alloys. Ensures roughing and finishing with high surface quality. Due to its highly smooth running, it will work with no vibration.

Mill tip 

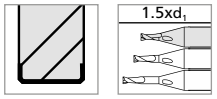
$l_1$ = Effective length $l_2$ = Cutting length

CRAZYMILL by Mikron Tool Cool

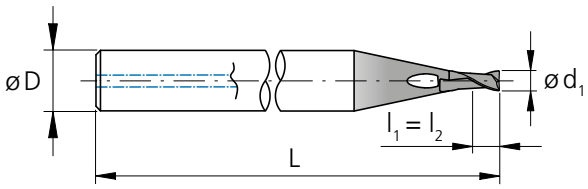
# Type A - 1.5 x d - Square / Corner radius - Z2

## MILLING WITH INTEGRATED COOLING

### Square




protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

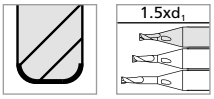
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.012** | 0.3 | **.018** | 0.45 | 0.45 | 3 | **1.50** | 38 | 2.CMC30.A1Z2.030.1 | ■ |
| **1/64** | **.0156** | 0.396 | **.023** | 0.59 | 0.59 | 3 | **1.50** | 38 | 2.CMC.SAZ2.F164 | ■ |
| | **.016** | 0.4 | **.024** | 0.60 | 0.60 | 3 | **1.50** | 38 | 2.CMC30.A1Z2.040.1 | ■ |
| | **.020** | 0.5 | **.030** | 0.75 | 0.75 | 3 | **1.50** | 38 | 2.CMC30.A1Z2.050.1 | ■ |
| | **.024** | 0.6 | **.035** | 0.90 | 0.90 | 3 | **1.50** | 38 | 2.CMC30.A1Z2.060.1 | ■ |
| **1/32** | **.0312** | 0.793 | **.047** | 1.19 | 1.19 | 3 | **1.50** | 38 | 2.CMC.SAZ2.F132 | ■ |
| | **.031** | 0.8 | **.047** | 1.20 | 1.20 | 3 | **1.50** | 38 | 2.CMC30.A1Z2.080.1 | ■ |
| | **.039** | 1.0 | **.059** | 1.50 | 1.50 | 4 | **1.57** | 40 | 2.CMC30.A1Z2.100.1 | ■ |
| | **.047** | 1.2 | **.071** | 1.80 | 1.80 | 4 | **1.57** | 40 | 2.CMC30.A1Z2.120.1 | ■ |
| | **.059** | 1.5 | **.089** | 2.25 | 2.25 | 4 | **1.57** | 40 | 2.CMC30.A1Z2.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.094** | 2.38 | 2.38 | 4 | **1.57** | 40 | 2.CMC.SAZ2.F116 | ■ |
| | **.071** | 1.8 | **.106** | 2.70 | 2.70 | 4 | **1.57** | 40 | 2.CMC30.A1Z2.180.1 | ■ |
| | **.079** | 2.0 | **.118** | 3.00 | 3.00 | 4 | **1.57** | 40 | 2.CMC30.A1Z2.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.141** | 3.57 | 3.57 | 4 | **1.57** | 40 | 2.CMC.SAZ2.F332 | ■ |
| | **.098** | 2.5 | **.148** | 3.75 | 3.75 | 6 | **1.77** | 45 | 2.CMC30.A1Z2.250.1 | ■ |
| | **.118** | 3.0 | **.177** | 4.50 | 4.50 | 6 | **1.97** | 50 | 2.CMC30.A1Z2.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.187** | 4.76 | 4.76 | 6 | **1.97** | 50 | 2.CMC.SAZ2.F18 | ■ |
| **5/32** | **.1562** | 3.968 | **.234** | 5.95 | 5.95 | 6 | **1.97** | 50 | 2.CMC.SAZ2.F532 | ■ |
| | **.157** | 4.0 | **.236** | 6.00 | 6.00 | 6 | **1.97** | 50 | 2.CMC30.A1Z2.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.281** | 7.14 | 7.14 | 8 | **2.36** | 60 | 2.CMC.SAZ2.F316 | ■ |
| **7/32** | **.2189** | 5.560 | **.328** | 8.34 | 8.34 | 10 | **2.36** | 60 | 2.CMC.SAZ2.F732 | ■ |
| | **.236** | 6.0 | **.354** | 9.00 | 9.00 | 10 | **2.36** | 60 | 2.CMC30.A1Z2.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **.375** | 9.53 | 9.53 | 10 | **2.36** | 60 | 2.CMC.SAZ2.F14 | ■ |

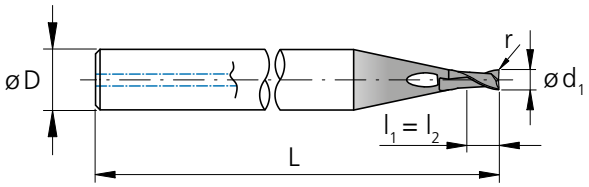
■ Stock item

Carbide | Z2 | 30° | eXedur RIP

| | | |
|---|---|---|
| Ø$d_1$ | **.012" - 1/4"** (0.3 - 6.35 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Corner radius




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.012** | 0.3 | **.018** | 0.45 | 0.45 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.A2Z2.030.1 | ■ |
| **1/64** | **.0156** | 0.396 | **.023** | 0.59 | 0.59 | 3 | **1.50** | 38 | **.0030** | 0.076 | 2.CMC.RA2Z2.F164 | ■ |
| | **.016** | 0.4 | **.024** | 0.60 | 0.60 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.A2Z2.040.1 | ■ |
| | **.020** | 0.5 | **.030** | 0.75 | 0.75 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.A2Z2.050.1 | ■ |
| | **.020** | 0.5 | **.030** | 0.75 | 0.75 | 3 | **1.50** | 38 | **.0039** | 0.10 | 2.CMC30.A3Z2.050.1 | ■ |
| | **.024** | 0.6 | **.035** | 0.90 | 0.90 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.A2Z2.060.1 | ■ |
| | **.024** | 0.6 | **.035** | 0.90 | 0.90 | 3 | **1.50** | 38 | **.0039** | 0.10 | 2.CMC30.A3Z2.060.1 | ■ |
| **1/32** | **.0312** | 0.793 | **.047** | 1.19 | 1.19 | 3 | **1.50** | 38 | **.0030** | 0.076 | 2.CMC.RA2Z2.F132 | ■ |
| **1/32** | **.0312** | 0.793 | **.047** | 1.19 | 1.19 | 3 | **1.50** | 38 | **.0050** | 0.127 | 2.CMC.RA3Z2.F132 | ■ |
| | **.031** | 0.8 | **.047** | 1.20 | 1.20 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.A2Z2.080.1 | ■ |
| | **.031** | 0.8 | **.047** | 1.20 | 1.20 | 3 | **1.50** | 38 | **.0039** | 0.10 | 2.CMC30.A3Z2.080.1 | ■ |
| | **.039** | 1.0 | **.059** | 1.50 | 1.50 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.A2Z2.100.1 | ■ |
| | **.039** | 1.0 | **.059** | 1.50 | 1.50 | 4 | **1.57** | 40 | **.0079** | 0.20 | 2.CMC30.A3Z2.100.1 | ■ |
| | **.047** | 1.2 | **.071** | 1.80 | 1.80 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.A2Z2.120.1 | ■ |
| | **.047** | 1.2 | **.071** | 1.80 | 1.80 | 4 | **1.57** | 40 | **.0079** | 0.20 | 2.CMC30.A3Z2.120.1 | ■ |
| | **.059** | 1.5 | **.089** | 2.25 | 2.25 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.A2Z2.150.1 | ■ |
| | **.059** | 1.5 | **.089** | 2.25 | 2.25 | 4 | **1.57** | 40 | **.0118** | 0.30 | 2.CMC30.A3Z2.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.094** | 2.38 | 2.38 | 4 | **1.57** | 40 | **.0050** | 0.127 | 2.CMC.RA2Z2.F116 | ■ |
| **1/16** | **.0625** | 1.587 | **.094** | 2.38 | 2.38 | 4 | **1.57** | 40 | **.0100** | 0.254 | 2.CMC.RA3Z2.F116 | ■ |
| | **.071** | 1.8 | **.106** | 2.70 | 2.70 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.A2Z2.180.1 | ■ |
| | **.071** | 1.8 | **.106** | 2.70 | 2.70 | 4 | **1.57** | 40 | **.0118** | 0.30 | 2.CMC30.A3Z2.180.1 | ■ |
| | **.079** | 2.0 | **.118** | 3.00 | 3.00 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.A2Z2.200.1 | ■ |
| | **.079** | 2.0 | **.118** | 3.00 | 3.00 | 4 | **1.57** | 40 | **.0079** | 0.20 | 2.CMC30.A3Z2.200.1 | ■ |
| | **.079** | 2.0 | **.118** | 3.00 | 3.00 | 4 | **1.57** | 40 | **.0197** | 0.50 | 2.CMC30.A4Z2.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.141** | 3.57 | 3.57 | 4 | **1.57** | 40 | **.0050** | 0.127 | 2.CMC.RA2Z2.F332 | ■ |
| **3/32** | **.0937** | 2.381 | **.141** | 3.57 | 3.57 | 4 | **1.57** | 40 | **.0100** | 0.254 | 2.CMC.RA3Z2.F332 | ■ |
| **3/32** | **.0937** | 2.381 | **.141** | 3.57 | 3.57 | 4 | **1.57** | 40 | **.0150** | 0.381 | 2.CMC.RA4Z2.F332 | ■ |
| | **.098** | 2.5 | **.148** | 3.75 | 3.75 | 6 | **1.77** | 45 | **.0079** | 0.20 | 2.CMC30.A2Z2.250.1 | ■ |
| | **.098** | 2.5 | **.148** | 3.75 | 3.75 | 6 | **1.77** | 45 | **.0197** | 0.50 | 2.CMC30.A3Z2.250.1 | ■ |
| | **.118** | 3.0 | **.177** | 4.50 | 4.50 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC30.A2Z2.300.1 | ■ |
| | **.118** | 3.0 | **.177** | 4.50 | 4.50 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC30.A3Z2.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.187** | 4.76 | 4.76 | 6 | **1.97** | 50 | **.0100** | 0.254 | 2.CMC.RA2Z2.F18 | ■ |
| **1/8** | **.1250** | 3.175 | **.187** | 4.76 | 4.76 | 6 | **1.97** | 50 | **.0150** | 0.381 | 2.CMC.RA3Z2.F18 | ■ |
| **5/32** | **.1562** | 3.968 | **.234** | 5.95 | 5.95 | 6 | **1.97** | 50 | **.0100** | 0.254 | 2.CMC.RA2Z2.F532 | ■ |
| **5/32** | **.1562** | 3.968 | **.234** | 5.95 | 5.95 | 6 | **1.97** | 50 | **.0150** | 0.381 | 2.CMC.RA3Z2.F532 | ■ |
| | **.157** | 4.0 | **.236** | 6.00 | 6.00 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC30.A2Z2.400.1 | ■ |
| | **.157** | 4.0 | **.236** | 6.00 | 6.00 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC30.A3Z2.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.281** | 7.14 | 7.14 | 8 | **2.36** | 60 | **.0100** | 0.254 | 2.CMC.RA2Z2.F316 | ■ |
| **3/16** | **.1875** | 4.762 | **.281** | 7.14 | 7.14 | 8 | **2.36** | 60 | **.0150** | 0.381 | 2.CMC.RA3Z2.F316 | ■ |
| **7/32** | **.2189** | 5.560 | **.328** | 8.34 | 8.34 | 10 | **2.36** | 60 | **.0150** | 0.381 | 2.CMC.RA2Z2.F732 | ■ |
| **7/32** | **.2189** | 5.560 | **.328** | 8.34 | 8.34 | 10 | **2.36** | 60 | **.0300** | 0.762 | 2.CMC.RA3Z2.F732 | ■ |
| | **.236** | 6.0 | **.354** | 9.00 | 9.00 | 10 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC30.A2Z2.600.1 | ■ |
| | **.236** | 6.0 | **.354** | 9.00 | 9.00 | 10 | **2.36** | 60 | **.0394** | 1.00 | 2.CMC30.A3Z2.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **.375** | 9.53 | 9.53 | 10 | **2.36** | 60 | **.0300** | 0.762 | 2.CMC.RA2Z2.F14 | ■ |

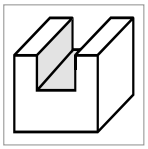
■ Stock item

CRAZYMILL by Mikron Tool Cool

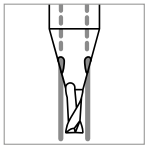
# Type A - Conventional slot milling

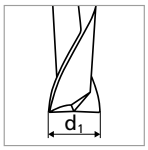
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

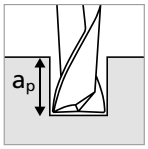
**Conventional slot milling**



■ $a_p = 1 \times d_1$



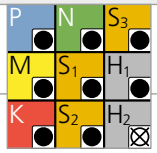



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3–0.4 mm \| .012"–.016" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| 197 | 0.004 – 0.006 .00016 – .00024 |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| 197 | 0.002–0.004 .00008–.00016 |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 60 \| 197 | 0.002–0.003 .00008–.00012 |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 \| 197 | 0.002–0.003 .00008–.00012 |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





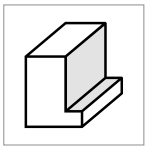

| Ød1 | 1/32" 0.5–0.8 mm \| .020"–.032" | | 1.0–1.2 mm \| .039"–.047" | | 1/16" 1.5–1.8 mm \| .059"–.071" | | 3/32" 2.0–2.5 mm \| .079"–.098" | | 1/8" 3.0 mm \| .118" | | 5/32–3/16–7/32–1/4" 4.0–6 mm \| .158"–.236" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 100 \| **328** | 0.008 – 0.012<br>**.00031–.00047** | 140 \| **459** | 0.013 – 0.015<br>**.00051 – .00059** | 180 \| **591** | 0.022–0.024<br>**.00087–.00094** | 200 \| **656** | 0.030 – 0.032<br>**.00118 – .00126** | 220 \| **722** | 0.046<br>**.00181** | 260 \| **853** | 0.048<br>**.00189** |
| | 100 \| **328** | 0.007 – 0.010<br>**.00028 – .00039** | 140 \| **459** | 0.012 – 0.014<br>**.00047 – .00055** | 180 \| **591** | 0.020–0.022<br>**.00079–.00087** | 200 \| **656** | 0.028 – 0.030<br>**.00110 – .00118** | 220 \| **722** | 0.044<br>**.00173** | 260 \| **853** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.006 – 0.009<br>**.00024 – .00035** | 140 \| **459** | 0.009 – 0.011<br>**.00035 – .00043** | 180 \| **591** | 0.018–0.020<br>**.00071–.00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.040<br>**.00157** | 260 \| **853** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.008 – 0.012<br>**.00031–.00047** | 140 \| **459** | 0.014 – 0.016<br>**.00055 – .00063** | 180 \| **591** | 0.022–0.024<br>**.00087–.00094** | 200 \| **656** | 0.030 – 0.032<br>**.00118 – .00126** | 220 \| **722** | 0.044<br>**.00173** | 260 \| **853** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.007 – 0.010<br>**.00028 – .00039** | 140 \| **459** | 0.013 – 0.015<br>**.00051 – .00059** | 180 \| **591** | 0.020–0.022<br>**.00079–.00087** | 200 \| **656** | 0.028 – 0.030<br>**.00110 – .00118** | 220 \| **722** | 0.042<br>**.00165** | 260 \| **853** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.007 – 0.010<br>**.00028 – .00039** | 140 \| **459** | 0.013 – 0.015<br>**.00051 – .00059** | 180 \| **591** | 0.020–0.022<br>**.00079–.00087** | 200 \| **656** | 0.028 – 0.030<br>**.00110 – .00118** | 220 \| **722** | 0.042<br>**.00165** | 260 \| **853** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.006 – 0.009<br>**.00024 – .00035** | 140 \| **459** | 0.010–0.012<br>**.00039–.00047** | 180 \| **591** | 0.016–0.018<br>**.00063–.00071** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.040<br>**.00157** | 260 \| **853** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.005–0.008<br>**.00020–.00031** | 120 \| **394** | 0.010–0.020<br>**.00039–.00079** | 140 \| **459** | 0.022–0.025<br>**.00087–.00098** | 160 \| **525** | 0.026–0.035<br>**.00102 – .00138** | 180 \| **591** | 0.040–0.046<br>**.00157–.00181** | 200 \| **656** | 0.050–0.054<br>**.00197–.00213** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.015 – 0.017<br>**.00059–.00067** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.015 – 0.017<br>**.00059–.00067** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.050<br>**.00197** | 260 \| **853** | 0.053<br>**.00209** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047–.00063** | 140 \| **459** | 0.018–0.020<br>**.00071–.00079** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047–.00063** | 140 \| **459** | 0.018–0.020<br>**.00071–.00079** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047–.00063** | 140 \| **459** | 0.018–0.020<br>**.00071–.00079** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.016–0.018<br>**.00063–.00071** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.004–0.006<br>**.00016–.00024** | 120 \| **394** | 0.007–0.008<br>**.00028–.00031** | 130 \| **427** | 0.009–0.010<br>**.00035–.00039** | 140 \| **459** | 0.010–0.012<br>**.00039–.00047** | 150 \| **492** | 0.015<br>**.00059** | 170 \| **558** | 0.020<br>**.00079** |
| | 100 \| **328** | 0.006–0.009<br>**.00024–.00035** | 120 \| **394** | 0.014–0.016<br>**.00055–.00063** | 130 \| **427** | 0.018–0.020<br>**.00071–.00079** | 140 \| **459** | 0.026 – 0.028<br>**.00102 – .00110** | 150 \| **492** | 0.040<br>**.00157** | 170 \| **558** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.006–0.009<br>**.00024–.00035** | 120 \| **394** | 0.014–0.016<br>**.00055–.00063** | 130 \| **427** | 0.018–0.020<br>**.00071–.00079** | 140 \| **459** | 0.026 – 0.028<br>**.00102 – .00110** | 150 \| **492** | 0.040<br>**.00157** | 170 \| **558** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.004–0.006<br>**.00016–.00024** | 140 \| **459** | 0.007–0.008<br>**.00028–.00031** | 160 \| **525** | 0.009–0.010<br>**.00035–.00039** | 180 \| **591** | 0.010–0.012<br>**.00039–.00047** | 200 \| **656** | 0.015<br>**.00059** | 220 \| **722** | 0.020<br>**.00079** |
| | 80 \| **262** | 0.006–0.007<br>**.00024–.00028** | 100 \| **328** | 0.008–0.010<br>**.00031–.00039** | 140 \| **459** | 0.012–0.016<br>**.00047–.00063** | 180 \| **591** | 0.018 – 0.024<br>**.00071 – .00094** | 200 \| **656** | 0.030<br>**.00118** | 240 \| **787** | 0.035<br>**.00138** |

CRAZYMILL by Mikron Tool Cool

# Type A - Side and trochoidal slot milling

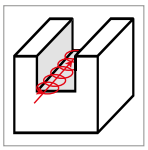
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Side milling**

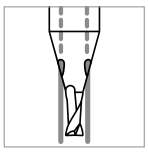


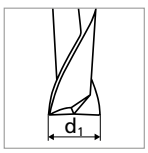
- $a_p = 1 \times d_1$
- $a_e = 0.3 \times d_1$

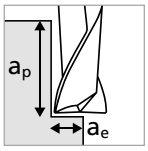
**Trochoidal Slot Milling**



- $a_p = 1 \times d_1$
- $a_e = 0.1 \times d_1$



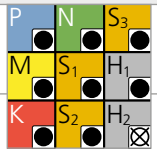



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3–0.4 mm \| .012"–.016" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 60 \| 197 | 0.003–0.004 .00012–.00016 |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 \| 197 | 0.003–0.004 .00012–.00016 |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






| Ød1 | 1/32" 0.5–0.8 mm \| .020"–.032" | | 1.0–1.2 mm \| .039"–.047" | | 1/16" 1.5–1.8 mm \| .059"–.071" | | 3/32" 2.0–2.5 mm \| .079"–.098" | | 1/8" 3.0 mm \| .118" | | 5/32–3/16–7/32–1/4" 4.0–6 mm \| .158"–.236" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.015 – 0.017<br>**.00059 – .00067** | 200 \| **656** | 0.024 – 0.026<br>**.00094 – .00102** | 220 \| **722** | 0.034 – 0.036<br>**.00134 – .00142** | 240 \| **787** | 0.048<br>**.00189** | 280 \| **919** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.009 – 0.012<br>**.00035 – .00047** | 140 \| **459** | 0.014 – 0.016<br>**.00055 – .00063** | 200 \| **656** | 0.022 – 0.024<br>**.00087 – .00094** | 220 \| **722** | 0.032 – 0.034<br>**.00126 – .00134** | 240 \| **787** | 0.046<br>**.00181** | 280 \| **919** | 0.048<br>**.00189** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 140 \| **459** | 0.011 – 0.013<br>**.00043 – .00051** | 200 \| **656** | 0.020 – 0.022<br>**.00079 – .00087** | 220 \| **722** | 0.030 – 0.032<br>**.00118 – .00126** | 240 \| **787** | 0.042<br>**.00165** | 280 \| **919** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.016 – 0.018<br>**.00063 – .00071** | 200 \| **656** | 0.024 – 0.026<br>**.00094 – .00102** | 220 \| **722** | 0.034 – 0.036<br>**.00134 – .00142** | 240 \| **787** | 0.046<br>**.00181** | 280 \| **919** | 0.048<br>**.00189** |
| | 100 \| **328** | 0.009 – 0.012<br>**.00035 – .00047** | 140 \| **459** | 0.015 – 0.017<br>**.00059 – .00067** | 200 \| **656** | 0.022 – 0.024<br>**.00087 – .00094** | 220 \| **722** | 0.032 – 0.034<br>**.00126 – .00134** | 240 \| **787** | 0.044<br>**.00173** | 280 \| **919** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.009 – 0.012<br>**.00035 – .00047** | 140 \| **459** | 0.015 – 0.017<br>**.00059 – .00067** | 200 \| **656** | 0.022 – 0.024<br>**.00087 – .00094** | 220 \| **722** | 0.032 – 0.034<br>**.00126 – .00134** | 240 \| **787** | 0.044<br>**.00173** | 280 \| **919** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 140 \| **459** | 0.012 – 0.014<br>**.00047 – .00055** | 200 \| **656** | 0.016 – 0.018<br>**.00063 – .00071** | 220 \| **722** | 0.030 – 0.032<br>**.00118 – .00126** | 240 \| **787** | 0.042<br>**.00165** | 280 \| **919** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.006 – 0.009<br>**.00024 – .00035** | 120 \| **394** | 0.011 – 0.022<br>**.00043 – .00087** | 140 \| **459** | 0.024 – 0.026<br>**.00094 – .00102** | 160 \| **525** | 0.028 – 0.036<br>**.00110 – .00142** | 180 \| **591** | 0.042 – 0.048<br>**.00165 – .00189** | 200 \| **656** | 0.052 – 0.057<br>**.00205 – .00224** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047 – .00063** | 140 \| **459** | 0.018 – 0.020<br>**.00071 – .00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047 – .00063** | 140 \| **459** | 0.018 – 0.020<br>**.00071 – .00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.014 – 0.018<br>**.00055 – .00071** | 140 \| **459** | 0.020 – 0.022<br>**.00079 – .00087** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.014 – 0.018<br>**.00055 – .00071** | 140 \| **459** | 0.020 – 0.022<br>**.00079 – .00087** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.014 – 0.018<br>**.00055 – .00071** | 140 \| **459** | 0.020 – 0.022<br>**.00079 – .00087** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047 – .00063** | 140 \| **459** | 0.018 – 0.020<br>**.00071 – .00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.004 – 0.006<br>**.00016 – .00024** | 120 \| **394** | 0.007 – 0.008<br>**.00028 – .00031** | 130 \| **427** | 0.009 – 0.010<br>**.00035 – .00039** | 140 \| **459** | 0.010 – 0.012<br>**.00039 – .00047** | 150 \| **492** | 0.015<br>**.00059** | 170 \| **558** | 0.020<br>**.00079** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 120 \| **394** | 0.016 – 0.018<br>**.00063 – .00071** | 130 \| **427** | 0.020 – 0.022<br>**.00079 – .00087** | 140 \| **459** | 0.028 – 0.030<br>**.00110 – .00118** | 150 \| **492** | 0.042<br>**.00165** | 170 \| **558** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 120 \| **394** | 0.016 – 0.018<br>**.00063 – .00071** | 130 \| **427** | 0.020 – 0.022<br>**.00079 – .00087** | 140 \| **459** | 0.028 – 0.030<br>**.00110 – .00118** | 150 \| **492** | 0.042<br>**.00165** | 170 \| **558** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.004 – 0.006<br>**.00016 – .00024** | 140 \| **459** | 0.007 – 0.008<br>**.00028 – .00031** | 180 \| **591** | 0.009 – 0.010<br>**.00035 – .00039** | 200 \| **656** | 0.010 – 0.012<br>**.00039 – .00047** | 220 \| **722** | 0.015<br>**.00059** | 240 \| **787** | 0.020<br>**.00079** |
| | 80 \| **262** | 0.007 – 0.009<br>**.00028 – .00035** | 100 \| **328** | 0.010 – 0.012<br>**.00039 – .00047** | 140 \| **459** | 0.014 – 0.018<br>**.00055 – .00071** | 180 \| **591** | 0.020 – 0.026<br>**.00079 – .00102** | 200 \| **656** | 0.035<br>**.00138** | 240 \| **787** | 0.040<br>**.00157** |

CRAZYMILL by Mikron Tool Cool

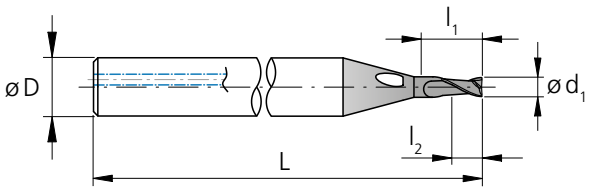
# Type B - 3 x d - Square / Corner radius - Z2

## MILLING WITH INTEGRATED COOLING

### Square




protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

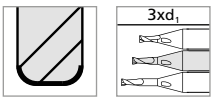
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.012** | 0.3 | **.035** | 0.90 | 0.45 | 3 | **1.50** | 38 | 2.CMC30.B1Z2.030.1 | ■ |
| **1/64** | **.0156** | 0.396 | **.047** | 1.19 | 0.59 | 3 | **1.50** | 38 | 2.CMC.SBZ2.F164 | ■ |
| | **.016** | 0.4 | **.047** | 1.20 | 0.60 | 3 | **1.50** | 38 | 2.CMC30.B1Z2.040.1 | ■ |
| | **.020** | 0.5 | **.059** | 1.50 | 0.75 | 3 | **1.50** | 38 | 2.CMC30.B1Z2.050.1 | ■ |
| | **.024** | 0.6 | **.071** | 1.80 | 0.90 | 3 | **1.50** | 38 | 2.CMC30.B1Z2.060.1 | ■ |
| **1/32** | **.0312** | 0.793 | **.094** | 2.38 | 1.19 | 3 | **1.50** | 38 | 2.CMC.SBZ2.F132 | ■ |
| | **.031** | 0.8 | **.094** | 2.40 | 1.20 | 3 | **1.50** | 38 | 2.CMC30.B1Z2.080.1 | ■ |
| | **.039** | 1.0 | **.118** | 3.00 | 1.50 | 4 | **1.57** | 40 | 2.CMC30.B1Z2.100.1 | ■ |
| | **.047** | 1.2 | **.142** | 3.60 | 1.80 | 4 | **1.57** | 40 | 2.CMC30.B1Z2.120.1 | ■ |
| | **.059** | 1.5 | **.177** | 4.50 | 2.25 | 4 | **1.57** | 40 | 2.CMC30.B1Z2.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.187** | 4.76 | 2.38 | 4 | **1.57** | 40 | 2.CMC.SBZ2.F116 | ■ |
| | **.071** | 1.8 | **.213** | 5.40 | 2.70 | 4 | **1.57** | 40 | 2.CMC30.B1Z2.180.1 | ■ |
| | **.079** | 2.0 | **.236** | 6.00 | 3.00 | 4 | **1.57** | 40 | 2.CMC30.B1Z2.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.281** | 7.14 | 3.57 | 4 | **1.57** | 40 | 2.CMC.SBZ2.F332 | ■ |
| | **.098** | 2.5 | **.295** | 7.50 | 3.75 | 6 | **1.77** | 45 | 2.CMC30.B1Z2.250.1 | ■ |
| | **.118** | 3.0 | **.354** | 9.00 | 4.50 | 6 | **1.97** | 50 | 2.CMC30.B1Z2.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.375** | 9.53 | 4.76 | 6 | **2.56** | 55 | 2.CMC.SBZ2.F18 | ■ |
| **5/32** | **.1562** | 3.968 | **.469** | 11.90 | 5.95 | 6 | **2.17** | 55 | 2.CMC.SBZ2.F532 | ■ |
| | **.157** | 4.0 | **.472** | 12.00 | 6.00 | 6 | **2.17** | 55 | 2.CMC30.B1Z2.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.563** | 14.29 | 7.14 | 8 | **2.56** | 65 | 2.CMC.SBZ2.F316 | ■ |
| **7/32** | **.2189** | 5.560 | **.657** | 16.68 | 8.34 | 10 | **2.56** | 65 | 2.CMC.SBZ2.F732 | ■ |
| | **.236** | 6.0 | **.709** | 18.00 | 9.00 | 10 | **2.56** | 65 | 2.CMC30.B1Z2.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **.750** | 19.05 | 9.53 | 10 | **2.56** | 65 | 2.CMC.SBZ2.F14 | ■ |

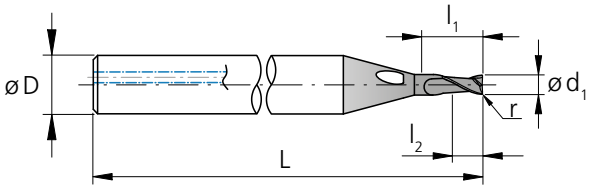
■ Stock item

Carbide | Z2 | 30° | eXedur RIP

| | | |
|---|---|---|
| Ø $d_1$ | **.012" - 1/4"** (0.3 - 6.35 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Corner radius




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.012** | 0.3 | **.035** | 0.90 | 0.45 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.B2Z2.030.1 | ■ |
| **1/64** | **.0156** | 0.396 | **.047** | 1.19 | 0.59 | 3 | **1.50** | 38 | **.0030** | 0.076 | 2.CMC.RB2Z2.F164 | ■ |
| | **.016** | 0.4 | **.047** | 1.20 | 0.60 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.B2Z2.040.1 | ■ |
| | **.020** | 0.5 | **.059** | 1.50 | 0.75 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.B2Z2.050.1 | ■ |
| | **.020** | 0.5 | **.059** | 1.50 | 0.75 | 3 | **1.50** | 38 | **.0039** | 0.10 | 2.CMC30.B3Z2.050.1 | ■ |
| | **.024** | 0.6 | **.071** | 1.80 | 0.90 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.B2Z2.060.1 | ■ |
| | **.024** | 0.6 | **.071** | 1.80 | 0.90 | 3 | **1.50** | 38 | **.0039** | 0.10 | 2.CMC30.B3Z2.060.1 | ■ |
| **1/32** | **.0312** | 0.793 | **.094** | 2.38 | 1.19 | 3 | **1.50** | 38 | **.0030** | 0.076 | 2.CMC.RB2Z2.F132 | ■ |
| **1/32** | **.0312** | 0.793 | **.094** | 2.38 | 1.19 | 3 | **1.50** | 38 | **.0050** | 0.127 | 2.CMC.RB3Z2.F132 | ■ |
| | **.031** | 0.8 | **.094** | 2.40 | 1.20 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.B2Z2.080.1 | ■ |
| | **.031** | 0.8 | **.094** | 2.40 | 1.20 | 3 | **1.50** | 38 | **.0039** | 0.10 | 2.CMC30.B3Z2.080.1 | ■ |
| | **.039** | 1.0 | **.118** | 3.00 | 1.50 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.B2Z2.100.1 | ■ |
| | **.039** | 1.0 | **.118** | 3.00 | 1.50 | 4 | **1.57** | 40 | **.0079** | 0.20 | 2.CMC30.B3Z2.100.1 | ■ |
| | **.047** | 1.2 | **.142** | 3.60 | 1.80 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.B2Z2.120.1 | ■ |
| | **.047** | 1.2 | **.142** | 3.60 | 1.80 | 4 | **1.57** | 40 | **.0079** | 0.20 | 2.CMC30.B3Z2.120.1 | ■ |
| | **.059** | 1.5 | **.177** | 4.50 | 2.25 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.B2Z2.150.1 | ■ |
| | **.059** | 1.5 | **.177** | 4.50 | 2.25 | 4 | **1.57** | 40 | **.0118** | 0.30 | 2.CMC30.B3Z2.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.187** | 4.76 | 2.38 | 4 | **1.57** | 40 | **.0050** | 0.127 | 2.CMC.RB2Z2.F116 | ■ |
| **1/16** | **.0625** | 1.587 | **.187** | 4.76 | 2.38 | 4 | **1.57** | 40 | **.0100** | 0.254 | 2.CMC.RB3Z2.F116 | ■ |
| | **.071** | 1.8 | **.213** | 5.40 | 2.70 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.B2Z2.180.1 | ■ |
| | **.071** | 1.8 | **.213** | 5.40 | 2.70 | 4 | **1.57** | 40 | **.0118** | 0.30 | 2.CMC30.B3Z2.180.1 | ■ |
| | **.079** | 2.0 | **.236** | 6.00 | 3.00 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.B2Z2.200.1 | ■ |
| | **.079** | 2.0 | **.236** | 6.00 | 3.00 | 4 | **1.57** | 40 | **.0079** | 0.20 | 2.CMC30.B3Z2.200.1 | ■ |
| | **.079** | 2.0 | **.236** | 6.00 | 3.00 | 4 | **1.57** | 40 | **.0197** | 0.50 | 2.CMC30.B4Z2.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.281** | 7.14 | 3.57 | 4 | **1.57** | 40 | **.0050** | 0.127 | 2.CMC.RB2Z2.F332 | ■ |
| **3/32** | **.0937** | 2.381 | **.281** | 7.14 | 3.57 | 4 | **1.57** | 40 | **.0100** | 0.254 | 2.CMC.RB3Z2.F332 | ■ |
| **3/32** | **.0937** | 2.381 | **.281** | 7.14 | 3.57 | 4 | **1.57** | 40 | **.0150** | 0.381 | 2.CMC.RB4Z2.F332 | ■ |
| | **.098** | 2.5 | **.295** | 7.50 | 3.75 | 6 | **1.77** | 45 | **.0079** | 0.20 | 2.CMC30.B2Z2.250.1 | ■ |
| | **.098** | 2.5 | **.295** | 7.50 | 3.75 | 6 | **1.77** | 45 | **.0197** | 0.50 | 2.CMC30.B3Z2.250.1 | ■ |
| | **.118** | 3.0 | **.354** | 9.00 | 4.50 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC30.B2Z2.300.1 | ■ |
| | **.118** | 3.0 | **.354** | 9.00 | 4.50 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC30.B3Z2.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.375** | 9.53 | 4.76 | 6 | **2.17** | 55 | **.0100** | 0.254 | 2.CMC.RB2Z2.F18 | ■ |
| **1/8** | **.1250** | 3.175 | **.375** | 9.53 | 4.76 | 6 | **2.17** | 55 | **.0150** | 0.381 | 2.CMC.RB3Z2.F18 | ■ |
| **5/32** | **.1562** | 3.968 | **.469** | 11.90 | 5.95 | 6 | **2.17** | 55 | **.0100** | 0.254 | 2.CMC.RB2Z2.F532 | ■ |
| **5/32** | **.1562** | 3.968 | **.469** | 11.90 | 5.95 | 6 | **2.17** | 55 | **.0150** | 0.381 | 2.CMC.RB3Z2.F532 | ■ |
| | **.157** | 4.0 | **.472** | 12.00 | 6.00 | 6 | **2.17** | 55 | **.0079** | 0.20 | 2.CMC30.B2Z2.400.1 | ■ |
| | **.157** | 4.0 | **.472** | 12.00 | 6.00 | 6 | **2.17** | 55 | **.0197** | 0.50 | 2.CMC30.B3Z2.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.563** | 14.29 | 7.14 | 8 | **2.56** | 65 | **.0100** | 0.254 | 2.CMC.RB2Z2.F316 | ■ |
| **3/16** | **.1875** | 4.762 | **.563** | 14.29 | 7.14 | 8 | **2.56** | 65 | **.0150** | 0.381 | 2.CMC.RB3Z2.F316 | ■ |
| **7/32** | **.2189** | 5.560 | **.657** | 16.68 | 8.34 | 10 | **2.56** | 65 | **.0150** | 0.381 | 2.CMC.RB2Z2.F732 | ■ |
| **7/32** | **.2189** | 5.560 | **.657** | 16.68 | 8.34 | 10 | **2.56** | 65 | **.0300** | 0.762 | 2.CMC.RB3Z2.F732 | ■ |
| | **.236** | 6.0 | **.709** | 18.00 | 9.00 | 10 | **2.56** | 65 | **.0197** | 0.50 | 2.CMC30.B2Z2.600.1 | ■ |
| | **.236** | 6.0 | **.709** | 18.00 | 9.00 | 10 | **2.56** | 65 | **.0394** | 1.00 | 2.CMC30.B3Z2.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **.750** | 19.05 | 9.53 | 10 | **2.56** | 65 | **.0300** | 0.762 | 2.CMC.RB2Z2.F14 | ■ |

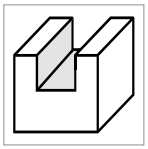
■ Stock item

CRAZYMILL by Mikron Tool Cool

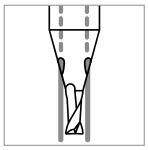
# Type B - Conventional slot milling

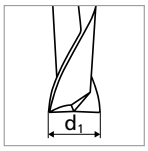
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

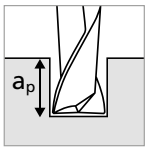
**Conventional slot milling**



- $a_p = 1 \times d_1$
- $a_p = 0.5 \times d_1$ for group $S_1$ and $S_3$



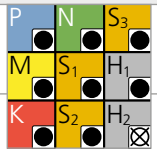



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3–0.4 mm \| .012"–.016" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| 197 | 0.004 – 0.006 .00016 – .00024 |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| 197 | 0.002–0.004 .00008–.00016 |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 60 \| 197 | 0.002–0.003 .00008–.00012 |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 \| 197 | 0.002–0.003 .00008–.00012 |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





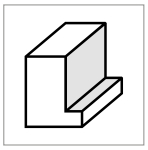

| Ød1 | 1/32" 0.5–0.8 mm \| .020"–.032" | | 1.0–1.2 mm \| .039"–.047" | | 1/16" 1.5–1.8 mm \| .059"–.071" | | 3/32" 2.0–2.5 mm \| .079"–.098" | | 1/8" 3.0 mm \| .118" | | 5/32–3/16–7/32–1/4" 4.0–6 mm \| .158"–.236" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 100 \| **328** | 0.008 – 0.012<br>**.00031–.00047** | 140 \| **459** | 0.013 – 0.015<br>**.00051 – .00059** | 180 \| **591** | 0.022–0.024<br>**.00087–.00094** | 200 \| **656** | 0.030 – 0.032<br>**.00118 – .00126** | 220 \| **722** | 0.044<br>**.00173** | 260 \| **853** | 0.048<br>**.00189** |
| | 100 \| **328** | 0.007 – 0.010<br>**.00028 – .00039** | 140 \| **459** | 0.012 – 0.014<br>**.00047 – .00055** | 180 \| **591** | 0.020–0.022<br>**.00079–.00087** | 200 \| **656** | 0.028 – 0.030<br>**.00110 – .00118** | 220 \| **722** | 0.042<br>**.00165** | 260 \| **853** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.006 – 0.009<br>**.00024 – .00035** | 140 \| **459** | 0.009 – 0.011<br>**.00035 – .00043** | 180 \| **591** | 0.018–0.020<br>**.00071–.00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.038<br>**.00150** | 260 \| **853** | 0.040<br>**.00157** |
| | 100 \| **328** | 0.008 – 0.012<br>**.00031–.00047** | 140 \| **459** | 0.014 – 0.016<br>**.00055 – .00063** | 180 \| **591** | 0.022–0.024<br>**.00087–.00094** | 200 \| **656** | 0.030 – 0.032<br>**.00118 – .00126** | 220 \| **722** | 0.042<br>**.00165** | 260 \| **853** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.007 – 0.010<br>**.00028 – .00039** | 140 \| **459** | 0.013 – 0.015<br>**.00051 – .00059** | 180 \| **591** | 0.020–0.022<br>**.00079–.00087** | 200 \| **656** | 0.028 – 0.030<br>**.00110 – .00118** | 220 \| **722** | 0.040<br>**.00157** | 260 \| **853** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.007 – 0.010<br>**.00028 – .00039** | 140 \| **459** | 0.013 – 0.015<br>**.00051 – .00059** | 180 \| **591** | 0.020–0.022<br>**.00079–.00087** | 200 \| **656** | 0.028 – 0.030<br>**.00110 – .00118** | 220 \| **722** | 0.040<br>**.00157** | 260 \| **853** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.006 – 0.009<br>**.00024 – .00035** | 140 \| **459** | 0.010–0.012<br>**.00039–.00047** | 180 \| **591** | 0.016–0.018<br>**.00063–.00071** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.038<br>**.00150** | 260 \| **853** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.005–0.008<br>**.00020–.00031** | 120 \| **394** | 0.010–0.020<br>**.00039–.00079** | 140 \| **459** | 0.022–0.025<br>**.00087–.00098** | 160 \| **525** | 0.026–0.035<br>**.00102 – .00138** | 180 \| **591** | 0.038–0.045<br>**.00150–.00177** | 200 \| **656** | 0.048–0.052<br>**.00189–.00205** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.015 – 0.017<br>**.00059–.00067** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.050<br>**.00197** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.015 – 0.017<br>**.00059–.00067** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.048<br>**.00189** | 260 \| **853** | 0.053<br>**.00209** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047–.00063** | 140 \| **459** | 0.018–0.020<br>**.00071–.00079** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.050<br>**.00197** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047–.00063** | 140 \| **459** | 0.018–0.020<br>**.00071–.00079** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.050<br>**.00197** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047–.00063** | 140 \| **459** | 0.018–0.020<br>**.00071–.00079** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.050<br>**.00197** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.016–0.018<br>**.00063–.00071** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.050<br>**.00197** | 260 \| **853** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.004–0.006<br>**.00016–.00024** | 120 \| **394** | 0.007–0.008<br>**.00028–.00031** | 130 \| **427** | 0.009–0.010<br>**.00035–.00039** | 140 \| **459** | 0.010–0.012<br>**.00039–.00047** | 150 \| **492** | 0.015<br>**.00059** | 170 \| **558** | 0.020<br>**.00079** |
| | 100 \| **328** | 0.006–0.009<br>**.00024–.00035** | 120 \| **394** | 0.014–0.016<br>**.00055–.00063** | 130 \| **427** | 0.018–0.020<br>**.00071–.00079** | 140 \| **459** | 0.026 – 0.028<br>**.00102 – .00110** | 150 \| **492** | 0.040<br>**.00157** | 170 \| **558** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.006–0.009<br>**.00024–.00035** | 120 \| **394** | 0.014–0.016<br>**.00055–.00063** | 130 \| **427** | 0.018–0.020<br>**.00071–.00079** | 140 \| **459** | 0.026 – 0.028<br>**.00102 – .00110** | 150 \| **492** | 0.040<br>**.00157** | 170 \| **558** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.004–0.006<br>**.00016–.00024** | 140 \| **459** | 0.007–0.008<br>**.00028–.00031** | 160 \| **525** | 0.009–0.010<br>**.00035–.00039** | 180 \| **591** | 0.010–0.012<br>**.00039–.00047** | 200 \| **656** | 0.015<br>**.00059** | 220 \| **722** | 0.020<br>**.00079** |
| | 80 \| **262** | 0.006–0.007<br>**.00024–.00028** | 100 \| **328** | 0.008–0.010<br>**.00031–.00039** | 140 \| **459** | 0.012–0.016<br>**.00047–.00063** | 180 \| **591** | 0.018 – 0.024<br>**.00071 – .00094** | 200 \| **656** | 0.030<br>**.00118** | 240 \| **787** | 0.035<br>**.00138** |

CRAZYMILL by Mikron Tool Cool

# Type B - Side and trochoidal slot milling

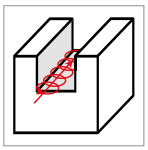
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Side milling**

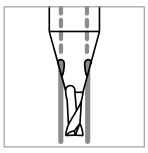


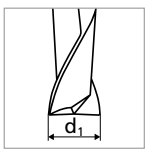
- $a_p = 1 \times d_1$
- $a_e = 0.3 \times d_1$

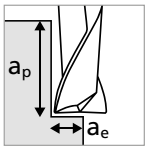
**Trochoidal Slot Milling**



- $a_p = 1 \times d_1$
- $a_e = 0.1 \times d_1$



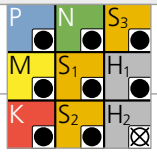



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3–0.4 mm \| .012"–.016" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 60 \| 197 | 0.003–0.004 .00012–.00016 |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 \| 197 | 0.003–0.004 .00012–.00016 |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





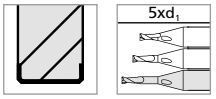

| Ød1 | 1/32" 0.5–0.8 mm \| .020"–.032" | | 1.0–1.2 mm \| .039"–.047" | | 1/16" 1.5–1.8 mm \| .059"–.071" | | 3/32" 2.0–2.5 mm \| .079"–.098" | | 1/8" 3.0 mm \| .118" | | 5/32–3/16–7/32–1/4" 4.0–6 mm \| .158"–.236" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.015 – 0.017<br>**.00059 – .00067** | 200 \| **656** | 0.024 – 0.026<br>**.00094 – .00102** | 220 \| **722** | 0.034 – 0.036<br>**.00134 – .00142** | 240 \| **787** | 0.046<br>**.00181** | 280 \| **919** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.009 – 0.012<br>**.00035 – .00047** | 140 \| **459** | 0.014 – 0.016<br>**.00055 – .00063** | 200 \| **656** | 0.022 – 0.024<br>**.00087 – .00094** | 220 \| **722** | 0.032 – 0.034<br>**.00126 – .00134** | 240 \| **787** | 0.044<br>**.00173** | 280 \| **919** | 0.048<br>**.00189** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 140 \| **459** | 0.011 – 0.013<br>**.00043 – .00051** | 200 \| **656** | 0.020 – 0.022<br>**.00079 – .00087** | 220 \| **722** | 0.030 – 0.032<br>**.00118 – .00126** | 240 \| **787** | 0.040<br>**.00157** | 280 \| **919** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.016 – 0.018<br>**.00063 – .00071** | 200 \| **656** | 0.024 – 0.026<br>**.00094 – .00102** | 220 \| **722** | 0.034 – 0.036<br>**.00134 – .00142** | 240 \| **787** | 0.044<br>**.00173** | 280 \| **919** | 0.048<br>**.00189** |
| | 100 \| **328** | 0.009 – 0.012<br>**.00035 – .00047** | 140 \| **459** | 0.015 – 0.017<br>**.00059 – .00067** | 200 \| **656** | 0.022 – 0.024<br>**.00087 – .00094** | 220 \| **722** | 0.032 – 0.034<br>**.00126 – .00134** | 240 \| **787** | 0.044<br>**.00173** | 280 \| **919** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.009 – 0.012<br>**.00035 – .00047** | 140 \| **459** | 0.015 – 0.017<br>**.00059 – .00067** | 200 \| **656** | 0.022 – 0.024<br>**.00087 – .00094** | 220 \| **722** | 0.032 – 0.034<br>**.00126 – .00134** | 240 \| **787** | 0.044<br>**.00173** | 280 \| **919** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 140 \| **459** | 0.012 – 0.014<br>**.00047 – .00055** | 200 \| **656** | 0.016 – 0.018<br>**.00063 – .00071** | 220 \| **722** | 0.030 – 0.032<br>**.00118 – .00126** | 240 \| **787** | 0.040<br>**.00157** | 280 \| **919** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.006 – 0.009<br>**.00024 – .00035** | 120 \| **394** | 0.011 – 0.022<br>**.00043 – .00087** | 140 \| **459** | 0.024 – 0.026<br>**.00094 – .00102** | 160 \| **525** | 0.028 – 0.036<br>**.00110 – .00142** | 180 \| **591** | 0.040 – 0.047<br>**.00157 – .00185** | 200 \| **656** | 0.050 – 0.054<br>**.00197 – .00213** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047 – .00063** | 140 \| **459** | 0.018 – 0.020<br>**.00071 – .00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047 – .00063** | 140 \| **459** | 0.018 – 0.020<br>**.00071 – .00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.014 – 0.018<br>**.00055 – .00071** | 140 \| **459** | 0.020 – 0.022<br>**.00079 – .00087** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.014 – 0.018<br>**.00055 – .00071** | 140 \| **459** | 0.020 – 0.022<br>**.00079 – .00087** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.014 – 0.018<br>**.00055 – .00071** | 140 \| **459** | 0.020 – 0.022<br>**.00079 – .00087** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047 – .00063** | 140 \| **459** | 0.018 – 0.020<br>**.00071 – .00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.060<br>**.00236** |
| | 100 \| **328** | 0.004 – 0.006<br>**.00016 – .00024** | 120 \| **394** | 0.007 – 0.008<br>**.00028 – .00031** | 130 \| **427** | 0.009 – 0.010<br>**.00035 – .00039** | 140 \| **459** | 0.010 – 0.012<br>**.00039 – .00047** | 150 \| **492** | 0.015<br>**.00059** | 170 \| **558** | 0.020<br>**.00079** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 120 \| **394** | 0.016 – 0.018<br>**.00063 – .00071** | 130 \| **427** | 0.020 – 0.022<br>**.00079 – .00087** | 140 \| **459** | 0.028 – 0.030<br>**.00110 – .00118** | 150 \| **492** | 0.040<br>**.00157** | 170 \| **558** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 120 \| **394** | 0.016 – 0.018<br>**.00063 – .00071** | 130 \| **427** | 0.020 – 0.022<br>**.00079 – .00087** | 140 \| **459** | 0.028 – 0.030<br>**.00110 – .00118** | 150 \| **492** | 0.040<br>**.00157** | 170 \| **558** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.004 – 0.006<br>**.00016 – .00024** | 140 \| **459** | 0.007 – 0.008<br>**.00028 – .00031** | 180 \| **591** | 0.009 – 0.010<br>**.00035 – .00039** | 200 \| **656** | 0.010 – 0.012<br>**.00039 – .00047** | 220 \| **722** | 0.015<br>**.00059** | 240 \| **787** | 0.020<br>**.00079** |
| | 80 \| **262** | 0.007 – 0.009<br>**.00028 – .00035** | 100 \| **328** | 0.010 – 0.012<br>**.00039 – .00047** | 140 \| **459** | 0.014 – 0.018<br>**.00055 – .00071** | 180 \| **591** | 0.020 – 0.026<br>**.00079 – .00102** | 200 \| **656** | 0.033<br>**.00130** | 240 \| **787** | 0.040<br>**.00157** |

CRAZYMILL by Mikron Tool Cool

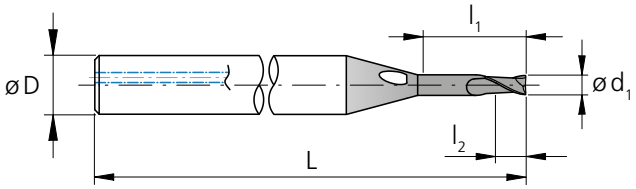
# Type C - 5 x d - Square / Corner radius - Z2

## MILLING WITH INTEGRATED COOLING

### Square




protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

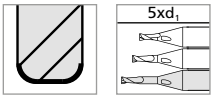
| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.012** | 0.3 | **.059** | 1.50 | 0.45 | 3 | **1.50** | 38 | 2.CMC30.C1Z2.030.1 | ■ |
| **1/64** | **.0156** | 0.396 | **.078** | 1.98 | 0.59 | 3 | **1.50** | 38 | 2.CMC.SCZ2.F164 | ■ |
| | **.016** | 0.4 | **.079** | 2.00 | 0.60 | 3 | **1.50** | 38 | 2.CMC30.C1Z2.040.1 | ■ |
| | **.020** | 0.5 | **.098** | 2.50 | 0.75 | 3 | **1.50** | 38 | 2.CMC30.C1Z2.050.1 | ■ |
| | **.024** | 0.6 | **.118** | 3.00 | 0.90 | 3 | **1.50** | 38 | 2.CMC30.C1Z2.060.1 | ■ |
| **1/32** | **.0312** | 0.793 | **.156** | 3.97 | 1.19 | 3 | **1.50** | 38 | 2.CMC.SCZ2.F132 | ■ |
| | **.031** | 0.8 | **.157** | 4.00 | 1.20 | 3 | **1.50** | 38 | 2.CMC30.C1Z2.080.1 | ■ |
| | **.039** | 1.0 | **.197** | 5.00 | 1.50 | 4 | **1.57** | 40 | 2.CMC30.C1Z2.100.1 | ■ |
| | **.047** | 1.2 | **.236** | 6.00 | 1.80 | 4 | **1.57** | 40 | 2.CMC30.C1Z2.120.1 | ■ |
| | **.059** | 1.5 | **.295** | 7.50 | 2.25 | 4 | **1.57** | 40 | 2.CMC30.C1Z2.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.313** | 7.94 | 2.38 | 4 | **1.57** | 40 | 2.CMC.SCZ2.F116 | ■ |
| | **.071** | 1.8 | **.354** | 9.00 | 2.70 | 4 | **1.57** | 40 | 2.CMC30.C1Z2.180.1 | ■ |
| | **.079** | 2.0 | **.394** | 10.00 | 3.00 | 4 | **1.73** | 44 | 2.CMC30.C1Z2.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.469** | 11.91 | 3.57 | 4 | **1.73** | 44 | 2.CMC.SCZ2.F332 | ■ |
| | **.098** | 2.5 | **.492** | 12.50 | 3.75 | 6 | **1.97** | 50 | 2.CMC30.C1Z2.250.1 | ■ |
| | **.118** | 3.0 | **.591** | 15.00 | 4.50 | 6 | **2.17** | 55 | 2.CMC30.C1Z2.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.625** | 15.88 | 4.76 | 6 | **2.36** | 60 | 2.CMC.SCZ2.F18 | ■ |
| **5/32** | **.1562** | 3.968 | **.781** | 19.84 | 5.95 | 6 | **2.36** | 60 | 2.CMC.SCZ2.F532 | ■ |
| | **.157** | 4.0 | **.787** | 20.00 | 6.00 | 6 | **2.36** | 60 | 2.CMC30.C1Z2.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.937** | 23.81 | 7.14 | 8 | **2.76** | 70 | 2.CMC.SCZ2.F316 | ■ |
| **7/32** | **.2189** | 5.560 | **1.09** | 27.80 | 8.34 | 10 | **2.76** | 70 | 2.CMC.SCZ2.F732 | ■ |
| | **.236** | 6.0 | **1.18** | 30.00 | 9.00 | 10 | **2.76** | 70 | 2.CMC30.C1Z2.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **1.25** | 31.75 | 9.53 | 10 | **2.76** | 70 | 2.CMC.SCZ2.F14 | ■ |

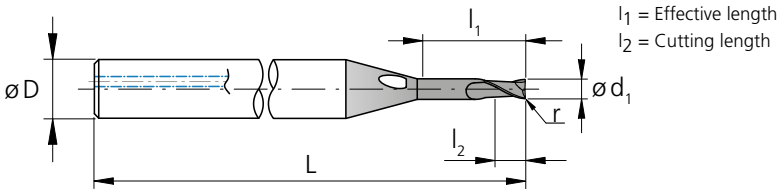
■ Stock item

Carbide | Z2 | 30° | eXedur RIP

| | | |
|---|---|---|
| Ø $d_1$ | **.012" - 1/4"** (0.3 - 6.35 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Corner radius




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.012** | 0.3 | **.059** | 1.50 | 0.45 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.C2Z2.030.1 | ■ |
| **1/64** | **.0156** | 0.396 | **.078** | 1.98 | 0.59 | 3 | **1.50** | 38 | **.0030** | 0.076 | 2.CMC.RC2Z2.F164 | ■ |
| | **.016** | 0.4 | **.079** | 2.00 | 0.60 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.C2Z2.040.1 | ■ |
| | **.020** | 0.5 | **.098** | 2.50 | 0.75 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.C2Z2.050.1 | ■ |
| | **.020** | 0.5 | **.098** | 2.50 | 0.75 | 3 | **1.50** | 38 | **.0039** | 0.10 | 2.CMC30.C3Z2.050.1 | ■ |
| | **.024** | 0.6 | **.118** | 3.00 | 0.90 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.C2Z2.060.1 | ■ |
| | **.024** | 0.6 | **.118** | 3.00 | 0.90 | 3 | **1.50** | 38 | **.0039** | 0.10 | 2.CMC30.C3Z2.060.1 | ■ |
| **1/32** | **.0312** | 0.793 | **.156** | 3.97 | 1.19 | 3 | **1.50** | 38 | **.0030** | 0.076 | 2.CMC.RC2Z2.F132 | ■ |
| **1/32** | **.0312** | 0.793 | **.156** | 3.97 | 1.19 | 3 | **1.50** | 38 | **.0050** | 0.127 | 2.CMC.RC3Z2.F132 | ■ |
| | **.031** | 0.8 | **.157** | 4.00 | 1.20 | 3 | **1.50** | 38 | **.0020** | 0.05 | 2.CMC30.C2Z2.080.1 | ■ |
| | **.031** | 0.8 | **.157** | 4.00 | 1.20 | 3 | **1.50** | 38 | **.0039** | 0.10 | 2.CMC30.C3Z2.080.1 | ■ |
| | **.039** | 1.0 | **.197** | 5.00 | 1.50 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.C2Z2.100.1 | ■ |
| | **.039** | 1.0 | **.197** | 5.00 | 1.50 | 4 | **1.57** | 40 | **.0079** | 0.20 | 2.CMC30.C3Z2.100.1 | ■ |
| | **.047** | 1.2 | **.236** | 6.00 | 1.80 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.C2Z2.120.1 | ■ |
| | **.047** | 1.2 | **.236** | 6.00 | 1.80 | 4 | **1.57** | 40 | **.0079** | 0.20 | 2.CMC30.C3Z2.120.1 | ■ |
| | **.059** | 1.5 | **.295** | 7.50 | 2.25 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.C2Z2.150.1 | ■ |
| | **.059** | 1.5 | **.295** | 7.50 | 2.25 | 4 | **1.57** | 40 | **.0118** | 0.30 | 2.CMC30.C3Z2.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.313** | 7.94 | 2.38 | 4 | **1.57** | 40 | **.0050** | 0.127 | 2.CMC.RC2Z2.F116 | ■ |
| **1/16** | **.0625** | 1.587 | **.313** | 7.94 | 2.38 | 4 | **1.57** | 40 | **.0100** | 0.254 | 2.CMC.RC3Z2.F116 | ■ |
| | **.071** | 1.8 | **.354** | 9.00 | 2.70 | 4 | **1.57** | 40 | **.0039** | 0.10 | 2.CMC30.C2Z2.180.1 | ■ |
| | **.071** | 1.8 | **.354** | 9.00 | 2.70 | 4 | **1.57** | 40 | **.0118** | 0.30 | 2.CMC30.C3Z2.180.1 | ■ |
| | **.079** | 2.0 | **.394** | 10.00 | 3.00 | 4 | **1.73** | 44 | **.0039** | 0.10 | 2.CMC30.C2Z2.200.1 | ■ |
| | **.079** | 2.0 | **.394** | 10.00 | 3.00 | 4 | **1.73** | 44 | **.0079** | 0.20 | 2.CMC30.C3Z2.200.1 | ■ |
| | **.079** | 2.0 | **.394** | 10.00 | 3.00 | 4 | **1.73** | 44 | **.0197** | 0.50 | 2.CMC30.C4Z2.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.469** | 11.91 | 3.57 | 4 | **1.73** | 44 | **.0050** | 0.127 | 2.CMC.RC2Z2.F332 | ■ |
| **3/32** | **.0937** | 2.381 | **.469** | 11.91 | 3.57 | 4 | **1.73** | 44 | **.0100** | 0.254 | 2.CMC.RC3Z2.F332 | ■ |
| **3/32** | **.0937** | 2.381 | **.469** | 11.91 | 3.57 | 4 | **1.73** | 44 | **.0150** | 0.381 | 2.CMC.RC4Z2.F332 | ■ |
| | **.098** | 2.5 | **.492** | 12.50 | 3.75 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC30.C2Z2.250.1 | ■ |
| | **.098** | 2.5 | **.492** | 12.50 | 3.75 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC30.C3Z2.250.1 | ■ |
| | **.118** | 3.0 | **.591** | 15.00 | 4.50 | 6 | **2.17** | 55 | **.0079** | 0.20 | 2.CMC30.C2Z2.300.1 | ■ |
| | **.118** | 3.0 | **.591** | 15.00 | 4.50 | 6 | **2.17** | 55 | **.0197** | 0.50 | 2.CMC30.C3Z2.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.625** | 15.88 | 4.76 | 6 | **2.36** | 60 | **.0100** | 0.254 | 2.CMC.RC2Z2.F18 | ■ |
| **1/8** | **.1250** | 3.175 | **.625** | 15.88 | 4.76 | 6 | **2.36** | 60 | **.0150** | 0.381 | 2.CMC.RC3Z2.F18 | ■ |
| **5/32** | **.1562** | 3.968 | **.781** | 19.84 | 5.95 | 6 | **2.36** | 60 | **.0100** | 0.254 | 2.CMC.RC2Z2.F532 | ■ |
| **5/32** | **.1562** | 3.968 | **.781** | 19.84 | 5.95 | 6 | **2.36** | 60 | **.0150** | 0.381 | 2.CMC.RC3Z2.F532 | ■ |
| | **.157** | 4.0 | **.787** | 20.00 | 6.00 | 6 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC30.C2Z2.400.1 | ■ |
| | **.157** | 4.0 | **.787** | 20.00 | 6.00 | 6 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC30.C3Z2.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.937** | 23.81 | 7.14 | 8 | **2.76** | 70 | **.0100** | 0.254 | 2.CMC.RC2Z2.F316 | ■ |
| **3/16** | **.1875** | 4.762 | **.937** | 23.81 | 7.14 | 8 | **2.76** | 70 | **.0150** | 0.381 | 2.CMC.RC3Z2.F316 | ■ |
| **7/32** | **.2189** | 5.560 | **1.09** | 27.80 | 8.34 | 10 | **2.76** | 70 | **.0150** | 0.381 | 2.CMC.RC2Z2.F732 | ■ |
| **7/32** | **.2189** | 5.560 | **1.09** | 27.80 | 8.34 | 10 | **2.76** | 70 | **.0300** | 0.762 | 2.CMC.RC3Z2.F732 | ■ |
| | **.236** | 6.0 | **1.18** | 30.00 | 9.00 | 10 | **2.76** | 70 | **.0197** | 0.50 | 2.CMC30.C2Z2.600.1 | ■ |
| | **.236** | 6.0 | **1.18** | 30.00 | 9.00 | 10 | **2.76** | 70 | **.0394** | 1.00 | 2.CMC30.C3Z2.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **1.25** | 31.75 | 9.53 | 10 | **2.76** | 70 | **.0300** | 0.762 | 2.CMC.RC2Z2.F14 | ■ |

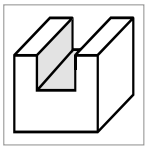
■ Stock item

CRAZYMILL by Mikron Tool Cool

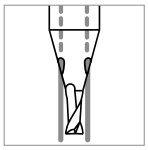
# Type C - Conventional slot milling

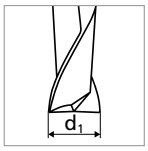
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

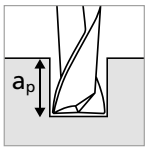
**Conventional slot milling**



- $a_p = 1 \times d_1$
- $a_p = 0.5 \times d_1$ for group $S_1$ and $S_3$



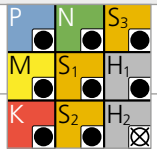



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3–0.4 mm \| .012"–.016" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| 197 | 0.004 – 0.006 .00016 – .00024 |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| 197 | 0.002–0.004 .00008–.00016 |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 60 \| 197 | 0.002–0.003 .00008–.00012 |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 \| 197 | 0.002–0.003 .00008–.00012 |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





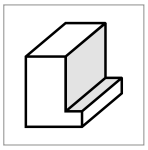

| Ød1 | 1/32" 0.5–0.8 mm \| .020"–.032" | | 1.0–1.2 mm \| .039"–.047" | | 1/16" 1.5–1.8 mm \| .059"–.071" | | 3/32" 2.0–2.5 mm \| .079"–.098" | | 1/8" 3.0 mm \| .118" | | 5/32–3/16–7/32–1/4" 4.0–6 mm \| .158"–.236" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 100 \| **328** | 0.008 – 0.012<br>**.00031–.00047** | 140 \| **459** | 0.013 – 0.015<br>**.00051 – .00059** | 180 \| **591** | 0.022–0.024<br>**.00087–.00094** | 200 \| **656** | 0.030 – 0.032<br>**.00118 – .00126** | 220 \| **722** | 0.034<br>**.00134** | 260 \| **853** | 0.048<br>**.00189** |
| | 100 \| **328** | 0.007 – 0.010<br>**.00028 – .00039** | 140 \| **459** | 0.012 – 0.014<br>**.00047 – .00055** | 180 \| **591** | 0.020–0.022<br>**.00079–.00087** | 200 \| **656** | 0.028 – 0.030<br>**.00110 – .00118** | 220 \| **722** | 0.032<br>**.00126** | 260 \| **853** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.006 – 0.009<br>**.00024 – .00035** | 140 \| **459** | 0.009 – 0.011<br>**.00035 – .00043** | 180 \| **591** | 0.018–0.020<br>**.00071–.00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.028<br>**.00110** | 260 \| **853** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.008 – 0.012<br>**.00031–.00047** | 140 \| **459** | 0.014 – 0.016<br>**.00055 – .00063** | 180 \| **591** | 0.022–0.024<br>**.00087–.00094** | 200 \| **656** | 0.030 – 0.032<br>**.00118 – .00126** | 220 \| **722** | 0.034<br>**.00134** | 260 \| **853** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.007 – 0.010<br>**.00028 – .00039** | 140 \| **459** | 0.013 – 0.015<br>**.00051 – .00059** | 180 \| **591** | 0.020–0.022<br>**.00079–.00087** | 200 \| **656** | 0.028 – 0.030<br>**.00110 – .00118** | 220 \| **722** | 0.032<br>**.00126** | 260 \| **853** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.007 – 0.010<br>**.00028 – .00039** | 140 \| **459** | 0.013 – 0.015<br>**.00051 – .00059** | 180 \| **591** | 0.020–0.022<br>**.00079–.00087** | 200 \| **656** | 0.028 – 0.030<br>**.00110 – .00118** | 220 \| **722** | 0.032<br>**.00126** | 260 \| **853** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.006 – 0.009<br>**.00024 – .00035** | 140 \| **459** | 0.010–0.012<br>**.00039–.00047** | 180 \| **591** | 0.016–0.018<br>**.00063–.00071** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.030<br>**.00118** | 260 \| **853** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.005–0.008<br>**.00020–.00031** | 120 \| **394** | 0.010–0.020<br>**.00039–.00079** | 140 \| **459** | 0.022–0.025<br>**.00087–.00098** | 160 \| **525** | 0.026–0.035<br>**.00102 – .00138** | 180 \| **591** | 0.040<br>**.00157** | 200 \| **656** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.015 – 0.017<br>**.00059–.00067** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.015 – 0.017<br>**.00059–.00067** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.050<br>**.00197** | 260 \| **853** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047–.00063** | 140 \| **459** | 0.018–0.020<br>**.00071–.00079** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047–.00063** | 140 \| **459** | 0.018–0.020<br>**.00071–.00079** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047–.00063** | 140 \| **459** | 0.018–0.020<br>**.00071–.00079** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.016–0.018<br>**.00063–.00071** | 180 \| **591** | 0.024–0.026<br>**.00094–.00102** | 200 \| **656** | 0.032–0.034<br>**.00126 – .00134** | 220 \| **722** | 0.052<br>**.00205** | 260 \| **853** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.004–0.006<br>**.00016–.00024** | 120 \| **394** | 0.007–0.008<br>**.00028–.00031** | 130 \| **427** | 0.009–0.010<br>**.00035–.00039** | 140 \| **459** | 0.010–0.012<br>**.00039–.00047** | 150 \| **492** | 0.015<br>**.00059** | 170 \| **558** | 0.020<br>**.00079** |
| | 100 \| **328** | 0.006–0.009<br>**.00024–.00035** | 120 \| **394** | 0.014–0.016<br>**.00055–.00063** | 130 \| **427** | 0.018–0.020<br>**.00071–.00079** | 140 \| **459** | 0.026 – 0.028<br>**.00102 – .00110** | 150 \| **492** | 0.030<br>**.00118** | 170 \| **558** | 0.040<br>**.00157** |
| | 100 \| **328** | 0.006–0.009<br>**.00024–.00035** | 120 \| **394** | 0.014–0.016<br>**.00055–.00063** | 130 \| **427** | 0.018–0.020<br>**.00071–.00079** | 140 \| **459** | 0.026 – 0.028<br>**.00102 – .00110** | 150 \| **492** | 0.030<br>**.00118** | 170 \| **558** | 0.040<br>**.00157** |
| | 100 \| **328** | 0.004–0.006<br>**.00016–.00024** | 140 \| **459** | 0.007–0.008<br>**.00028–.00031** | 160 \| **525** | 0.009–0.010<br>**.00035–.00039** | 180 \| **591** | 0.010–0.012<br>**.00039–.00047** | 200 \| **656** | 0.015<br>**.00059** | 220 \| **722** | 0.020<br>**.00079** |
| | 80 \| **262** | 0.006–0.007<br>**.00024–.00028** | 100 \| **328** | 0.008–0.010<br>**.00031–.00039** | 140 \| **459** | 0.012–0.016<br>**.00047–.00063** | 180 \| **591** | 0.018 – 0.024<br>**.00071 – .00094** | 200 \| **656** | 0.028<br>**.00110** | 240 \| **787** | 0.030<br>**.00118** |

CRAZYMILL by Mikron Tool Cool

# Type C - Side and trochoidal slot milling

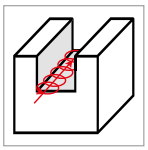
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Side milling**

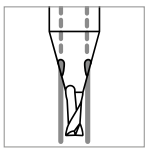


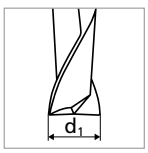
- $a_p = 1 \times d_1$
- $a_e = 0.3 \times d_1$

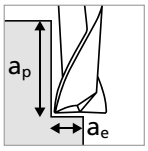
**Trochoidal Slot Milling**



- $a_p = 1 \times d_1$
- $a_e = 0.1 \times d_1$



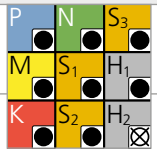



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3–0.4 mm \| .012"–.016" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| 197 | 0.005–0.007 .00020–.00028 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| 197 | 0.003–0.005 .00012–.00020 |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 60 \| 197 | 0.006–0.008 .00024–.00031 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 60 \| 197 | 0.003–0.004 .00012–.00016 |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 \| 197 | 0.003–0.004 .00012–.00016 |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| 197 | 0.004–0.006 .00016–.00024 |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

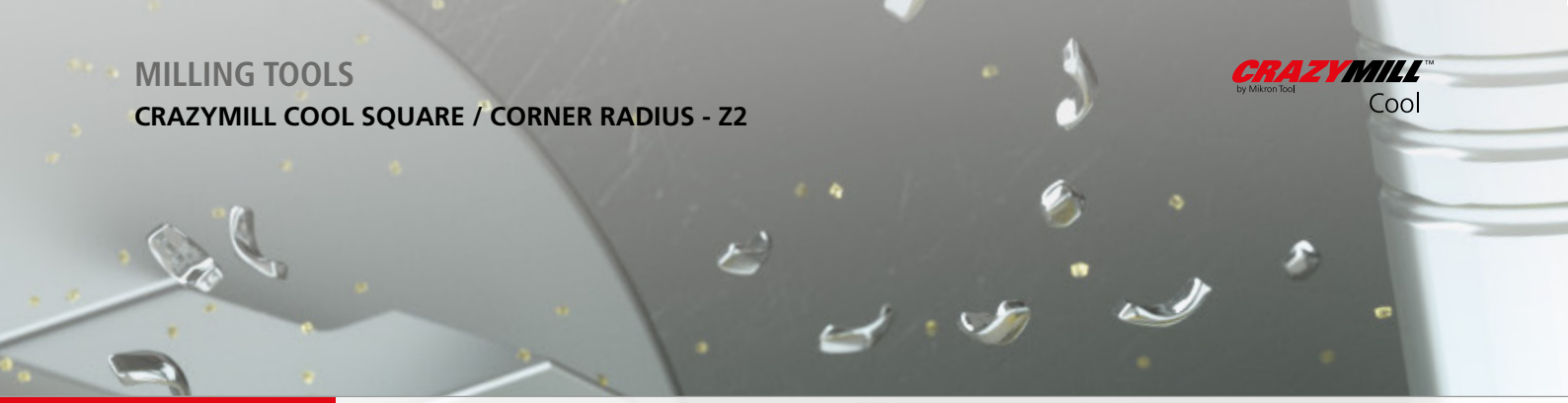
$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






| Ød1 | 1/32" 0.5–0.8 mm \| .020"–.032" | | 1.0–1.2 mm \| .039"–.047" | | 1/16" 1.5–1.8 mm \| .059"–.071" | | 3/32" 2.0–2.5 mm \| .079"–.098" | | 1/8" 3.0 mm \| .118" | | 5/32–3/16–7/32–1/4" 4.0–6 mm \| .158"–.236" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.015 – 0.017<br>**.00059 – .00067** | 200 \| **656** | 0.024 – 0.026<br>**.00094 – .00102** | 220 \| **722** | 0.034 – 0.036<br>**.00134 – .00142** | 240 \| **787** | 0.040<br>**.00157** | 280 \| **919** | 0.050<br>**.00197** |
| | 100 \| **328** | 0.009 – 0.012<br>**.00035 – .00047** | 140 \| **459** | 0.014 – 0.016<br>**.00055 – .00063** | 200 \| **656** | 0.022 – 0.024<br>**.00087 – .00094** | 220 \| **722** | 0.032 – 0.034<br>**.00126 – .00134** | 240 \| **787** | 0.038<br>**.00150** | 280 \| **919** | 0.048<br>**.00189** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 140 \| **459** | 0.011 – 0.013<br>**.00043 – .00051** | 200 \| **656** | 0.020 – 0.022<br>**.00079 – .00087** | 220 \| **722** | 0.030 – 0.032<br>**.00118 – .00126** | 240 \| **787** | 0.035<br>**.00138** | 280 \| **919** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.010 – 0.014<br>**.00039 – .00055** | 140 \| **459** | 0.016 – 0.018<br>**.00063 – .00071** | 200 \| **656** | 0.024 – 0.026<br>**.00094 – .00102** | 220 \| **722** | 0.034 – 0.036<br>**.00134 – .00142** | 240 \| **787** | 0.040<br>**.00157** | 280 \| **919** | 0.048<br>**.00189** |
| | 100 \| **328** | 0.009 – 0.012<br>**.00035 – .00047** | 140 \| **459** | 0.015 – 0.017<br>**.00059 – .00067** | 200 \| **656** | 0.022 – 0.024<br>**.00087 – .00094** | 220 \| **722** | 0.032 – 0.034<br>**.00126 – .00134** | 240 \| **787** | 0.036<br>**.00142** | 280 \| **919** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.009 – 0.012<br>**.00035 – .00047** | 140 \| **459** | 0.015 – 0.017<br>**.00059 – .00067** | 200 \| **656** | 0.022 – 0.024<br>**.00087 – .00094** | 220 \| **722** | 0.032 – 0.034<br>**.00126 – .00134** | 240 \| **787** | 0.036<br>**.00142** | 280 \| **919** | 0.046<br>**.00181** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 140 \| **459** | 0.012 – 0.014<br>**.00047 – .00055** | 200 \| **656** | 0.016 – 0.018<br>**.00063 – .00071** | 220 \| **722** | 0.030 – 0.032<br>**.00118 – .00126** | 240 \| **787** | 0.034<br>**.00134** | 280 \| **919** | 0.044<br>**.00173** |
| | 100 \| **328** | 0.006 – 0.009<br>**.00024 – .00035** | 120 \| **394** | 0.011 – 0.022<br>**.00043 – .00087** | 140 \| **459** | 0.024 – 0.026<br>**.00094 – .00102** | 160 \| **525** | 0.028 – 0.036<br>**.00110 – .00142** | 180 \| **591** | 0.042<br>**.00165** | 200 \| **656** | 0.052<br>**.00205** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047 – .00063** | 140 \| **459** | 0.018 – 0.020<br>**.00071 – .00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047 – .00063** | 140 \| **459** | 0.018 – 0.020<br>**.00071 – .00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.014 – 0.018<br>**.00055 – .00071** | 140 \| **459** | 0.020 – 0.022<br>**.00079 – .00087** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.014 – 0.018<br>**.00055 – .00071** | 140 \| **459** | 0.020 – 0.022<br>**.00079 – .00087** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.014 – 0.018<br>**.00055 – .00071** | 140 \| **459** | 0.020 – 0.022<br>**.00079 – .00087** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.012 – 0.016<br>**.00047 – .00063** | 140 \| **459** | 0.018 – 0.020<br>**.00071 – .00079** | 200 \| **656** | 0.026 – 0.028<br>**.00102 – .00110** | 220 \| **722** | 0.036 – 0.040<br>**.00142 – .00157** | 240 \| **787** | 0.058<br>**.00228** | 280 \| **919** | 0.055<br>**.00217** |
| | 100 \| **328** | 0.004 – 0.006<br>**.00016 – .00024** | 120 \| **394** | 0.007 – 0.008<br>**.00028 – .00031** | 130 \| **427** | 0.009 – 0.010<br>**.00035 – .00039** | 140 \| **459** | 0.010 – 0.012<br>**.00039 – .00047** | 150 \| **492** | 0.015<br>**.00059** | 170 \| **558** | 0.020<br>**.00079** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 120 \| **394** | 0.016 – 0.018<br>**.00063 – .00071** | 130 \| **427** | 0.020 – 0.022<br>**.00079 – .00087** | 140 \| **459** | 0.028 – 0.030<br>**.00110 – .00118** | 150 \| **492** | 0.034<br>**.00134** | 170 \| **558** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.008 – 0.011<br>**.00031 – .00043** | 120 \| **394** | 0.016 – 0.018<br>**.00063 – .00071** | 130 \| **427** | 0.020 – 0.022<br>**.00079 – .00087** | 140 \| **459** | 0.028 – 0.030<br>**.00110 – .00118** | 150 \| **492** | 0.034<br>**.00134** | 170 \| **558** | 0.042<br>**.00165** |
| | 100 \| **328** | 0.004 – 0.006<br>**.00016 – .00024** | 140 \| **459** | 0.007 – 0.008<br>**.00028 – .00031** | 180 \| **591** | 0.009 – 0.010<br>**.00035 – .00039** | 200 \| **656** | 0.010 – 0.012<br>**.00039 – .00047** | 220 \| **722** | 0.015<br>**.00059** | 240 \| **787** | 0.020<br>**.00079** |
| | 80 \| **262** | 0.007 – 0.009<br>**.00028 – .00035** | 100 \| **328** | 0.010 – 0.012<br>**.00039 – .00047** | 140 \| **459** | 0.014 – 0.018<br>**.00055 – .00071** | 180 \| **591** | 0.020 – 0.026<br>**.00079 – .00102** | 200 \| **656** | 0.030<br>**.00118** | 240 \| **787** | 0.032<br>**.00126** |



# Process CrazyMill Cool Square / Corner radius - Z2

## ACCURATE AND EFFICIENT MILLING

### Coolant type, pressure and filtration

**Coolant:** for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

**Filter:** the large cooling channels permit the use of a standard filter with filter quality of ≤ .002" (0.05 mm).

**Coolant pressure:** at least 15 bar (218 psi) coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

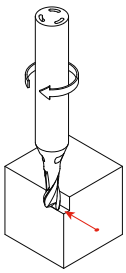
| | | | |
|---|---|---|---|
| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
| **Minimal pressure** | [bar] | 15 | 30 |
| | **[psi]** | **218** | **435** |

### Tool holders

For detailed indications for tool holders see chapter "Technical information".

## MLLING PROCESS

### Climb milling and conventional milling

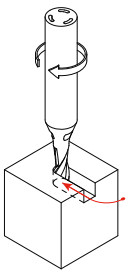


When milling pockets or walls, for example, Mikron Tool recommends climb milling since chip thickness in conventional milling is zero at the beginning and increases up to the exit. In this case, high cutting forces push the milling tool and the workpiece away from each other. Thus, surface quality decreases.

### Entry for milling into the material

During milling with direct entry into the material, very thick chips are produced and the milling tool is subject to asymmetrical stress until it is working with its entire diameter in the material. These stresses can affect the tool life of cutting edges, especially in hard and tough materials such as heat-resistant steel or titanium. We, therefore, recommend two other more gentle types of entry apart from direct entry with full feeding:

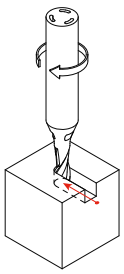
**1. Indirect entry**



$f_z$ = 70%

Indirect milling (also referred to as rolling entry) into the material (clockwise entry into the material in one radius) and 30% less feed in hard and tough materials such as heat-resistant steels or titanium.

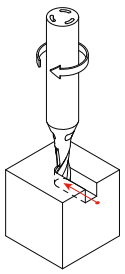
**2. Reduced feed**



$f_z$ = 50%

Direct milling into the material with approx. 50% less feed in hard and tough materials, such as heat-resistant steels or titanium.

**3. Direct milling**



$f_z$ = 100%

Without reducing the feed for general steels (material group P), aluminum, etc. (material group N).

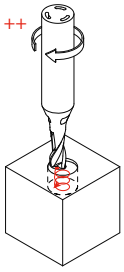
# Process CrazyMill Cool Square / Corner radius - Z2

## MILLING PROCESS

### Immersion

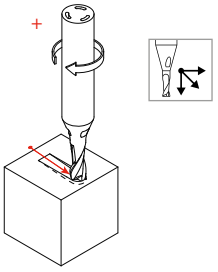
Spiral interpolation offers the best and most gentle method of immersion. The methods of immersion using a linear ramp can also be used with milling tools such as CrazyMill Cool (milling tool cuts over center).

#### 1. Spiral interpolation




Note that the minimum diameter to be produced must be 1.3 x $d_1$. The minimum and maximum immersion angle $\alpha$ and the feed correction $v_f$ must be maintained depending on the material (see tables).

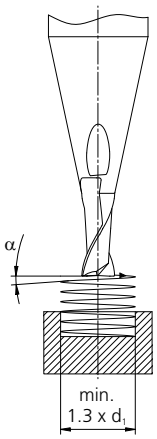
#### 2. Linear ramp




A milling tool that can be immersed axially is needed for the immersion (milling tool must cut above center). The minimum and maximum immersion angle $\alpha$ and the feed correction $v_f$ must be maintained depending on the material (see tables).

#### Suggested ramp angle (calculated on the endmill center)

| | Material | Ramp angle $\alpha$ min | Ramp angle $\alpha$ max |
|---|---|---|---|
| P | Unalloyed and alloyed Steel | 5° | 15° |
| M | Stainless steels | 5° | 10° |
| K | Cast iron | 5° | 15° |
| N | Aluminum and non-ferrous metals | 10° | 30° |
| $S_1$ | Super alloys | 2° | 8° |
| $S_2$ | Titanium and titanium alloys | 2° | 8° |
| $S_3$ | CrCo alloys | 2° | 8° |
| $H_1$ | Hardened steel < 55 HRC | 5° | 10° |




#### Suggested feed correction $v_f$

| Ramp angle $\alpha$ - Feed correction $v_f$ | | | | |
|---|---|---|---|---|
| $\alpha$ | 5° | 10° | 20° | 30° |
| $V_f$ | 80% | 70% | 60% | 50% |

## MILLING PROCESS

### Conventional slot milling

Cutting values: see cutting data chart "Conventional slot milling"!

#### Advantages

- Conventional 3-axis CNC machines can be used
- High metal removal rates if the conditions are stable (stable tool and workpiece clamping)
- Simple programming

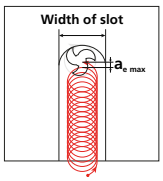
#### Drawbacks

- Sensitive to vibrations (several milling steps may be needed)
- Limited precision when flute milling (for example, perpendicularity or surface), sometimes must be machined in several milling steps $a_p$
- Produces high radial forces

### Trochoidal slot milling

Cutting values: see cutting data chart "Side milling" / "Trochoidal slot milling"!

#### Additional parameter recommendation




- Milling tool diameter $d_1$ as compared to the groove: $d_1$ = max. 70% of the groove width
- Cutting width $a_e$ = max. 10% of milling tool's diameter $d_1$
- Cutting depth $a_p$ = depending on material and milling tool type, see cutting data chart
- Cutting speed = depending on material and milling tool type, see cutting data chart
- Feed per tooth $f_z$ = depending on material and milling tool type, see cutting data chart

#### Advantages

- Generates smaller radial forces and fewer vibrations
- Higher precision due to smaller tool deflection (because of small radial forces)
- Better chip evacuation
- Less heat development
- Gentle on the tool, especially with stainless, acid-resistant and heat-resistant steel, and titanium alloys, resulting in longer tool lives

#### Drawbacks

- A dynamic machining center and modern machine control are necessary
- More programming effort
- Longer processing time

PATENTED

# CrazyMill Cool Square / Corner radius - Z4



CRAZYMILL Cool

## MILLING TOOL FOR PRE-MACHINING AND FINISHING DIFFICULT MATERIALS



CrazyMill Cool Square / Corner radius with four flutes is an innovative end mill, developed by Mikron Tool, for machining stainless steels, titanium alloys, CrCo and super alloys. Two versions of endmill are available in diameters of .039" - .315" (1.0 - 8.0 mm):

- **Variant square** - sharp-edged with small, defined protection phase of 45°, for a maximum machining depth of 5 x d.
- **Variant corner radius** - sharp-edged with a corner radius for a maximum machining depth of 5 x d.

CrazyMill Cool is setting new standards for the milling of pockets and walls with regard to cutting speeds, feed, performance, tool life, and surface quality. The new features of this pre-machining and finishing cutter include not only the solid carbide, coating and geometry, but especially the unique cooling system with cooling channels integrated in the shaft, which achieve constant and extensive cooling of the cutting edges, thus enabling the highest cutting speeds and maximum feed.

The milling tools have three to five integrated cooling channels depending on the shaft diameter.

**Regrinding:** This product is not suitable for regrinding.

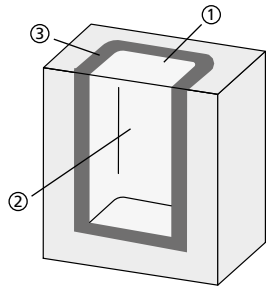
**Please note:** You couldn't find your suitable version of the CrazyMill Cool Square / Corner radius - Z4 (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYMILL by Mikron Tool Cool

# Benefits and applications

## PRE-MACHINING AND FINISHING CUTTER WITH INTEGRATED COOLING

- **TIME AND COST SAVING** | highest speed and feed
- **EXCELLENT SURFACE QUALITY** | efficient integrated cooling
- **RELIABLE PROCESS** | pre-machining and finishing with one tool
- **PERFECT CHIP CONTROL** | new chip-splitting concept




**COMPONENT**
Pocket milling

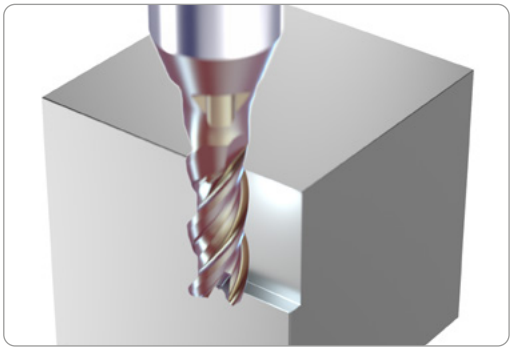
**MATERIAL**
X2CrNiMo17-12-2 / 1.4404 / AISI 316L

**MACHINING**
- ① Helical ramp
- ② Pre-machining
- ③ Finishing
- Diameter endmill = .315" (8 mm)
- Pocket depth = .630" (16 mm)

**MILLING TOOL**
Mikron Tool - CrazyMill Cool Square - Z4
Type A

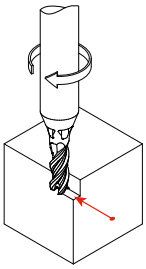
| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyMill Cool Square - Z4<br>- Carbide<br>- Coated<br>- Integrated cooling |
| Item number | 2.CMC42.A1Z4.800.1 |
| Cutting data | ① Helical ramp<br>$v_c$ = 160 m/min **\| 525 SFM**<br>$f_z$ = 0.03 mm **\| .00012 IPT**<br>$a_{p,\,max}$ = 1 x d<br>$a_e$ = 7.5 mm **\| .295"**<br>α = 20°<br>Q = 22.9 cm³/min **\| .006 gpm**<br>Δt = 4 s<br><br>② Pre-machining<br>$v_c$ = 180 m/min **\| 591 SFM**<br>$f_z$ = 0.048 mm **\| .0019 IPT**<br>$a_{p,\,max}$ = 2 x d<br>$a_e$ = 1.6 mm **\| .063"**<br>Q = 35.2 cm³/min **\| .009 gpm**<br>Δt = 1 min 40 s<br><br>③ Finishing<br>$v_c$ = 260 m/min **\| 853 SFM**<br>$f_z$ = 0.04 mm **\| .0016 IPT**<br>$a_{p,\,max}$ = 2 x d<br>$a_e$ = 0.16 mm **\| .0063"**<br>Q = 4.2 cm³/min **\| .001 gpm**<br>Δt = 9 s |

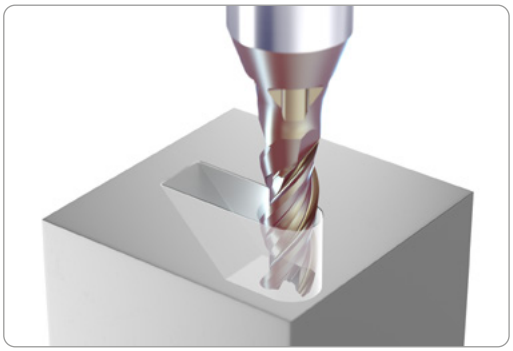
## ■ CrazyMill Cool Square / Corner radius - Z4 for:



**1. Side milling: Pre-machining and Finishing**

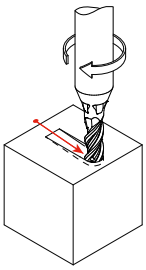
$a_p$ = 2 x d / 3 x d / 4 x d

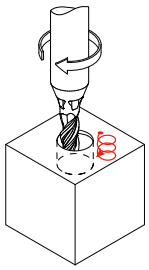


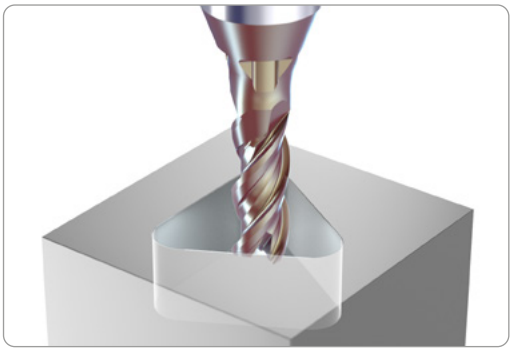


**2. Linear ramp or helical interpolation milling**

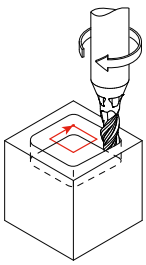
Angle depending on material







**3. Pocket milling**



CRAZYMILL by Mikron Tool Cool

PATENTED

| 2 x d | 5 x d | 3 x d | 4 x d |
|---|---|---|---|
| Type A | Type C | Type M | Type N |

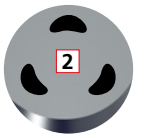
$l_1$ = Effective length
$l_2$ = Cutting length

- Coated
- Integ. cooling
- $l_1$: 2xd, $l_2$: 2xd

- Coated
- Integ. cooling
- $l_1$: 5xd, $l_2$: 2xd

- Coated
- Integ. cooling
- $l_1$: 3xd, $l_2$: 3xd

- Coated
- Integ. cooling
- $l_1$: 4xd, $l_2$: 4xd



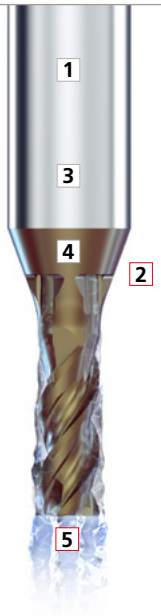






















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**1 | SHANK**
The robust solid carbide shank guarantees stable and vibration-free milling. High precision and extraordinary surface quality are reached.

**2 | INTEGRATED COOLING - PATENTED**
The integrated cooling channels guarantee constant and maximal cooling of the cutting edges and optimal chip removal. The result is higher cutting speed and depth $a_p$ as well as an excellent surface quality.

**3 | CARBIDE**
The specially developed micro-grain carbide meets all requirements in terms of mechanical properties.

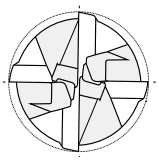
**4 | COATING**
The high-performance eXedur SNP coating is heat and wear resistant, prevents buildup edges and guarantees optimum chip flushing. The result is a long tool life.

**5 | CUTTING GEOMETRY OF END FACE - LINEAR RAMP AND HELICAL INTERPOLATION MILLING**
The frontal cutting geometry with the specially designed expanded chip collection has been optimized for linear ramp and helical interpolation milling by high ramp angles.

**6 | LATERAL CUTTING GEOMETRY**
The long and robust lateral cutting edge of versions M and N allows to obtain high tool rigidity. The result is higher machining force resistance that leads to high perpendicularity precision and high surface quality.

**7 | CHIP-SPLITTING**
An optimized chip-splitting guarantees short chips and highest surface quality. The chip-splitting is implemented in version M for Ø$d_1 \geq 4$ mm and N for Ø$d_1 \geq 3$ mm.

Mill tip





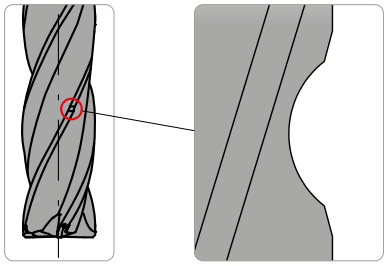
4 - Flute

# Important features

## FOR BEST PERFORMANCE ON SURFACE QUALITY

■ **Optimized chip-splitting for short chips and perfect surface quality**

### Chip-splitting design



Optimized chip-splitting geometry for short chips and a perfect chip evacuation. The result is a perfect surface quality.

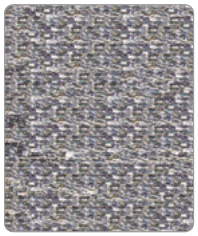
### Short chips



Due to the chip-splitting, the chips are short and easily evacuated. The result is long tool life.

### Surface quality

CrazyMill Cool

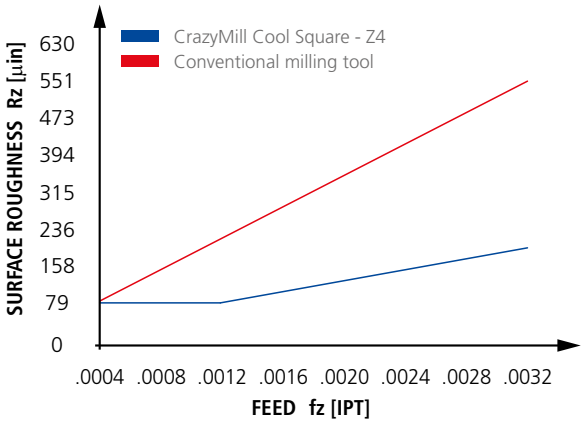


Conventional endmill



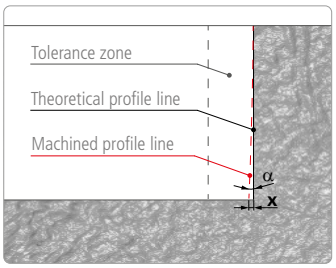
Due to the new design of chip-splitting, there is no visible mark as happens when using a conventional milling tool. The result is an excellent surface quality.

## ■ Surface roughness Rz




Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: .315" (8 mm); Milling depth: .630" (16 mm);
Coolant: cutting oil; Cutting data: $v_c$ = 853 SFM (260 m/min);
$a_p$ = .630" (16 mm); $a_e$ = .006" (0.16 mm)

## ■ Perpendicularity




| | Perpendicularity precision |
|---|---|
| x | .0008" (0.02 mm) |
| α | - 0.05° |

Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: .236" (6 mm); Milling depth: .945" (24 mm);
Coolant: cutting oil; Cutting data: $v_c$ = 723 SFM (220 m/min);
$f_z$ = .0012 IPT (0.03 mm); $a_p$ = .945" (24 mm);
$a_e$ = .0047" (0.12 mm)

Thanks to the profile of the flute and the size of the core, greater stability is achieved. The result is high perpendicularity precision, in particularly for long tool versions.

CRAZYMILL by Mikron Tool Cool

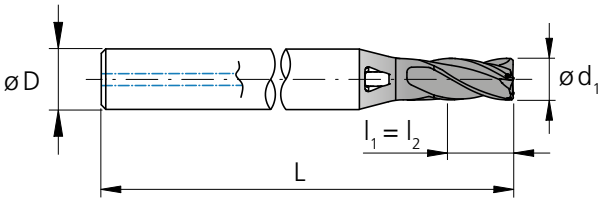
# Type A - 2 x d - Square / Corner radius - Z4

## MILLING WITH INTEGRATED COOLING

### Square



protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | **.079** | 2.0 | 2.0 | 4 | **1.57** | 40 | 2.CMC42.A1Z4.100.1 | ■ |
| | **.047** | 1.2 | **.094** | 2.4 | 2.4 | 4 | **1.57** | 40 | 2.CMC42.A1Z4.120.1 | ■ |
| | **.059** | 1.5 | **.118** | 3.0 | 3.0 | 4 | **1.57** | 40 | 2.CMC42.A1Z4.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.122** | 3.1 | 3.1 | 4 | **1.57** | 40 | 2.CMC.SAZ4.F116 | ■ |
| | **.071** | 1.8 | **.142** | 3.6 | 3.6 | 4 | **1.57** | 40 | 2.CMC42.A1Z4.180.1 | ■ |
| | **.079** | 2.0 | **.157** | 4.0 | 4.0 | 4 | **1.57** | 40 | 2.CMC42.A1Z4.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.185** | 4.7 | 4.7 | 4 | **1.57** | 40 | 2.CMC.SAZ4.F332 | ■ |
| | **.098** | 2.5 | **.197** | 5.0 | 5.0 | 6 | **1.97** | 50 | 2.CMC42.A1Z4.250.1 | ■ |
| | **.118** | 3.0 | **.236** | 6.0 | 6.0 | 6 | **1.97** | 50 | 2.CMC42.A1Z4.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.252** | 6.4 | 6.4 | 6 | **1.97** | 50 | 2.CMC.SAZ4.F18 | ■ |
| | **.138** | 3.5 | **.276** | 7.0 | 7.0 | 6 | **1.97** | 50 | 2.CMC42.A1Z4.350.1 | ■ |
| **5/32** | **.1562** | 3.968 | **.312** | 7.9 | 7.9 | 6 | **1.97** | 50 | 2.CMC.SAZ4.F532 | ■ |
| | **.157** | 4.0 | **.315** | 8.0 | 8.0 | 6 | **1.97** | 50 | 2.CMC42.A1Z4.400.1 | ■ |
| | **.177** | 4.5 | **.354** | 9.0 | 9.0 | 8 | **2.36** | 60 | 2.CMC42.A1Z4.450.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.375** | 9.5 | 9.5 | 8 | **2.36** | 60 | 2.CMC.SAZ4.F316 | ■ |
| | **.197** | 5.0 | **.394** | 10.0 | 10.0 | 8 | **2.36** | 60 | 2.CMC42.A1Z4.500.1 | ■ |
| **7/32** | **.2189** | 5.560 | **.438** | 11.1 | 11.1 | 10 | **2.36** | 60 | 2.CMC.SAZ4.F732 | ■ |
| | **.236** | 6.0 | **.472** | 12.0 | 12.0 | 10 | **2.36** | 60 | 2.CMC42.A1Z4.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **.500** | 12.7 | 12.7 | 10 | **2.36** | 60 | 2.CMC.SAZ4.F14 | ■ |
| | **.315** | 8.0 | **.630** | 16.0 | 16.0 | 12 | **2.76** | 70 | 2.CMC42.A1Z4.800.1 | ■ |

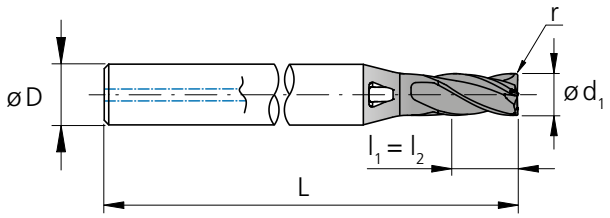
■ Stock item

Carbide | 2xd1 | Z4 | 42° | eXedur SNP | ap | ae

| Ø d1 | .004" - .118" (0.1 - 3.0 mm) | | .122" - .236" (3.1 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | - .00055"<br>- .00110" | - 0.014 mm<br>- 0.028 mm | - .00079"<br>- .00150" | - 0.020 mm<br>- 0.038 mm | - .00098"<br>- .00185" | - 0.025 mm<br>- 0.047 mm |

## Corner radius






l1 = Effective length
l2 = Cutting length

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .039 | 1.0 | .079 | 2.0 | 2.0 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z4.100.1 | ■ |
| | .039 | 1.0 | .079 | 2.0 | 2.0 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A3Z4.100.1 | ■ |
| | .047 | 1.2 | .094 | 2.4 | 2.4 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z4.120.1 | ■ |
| | .047 | 1.2 | .094 | 2.4 | 2.4 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A3Z4.120.1 | ■ |
| | .059 | 1.5 | .118 | 3.0 | 3.0 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z4.150.1 | ■ |
| | .059 | 1.5 | .118 | 3.0 | 3.0 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.A3Z4.150.1 | ■ |
| 1/16 | .0625 | 1.587 | .122 | 3.1 | 3.1 | 4 | 1.57 | 40 | .0050 | 0.127 | 2.CMC.RA2Z4.F116 | ■ |
| 1/16 | .0625 | 1.587 | .122 | 3.1 | 3.1 | 4 | 1.57 | 40 | .0100 | 0.254 | 2.CMC.RA3Z4.F116 | ■ |
| | .071 | 1.8 | .142 | 3.6 | 3.6 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z4.180.1 | ■ |
| | .071 | 1.8 | .142 | 3.6 | 3.6 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.A3Z4.180.1 | ■ |
| | .079 | 2.0 | .157 | 4.0 | 4.0 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z4.200.1 | ■ |
| | .079 | 2.0 | .157 | 4.0 | 4.0 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A3Z4.200.1 | ■ |
| | .079 | 2.0 | .157 | 4.0 | 4.0 | 4 | 1.57 | 40 | .0197 | 0.50 | 2.CMC42.A4Z4.200.1 | ■ |
| 3/32 | .0937 | 2.381 | .185 | 4.7 | 4.7 | 4 | 1.57 | 40 | .0050 | 0.127 | 2.CMC.RA2Z4.F332 | ■ |
| 3/32 | .0937 | 2.381 | .185 | 4.7 | 4.7 | 4 | 1.57 | 40 | .0100 | 0.254 | 2.CMC.RA3Z4.F332 | ■ |
| 3/32 | .0937 | 2.381 | .185 | 4.7 | 4.7 | 4 | 1.57 | 40 | .0150 | 0.381 | 2.CMC.RA4Z4.F332 | ■ |
| | .098 | 2.5 | .197 | 5.0 | 5.0 | 6 | 1.97 | 50 | .0079 | 0.20 | 2.CMC42.A2Z4.250.1 | ■ |
| | .098 | 2.5 | .197 | 5.0 | 5.0 | 6 | 1.97 | 50 | .0197 | 0.50 | 2.CMC42.A3Z4.250.1 | ■ |
| | .118 | 3.0 | .236 | 6.0 | 6.0 | 6 | 1.97 | 50 | .0079 | 0.20 | 2.CMC42.A2Z4.300.1 | ■ |
| | .118 | 3.0 | .236 | 6.0 | 6.0 | 6 | 1.97 | 50 | .0197 | 0.50 | 2.CMC42.A3Z4.300.1 | ■ |
| 1/8 | .1250 | 3.175 | .250 | 6.4 | 6.4 | 6 | 1.97 | 50 | .0100 | 0.254 | 2.CMC.RA2Z4.F18 | ■ |
| 1/8 | .1250 | 3.175 | .250 | 6.4 | 6.4 | 6 | 1.97 | 50 | .0150 | 0.381 | 2.CMC.RA3Z4.F18 | ■ |
| | .138 | 3.5 | .276 | 7.0 | 7.0 | 6 | 1.97 | 50 | .0079 | 0.20 | 2.CMC42.A2Z4.350.1 | ■ |
| | .138 | 3.5 | .276 | 7.0 | 7.0 | 6 | 1.97 | 50 | .0197 | 0.50 | 2.CMC42.A3Z4.350.1 | ■ |
| 5/32 | .1562 | 3.968 | .312 | 7.9 | 7.9 | 6 | 1.97 | 50 | .0100 | 0.254 | 2.CMC.RA2Z4.F532 | ■ |
| 5/32 | .1562 | 3.968 | .312 | 7.9 | 7.9 | 6 | 1.97 | 50 | .0150 | 0.381 | 2.CMC.RA3Z4.F532 | ■ |
| | .157 | 4.0 | .315 | 8.0 | 8.0 | 6 | 1.97 | 50 | .0079 | 0.20 | 2.CMC42.A2Z4.400.1 | ■ |
| | .157 | 4.0 | .315 | 8.0 | 8.0 | 6 | 1.97 | 50 | .0197 | 0.50 | 2.CMC42.A3Z4.400.1 | ■ |
| | .177 | 4.5 | .354 | 9.0 | 9.0 | 8 | 2.36 | 60 | .0079 | 0.20 | 2.CMC42.A2Z4.450.1 | ■ |
| | .177 | 4.5 | .354 | 9.0 | 9.0 | 8 | 2.36 | 60 | .0197 | 0.50 | 2.CMC42.A3Z4.450.1 | ■ |
| 3/16 | .1875 | 4.762 | .375 | 9.5 | 9.5 | 8 | 2.36 | 60 | .0100 | 0.254 | 2.CMC.RA2Z4.F316 | ■ |
| 3/16 | .1875 | 4.762 | .375 | 9.5 | 9.5 | 8 | 2.36 | 60 | .0150 | 0.381 | 2.CMC.RA3Z4.F316 | ■ |
| | .197 | 5.0 | .394 | 10.0 | 10.0 | 8 | 2.36 | 60 | .0079 | 0.20 | 2.CMC42.A2Z4.500.1 | ■ |
| | .197 | 5.0 | .394 | 10.0 | 10.0 | 8 | 2.36 | 60 | .0197 | 0.50 | 2.CMC42.A3Z4.500.1 | ■ |
| 7/32 | .2189 | 5.560 | .438 | 11.1 | 11.1 | 10 | 2.36 | 60 | .0150 | 0.381 | 2.CMC.RA2Z4.F732 | ■ |
| 7/32 | .2189 | 5.560 | .438 | 11.1 | 11.1 | 10 | 2.36 | 60 | .0300 | 0.762 | 2.CMC.RA3Z4.F732 | ■ |
| | .236 | 6.0 | .472 | 12.0 | 12.0 | 10 | 2.36 | 60 | .0079 | 0.20 | 2.CMC42.A2Z4.600.1 | ■ |
| | .236 | 6.0 | .472 | 12.0 | 12.0 | 10 | 2.36 | 60 | .0197 | 0.50 | 2.CMC42.A3Z4.600.1 | ■ |
| | .236 | 6.0 | .472 | 12.0 | 12.0 | 10 | 2.36 | 60 | .0394 | 1.00 | 2.CMC42.A4Z4.600.1 | ■ |
| 1/4 | .2500 | 6.350 | .500 | 12.7 | 12.7 | 10 | 2.36 | 60 | .0150 | 0.381 | 2.CMC.RA2Z4.F14 | ■ |
| 1/4 | .2500 | 6.350 | .500 | 12.7 | 12.7 | 10 | 2.36 | 60 | .0300 | 0.762 | 2.CMC.RA3Z4.F14 | ■ |
| 1/4 | .2500 | 6.350 | .500 | 12.7 | 12.7 | 10 | 2.36 | 60 | .0600 | 1.524 | 2.CMC.RA4Z4.F14 | ■ |
| | .315 | 8.0 | .630 | 16.0 | 16.0 | 12 | 2.76 | 70 | .0079 | 0.20 | 2.CMC42.A2Z4.800.1 | ■ |
| | .315 | 8.0 | .630 | 16.0 | 16.0 | 12 | 2.76 | 70 | .0197 | 0.50 | 2.CMC42.A3Z4.800.1 | ■ |
| | .315 | 8.0 | .630 | 16.0 | 16.0 | 12 | 2.76 | 70 | .0591 | 1.50 | 2.CMC42.A4Z4.800.1 | ■ |

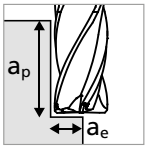
■ Stock item

CRAZYMILL by Mikron Tool Cool

# Type A - Pre-machining

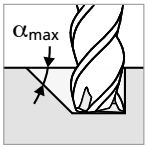
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Pre-machining**



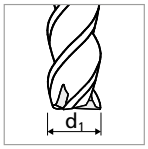

①
- $a_p = 1.5 \times d_1$
- $a_e = 0.3 \times d_1$

②
- $a_p = 2 \times d_1$
- $a_e = 0.2 \times d_1$




**Note:**
In case of linear ramp or helical interpolation milling reduce $f_z$ by 35%

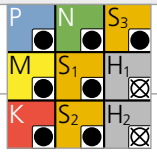





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ ① | 1.0 mm \| .039" $f_z$ ② | 1/16" 1.5 mm \| .059" $v_c$ | 1/16" 1.5 mm \| .059" $f_z$ ① | 1/16" 1.5 mm \| .059" $f_z$ ② |
|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.011 **.00043** | 0.013 **.00051** | 200 **656** | 0.024 **.00094** | 0.017 **.00067** |
| | | 1.0401 | C15 | AISI 1015 | | | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.010 **.00039** | 0.012 **.00047** | 200 **656** | 0.022 **.00087** | 0.015 **.00059** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.008 **.00032** | 0.009 **.00035** | 200 **656** | 0.019 **.00075** | 0.013 **.00051** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.012 **.00047** | 0.014 **.00055** | 180 **591** | 0.021 **.00083** | 0.016 **.00063** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.011 **.00043** | 0.013 **.00051** | 180 **591** | 0.021 **.00083** | 0.016 **.00063** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.011 **.00043** | 0.013 **.00051** | 180 **591** | 0.021 **.00083** | 0.016 **.00063** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.009 **.00035** | 0.011 **.00043** | 180 **591** | 0.018 **.00071** | 0.014 **.00055** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.008 **.00032** | 0.010 **.00039** | 160 **525** | 0.019 **.00075** | 0.016 **.00063** |
| | | 0.6030 | GG30 | ASTM 40B | | | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 160 **525** | 0.013 **.00051** | 0.015 **.00059** | 200 **656** | 0.026 **.00102** | 0.018 **.00071** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 160 **525** | 0.013 **.00051** | 0.015 **.00059** | 220 **722** | 0.026 **.00102** | 0.018 **.00071** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 160 **525** | 0.013 **.00051** | 0.015 **.00059** | 220 **722** | 0.026 **.00102** | 0.018 **.00071** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 160 **525** | 0.013 **.00051** | 0.015 **.00059** | 220 **722** | 0.026 **.00102** | 0.018 **.00071** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 160 **525** | 0.013 **.00051** | 0.015 **.00059** | 220 **722** | 0.026 **.00102** | 0.018 **.00071** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 160 **525** | 0.013 **.00051** | 0.015 **.00059** | 220 **722** | 0.026 **.00102** | 0.018 **.00071** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 80 **262** | - | 0.006 **.00024** | 100 **328** | - | 0.008 **.00030** |
| | | 2.4668 | | Inconel 718 | | | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 100 **328** | 0.010 **.00039** | 0.012 **.00047** | 100 **328** | 0.017 **.00067** | 0.014 **.00055** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 100 **328** | 0.010 **.00039** | 0.012 **.00047** | 100 **328** | 0.017 **.00067** | 0.014 **.00055** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 80 **262** | - | 0.006 **.00024** | 100 **328** | - | 0.008 **.00030** |
| | | | CrCoMo28 | ASTM F1537 | | | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



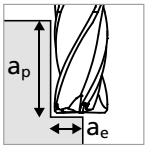

| | **3/32"** 2.0 mm \| **.079"** | | | **1/8"** 3.0 mm \| **.118"** | | | **Ød1 5/32"** 4.0 mm \| **.157"** | | | **3/16" - 7/32"** 5.0 mm \| **.197"** | | | **1/4"** 6.0 mm \| **.236"** | | | 8.0 mm \| **.315"** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ① | ② | | ① | ② | | ① | ② | | ① | ② | | ① | ② | | ① | ② |
| | $v_c$ | $f_z$ | | $v_c$ | $f_z$ | | $v_c$ | $f_z$ | | $v_c$ | $f_z$ | | $v_c$ | $f_z$ | | $v_c$ | $f_z$ | |
| | 220<br>**722** | 0.024<br>**.00094** | 0.027<br>**.00106** | 240<br>**787** | 0.033<br>**.00130** | 0.038<br>**.00150** | 260<br>**853** | 0.035<br>**.00138** | 0.040<br>**.00157** | 260<br>**853** | 0.035<br>**.00138** | 0.040<br>**.00157** | 260<br>**853** | 0.046<br>**.00181** | 0.052<br>**.00205** | 260<br>**853** | 0.054<br>**.00213** | 0.064<br>**.00252** |
| | 220<br>**722** | 0.022<br>**.00087** | 0.025<br>**.00098** | 240<br>**787** | 0.031<br>**.00122** | 0.035<br>**.00139** | 260<br>**853** | 0.033<br>**.00130** | 0.038<br>**.00151** | 260<br>**853** | 0.033<br>**.00130** | 0.038<br>**.00151** | 260<br>**853** | 0.044<br>**.00173** | 0.050<br>**.00197** | 260<br>**853** | 0.052<br>**.00205** | 0.060<br>**.00236** |
| | 220<br>**722** | 0.019<br>**.00075** | 0.022<br>**.00087** | 240<br>**787** | 0.028<br>**.00110** | 0.032<br>**.00126** | 260<br>**853** | 0.030<br>**.00118** | 0.034<br>**.00134** | 260<br>**853** | 0.030<br>**.00118** | 0.034<br>**.00134** | 260<br>**853** | 0.042<br>**.00165** | 0.048<br>**.00189** | 260<br>**853** | 0.050<br>**.00197** | 0.057<br>**.00224** |
| | 180<br>**591** | 0.021<br>**.00083** | 0.024<br>**.00094** | 200<br>**656** | 0.030<br>**.00118** | 0.034<br>**.00134** | 220<br>**722** | 0.033<br>**.00130** | 0.038<br>**.00151** | 220<br>**722** | 0.033<br>**.00130** | 0.038<br>**.00151** | 220<br>**722** | 0.040<br>**.00157** | 0.045<br>**.00177** | 260<br>**853** | 0.048<br>**.00189** | 0.055<br>**.00217** |
| | 180<br>**591** | 0.021<br>**.00083** | 0.024<br>**.00094** | 200<br>**656** | 0.030<br>**.00118** | 0.034<br>**.00134** | 220<br>**722** | 0.032<br>**.00126** | 0.037<br>**.00145** | 220<br>**722** | 0.032<br>**.00126** | 0.037<br>**.00145** | 220<br>**722** | 0.037<br>**.00145** | 0.043<br>**.00169** | 260<br>**853** | 0.045<br>**.00177** | 0.052<br>**.00205** |
| | 180<br>**591** | 0.021<br>**.00083** | 0.024<br>**.00094** | 200<br>**656** | 0.030<br>**.00118** | 0.034<br>**.00134** | 220<br>**722** | 0.032<br>**.00126** | 0.037<br>**.00145** | 220<br>**722** | 0.032<br>**.00126** | 0.037<br>**.00145** | 220<br>**722** | 0.037<br>**.00145** | 0.043<br>**.00169** | 260<br>**853** | 0.045<br>**.00177** | 0.052<br>**.00205** |
| | 180<br>**591** | 0.018<br>**.00071** | 0.020<br>**.00079** | 200<br>**656** | 0.026<br>**.00102** | 0.030<br>**.00118** | 220<br>**722** | 0.031<br>**.00122** | 0.035<br>**.00138** | 220<br>**722** | 0.031<br>**.00122** | 0.035<br>**.00139** | 220<br>**722** | 0.035<br>**.00139** | 0.040<br>**.00157** | 260<br>**853** | 0.042<br>**.00165** | 0.048<br>**.00189** |
| | 200<br>**656** | 0.019<br>**.00075** | 0.022<br>**.00087** | 220<br>**722** | 0.030<br>**.00118** | 0.034<br>**.00135** | 240<br>**787** | 0.042<br>**.00165** | 0.048<br>**.00189** | 240<br>**787** | 0.042<br>**.00165** | 0.048<br>**.00189** | 240<br>**787** | 0.044<br>**.00173** | 0.050<br>**.00197** | 240<br>**787** | 0.052<br>**.00205** | 0.057<br>**.00224** |
| | 240<br>**787** | 0.026<br>**.00102** | 0.030<br>**.00118** | 260<br>**853** | 0.040<br>**.00157** | 0.046<br>**.00183** | 300<br>**984** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.052<br>**.00205** | 0.060<br>**.00236** | 350<br>**1148** | 0.060<br>**.00236** | 0.069<br>**.00272** |
| | 240<br>**787** | 0.026<br>**.00102** | 0.030<br>**.00118** | 260<br>**853** | 0.040<br>**.00157** | 0.046<br>**.00183** | 300<br>**984** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.052<br>**.00205** | 0.060<br>**.00236** | 350<br>**1148** | 0.060<br>**.00236** | 0.069<br>**.00272** |
| | 240<br>**787** | 0.026<br>**.00102** | 0.030<br>**.00118** | 260<br>**853** | 0.040<br>**.00157** | 0.046<br>**.00183** | 300<br>**984** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.052<br>**.00205** | 0.060<br>**.00236** | 350<br>**1148** | 0.060<br>**.00236** | 0.069<br>**.00272** |
| | 240<br>**787** | 0.026<br>**.00102** | 0.030<br>**.00118** | 260<br>**853** | 0.040<br>**.00157** | 0.046<br>**.00183** | 300<br>**984** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.052<br>**.00205** | 0.060<br>**.00236** | 350<br>**1148** | 0.060<br>**.00236** | 0.069<br>**.00272** |
| | 240<br>**787** | 0.026<br>**.00102** | 0.030<br>**.00118** | 260<br>**853** | 0.040<br>**.00157** | 0.046<br>**.00183** | 300<br>**984** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.051<br>**.00201** | 0.058<br>**.00228** | 320<br>**1050** | 0.052<br>**.00205** | 0.060<br>**.00236** | 350<br>**1148** | 0.060<br>**.00236** | 0.069<br>**.00272** |
| | 100<br>**328** | - | 0.010<br>**.00039** | 100<br>**328** | - | 0.014<br>**.00055** | 120<br>**394** | - | 0.016<br>**.00063** | 120<br>**394** | - | 0.018<br>**.00071** | 120<br>**394** | - | 0.020<br>**.00079** | 120<br>**394** | - | 0.020<br>**.00079** |
| | 110<br>**361** | 0.017<br>**.00067** | 0.020<br>**.00079** | 110<br>**361** | 0.028<br>**.00110** | 0.032<br>**.00126** | 130<br>**427** | 0.028<br>**.00110** | 0.035<br>**.00139** | 130<br>**427** | 0.031<br>**.00122** | 0.035<br>**.00139** | 130<br>**427** | 0.032<br>**.00126** | 0.037<br>**.00147** | 140<br>**459** | 0.035<br>**.00138** | 0.040<br>**.00157** |
| | 110<br>**361** | 0.017<br>**.00067** | 0.020<br>**.00079** | 110<br>**361** | 0.028<br>**.00110** | 0.032<br>**.00126** | 130<br>**427** | 0.028<br>**.00110** | 0.035<br>**.00139** | 130<br>**427** | 0.031<br>**.00122** | 0.035<br>**.00139** | 130<br>**427** | 0.032<br>**.00126** | 0.037<br>**.00147** | 140<br>**459** | 0.035<br>**.00138** | 0.040<br>**.00157** |
| | 100<br>**328** | - | 0.010<br>**.00039** | 100<br>**328** | - | 0.014<br>**.00055** | 120<br>**394** | - | 0.016<br>**.00063** | 120<br>**394** | - | 0.018<br>**.00071** | 120<br>**394** | - | 0.020<br>**.00079** | 120<br>**394** | - | 0.025<br>**.00098** |

CRAZYMILL by Mikron Tool Cool

# Type A - Finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

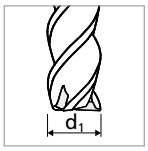
**Finishing**




①
- $a_p = 2 \times d_1$
- $a_e = 0.04 \times d_1$

②
- $a_p = 2 \times d_1$
- $a_e = 0.02 \times d_1$

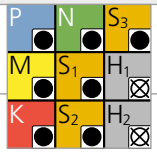





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" ① $f_z$ | 1.0 mm \| .039" ② $f_z$ | 1.5 mm \| 1/16" $v_c$ | 1.5 mm \| 1/16" ① $f_z$ | 1.5 mm \| 1/16" ② $f_z$ |
|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 130 **427** | 0.008 **.00032** | 0.009 **.00035** | 180 **591** | 0.012 **.00047** | 0.014 **.00055** |
| | | 1.0401 | C15 | AISI 1015 | | | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 130 **427** | 0.007 **.00028** | 0.008 **.00032** | 180 **591** | 0.011 **.00043** | 0.013 **.00051** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 130 **427** | 0.006 **.00024** | 0.007 **.00028** | 180 **591** | 0.010 **.00039** | 0.012 **.00047** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 130 **427** | 0.008 **.00032** | 0.009 **.00035** | 180 **591** | 0.012 **.00047** | 0.014 **.00055** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 130 **427** | 0.008 **.00032** | 0.009 **.00035** | 180 **591** | 0.011 **.00043** | 0.013 **.00051** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 130 **427** | 0.008 **.00032** | 0.009 **.00035** | 180 **591** | 0.011 **.00043** | 0.013 **.00051** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 130 **427** | 0.006 **.00024** | 0.007 **.00028** | 180 **591** | 0.008 **.00032** | 0.009 **.00035** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 110 **361** | 0.006 **.00024** | 0.007 **.00028** | 130 **427** | 0.012 **.00047** | 0.014 **.00055** |
| | | 0.6030 | GG30 | ASTM 40B | | | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 130 **427** | 0.009 **.00035** | 0.010 **.00039** | 180 **591** | 0.013 **.00051** | 0.015 **.00060** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 130 **427** | 0.009 **.00035** | 0.010 **.00039** | 180 **591** | 0.013 **.00051** | 0.015 **.00060** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 130 **427** | 0.010 **.00039** | 0.012 **.00047** | 180 **591** | 0.013 **.00051** | 0.015 **.00060** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 130 **427** | 0.010 **.00039** | 0.012 **.00047** | 180 **591** | 0.013 **.00051** | 0.015 **.00060** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 130 **427** | 0.010 **.00039** | 0.012 **.00047** | 180 **591** | 0.013 **.00051** | 0.015 **.00060** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 130 **427** | 0.009 **.00035** | 0.010 **.00039** | 180 **591** | 0.013 **.00051** | 0.015 **.00060** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 110 **361** | 0.004 **.00016** | 0.005 **.00020** | 120 **394** | 0.005 **.00020** | 0.006 **.00024** |
| | | 2.4668 | | Inconel 718 | | | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 110 **361** | 0.008 **.00032** | 0.009 **.00035** | 120 **394** | 0.010 **.00039** | 0.012 **.00047** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 110 **361** | 0.008 **.00032** | 0.009 **.00035** | 120 **394** | 0.010 **.00039** | 0.012 **.00047** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 110 **361** | 0.004 **.00016** | 0.005 **.00020** | 120 **394** | 0.005 **.00020** | 0.006 **.00024** |
| | | | CrCoMo28 | ASTM F1537 | | | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| Ød1 | $v_c$ | $f_z$ ① | $f_z$ ② |
|---|---|---|---|
| **3/32"** 2.0 mm \| **.079"** | 200 **656** | 0.017 **.00067** | 0.020 **.00079** |
| | 200 **656** | 0.016 **.00063** | 0.018 **.00071** |
| | 200 **656** | 0.015 **.00059** | 0.017 **.00067** |
| | 200 **656** | 0.017 **.00067** | 0.020 **.00079** |
| | 200 **656** | 0.016 **.00063** | 0.018 **.00071** |
| | 200 **656** | 0.016 **.00063** | 0.018 **.00071** |
| | 200 **656** | 0.015 **.00059** | 0.017 **.00067** |
| | 150 **492** | 0.014 **.00055** | 0.016 **.00063** |
| | 200 **656** | 0.018 **.00071** | 0.021 **.00083** |
| | 200 **656** | 0.018 **.00071** | 0.021 **.00083** |
| | 200 **656** | 0.018 **.00071** | 0.021 **.00083** |
| | 200 **656** | 0.018 **.00071** | 0.021 **.00083** |
| | 200 **656** | 0.018 **.00071** | 0.021 **.00083** |
| | 200 **656** | 0.018 **.00071** | 0.021 **.00083** |
| | 130 **427** | 0.005 **.00020** | 0.006 **.00024** |
| | 130 **427** | 0.014 **.00055** | 0.016 **.00063** |
| | 130 **427** | 0.014 **.00055** | 0.016 **.00063** |
| | 130 **427** | 0.005 **.00020** | 0.006 **.00024** |
| **1/8"** 3.0 mm \| **.118"** | 210 **689** | 0.023 **.0091** | 0.026 **.00103** |
| | 210 **689** | 0.022 **.00087** | 0.025 **.00098** |
| | 210 **689** | 0.020 **.00079** | 0.023 **.0091** |
| | 210 **689** | 0.022 **.00087** | 0.025 **.00098** |
| | 210 **689** | 0.022 **.00087** | 0.025 **.00098** |
| | 210 **689** | 0.022 **.00087** | 0.025 **.00098** |
| | 210 **689** | 0.020 **.00079** | 0.023 **.0091** |
| | 160 **525** | 0.022 **.00087** | 0.025 **.00098** |
| | 210 **689** | 0.029 **.00114** | 0.033 **.00130** |
| | 210 **689** | 0.029 **.00114** | 0.033 **.00130** |
| | 210 **689** | 0.029 **.00114** | 0.033 **.00130** |
| | 210 **689** | 0.029 **.00114** | 0.033 **.00130** |
| | 210 **689** | 0.029 **.00114** | 0.033 **.00130** |
| | 210 **689** | 0.029 **.00114** | 0.033 **.00130** |
| | 130 **427** | 0.008 **.00032** | 0.009 **.00035** |
| | 130 **427** | 0.020 **.00079** | 0.023 **.00091** |
| | 130 **427** | 0.020 **.00079** | 0.023 **.00091** |
| | 130 **427** | 0.008 **.00032** | 0.009 **.00035** |
| **5/32"** 4.0 mm \| **.157"** | 220 **722** | 0.025 **.00098** | 0.029 **.00114** |
| | 220 **722** | 0.024 **.00094** | 0.028 **.00110** |
| | 220 **722** | 0.021 **.00083** | 0.024 **.00094** |
| | 220 **722** | 0.024 **.00094** | 0.028 **.00110** |
| | 220 **722** | 0.023 **.00091** | 0.027 **.00106** |
| | 220 **722** | 0.023 **.00091** | 0.027 **.00106** |
| | 220 **722** | 0.022 **.00087** | 0.025 **.00098** |
| | 170 **558** | 0.025 **.00098** | 0.029 **.00114** |
| | 220 **722** | 0.030 **.00118** | 0.035 **.00138** |
| | 220 **722** | 0.030 **.00118** | 0.035 **.00138** |
| | 220 **722** | 0.030 **.00118** | 0.035 **.00138** |
| | 220 **722** | 0.030 **.00118** | 0.035 **.00138** |
| | 220 **722** | 0.030 **.00118** | 0.035 **.00138** |
| | 220 **722** | 0.030 **.00118** | 0.035 **.00138** |
| | 140 **459** | 0.010 **.00039** | 0.012 **.00047** |
| | 140 **459** | 0.022 **.00087** | 0.025 **.00098** |
| | 140 **459** | 0.022 **.00087** | 0.025 **.00098** |
| | 140 **459** | 0.010 **.00039** | 0.012 **.00047** |
| **3/16" - 7/32"** 5.0 mm \| **.197"** | 220 **722** | 0.028 **.00110** | 0.032 **.00126** |
| | 220 **722** | 0.026 **.00102** | 0.030 **.00118** |
| | 220 **722** | 0.023 **.00091** | 0.026 **.00102** |
| | 220 **722** | 0.026 **.00102** | 0.030 **.00118** |
| | 220 **722** | 0.025 **.00098** | 0.029 **.00114** |
| | 220 **722** | 0.025 **.00098** | 0.029 **.00114** |
| | 220 **722** | 0.024 **.00094** | 0.028 **.00110** |
| | 170 **558** | 0.029 **.00114** | 0.033 **.00130** |
| | 220 **722** | 0.033 **.00130** | 0.038 **.00150** |
| | 220 **722** | 0.033 **.00130** | 0.038 **.00150** |
| | 220 **722** | 0.033 **.00130** | 0.038 **.00150** |
| | 220 **722** | 0.033 **.00130** | 0.038 **.00150** |
| | 220 **722** | 0.033 **.00130** | 0.038 **.00150** |
| | 220 **722** | 0.033 **.00130** | 0.038 **.00150** |
| | 140 **459** | 0.011 **.00043** | 0.013 **.00051** |
| | 140 **459** | 0.024 **.00094** | 0.028 **.00110** |
| | 140 **459** | 0.024 **.00094** | 0.028 **.00110** |
| | 140 **459** | 0.011 **.00043** | 0.013 **.00051** |
| **1/4"** 6.0 mm \| **.236"** | 220 **722** | 0.033 **.00130** | 0.038 **.00150** |
| | 220 **722** | 0.029 **.00114** | 0.033 **.00130** |
| | 220 **722** | 0.025 **.00098** | 0.029 **.00114** |
| | 220 **722** | 0.029 **.00114** | 0.033 **.00130** |
| | 220 **722** | 0.028 **.00110** | 0.032 **.00126** |
| | 220 **722** | 0.028 **.00110** | 0.032 **.00126** |
| | 220 **722** | 0.026 **.00102** | 0.030 **.00118** |
| | 170 **558** | 0.031 **.00122** | 0.036 **.00142** |
| | 220 **722** | 0.036 **.00142** | 0.041 **.00161** |
| | 220 **722** | 0.036 **.00142** | 0.041 **.00161** |
| | 220 **722** | 0.036 **.00142** | 0.041 **.00161** |
| | 220 **722** | 0.036 **.00142** | 0.041 **.00161** |
| | 220 **722** | 0.036 **.00142** | 0.041 **.00161** |
| | 220 **722** | 0.036 **.00142** | 0.041 **.00162** |
| | 150 **492** | 0.012 **.00047** | 0.014 **.00055** |
| | 150 **492** | 0.026 **.00102** | 0.030 **.00118** |
| | 150 **492** | 0.026 **.00102** | 0.030 **.00118** |
| | 150 **492** | 0.012 **.00047** | 0.014 **.00055** |
| **8.0 mm \| .315"** | 220 **722** | 0.038 **.00150** | 0.044 **.00173** |
| | 220 **722** | 0.034 **.00134** | 0.040 **.00157** |
| | 220 **722** | 0.030 **.00118** | 0.035 **.00138** |
| | 260 **853** | 0.034 **.00134** | 0.040 **.00157** |
| | 260 **853** | 0.033 **.00130** | 0.038 **.00150** |
| | 260 **853** | 0.033 **.00130** | 0.038 **.00150** |
| | 260 **853** | 0.032 **.00126** | 0.037 **.00146** |
| | 200 **656** | 0.036 **.00142** | 0.042 **.00165** |
| | 270 **886** | 0.041 **.00161** | 0.047 **.00185** |
| | 270 **886** | 0.041 **.00161** | 0.047 **.00185** |
| | 270 **886** | 0.041 **.00161** | 0.047 **.00185** |
| | 270 **886** | 0.041 **.00161** | 0.047 **.00185** |
| | 270 **886** | 0.041 **.00161** | 0.047 **.00186** |
| | 270 **886** | 0.041 **.00161** | 0.047 **.00185** |
| | 160 **525** | 0.017 **.00067** | 0.020 **.00079** |
| | 160 **525** | 0.031 **.00122** | 0.036 **.00142** |
| | 160 **525** | 0.031 **.00122** | 0.036 **.00142** |
| | 160 **525** | 0.017 **.00067** | 0.020 **.00079** |

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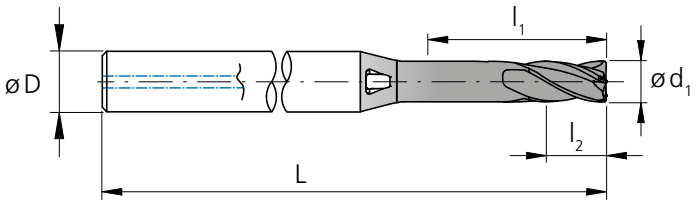
# Type C - 5 x d - Square / Corner radius - Z4

## MILLING WITH INTEGRATED COOLING

### Square



protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | **.197** | 5.00 | 2.00 | 4 | **1.57** | 40 | 2.CMC42.C1Z4.100.1 | ■ |
| | **.047** | 1.2 | **.236** | 6.00 | 2.40 | 4 | **1.57** | 40 | 2.CMC42.C1Z4.120.1 | ■ |
| | **.059** | 1.5 | **.295** | 7.50 | 3.00 | 4 | **1.57** | 40 | 2.CMC42.C1Z4.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.312** | 7.94 | 3.10 | 4 | **1.77** | 45 | 2.CMC.SCZ4.F116 | ■ |
| | **.071** | 1.8 | **.354** | 9.00 | 3.60 | 4 | **1.77** | 45 | 2.CMC42.C1Z4.180.1 | ■ |
| | **.079** | 2.0 | **.394** | 10.00 | 4.00 | 4 | **1.73** | 44 | 2.CMC42.C1Z4.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.469** | 11.91 | 4.70 | 4 | **1.73** | 44 | 2.CMC.SCZ4.F332 | ■ |
| | **.098** | 2.5 | **.492** | 12.50 | 5.00 | 6 | **2.17** | 55 | 2.CMC42.C1Z4.250.1 | ■ |
| | **.118** | 3.0 | **.591** | 15.00 | 6.00 | 6 | **2.17** | 55 | 2.CMC42.C1Z4.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.625** | 15.88 | 6.40 | 6 | **2.36** | 60 | 2.CMC.SCZ4.F18 | ■ |
| | **.138** | 3.5 | **.689** | 17.50 | 7.00 | 6 | **2.36** | 60 | 2.CMC42.C1Z4.350.1 | ■ |
| **5/32** | **.1562** | 3.968 | **.781** | 19.84 | 7.94 | 6 | **2.36** | 60 | 2.CMC.SCZ4.F532 | ■ |
| | **.157** | 4.0 | **.787** | 20.00 | 8.00 | 6 | **2.36** | 60 | 2.CMC42.C1Z4.400.1 | ■ |
| | **.177** | 4.5 | **.886** | 22.50 | 9.00 | 8 | **2.76** | 70 | 2.CMC42.C1Z4.450.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.937** | 23.81 | 9.52 | 8 | **2.76** | 70 | 2.CMC.SCZ4.F316 | ■ |
| | **.197** | 5.0 | **.984** | 25.00 | 10.00 | 8 | **2.76** | 70 | 2.CMC42.C1Z4.500.1 | ■ |
| **7/32** | **.2189** | 5.560 | **1.09** | 27.80 | 11.12 | 10 | **2.76** | 70 | 2.CMC.SCZ4.F732 | ■ |
| | **.236** | 6.0 | **1.18** | 30.00 | 12.00 | 10 | **2.76** | 70 | 2.CMC42.C1Z4.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **1.25** | 31.70 | 12.70 | 10 | **2.76** | 70 | 2.CMC.SCZ4.F14 | ■ |
| | **.315** | 8.0 | **1.57** | 40.00 | 16.00 | 12 | **3.54** | 90 | 2.CMC42.C1Z4.800.1 | ■ |

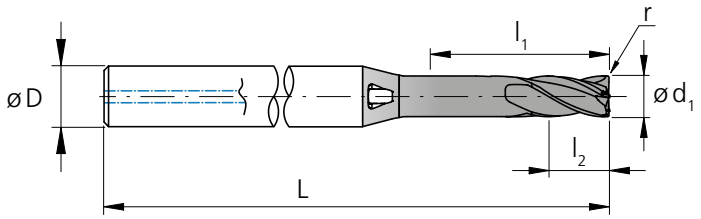
■ Stock item

Carbide | 5xd$_1$ | Z4 | 42° | eXedur SNP | $a_p$ | $a_e$

| Ø d$_1$ | .004" - .118" (0.1 - 3.0 mm) | | .122" - .236" (3.1 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | - .00055"<br>- .00110" | - 0.014 mm<br>- 0.028 mm | - .00079"<br>- .00150" | - 0.020 mm<br>- 0.038 mm | - .00098"<br>- .00185" | - 0.025 mm<br>- 0.047 mm |

## Corner radius






l$_1$ = Effective length
l$_2$ = Cutting length

| d$_1$ [inch] | d$_1$ [inch] | d$_1$ [mm] | l$_1$ [inch] | l$_1$ [mm] | l$_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .039 | 1.0 | .197 | 5.00 | 2.00 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.C2Z4.100.1 | ■ |
| | .039 | 1.0 | .197 | 5.00 | 2.00 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.C3Z4.100.1 | ■ |
| | .047 | 1.2 | .236 | 6.00 | 2.40 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.C2Z4.120.1 | ■ |
| | .047 | 1.2 | .236 | 6.00 | 2.40 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.C3Z4.120.1 | ■ |
| | .059 | 1.5 | .295 | 7.50 | 3.00 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.C2Z4.150.1 | ■ |
| | .059 | 1.5 | .295 | 7.50 | 3.00 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.C3Z4.150.1 | ■ |
| 1/16 | .0625 | 1.587 | .312 | 7.94 | 3.10 | 4 | 1.77 | 45 | .0050 | 0.127 | 2.CMC.RC2Z4.F116 | ■ |
| 1/16 | .0625 | 1.587 | .312 | 7.94 | 3.10 | 4 | 1.77 | 45 | .0100 | 0.254 | 2.CMC.RC3Z4.F116 | ■ |
| | .071 | 1.8 | .354 | 9.00 | 3.60 | 4 | 1.77 | 45 | .0039 | 0.10 | 2.CMC42.C2Z4.180.1 | ■ |
| | .071 | 1.8 | .354 | 9.00 | 3.60 | 4 | 1.77 | 45 | .0118 | 0.30 | 2.CMC42.C3Z4.180.1 | ■ |
| | .079 | 2.0 | .394 | 10.00 | 4.00 | 4 | 1.73 | 44 | .0039 | 0.10 | 2.CMC42.C2Z4.200.1 | ■ |
| | .079 | 2.0 | .394 | 10.00 | 4.00 | 4 | 1.73 | 44 | .0079 | 0.20 | 2.CMC42.C3Z4.200.1 | ■ |
| | .079 | 2.0 | .394 | 10.00 | 4.00 | 4 | 1.73 | 44 | .0197 | 0.50 | 2.CMC42.C4Z4.200.1 | ■ |
| 3/32 | .0937 | 2.381 | .469 | 11.91 | 4.70 | 4 | 1.73 | 44 | .0050 | 0.127 | 2.CMC.RC2Z4.F332 | ■ |
| 3/32 | .0937 | 2.381 | .469 | 11.91 | 4.70 | 4 | 1.73 | 44 | .0100 | 0.254 | 2.CMC.RC3Z4.F332 | ■ |
| 3/32 | .0937 | 2.381 | .469 | 11.91 | 4.70 | 4 | 1.73 | 44 | .0150 | 0.381 | 2.CMC.RC4Z4.F332 | ■ |
| | .098 | 2.5 | .492 | 12.50 | 5.00 | 6 | 2.17 | 55 | .0079 | 0.20 | 2.CMC42.C2Z4.250.1 | ■ |
| | .098 | 2.5 | .492 | 12.50 | 5.00 | 6 | 2.17 | 55 | .0197 | 0.50 | 2.CMC42.C3Z4.250.1 | ■ |
| | .118 | 3.0 | .591 | 15.00 | 6.00 | 6 | 2.17 | 55 | .0079 | 0.20 | 2.CMC42.C2Z4.300.1 | ■ |
| | .118 | 3.0 | .591 | 15.00 | 6.00 | 6 | 2.17 | 55 | .0197 | 0.50 | 2.CMC42.C3Z4.300.1 | ■ |
| 1/8 | .1250 | 3.175 | .625 | 15.88 | 6.35 | 6 | 2.36 | 60 | .0100 | 0.254 | 2.CMC.RC2Z4.F18 | ■ |
| 1/8 | .1250 | 3.175 | .625 | 15.88 | 6.35 | 6 | 2.36 | 60 | .0150 | 0.381 | 2.CMC.RC3Z4.F18 | ■ |
| | .138 | 3.5 | .689 | 17.50 | 7.00 | 6 | 2.36 | 60 | .0079 | 0.20 | 2.CMC42.C2Z4.350.1 | ■ |
| | .138 | 3.5 | .689 | 17.50 | 7.00 | 6 | 2.36 | 60 | .0197 | 0.50 | 2.CMC42.C3Z4.350.1 | ■ |
| 5/32 | .1562 | 3.968 | .781 | 19.84 | 7.94 | 6 | 2.36 | 60 | .0100 | 0.254 | 2.CMC.RC2Z4.F532 | ■ |
| 5/32 | .1562 | 3.968 | .781 | 19.84 | 7.94 | 6 | 2.36 | 60 | .0150 | 0.381 | 2.CMC.RC3Z4.F532 | ■ |
| | .157 | 4.0 | .787 | 20.00 | 8.00 | 6 | 2.36 | 60 | .0079 | 0.20 | 2.CMC42.C2Z4.400.1 | ■ |
| | .157 | 4.0 | .787 | 20.00 | 8.00 | 6 | 2.36 | 60 | .0197 | 0.50 | 2.CMC42.C3Z4.400.1 | ■ |
| | .177 | 4.5 | .886 | 22.50 | 9.00 | 8 | 2.76 | 70 | .0079 | 0.20 | 2.CMC42.C2Z4.450.1 | ■ |
| | .177 | 4.5 | .886 | 22.50 | 9.00 | 8 | 2.76 | 70 | .0197 | 0.50 | 2.CMC42.C3Z4.450.1 | ■ |
| 3/16 | .1875 | 4.762 | .937 | 23.81 | 9.52 | 8 | 2.76 | 70 | .0100 | 0.254 | 2.CMC.RC2Z4.F316 | ■ |
| 3/16 | .1875 | 4.762 | .937 | 23.81 | 9.52 | 8 | 2.76 | 70 | .0150 | 0.381 | 2.CMC.RC3Z4.F316 | ■ |
| | .197 | 5.0 | .984 | 25.00 | 10.00 | 8 | 2.76 | 70 | .0079 | 0.20 | 2.CMC42.C2Z4.500.1 | ■ |
| | .197 | 5.0 | .984 | 25.00 | 10.00 | 8 | 2.76 | 70 | .0197 | 0.50 | 2.CMC42.C3Z4.500.1 | ■ |
| 7/32 | .2189 | 5.560 | 1.09 | 27.80 | 11.12 | 10 | 2.76 | 70 | .0150 | 0.381 | 2.CMC.RC2Z4.F732 | ■ |
| 7/32 | .2189 | 5.560 | 1.09 | 27.80 | 11.12 | 10 | 2.76 | 70 | .0300 | 0.762 | 2.CMC.RC3Z4.F732 | ■ |
| | .236 | 6.0 | 1.18 | 30.00 | 12.00 | 10 | 2.76 | 70 | .0079 | 0.20 | 2.CMC42.C2Z4.600.1 | ■ |
| | .236 | 6.0 | 1.18 | 30.00 | 12.00 | 10 | 2.76 | 70 | .0197 | 0.50 | 2.CMC42.C3Z4.600.1 | ■ |
| | .236 | 6.0 | 1.18 | 30.00 | 12.00 | 10 | 2.76 | 70 | .0394 | 1.00 | 2.CMC42.C4Z4.600.1 | ■ |
| 1/4 | .2500 | 6.350 | 1.25 | 31.70 | 12.70 | 10 | 2.76 | 70 | .0150 | 0.381 | 2.CMC.RC2Z4.F14 | ■ |
| 1/4 | .2500 | 6.350 | 1.25 | 31.70 | 12.70 | 10 | 2.76 | 70 | .0300 | 0.762 | 2.CMC.RC3Z4.F14 | ■ |
| 1/4 | .2500 | 6.350 | 1.25 | 31.70 | 12.70 | 10 | 2.76 | 70 | .0600 | 1.524 | 2.CMC.RC4Z4.F14 | ■ |
| | .315 | 8.0 | 1.57 | 40.00 | 16.00 | 12 | 3.54 | 90 | .0079 | 0.20 | 2.CMC42.C2Z4.800.1 | ■ |
| | .315 | 8.0 | 1.57 | 40.00 | 16.00 | 12 | 3.54 | 90 | .0197 | 0.50 | 2.CMC42.C3Z4.800.1 | ■ |
| | .315 | 8.0 | 1.57 | 40.00 | 16.00 | 12 | 3.54 | 90 | .0591 | 1.50 | 2.CMC42.C4Z4.800.1 | ■ |

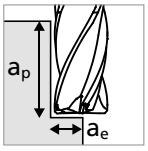
■ Stock item

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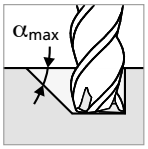
# Type C - Pre-machining

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Pre-machining**

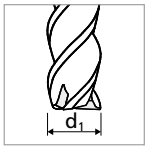



- $a_p = 2 \times d_1$
- $a_e = 0.1 \times d_1$




**Note:**
In case of linear ramp or helical interpolation milling reduce $f_z$ by 35%

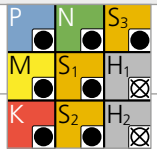





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 120 **394** | 0.017 **.00067** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 120 **394** | 0.016 **.00063** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 120 **394** | 0.012 **.00047** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 120 **394** | 0.018 **.00071** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 120 **394** | 0.017 **.00067** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 120 **394** | 0.017 **.00067** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 120 **394** | 0.013 **.00051** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 100 **328** | 0.012 **.00047** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 170 **558** | 0.020 **.00079** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 170 **558** | 0.020 **.00079** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 170 **558** | 0.022 **.00087** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 170 **558** | 0.022 **.00087** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 170 **558** | 0.022 **.00087** |
| | | 2.1020 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 170 **558** | 0.020 **.00079** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 100 **328** | 0.008 **.00032** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 100 **328** | 0.018 **.00071** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 100 **328** | 0.018 **.00071** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 100 **328** | 0.008 **.00032** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



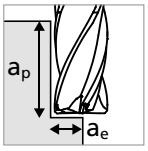

| Ød1 | 1/16" 1.5 mm \| .059" | | 3/32" 2.0 mm \| .079" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .157" | | 3/16" - 7/32" 5.0 mm \| .197" | | 1/4" 6.0 mm \| .236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 140<br>**459** | 0.026<br>**.00102** | 160<br>**525** | 0.038<br>**.00150** | 180<br>**591** | 0.048<br>**.00189** | 200<br>**656** | 0.050<br>**.00197** | 220<br>**722** | 0.052<br>**.00205** | 220<br>**722** | 0.056<br>**.00220** | 220<br>**722** | 0.068<br>**.00268** |
| | 140<br>**459** | 0.025<br>**.00098** | 160<br>**525** | 0.036<br>**.00142** | 180<br>**591** | 0.044<br>**.00173** | 200<br>**656** | 0.048<br>**.00189** | 220<br>**722** | 0.050<br>**.00197** | 220<br>**722** | 0.054<br>**.00213** | 220<br>**722** | 0.066<br>**.00260** |
| | 140<br>**459** | 0.022<br>**.00087** | 160<br>**525** | 0.035<br>**.00138** | 180<br>**591** | 0.042<br>**.00165** | 200<br>**656** | 0.043<br>**.00169** | 220<br>**722** | 0.045<br>**.00177** | 220<br>**722** | 0.048<br>**.00189** | 220<br>**722** | 0.058<br>**.00228** |
| | 140<br>**459** | 0.026<br>**.00102** | 160<br>**525** | 0.038<br>**.00150** | 180<br>**591** | 0.046<br>**.00181** | 200<br>**656** | 0.048<br>**.00189** | 220<br>**722** | 0.050<br>**.00197** | 220<br>**722** | 0.055<br>**.00217** | 260<br>**853** | 0.062<br>**.00244** |
| | 140<br>**459** | 0.025<br>**.00098** | 160<br>**525** | 0.036<br>**.00142** | 180<br>**591** | 0.044<br>**.00173** | 200<br>**656** | 0.046<br>**.00181** | 220<br>**722** | 0.048<br>**.00189** | 220<br>**722** | 0.052<br>**.00205** | 260<br>**853** | 0.060<br>**.00236** |
| | 140<br>**459** | 0.025<br>**.00098** | 160<br>**525** | 0.036<br>**.00142** | 180<br>**591** | 0.044<br>**.00173** | 200<br>**656** | 0.046<br>**.00181** | 220<br>**722** | 0.048<br>**.00189** | 220<br>**722** | 0.052<br>**.00205** | 260<br>**853** | 0.060<br>**.00236** |
| | 140<br>**459** | 0.016<br>**.00063** | 160<br>**525** | 0.034<br>**.00134** | 180<br>**591** | 0.042<br>**.00165** | 200<br>**656** | 0.044<br>**.00173** | 220<br>**722** | 0.046<br>**.00181** | 220<br>**722** | 0.049<br>**.00193** | 260<br>**853** | 0.058<br>**.00228** |
| | 120<br>**394** | 0.026<br>**.00102** | 140<br>**459** | 0.032<br>**.00126** | 160<br>**525** | 0.043<br>**.00169** | 180<br>**591** | 0.054<br>**.00213** | 200<br>**656** | 0.056<br>**.00220** | 200<br>**656** | 0.058<br>**.00228** | 200<br>**656** | **0.070**<br>**.00276** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00157** | 230<br>**755** | 0.060<br>**.00236** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00157** | 230<br>**755** | 0.060<br>**.00236** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00157** | 230<br>**755** | 0.060<br>**.00236** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00157** | 230<br>**755** | 0.060<br>**.00236** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00157** | 230<br>**755** | 0.060<br>**.00236** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00157** | 230<br>**755** | 0.060<br>**.00236** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 100<br>**328** | 0.010<br>**.00039** | 120<br>**394** | 0.012<br>**.00047** | 120<br>**394** | 0.016<br>**.00063** | 140<br>**459** | 0.018<br>**.00071** | 140<br>**459** | 0.020<br>**.00079** | 160<br>**525** | 0.022<br>**.00087** | 160<br>**525** | 0.024<br>**.00094** |
| | 100<br>**328** | 0.022<br>**.00087** | 120<br>**394** | 0.032<br>**.00126** | 120<br>**394** | 0.042<br>**.00165** | 140<br>**459** | 0.044<br>**.00173** | 140<br>**459** | 0.046<br>**.00181** | 160<br>**525** | 0.048<br>**.00189** | 160<br>**525** | 0.054<br>**.00213** |
| | 100<br>**328** | 0.022<br>**.00087** | 120<br>**394** | 0.032<br>**.00126** | 120<br>**394** | 0.042<br>**.00165** | 140<br>**459** | 0.044<br>**.00173** | 140<br>**459** | 0.046<br>**.00181** | 160<br>**525** | 0.048<br>**.00189** | 160<br>**525** | 0.054<br>**.00213** |
| | 100<br>**328** | 0.010<br>**.00039** | 120<br>**394** | 0.012<br>**.00047** | 120<br>**394** | 0.016<br>**.00063** | 140<br>**459** | 0.018<br>**.00071** | 140<br>**459** | 0.020<br>**.00079** | 160<br>**525** | 0.022<br>**.00087** | 160<br>**525** | 0.024<br>**.00094** |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

CRAZYMILL by Mikron Tool Cool

# Type C - Finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

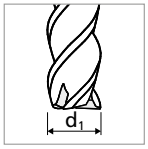
**Finishing**




$a_p = 2 \times d_1$

$a_e = 0.02 \times d_1$

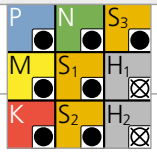





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 130 **425** | 0.008 **.00032** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 130 **425** | 0.007 **.00028** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 130 **425** | 0.006 **.00024** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 130 **425** | 0.008 **.00032** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 130 **425** | 0.008 **.00032** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 130 **425** | 0.008 **.00032** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 130 **425** | 0.006 **.00024** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 110 **361** | 0.006 **.00024** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 130 **425** | 0.009 **.00035** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 130 **425** | 0.009 **.00035** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 130 **425** | 0.010 **.00039** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 130 **425** | 0.010 **.00039** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 130 **425** | 0.010 **.00039** |
| | | 2.1020 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 130 **425** | 0.009 **.00035** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 110 **361** | 0.004 **.00016** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 110 **361** | 0.008 **.00032** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 110 **361** | 0.008 **.00032** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 110 **361** | 0.004 **.00016** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| Ød1 | 1/16" 1.5 mm \| .059" | | 3/32" 2.0 mm \| .079" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .157" | | 3/16" - 7/32" 5.0 mm \| .197" | | 1/4" 6.0 mm \| .236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 180<br>**591** | 0.012<br>**.00047** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.042<br>**.00165** |
| | 180<br>**591** | 0.011<br>**.00043** | 200<br>**656** | 0.016<br>**.00063** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**722** | 0.024<br>**.00094** | 220<br>**722** | 0.026<br>**.00102** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.038<br>**.00150** |
| | 180<br>**591** | 0.010<br>**.00039** | 200<br>**656** | 0.015<br>**.00059** | 210<br>**688** | 0.020<br>**.00079** | 220<br>**722** | 0.021<br>**.00083** | 220<br>**722** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** | 220<br>**722** | 0.034<br>**.00134** |
| | 180<br>**591** | 0.012<br>**.00047** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**722** | 0.024<br>**.00094** | 220<br>**722** | 0.026<br>**.00102** | 220<br>**722** | 0.029<br>**.00114** | 260<br>**853** | 0.036<br>**.00142** |
| | 180<br>**591** | 0.011<br>**.00043** | 200<br>**656** | 0.016<br>**.00063** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**722** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 260<br>**853** | 0.037<br>**.00146** |
| | 180<br>**591** | 0.011<br>**.00043** | 200<br>**656** | 0.016<br>**.00063** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**722** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 260<br>**853** | 0.037<br>**.00146** |
| | 180<br>**591** | 0.008<br>**.00032** | 200<br>**656** | 0.015<br>**.00059** | 210<br>**688** | 0.020<br>**.00079** | 220<br>**722** | 0.022<br>**.00087** | 220<br>**722** | 0.024<br>**.00094** | 220<br>**722** | 0.026<br>**.00102** | 260<br>**853** | 0.035<br>**.00138** |
| | 130<br>**427** | 0.012<br>**.00047** | 150<br>**492** | 0.014<br>**.00055** | 160<br>**525** | 0.022<br>**.00087** | 170<br>**558** | 0.025<br>**.00098** | 170<br>**558** | 0.029<br>**.00114** | 170<br>**558** | 0.031<br>**.00122** | 200<br>**656** | 0.040<br>**.00154** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 120<br>**394** | 0.005<br>**.00020** | 130<br>**427** | 0.005<br>**.00020** | 130<br>**427** | 0.008<br>**.00032** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.011<br>**.00043** | 150<br>**492** | 0.012<br>**.00047** | 160<br>**525** | 0.021<br>**.00083** |
| | 120<br>**394** | 0.010<br>**.00039** | 130<br>**427** | 0.014<br>**.00055** | 130<br>**427** | 0.020<br>**.00079** | 140<br>**459** | 0.022<br>**.00087** | 140<br>**459** | 0.024<br>**.00094** | 150<br>**492** | 0.026<br>**.00102** | 160<br>**525** | 0.035<br>**.00138** |
| | 120<br>**394** | 0.010<br>**.00039** | 130<br>**427** | 0.014<br>**.00055** | 130<br>**427** | 0.020<br>**.00079** | 140<br>**459** | 0.022<br>**.00087** | 140<br>**459** | 0.024<br>**.00094** | 150<br>**492** | 0.026<br>**.00102** | 160<br>**525** | 0.035<br>**.00138** |
| | 120<br>**394** | 0.005<br>**.00020** | 130<br>**427** | 0.005<br>**.00020** | 130<br>**427** | 0.008<br>**.00032** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.011<br>**.00043** | 150<br>**492** | 0.012<br>**.00047** | 160<br>**525** | 0.021<br>**.00083** |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

07

CRAZYMILL by Mikron Tool Cool

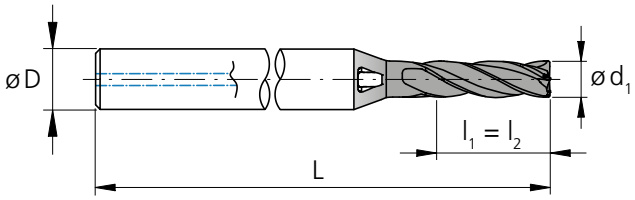
# Type M - 3 x d - Square / Corner radius - Z4

## MILLING WITH INTEGRATED COOLING

### Square



protection
phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | **.118** | 3.0 | 3.0 | 4 | **1.57** | 40 | 2.CMC42.M1Z4.100.1 | ■ |
| | **.047** | 1.2 | **.142** | 3.6 | 3.6 | 4 | **1.57** | 40 | 2.CMC42.M1Z4.120.1 | ■ |
| | **.059** | 1.5 | **.177** | 4.5 | 4.5 | 4 | **1.57** | 40 | 2.CMC42.M1Z4.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.185** | 4.7 | 4.7 | 4 | **1.57** | 40 | 2.CMC.SMZ4.F116 | ■ |
| | **.071** | 1.8 | **.213** | 5.4 | 5.4 | 4 | **1.57** | 40 | 2.CMC42.M1Z4.180.1 | ■ |
| | **.079** | 2.0 | **.236** | 6.0 | 6.0 | 4 | **1.57** | 40 | 2.CMC42.M1Z4.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.281** | 7.1 | 7.1 | 4 | **1.57** | 40 | 2.CMC.SMZ4.F332 | ■ |
| | **.098** | 2.5 | **.295** | 7.5 | 7.5 | 6 | **1.97** | 50 | 2.CMC42.M1Z4.250.1 | ■ |
| | **.118** | 3.0 | **.354** | 9.0 | 9.0 | 6 | **1.97** | 50 | 2.CMC42.M1Z4.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.375** | 9.5 | 9.5 | 6 | **2.17** | 55 | 2.CMC.SMZ4.F18 | ■ |
| | **.138** | 3.5 | **.413** | 10.5 | 10.5 | 6 | **2.17** | 55 | 2.CMC42.M1Z4.350.1 | ■ |
| **5/32** | **.1562** | 3.968 | **.469** | 11.9 | 11.9 | 6 | **2.17** | 55 | 2.CMC.SMZ4.F532 | ■ |
| | **.157** | 4.0 | **.472** | 12.0 | 12.0 | 6 | **2.17** | 55 | 2.CMC42.M1Z4.400.1 | ■ |
| | **.177** | 4.5 | **.531** | 13.5 | 13.5 | 8 | **2.56** | 65 | 2.CMC42.M1Z4.450.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.562** | 14.3 | 14.3 | 8 | **2.56** | 65 | 2.CMC.SMZ4.F316 | ■ |
| | **.197** | 5.0 | **.591** | 15.0 | 15.0 | 8 | **2.56** | 65 | 2.CMC42.M1Z4.500.1 | ■ |
| **7/32** | **.2189** | 5.560 | **.657** | 16.7 | 16.7 | 10 | **2.56** | 65 | 2.CMC.SMZ4.F732 | ■ |
| | **.236** | 6.0 | **.709** | 18.0 | 18.0 | 10 | **2.56** | 65 | 2.CMC42.M1Z4.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **.748** | 19.0 | 19.0 | 10 | **2.56** | 65 | 2.CMC.SMZ4.F14 | ■ |
| | **.315** | 8.0 | **.945** | 24.0 | 24.0 | 12 | **3.15** | 80 | 2.CMC42.M1Z4.800.1 | ■ |

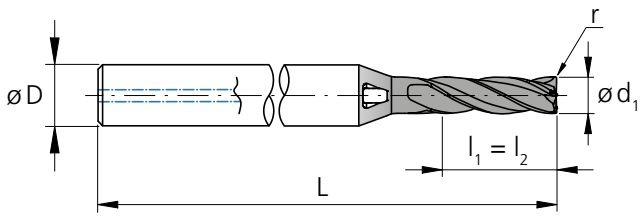
■ Stock item

Carbide | 3xd$_1$ | Z4 | 42° | eXedur SNP | $a_p$ | $a_e$

| Ø d$_1$ | .004" - .118" (0.1 - 3.0 mm) | | .122" - .236" (3.1 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | - .00055"<br>- .00110" | - 0.014 mm<br>- 0.028 mm | - .00079"<br>- .00150" | - 0.020 mm<br>- 0.038 mm | - .00098"<br>- .00185" | - 0.025 mm<br>- 0.047 mm |

## Corner radius






l$_1$ = Effective length
l$_2$ = Cutting length

| d$_1$ [inch] | d$_1$ [inch] | d$_1$ [mm] | l$_1$ [inch] | l$_1$ [mm] | l$_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .039 | 1.0 | .118 | 3.00 | 3.00 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.M2Z4.100.1 | ■ |
| | .039 | 1.0 | .118 | 3.00 | 3.00 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.M3Z4.100.1 | ■ |
| | .047 | 1.2 | .142 | 3.60 | 3.60 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.M2Z4.120.1 | ■ |
| | .047 | 1.2 | .142 | 3.60 | 3.60 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.M3Z4.120.1 | ■ |
| | .059 | 1.5 | .177 | 4.50 | 4.50 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.M2Z4.150.1 | ■ |
| | .059 | 1.5 | .177 | 4.50 | 4.50 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.M3Z4.150.1 | ■ |
| 1/16 | .0625 | 1.587 | .187 | 4.76 | 4.70 | 4 | 1.57 | 40 | .0050 | 0.127 | 2.CMC.RM2Z4.F116 | ■ |
| 1/16 | .0625 | 1.587 | .187 | 4.76 | 4.70 | 4 | 1.57 | 40 | .0100 | 0.254 | 2.CMC.RM3Z4.F116 | ■ |
| | .071 | 1.8 | .213 | 5.40 | 5.40 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.M2Z4.180.1 | ■ |
| | .071 | 1.8 | .213 | 5.40 | 5.40 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.M3Z4.180.1 | ■ |
| | .079 | 2.0 | .236 | 6.00 | 6.00 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.M2Z4.200.1 | ■ |
| | .079 | 2.0 | .236 | 6.00 | 6.00 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.M3Z4.200.1 | ■ |
| | .079 | 2.0 | .236 | 6.00 | 6.00 | 4 | 1.57 | 40 | .0197 | 0.50 | 2.CMC42.M4Z4.200.1 | ■ |
| 3/32 | .0937 | 2.381 | .281 | 7.14 | 7.14 | 4 | 1.57 | 40 | .0050 | 0.127 | 2.CMC.RM2Z4.F332 | ■ |
| 3/32 | .0937 | 2.381 | .281 | 7.14 | 7.14 | 4 | 1.57 | 40 | .0100 | 0.254 | 2.CMC.RM3Z4.F332 | ■ |
| 3/32 | .0937 | 2.381 | .281 | 7.14 | 7.14 | 4 | 1.57 | 40 | .0150 | 0.381 | 2.CMC.RM4Z4.F332 | ■ |
| | .098 | 2.5 | .295 | 7.50 | 7.50 | 6 | 1.97 | 50 | .0079 | 0.20 | 2.CMC42.M2Z4.250.1 | ■ |
| | .098 | 2.5 | .295 | 7.50 | 7.50 | 6 | 1.97 | 50 | .0197 | 0.50 | 2.CMC42.M3Z4.250.1 | ■ |
| | .118 | 3.0 | .354 | 9.00 | 9.00 | 6 | 1.97 | 50 | .0079 | 0.20 | 2.CMC42.M2Z4.300.1 | ■ |
| | .118 | 3.0 | .354 | 9.00 | 9.00 | 6 | 1.97 | 50 | .0197 | 0.50 | 2.CMC42.M3Z4.300.1 | ■ |
| 1/8 | .1250 | 3.175 | .375 | 9.53 | 9.53 | 6 | 2.17 | 55 | .0100 | 0.254 | 2.CMC.RM2Z4.F18 | ■ |
| 1/8 | .1250 | 3.175 | .375 | 9.53 | 9.53 | 6 | 2.17 | 55 | .0150 | 0.381 | 2.CMC.RM3Z4.F18 | ■ |
| | .138 | 3.5 | .413 | 10.50 | 10.50 | 6 | 2.17 | 55 | .0079 | 0.20 | 2.CMC42.M2Z4.350.1 | ■ |
| | .138 | 3.5 | .413 | 10.50 | 10.50 | 6 | 2.17 | 55 | .0197 | 0.50 | 2.CMC42.M3Z4.350.1 | ■ |
| 5/32 | .1562 | 3.968 | .469 | 11.90 | 11.90 | 6 | 2.17 | 55 | .0100 | 0.254 | 2.CMC.RM2Z4.F532 | ■ |
| 5/32 | .1562 | 3.968 | .469 | 11.90 | 11.90 | 6 | 2.17 | 55 | .0150 | 0.381 | 2.CMC.RM3Z4.F532 | ■ |
| | .157 | 4.0 | .472 | 12.00 | 12.00 | 6 | 2.17 | 55 | .0079 | 0.20 | 2.CMC42.M2Z4.400.1 | ■ |
| | .157 | 4.0 | .472 | 12.00 | 12.00 | 6 | 2.17 | 55 | .0197 | 0.50 | 2.CMC42.M3Z4.400.1 | ■ |
| | .177 | 4.5 | .531 | 13.50 | 13.50 | 8 | 2.56 | 65 | .0079 | 0.20 | 2.CMC42.M2Z4.450.1 | ■ |
| | .177 | 4.5 | .531 | 13.50 | 13.50 | 8 | 2.56 | 65 | .0197 | 0.50 | 2.CMC42.M3Z4.450.1 | ■ |
| 3/16 | .1875 | 4.762 | .563 | 14.29 | 14.29 | 8 | 2.56 | 65 | .0100 | 0.254 | 2.CMC.RM2Z4.F316 | ■ |
| 3/16 | .1875 | 4.762 | .563 | 14.29 | 14.29 | 8 | 2.56 | 65 | .0150 | 0.381 | 2.CMC.RM3Z4.F316 | ■ |
| | .197 | 5.0 | .591 | 15.00 | 15.00 | 8 | 2.56 | 65 | .0079 | 0.20 | 2.CMC42.M2Z4.500.1 | ■ |
| | .197 | 5.0 | .591 | 15.00 | 15.00 | 8 | 2.56 | 65 | .0197 | 0.50 | 2.CMC42.M3Z4.500.1 | ■ |
| 7/32 | .2189 | 5.560 | .657 | 16.68 | 16.68 | 10 | 2.56 | 65 | .0150 | 0.381 | 2.CMC.RM2Z4.F732 | ■ |
| 7/32 | .2189 | 5.560 | .657 | 16.68 | 16.68 | 10 | 2.56 | 65 | .0300 | 0.762 | 2.CMC.RM3Z4.F732 | ■ |
| | .236 | 6.0 | .709 | 18.00 | 18.00 | 10 | 2.56 | 65 | .0079 | 0.20 | 2.CMC42.M2Z4.600.1 | ■ |
| | .236 | 6.0 | .709 | 18.00 | 18.00 | 10 | 2.56 | 65 | .0197 | 0.50 | 2.CMC42.M3Z4.600.1 | ■ |
| | .236 | 6.0 | .709 | 18.00 | 18.00 | 10 | 2.56 | 65 | .0394 | 1.00 | 2.CMC42.M4Z4.600.1 | ■ |
| 1/4 | .2500 | 6.350 | .750 | 19.05 | 19.00 | 10 | 2.56 | 65 | .0150 | 0.381 | 2.CMC.RM2Z4.F14 | ■ |
| 1/4 | .2500 | 6.350 | .750 | 19.05 | 19.00 | 10 | 2.56 | 65 | .0300 | 0.762 | 2.CMC.RM3Z4.F14 | ■ |
| 1/4 | .2500 | 6.350 | .750 | 19.05 | 19.00 | 10 | 2.56 | 65 | .0600 | 1.524 | 2.CMC.RM4Z4.F14 | ■ |
| | .315 | 8.0 | .945 | 24.00 | 24.00 | 12 | 3.15 | 80 | .0079 | 0.20 | 2.CMC42.M2Z4.800.1 | ■ |
| | .315 | 8.0 | .945 | 24.00 | 24.00 | 12 | 3.15 | 80 | .0197 | 0.50 | 2.CMC42.M3Z4.800.1 | ■ |
| | .315 | 8.0 | .945 | 24.00 | 24.00 | 12 | 3.15 | 80 | .0591 | 1.50 | 2.CMC42.M4Z4.800.1 | ■ |

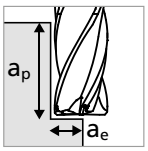
■ Stock item

CRAZYMILL by Mikron Tool Cool

# Type M - Pre-machining

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

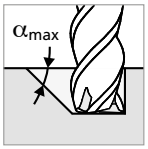
**Pre-machining**




①
- $a_p = 1.5 \times d_1$
- $a_e = 0.2 \times d_1$

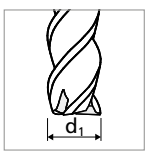
②
- $a_p = 3 \times d_1$
- $a_e = 0.1 \times d_1$

③
- $a_p = 3 \times d_1$
- $a_e = 0.05 \times d_1$




**Note:**
In case of linear ramp or helical interpolation milling reduce $f_z$ by 35%

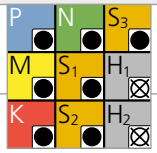





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ ① | 1.0 mm \| .039" $f_z$ ② | 1.0 mm \| .039" $f_z$ ③ | 1/16" 1.5 mm \| .059" $v_c$ | 1/16" 1.5 mm \| .059" $f_z$ ① | 1/16" 1.5 mm \| .059" $f_z$ ② | 1/16" 1.5 mm \| .059" $f_z$ ③ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 / **459** | 0.011 / **.00043** | 0.015 / **.00059** | 0.020 / **.00079** | 200 / **656** | 0.015 / **.00059** | 0.020 / **.00079** | 0.028 / **.00110** |
| | | 1.0401 | C15 | AISI 1015 | | | | | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 / **459** | 0.010 / **.00039** | 0.013 / **.00051** | 0.018 / **.00071** | 200 / **656** | 0.013 / **.00051** | 0.017 / **.00067** | 0.024 / **.00094** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 / **459** | 0.008 / **.00032** | 0.011 / **.00043** | 0.015 / **.00059** | 200 / **656** | 0.011 / **.00043** | 0.015 / **.00059** | 0.020 / **.00079** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 / **459** | 0.012 / **.00047** | 0.016 / **.00063** | 0.022 / **.00087** | 180 / **591** | 0.015 / **.00059** | 0.020 / **.00079** | 0.028 / **.00110** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 / **459** | 0.011 / **.00043** | 0.015 / **.00059** | 0.020 / **.00079** | 180 / **591** | 0.014 / **.00055** | 0.019 / **.00075** | 0.026 / **.00102** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 / **459** | 0.011 / **.00043** | 0.015 / **.00059** | 0.020 / **.00079** | 180 / **591** | 0.014 / **.00055** | 0.019 / **.00075** | 0.026 / **.00102** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 / **459** | 0.009 / **.00035** | 0.012 / **.00047** | 0.017 / **.00067** | 180 / **591** | 0.012 / **.00047** | 0.016 / **.00063** | 0.022 / **.00087** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 / **394** | 0.008 / **.00032** | 0.016 / **.00063** | 0.022 / **.00087** | 160 / **525** | 0.014 / **.00055** | 0.019 / **.00075** | 0.026 / **.00102** |
| | | 0.6030 | GG30 | ASTM 40B | | | | | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 160 / **525** | 0.013 / **.00051** | 0.017 / **.00067** | 0.024 / **.00094** | 200 / **656** | 0.016 / **.00063** | 0.021 / **.00083** | 0.029 / **.00114** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 160 / **525** | 0.013 / **.00051** | 0.017 / **.00067** | 0.024 / **.00094** | 220 / **722** | 0.016 / **.00063** | 0.021 / **.00083** | 0.029 / **.00114** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 160 / **525** | 0.013 / **.00051** | 0.017 / **.00067** | 0.024 / **.00094** | 220 / **722** | 0.016 / **.00063** | 0.021 / **.00083** | 0.029 / **.00114** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 160 / **525** | 0.013 / **.00051** | 0.017 / **.00067** | 0.024 / **.00094** | 220 / **722** | 0.016 / **.00063** | 0.021 / **.00083** | 0.029 / **.00114** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3/CW614N | UNS C38500 | 160 / **525** | 0.013 / **.00051** | 0.017 / **.00067** | 0.024 / **.00094** | 220 / **722** | 0.016 / **.00063** | 0.021 / **.00083** | 0.029 / **.00114** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 160 / **525** | 0.013 / **.00051** | 0.017 / **.00067** | 0.024 / **.00094** | 220 / **722** | 0.016 / **.00063** | 0.021 / **.00083** | 0.029 / **.00114** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 80 / **262** | 0.006 / **.00024** | 0.008 / **.00032** | 0.011 / **.00043** | 100 / **328** | 0.008 / **.00032** | 0.011 / **.00043** | 0.015 / **.00059** |
| | | 2.4668 | | Inconel 718 | | | | | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 / **394** | 0.010 / **.00039** | 0.013 / **.00051** | 0.018 / **.00071** | 120 / **394** | 0.012 / **.00047** | 0.016 / **.00063** | 0.022 / **.00087** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 / **394** | 0.010 / **.00039** | 0.013 / **.00051** | 0.018 / **.00071** | 120 / **394** | 0.012 / **.00047** | 0.016 / **.00063** | 0.022 / **.00087** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 80 / **262** | 0.006 / **.00024** | 0.008 / **.00032** | 0.011 / **.00043** | 100 / **328** | 0.008 / **.00032** | 0.011 / **.00043** | 0.015 / **.00059** |
| | | | CrCoMo28 | ASTM F1537 | | | | | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





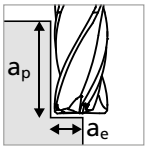

| Ød1 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **3/32"** 2.0 mm \| **.079"** | | | | **1/8"** 3.0 mm \| **.118"** | | | | **5/32"** 4.0 mm \| **.157"** | | | | **3/16" - 7/32"** 5.0 mm \| **.197"** | | | | **1/4"** 6.0 mm \| **.236"** | | | | 8.0 mm \| **.315"** | | | |
| | | ① | ② | ③ | | ① | ② | ③ | | ① | ② | ③ | | ① | ② | ③ | | ① | ② | ③ | | ① | ② | ③ |
| | $v_c$ | $f_z$ | | | $v_c$ | $f_z$ | | | $v_c$ | $f_z$ | | | $v_c$ | $f_z$ | | | $v_c$ | $f_z$ | | | $v_c$ | $f_z$ | | |
| | 220 | 0.024 | 0.032 | 0.044 | 240 | 0.033 | 0.044 | 0.061 | 260 | 0.034 | 0.045 | 0.062 | 260 | 0.035 | 0.047 | 0.064 | 260 | 0.046 | **0.061** | **0.084** | 260 | 0.054 | 0.072 | 0.100 |
| | **722** | **.00094** | **.00126** | **.00173** | **787** | **.00130** | **.00173** | **.00240** | **853** | **.00134** | **.00177** | **.00244** | **853** | **.00138** | **.00185** | **.00252** | **853** | **.00181** | **.00240** | **.00331** | **853** | **.00213** | **.00283** | **.00394** |
| | 220 | 0.022 | 0.029 | 0.040 | 240 | 0.031 | 0.041 | 0.057 | 260 | 0.032 | 0.043 | 0.059 | 260 | 0.033 | 0.044 | 0.061 | 260 | 0.044 | **0.059** | **0.081** | 260 | 0.052 | 0.069 | 0.095 |
| | **722** | **.00087** | **.00114** | **.00157** | **787** | **.00122** | **.00161** | **.00224** | **853** | **.00126** | **.00169** | **.00232** | **853** | **.00130** | **.00173** | **.00240** | **853** | **.00173** | **.00232** | **.00319** | **853** | **.00205** | **.00272** | **.00374** |
| | 220 | 0.019 | 0.025 | 0.035 | 240 | 0.028 | 0.037 | 0.051 | 260 | 0.029 | 0.039 | 0.053 | 260 | 0.030 | 0.040 | 0.055 | 260 | 0.042 | 0.056 | 0.077 | 260 | 0.050 | 0.067 | 0.092 |
| | **722** | **.00075** | **.00098** | **.00138** | **787** | **.00110** | **.00146** | **.00201** | **853** | **.00114** | **.00154** | **.00209** | **853** | **.00118** | **.00157** | **.00217** | **853** | **.00165** | **.00220** | **.00303** | **853** | **.00197** | **.00264** | **.00362** |
| | 180 | 0.021 | 0.028 | 0.039 | 200 | 0.030 | 0.040 | 0.055 | 220 | 0.032 | 0.043 | 0.059 | 220 | 0.033 | 0.044 | 0.061 | 220 | 0.040 | 0.053 | 0.073 | 260 | 0.048 | 0.064 | 0.088 |
| | **591** | **.00083** | **.00110** | **.00154** | **656** | **.00118** | **.00157** | **.00217** | **722** | **.00126** | **.00169** | **.00232** | **722** | **.00130** | **.00173** | **.00240** | **722** | **.00157** | **.00209** | **.00287** | **853** | **.00189** | **.00252** | **.00346** |
| | 180 | 0.020 | 0.027 | 0.037 | 200 | 0.028 | 0.037 | 0.051 | 220 | 0.031 | 0.041 | 0.057 | 220 | 0.032 | 0.043 | 0.059 | 220 | 0.037 | 0.049 | 0.068 | 260 | 0.045 | 0.060 | 0.083 |
| | **591** | **.00079** | **.00106** | **.00146** | **656** | **.00110** | **.00146** | **.00201** | **722** | **.00122** | **.00161** | **.00224** | **722** | **.00126** | **.00169** | **.00232** | **722** | **.00145** | **.00193** | **.00268** | **853** | **.00177** | **.00236** | **.00327** |
| | 180 | 0.020 | 0.027 | 0.037 | 200 | 0.028 | 0.037 | 0.051 | 220 | 0.031 | 0.041 | 0.057 | 220 | 0.032 | 0.043 | 0.059 | 220 | 0.037 | 0.049 | 0.068 | 260 | 0.045 | 0.060 | 0.083 |
| | **591** | **.00079** | **.00106** | **.00146** | **656** | **.00110** | **.00146** | **.00201** | **722** | **.00122** | **.00161** | **.00224** | **722** | **.00126** | **.00169** | **.00232** | **722** | **.00145** | **.00193** | **.00268** | **853** | **.00177** | **.00236** | **.00327** |
| | 180 | 0.018 | 0.024 | 0.034 | 200 | 0.026 | 0.035 | 0.048 | 220 | 0.030 | 0.040 | 0.055 | 220 | 0.031 | 0.041 | 0.057 | 220 | 0.035 | 0.047 | 0.064 | 260 | 0.042 | 0.056 | 0.077 |
| | **591** | **.00071** | **.00094** | **.00134** | **656** | **.00102** | **.00138** | **.00189** | **722** | **.00118** | **.00157** | **.00217** | **722** | **.00122** | **.00161** | **.00224** | **722** | **.00139** | **.00185** | **.00252** | **853** | **.00165** | **.00220** | **.00303** |
| | 200 | 0.024 | 0.032 | 0.044 | 220 | 0.032 | 0.043 | 0.059 | 240 | 0.038 | 0.051 | 0.070 | 240 | 0.042 | 0.056 | 0.077 | 240 | 0.044 | 0.059 | 0.081 | 240 | 0.052 | 0.069 | 0.095 |
| | **656** | **.00094** | **.00126** | **.00173** | **722** | **.00126** | **.00169** | **.00232** | **787** | **.00150** | **.00201** | **.00276** | **787** | **.00165** | **.00220** | **.00303** | **787** | **.00173** | **.00232** | **.00319** | **787** | **.00205** | **.00272** | **.00374** |
| | 240 | 0.026 | 0.035 | 0.048 | 260 | 0.040 | 0.053 | 0.073 | 300 | 0.048 | 0.064 | 0.088 | 300 | 0.051 | 0.068 | 0.094 | 320 | 0.052 | 0.069 | 0.095 | 350 | 0.060 | 0.080 | 0.110 |
| | **787** | **.00102** | **.00138** | **.00189** | **853** | **.00157** | **.00209** | **.00287** | **984** | **.00189** | **.00252** | **.00346** | **984** | **.00201** | **.00268** | **.00370** | **1050** | **.00205** | **.00272** | **.00374** | **1148** | **.00236** | **.00315** | **.00433** |
| | 240 | 0.026 | 0.035 | 0.048 | 260 | 0.040 | 0.053 | 0.073 | 300 | 0.048 | 0.064 | 0.088 | 300 | 0.051 | 0.068 | 0.094 | 320 | 0.052 | 0.069 | 0.095 | 350 | 0.060 | 0.080 | 0.110 |
| | **787** | **.00102** | **.00138** | **.00189** | **853** | **.00157** | **.00209** | **.00287** | **984** | **.00189** | **.00252** | **.00346** | **984** | **.00201** | **.00268** | **.00370** | **1050** | **.00205** | **.00272** | **.00374** | **1148** | **.00236** | **.00315** | **.00433** |
| | 240 | 0.026 | 0.035 | 0.048 | 260 | 0.040 | 0.053 | 0.073 | 300 | 0.048 | 0.064 | 0.088 | 300 | 0.051 | 0.068 | 0.094 | 320 | 0.052 | 0.069 | 0.095 | 350 | 0.060 | 0.080 | 0.110 |
| | **787** | **.00102** | **.00138** | **.00189** | **853** | **.00157** | **.00209** | **.00287** | **984** | **.00189** | **.00252** | **.00346** | **984** | **.00201** | **.00268** | **.00370** | **1050** | **.00205** | **.00272** | **.00374** | **1148** | **.00236** | **.00315** | **.00433** |
| | 240 | 0.026 | 0.035 | 0.048 | 260 | 0.040 | 0.053 | 0.073 | 300 | 0.048 | 0.064 | 0.088 | 300 | 0.051 | 0.068 | 0.094 | 320 | 0.052 | 0.069 | 0.095 | 350 | 0.060 | 0.080 | 0.110 |
| | **787** | **.00102** | **.00138** | **.00189** | **853** | **.00157** | **.00209** | **.00287** | **984** | **.00189** | **.00252** | **.00346** | **984** | **.00201** | **.00268** | **.00370** | **1050** | **.00205** | **.00272** | **.00374** | **1148** | **.00236** | **.00315** | **.00433** |
| | 240 | 0.026 | 0.035 | 0.048 | 260 | 0.040 | 0.053 | 0.073 | 300 | 0.048 | 0.064 | 0.088 | 300 | 0.051 | 0.068 | 0.094 | 320 | 0.052 | 0.069 | 0.095 | 350 | 0.060 | 0.080 | 0.110 |
| | **787** | **.00102** | **.00138** | **.00189** | **853** | **.00157** | **.00209** | **.00287** | **984** | **.00189** | **.00252** | **.00346** | **984** | **.00201** | **.00268** | **.00370** | **1050** | **.00205** | **.00272** | **.00374** | **1148** | **.00236** | **.00315** | **.00433** |
| | 100 | 0.010 | 0.013 | 0.018 | 100 | 0.014 | 0.019 | 0.026 | 120 | 0.016 | 0.021 | 0.029 | 120 | 0.018 | 0.024 | 0.033 | 120 | 0.020 | 0.027 | 0.037 | 120 | 0.025 | 0.033 | 0.046 |
| | **328** | **.00039** | **.00051** | **.00071** | **328** | **.00055** | **.00075** | **.00102** | **394** | **.00063** | **.00083** | **.00114** | **394** | **.00071** | **.00094** | **.00130** | **394** | **.00079** | **.00106** | **.00146** | **394** | **.00098** | **.00130** | **.00181** |
| | 130 | 0.017 | 0.023 | 0.031 | 130 | 0.028 | 0.037 | 0.051 | 150 | 0.030 | 0.040 | 0.055 | 150 | 0.031 | 0.041 | 0.057 | 150 | 0.032 | 0.043 | 0.059 | 170 | 0.035 | 0.047 | 0.064 |
| | **427** | **.00067** | **.00091** | **.00122** | **427** | **.00110** | **.00146** | **.00201** | **492** | **.00118** | **.00157** | **.00217** | **492** | **.00122** | **.00161** | **.00224** | **492** | **.00126** | **.00169** | **.00232** | **558** | **.00138** | **.00185** | **.00252** |
| | 130 | 0.017 | 0.023 | 0.031 | 130 | 0.028 | 0.037 | 0.051 | 150 | 0.030 | 0.040 | 0.055 | 150 | 0.031 | 0.041 | 0.057 | 150 | 0.032 | 0.043 | 0.059 | 170 | 0.035 | 0.047 | 0.064 |
| | **427** | **.00067** | **.00091** | **.00122** | **427** | **.00110** | **.00146** | **.00201** | **492** | **.00118** | **.00157** | **.00217** | **492** | **.00122** | **.00161** | **.00224** | **492** | **.00126** | **.00169** | **.00232** | **558** | **.00138** | **.00185** | **.00252** |
| | 100 | 0.010 | 0.013 | 0.018 | 100 | 0.014 | 0.019 | 0.026 | 120 | 0.016 | 0.021 | 0.029 | 120 | 0.018 | 0.024 | 0.033 | 120 | 0.020 | 0.027 | 0.037 | 120 | 0.025 | 0.033 | 0.046 |
| | **328** | **.00039** | **.00051** | **.00071** | **328** | **.00055** | **.00075** | **.00102** | **394** | **.00063** | **.00083** | **.00114** | **394** | **.00071** | **.00094** | **.00130** | **394** | **.00079** | **.00106** | **.00146** | **394** | **.00098** | **.00130** | **.00181** |

CRAZYMILL by Mikron Tool Cool

# Type M - Finishing

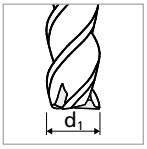
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Finishing**




- $a_p = 3 \times d_1$
- $a_e = 0.02 \times d_1$

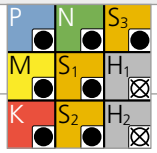





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 130 **425** | 0.009 **.00035** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 130 **425** | 0.008 **.00031** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 130 **425** | 0.007 **.00028** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 130 **425** | 0.009 **.00035** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 130 **425** | 0.009 **.00035** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 130 **425** | 0.009 **.00035** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 130 **425** | 0.007 **.00028** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 110 **361** | 0.007 **.00028** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 130 **425** | 0.010 **.00039** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 130 **425** | 0.010 **.00039** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 130 **425** | 0.012 **.00047** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 130 **425** | 0.012 **.00047** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 130 **425** | 0.012 **.00047** |
| | | 2.1020 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 130 **425** | 0.010 **.00039** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 110 **361** | 0.005 **.00020** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 110 **361** | 0.009 **.00035** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 110 **361** | 0.009 **.00035** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 110 **361** | 0.005 **.00020** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| Ød1 | 1/16" 1.5 mm \| .059" | | 3/32" 2.0 mm \| .079" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .157" | | 3/16" - 7/32" 5.0 mm \| .197" | | 1/4" 6.0 mm \| .236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.026<br>**.00102** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.044<br>**.00173** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.040<br>**.00157** |
| | 180<br>**591** | 0.012<br>**.00047** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.023<br>**.00091** | 220<br>**722** | 0.024<br>**.00094** | 220<br>**722** | 0.026<br>**.00102** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.035<br>**.00138** |
| | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 260<br>**853** | 0.040<br>**.00157** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.025<br>**.00098** | 220<br>**722** | 0.027<br>**.00106** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.032<br>**.00126** | 260<br>**853** | 0.038<br>**.00150** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.025<br>**.00098** | 220<br>**722** | 0.027<br>**.00106** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.032<br>**.00126** | 260<br>**853** | 0.038<br>**.00150** |
| | 180<br>**591** | 0.009<br>**.00035** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 220<br>**722** | 0.030<br>**.00118** | 260<br>**853** | 0.037<br>**.00146** |
| | 130<br>**427** | 0.014<br>**.00055** | 150<br>**492** | 0.016<br>**.00063** | 160<br>**525** | 0.025<br>**.00098** | 170<br>**558** | 0.029<br>**.00114** | 170<br>**558** | 0.033<br>**.00130** | 170<br>**558** | 0.036<br>**.00142** | 200<br>**656** | 0.042<br>**.00165** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 120<br>**394** | 0.006<br>**.00024** | 130<br>**427** | 0.006<br>**.00024** | 130<br>**427** | 0.009<br>**.00035** | 140<br>**459** | 0.012<br>**.00047** | 140<br>**459** | 0.013<br>**.00051** | 150<br>**492** | 0.014<br>**.00055** | 160<br>**525** | 0.020<br>**.00079** |
| | 120<br>**394** | 0.012<br>**.00047** | 130<br>**427** | 0.016<br>**.00063** | 130<br>**427** | 0.023<br>**.00091** | 140<br>**459** | 0.025<br>**.00098** | 140<br>**459** | 0.028<br>**.00110** | 150<br>**492** | 0.030<br>**.00118** | 160<br>**525** | 0.036<br>**.00142** |
| | 120<br>**394** | 0.012<br>**.00047** | 130<br>**427** | 0.016<br>**.00063** | 130<br>**427** | 0.023<br>**.00091** | 140<br>**459** | 0.025<br>**.00098** | 140<br>**459** | 0.028<br>**.00110** | 150<br>**492** | 0.030<br>**.00118** | 160<br>**525** | 0.036<br>**.00142** |
| | 120<br>**394** | 0.006<br>**.00024** | 130<br>**427** | 0.006<br>**.00024** | 130<br>**427** | 0.009<br>**.00035** | 140<br>**459** | 0.012<br>**.00047** | 140<br>**459** | 0.013<br>**.00051** | 150<br>**492** | 0.014<br>**.00055** | 160<br>**525** | 0.020<br>**.00079** |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

CRAZYMILL by Mikron Tool Cool

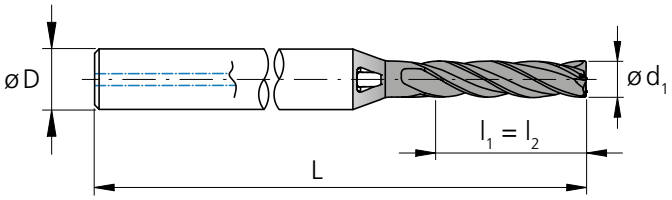
# Type N - 4 x d - Square / Corner radius - Z4

## MILLING WITH INTEGRATED COOLING

### Square



protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | **.157** | 4.0 | 4.0 | 4 | **1.57** | 40 | 2.CMC42.N1Z4.100.1 | ■ |
| | **.047** | 1.2 | **.189** | 4.8 | 4.8 | 4 | **1.57** | 40 | 2.CMC42.N1Z4.120.1 | ■ |
| | **.059** | 1.5 | **.236** | 6.0 | 6.0 | 4 | **1.57** | 40 | 2.CMC42.N1Z4.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.250** | 6.3 | 6.3 | 4 | **1.77** | 45 | 2.CMC.SNZ4.F116 | ■ |
| | **.071** | 1.8 | **.283** | 7.2 | 7.2 | 4 | **1.77** | 45 | 2.CMC42.N1Z4.180.1 | ■ |
| | **.079** | 2.0 | **.315** | 8.0 | 8.0 | 4 | **1.73** | 44 | 2.CMC42.N1Z4.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.375** | 9.5 | 9.5 | 4 | **1.73** | 44 | 2.CMC.SNZ4.F332 | ■ |
| | **.098** | 2.5 | **.394** | 10.0 | 10.0 | 6 | **2.17** | 55 | 2.CMC42.N1Z4.250.1 | ■ |
| | **.118** | 3.0 | **.472** | 12.0 | 12.0 | 6 | **2.17** | 55 | 2.CMC42.N1Z4.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.500** | 12.7 | 12.7 | 6 | **2.36** | 60 | 2.CMC.SNZ4.F18 | ■ |
| | **.138** | 3.5 | **.551** | 14.0 | 14.0 | 6 | **2.36** | 60 | 2.CMC42.N1Z4.350.1 | ■ |
| **5/32** | **.1562** | 3.968 | **.625** | 15.9 | 15.9 | 6 | **2.36** | 60 | 2.CMC.SNZ4.F532 | ■ |
| | **.157** | 4.0 | **.630** | 16.0 | 16.0 | 6 | **2.36** | 60 | 2.CMC42.N1Z4.400.1 | ■ |
| | **.177** | 4.5 | **.709** | 18.0 | 18.0 | 8 | **2.76** | 70 | 2.CMC42.N1Z4.450.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.750** | 19.0 | 19.0 | 8 | **2.76** | 70 | 2.CMC.SNZ4.F316 | ■ |
| | **.197** | 5.0 | **.787** | 20.0 | 20.0 | 8 | **2.76** | 70 | 2.CMC42.N1Z4.500.1 | ■ |
| **7/32** | **.2189** | 5.560 | **.876** | 22.2 | 22.2 | 10 | **2.76** | 70 | 2.CMC.SNZ4.F732 | ■ |
| | **.236** | 6.0 | **.945** | 24.0 | 24.0 | 10 | **2.76** | 70 | 2.CMC42.N1Z4.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **1.00** | 25.4 | 25.4 | 10 | **2.76** | 70 | 2.CMC.SNZ4.F14 | ■ |
| | **.315** | 8.0 | **1.26** | 32.0 | 32.0 | 12 | **3.54** | 90 | 2.CMC42.N1Z4.800.1 | ■ |

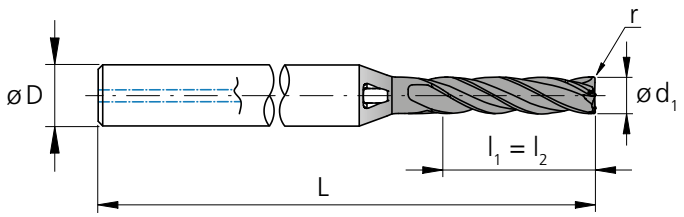
■ Stock item

Carbide | 4xd1 | Z4 | 42° | eXedur SNP | ap | ae

| Ø d1 | .004" - .118" (0.1 - 3.0 mm) | | .122" - .236" (3.1 - 6.0 mm) | | .240" - .394" (6.1 - 10.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | - .00055"<br>- .00110" | - 0.014 mm<br>- 0.028 mm | - .00079"<br>- .00150" | - 0.020 mm<br>- 0.038 mm | - .00098"<br>- .00185" | - 0.025 mm<br>- 0.047 mm |

## Corner radius






l1 = Effective length
l2 = Cutting length

| d1 [inch] | d1 [inch] | d1 [mm] | l1 [inch] | l1 [mm] | l2 [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .039 | 1.0 | .157 | 4.0 | 4.0 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.N2Z4.100.1 | ■ |
| | .039 | 1.0 | .157 | 4.0 | 4.0 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.N3Z4.100.1 | ■ |
| | .047 | 1.2 | .189 | 4.8 | 4.8 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.N2Z4.120.1 | ■ |
| | .047 | 1.2 | .189 | 4.8 | 4.8 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.N3Z4.120.1 | ■ |
| | .059 | 1.5 | .236 | 6.0 | 6.0 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.N2Z4.150.1 | ■ |
| | .059 | 1.5 | .236 | 6.0 | 6.0 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.N3Z4.150.1 | ■ |
| 1/16 | .0625 | 1.587 | .250 | 6.3 | 6.3 | 4 | 1.77 | 45 | .0050 | 0.127 | 2.CMC.RN2Z4.F116 | ■ |
| 1/16 | .0625 | 1.587 | .250 | 6.3 | 6.3 | 4 | 1.77 | 45 | .0100 | 0.254 | 2.CMC.RN3Z4.F116 | ■ |
| | .071 | 1.8 | .283 | 7.2 | 7.2 | 4 | 1.77 | 45 | .0039 | 0.10 | 2.CMC42.N2Z4.180.1 | ■ |
| | .071 | 1.8 | .283 | 7.2 | 7.2 | 4 | 1.77 | 45 | .0118 | 0.30 | 2.CMC42.N3Z4.180.1 | ■ |
| | .079 | 2.0 | .315 | 8.0 | 8.0 | 4 | 1.73 | 44 | .0039 | 0.10 | 2.CMC42.N2Z4.200.1 | ■ |
| | .079 | 2.0 | .315 | 8.0 | 8.0 | 4 | 1.73 | 44 | .0079 | 0.20 | 2.CMC42.N3Z4.200.1 | ■ |
| | .079 | 2.0 | .315 | 8.0 | 8.0 | 4 | 1.73 | 44 | .0197 | 0.50 | 2.CMC42.N4Z4.200.1 | ■ |
| 3/32 | .0937 | 2.381 | .375 | 9.5 | 9.5 | 4 | 1.73 | 44 | .0050 | 0.127 | 2.CMC.RN2Z4.F332 | ■ |
| 3/32 | .0937 | 2.381 | .375 | 9.5 | 9.5 | 4 | 1.73 | 44 | .0100 | 0.254 | 2.CMC.RN3Z4.F332 | ■ |
| 3/32 | .0937 | 2.381 | .375 | 9.5 | 9.5 | 4 | 1.73 | 44 | .0150 | 0.381 | 2.CMC.RN4Z4.F332 | ■ |
| | .098 | 2.5 | .394 | 10.0 | 10.0 | 6 | 2.17 | 55 | .0079 | 0.20 | 2.CMC42.N2Z4.250.1 | ■ |
| | .098 | 2.5 | .394 | 10.0 | 10.0 | 6 | 2.17 | 55 | .0197 | 0.50 | 2.CMC42.N3Z4.250.1 | ■ |
| | .118 | 3.0 | .472 | 12.0 | 12.0 | 6 | 2.17 | 55 | .0079 | 0.20 | 2.CMC42.N2Z4.300.1 | ■ |
| | .118 | 3.0 | .472 | 12.0 | 12.0 | 6 | 2.17 | 55 | .0197 | 0.50 | 2.CMC42.N3Z4.300.1 | ■ |
| 1/8 | .1250 | 3.175 | .500 | 12.7 | 12.7 | 6 | 2.36 | 60 | .0100 | 0.254 | 2.CMC.RN2Z4.F18 | ■ |
| 1/8 | .1250 | 3.175 | .500 | 12.7 | 12.7 | 6 | 2.36 | 60 | .0150 | 0.381 | 2.CMC.RN3Z4.F18 | ■ |
| | .138 | 3.5 | .551 | 14.0 | 14.0 | 6 | 2.36 | 60 | .0079 | 0.20 | 2.CMC42.N2Z4.350.1 | ■ |
| | .138 | 3.5 | .551 | 14.0 | 14.0 | 6 | 2.36 | 60 | .0197 | 0.50 | 2.CMC42.N3Z4.350.1 | ■ |
| 5/32 | .1562 | 3.968 | .625 | 15.9 | 15.9 | 6 | 2.36 | 60 | .0100 | 0.254 | 2.CMC.RN2Z4.F532 | ■ |
| 5/32 | .1562 | 3.968 | .625 | 15.9 | 15.9 | 6 | 2.36 | 60 | .0150 | 0.381 | 2.CMC.RN3Z4.F532 | ■ |
| | .157 | 4.0 | .630 | 16.0 | 16.0 | 6 | 2.36 | 60 | .0079 | 0.20 | 2.CMC42.N2Z4.400.1 | ■ |
| | .157 | 4.0 | .630 | 16.0 | 16.0 | 6 | 2.36 | 60 | .0197 | 0.50 | 2.CMC42.N3Z4.400.1 | ■ |
| | .177 | 4.5 | .709 | 18.0 | 18.0 | 8 | 2.76 | 70 | .0079 | 0.20 | 2.CMC42.N2Z4.450.1 | ■ |
| | .177 | 4.5 | .709 | 18.0 | 18.0 | 8 | 2.76 | 70 | .0197 | 0.50 | 2.CMC42.N3Z4.450.1 | ■ |
| 3/16 | .1875 | 4.762 | .750 | 19.0 | 19.0 | 8 | 2.76 | 70 | .0100 | 0.254 | 2.CMC.RN2Z4.F316 | ■ |
| 3/16 | .1875 | 4.762 | .750 | 19.0 | 19.0 | 8 | 2.76 | 70 | .0150 | 0.381 | 2.CMC.RN3Z4.F316 | ■ |
| | .197 | 5.0 | .787 | 20.0 | 20.0 | 8 | 2.76 | 70 | .0079 | 0.20 | 2.CMC42.N2Z4.500.1 | ■ |
| | .197 | 5.0 | .787 | 20.0 | 20.0 | 8 | 2.76 | 70 | .0197 | 0.50 | 2.CMC42.N3Z4.500.1 | ■ |
| 7/32 | .2189 | 5.560 | .876 | 22.2 | 22.2 | 10 | 2.76 | 70 | .0150 | 0.381 | 2.CMC.RN2Z4.F732 | ■ |
| 7/32 | .2189 | 5.560 | .876 | 22.2 | 22.2 | 10 | 2.76 | 70 | .0300 | 0.762 | 2.CMC.RN3Z4.F732 | ■ |
| | .236 | 6.0 | .945 | 24.0 | 24.0 | 10 | 2.76 | 70 | .0079 | 0.20 | 2.CMC42.N2Z4.600.1 | ■ |
| | .236 | 6.0 | .945 | 24.0 | 24.0 | 10 | 2.76 | 70 | .0197 | 0.50 | 2.CMC42.N3Z4.600.1 | ■ |
| | .236 | 6.0 | .945 | 24.0 | 24.0 | 10 | 2.76 | 70 | .0394 | 1.00 | 2.CMC42.N4Z4.600.1 | ■ |
| 1/4 | .2500 | 6.350 | 1.00 | 25.4 | 25.4 | 10 | 2.76 | 70 | .0150 | 0.381 | 2.CMC.RN2Z4.F14 | ■ |
| 1/4 | .2500 | 6.350 | 1.00 | 25.4 | 25.4 | 10 | 2.76 | 70 | .0300 | 0.762 | 2.CMC.RN3Z4.F14 | ■ |
| 1/4 | .2500 | 6.350 | 1.00 | 25.4 | 25.4 | 10 | 2.76 | 70 | .0600 | 1.524 | 2.CMC.RN4Z4.F14 | ■ |
| | .315 | 8.0 | 1.26 | 32.0 | 32.0 | 12 | 3.54 | 90 | .0079 | 0.20 | 2.CMC42.N2Z4.800.1 | ■ |
| | .315 | 8.0 | 1.26 | 32.0 | 32.0 | 12 | 3.54 | 90 | .0197 | 0.50 | 2.CMC42.N3Z4.800.1 | ■ |
| | .315 | 8.0 | 1.26 | 32.0 | 32.0 | 12 | 3.54 | 90 | .0591 | 1.50 | 2.CMC42.N4Z4.800.1 | ■ |

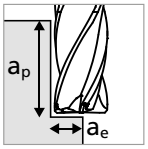
■ Stock item

CRAZYMILL by Mikron Tool Cool

# Type N - Pre-machining

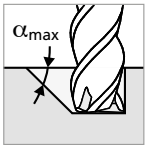
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Pre-machining**



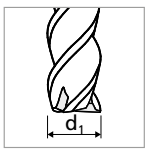

①
- $a_p = 2 \times d_1$
- $a_e = 0.1 \times d_1$

②
- $a_p = 4 \times d_1$
- $a_e = 0.05 \times d_1$




**Note:**
In case of linear ramp or helical interpolation milling reduce $f_z$ by 35%

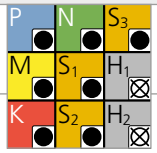





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ ① | 1.0 mm \| .039" $f_z$ ② | 1/16" 1.5 mm \| .059" $v_c$ | 1/16" 1.5 mm \| .059" $f_z$ ① | 1/16" 1.5 mm \| .059" $f_z$ ② |
|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.011 **.00043** | 0.008 **.00032** | 200 **656** | 0.015 **.00059** | 0.012 **.00047** |
| | | 1.0401 | C15 | AISI 1015 | | | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.010 **.00039** | 0.007 **.00028** | 200 **656** | 0.013 **.00051** | 0.011 **.00043** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.008 **.00032** | 0.006 **.00024** | 200 **656** | 0.011 **.00043** | 0.010 **.00039** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.012 **.00047** | 0.008 **.00032** | 180 **591** | 0.015 **.00059** | 0.012 **.00047** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.011 **.00043** | 0.008 **.00032** | 180 **591** | 0.014 **.00055** | 0.011 **.00043** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.011 **.00043** | 0.008 **.00032** | 180 **591** | 0.014 **.00055** | 0.011 **.00043** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.009 **.00035** | 0.006 **.00024** | 180 **591** | 0.012 **.00047** | 0.008 **.00031** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.010 **.00039** | 0.006 **.00024** | 160 **525** | 0.014 **.00055** | 0.012 **.00047** |
| | | 0.6030 | GG30 | ASTM 40B | | | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 160 **525** | 0.013 **.00051** | 0.009 **.00035** | 200 **656** | 0.016 **.00063** | 0.013 **.00051** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 160 **525** | 0.013 **.00051** | 0.009 **.00035** | 220 **722** | 0.016 **.00063** | 0.013 **.00051** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 160 **525** | 0.013 **.00051** | 0.010 **.00039** | 220 **722** | 0.016 **.00063** | 0.013 **.00051** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 160 **525** | 0.013 **.00051** | 0.010 **.00039** | 220 **722** | 0.016 **.00063** | 0.013 **.00051** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 160 **525** | 0.013 **.00051** | 0.010 **.00039** | 220 **722** | 0.016 **.00063** | 0.013 **.00051** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 160 **525** | 0.013 **.00051** | 0.009 **.00035** | 220 **722** | 0.016 **.00063** | 0.013 **.00051** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 100 **328** | 0.006 **.00024** | 0.004 **.00016** | 100 **328** | 0.008 **.00031** | 0.005 **.00020** |
| | | 2.4668 | | Inconel 718 | | | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.010 **.00039** | 0.008 **.00032** | 120 **394** | 0.012 **.00047** | 0.010 **.00039** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.010 **.00039** | 0.008 **.00032** | 120 **394** | 0.012 **.00047** | 0.010 **.00039** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 100 **328** | 0.006 **.00024** | 0.004 **.00016** | 140 **459** | 0.008 **.00031** | 0.005 **.00018** |
| | | | CrCoMo28 | ASTM F1537 | | | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



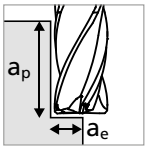

| Ød1 | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/32" 2.0 mm \| .079" | | | 1/8" 3.0 mm \| .118" | | | 5/32" 4.0 mm \| .157" | | | 3/16" - 7/32" 5.0 mm \| .197" | | | 1/4" 6.0 mm \| .236" | | | 8.0 mm \| .315" | | |
| | ① | ② | | ① | ② | | ① | ② | | ① | ② | | ① | ② | | ① | ② |
| $v_c$ | $f_z$ | | $v_c$ | $f_z$ | | $v_c$ | $f_z$ | | $v_c$ | $f_z$ | | $v_c$ | $f_z$ | | $v_c$ | $f_z$ | |
| 220<br>**722** | 0.024<br>**.00094** | 0.017<br>**.00067** | 240<br>**787** | 0.033<br>**.00130** | 0.020<br>**.00079** | 260<br>**853** | 0.034<br>**.00134** | 0.025<br>**.00098** | 260<br>**853** | 0.035<br>**.00138** | 0.028<br>**.00110** | 260<br>**853** | 0.046<br>**.00181** | 0.030<br>**.00117** | 260<br>**853** | 0.054<br>**.00213** | 0.033<br>**.00130** |
| 220<br>**722** | 0.022<br>**.00087** | 0.016<br>**.00063** | 240<br>**787** | 0.031<br>**.00122** | 0.019<br>**.00075** | 260<br>**853** | 0.032<br>**.00126** | 0.024<br>**.00094** | 260<br>**853** | 0.033<br>**.00130** | 0.026<br>**.00102** | 260<br>**853** | 0.044<br>**.00173** | 0.028<br>**.00110** | 260<br>**853** | 0.052<br>**.00205** | 0.031<br>**.00122** |
| 220<br>**722** | 0.019<br>**.00075** | 0.015<br>**.00059** | 240<br>**787** | 0.028<br>**.00110** | 0.018<br>**.00071** | 260<br>**853** | 0.029<br>**.00114** | 0.022<br>**.00087** | 260<br>**853** | 0.030<br>**.00118** | 0.024<br>**.00094** | 260<br>**853** | 0.042<br>**.00165** | 0.026<br>**.00103** | 260<br>**853** | 0.050<br>**.00197** | 0.029<br>**.00114** |
| 180<br>**591** | 0.021<br>**.00083** | 0.017<br>**.00067** | 200<br>**656** | 0.030<br>**.00118** | 0.034<br>**.00134** | 220<br>**722** | 0.032<br>**.00126** | 0.024<br>**.00094** | 220<br>**722** | 0.033<br>**.00130** | 0.026<br>**.00102** | 220<br>**722** | 0.040<br>**.00157** | 0.028<br>**.00110** | 260<br>**853** | 0.048<br>**.00189** | 0.031<br>**.00122** |
| 180<br>**591** | 0.020<br>**.00079** | 0.016<br>**.00063** | 200<br>**656** | 0.028<br>**.00110** | 0.018<br>**.00071** | 220<br>**722** | 0.031<br>**.00122** | 0.023<br>**.00091** | 220<br>**722** | 0.032<br>**.00126** | 0.025<br>**.00098** | 220<br>**722** | 0.037<br>**.00145** | 0.027<br>**.00106** | 260<br>**853** | 0.045<br>**.00177** | 0.030<br>**.00118** |
| 180<br>**591** | 0.020<br>**.00079** | 0.016<br>**.00063** | 200<br>**656** | 0.028<br>**.00110** | 0.018<br>**.00071** | 220<br>**722** | 0.031<br>**.00122** | 0.023<br>**.00091** | 220<br>**722** | 0.032<br>**.00126** | 0.025<br>**.00098** | 220<br>**722** | 0.037<br>**.00145** | 0.027<br>**.00106** | 260<br>**853** | 0.045<br>**.00177** | 0.030<br>**.00118** |
| 180<br>**591** | 0.018<br>**.00071** | 0.015<br>**.00059** | 200<br>**656** | 0.026<br>**.00102** | 0.017<br>**.00067** | 220<br>**722** | 0.030<br>**.00118** | 0.022<br>**.00087** | 220<br>**722** | 0.031<br>**.00122** | 0.024<br>**.00094** | 220<br>**722** | 0.035<br>**.00139** | 0.026<br>**.00103** | 260<br>**853** | 0.042<br>**.00165** | 0.029<br>**.00114** |
| 200<br>**656** | 0.024<br>**.00094** | 0.014<br>**.00055** | 220<br>**722** | 0.032<br>**.00126** | 0.021<br>**.00083** | 240<br>**787** | 0.038<br>**.00150** | 0.026<br>**.00102** | 240<br>**787** | 0.042<br>**.00165** | **0.029**<br>**.00114** | 240<br>**787** | 0.044<br>**.00173** | **0.031**<br>**.00120** | 240<br>**787** | 0.052<br>**.00205** | **0.034**<br>**.00134** |
| 240<br>**787** | 0.026<br>**.00102** | 0.018<br>**.00071** | 260<br>**853** | 0.040<br>**.00157** | 0.029<br>**.00114** | 300<br>**984** | 0.048<br>**.00189** | 0.028<br>**.00110** | 320<br>**1050** | 0.051<br>**.00201** | 0.030<br>**.00118** | 320<br>**1050** | 0.052<br>**.00205** | 0.032<br>**.00128** | 350<br>**1148** | 0.060<br>**.00236** | 0.036<br>**.00142** |
| 240<br>**787** | 0.026<br>**.00102** | 0.018<br>**.00071** | 260<br>**853** | 0.040<br>**.00157** | 0.029<br>**.00114** | 300<br>**984** | 0.048<br>**.00189** | 0.028<br>**.00110** | 320<br>**1050** | 0.051<br>**.00201** | 0.030<br>**.00118** | 320<br>**1050** | 0.052<br>**.00205** | 0.032<br>**.00128** | 350<br>**1148** | 0.060<br>**.00236** | 0.036<br>**.00142** |
| 240<br>**787** | 0.026<br>**.00102** | 0.018<br>**.00071** | 260<br>**853** | 0.040<br>**.00157** | 0.029<br>**.00114** | 300<br>**984** | 0.048<br>**.00189** | 0.028<br>**.00110** | 320<br>**1050** | 0.051<br>**.00201** | 0.030<br>**.00118** | 320<br>**1050** | 0.052<br>**.00205** | 0.032<br>**.00128** | 350<br>**1148** | 0.060<br>**.00236** | 0.036<br>**.00142** |
| 240<br>**787** | 0.026<br>**.00102** | 0.018<br>**.00071** | 260<br>**853** | 0.040<br>**.00157** | 0.029<br>**.00114** | 300<br>**984** | 0.048<br>**.00189** | 0.028<br>**.00110** | 320<br>**1050** | 0.051<br>**.00201** | 0.030<br>**.00118** | 320<br>**1050** | 0.052<br>**.00205** | 0.032<br>**.00128** | 350<br>**1148** | 0.060<br>**.00236** | 0.036<br>**.00142** |
| 240<br>**787** | 0.026<br>**.00102** | 0.018<br>**.00071** | 260<br>**853** | 0.040<br>**.00157** | 0.029<br>**.00114** | 300<br>**984** | 0.048<br>**.00189** | 0.028<br>**.00110** | 320<br>**1050** | 0.051<br>**.00201** | 0.030<br>**.00118** | 320<br>**1050** | 0.052<br>**.00205** | 0.032<br>**.00128** | 350<br>**1148** | 0.060<br>**.00236** | 0.036<br>**.00142** |
| 240<br>**787** | 0.026<br>**.00102** | 0.018<br>**.00071** | 260<br>**853** | 0.040<br>**.00157** | 0.029<br>**.00114** | 300<br>**984** | 0.048<br>**.00189** | 0.028<br>**.00110** | 320<br>**1050** | 0.051<br>**.00201** | 0.030<br>**.00118** | 320<br>**1050** | 0.052<br>**.00205** | 0.032<br>**.00128** | 350<br>**1148** | 0.060<br>**.00236** | 0.036<br>**.00142** |
| 100<br>**328** | 0.010<br>**.00039** | 0.005<br>**.00020** | 100<br>**328** | 0.014<br>**.00055** | 0.008<br>**.00032** | 120<br>**394** | 0.016<br>**.00063** | 0.010<br>**.00039** | 120<br>**394** | 0.018<br>**.00071** | 0.011<br>**.00043** | 120<br>**394** | 0.020<br>**.00079** | 0.012<br>**.00046** | 120<br>**394** | 0.025<br>**.00098** | 0.013<br>**.00051** |
| 130<br>**427** | 0.017<br>**.00067** | 0.014<br>**.00055** | 130<br>**427** | 0.028<br>**.00110** | 0.017<br>**.00067** | 150<br>**492** | 0.030<br>**.00118** | 0.021<br>**.00083** | 150<br>**492** | 0.031<br>**.00122** | 0.023<br>**.00091** | 150<br>**492** | 0.032<br>**.00126** | 0.024<br>**.00096** | 170<br>**558** | 0.035<br>**.00138** | 0.027<br>**.00106** |
| 130<br>**427** | 0.017<br>**.00067** | 0.014<br>**.00055** | 130<br>**427** | 0.028<br>**.00110** | 0.017<br>**.00067** | 150<br>**492** | 0.030<br>**.00118** | 0.021<br>**.00083** | 150<br>**492** | 0.031<br>**.00122** | 0.023<br>**.00091** | 150<br>**492** | 0.032<br>**.00126** | 0.024<br>**.00096** | 170<br>**558** | 0.035<br>**.00138** | **0.027**<br>**.00106** |
| 100<br>**328** | 0.010<br>**.00039** | 0.005<br>**.00020** | 100<br>**328** | 0.014<br>**.00055** | 0.008<br>**.00032** | 120<br>**394** | 0.016<br>**.00063** | 0.010<br>**.00039** | 120<br>**394** | 0.018<br>**.00071** | 0.011<br>**.00043** | 120<br>**394** | 0.020<br>**.00079** | 0.012<br>**.00046** | 120<br>**394** | 0.025<br>**.00098** | 0.013<br>**.00051** |

CRAZYMILL by Mikron Tool Cool

# Type N - Finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

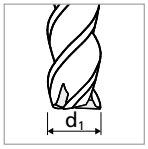
**Finishing**




$a_p = 4 \times d_1$

$a_e = 0.02 \times d_1$

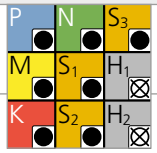





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 130 **425** | 0.009 **.00035** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 130 **425** | 0.008 **.00032** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 130 **425** | 0.007 **.00028** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 130 **425** | 0.009 **.00035** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 130 **425** | 0.009 **.00035** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 130 **425** | 0.009 **.00035** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 130 **425** | 0.007 **.00028** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 110 **361** | 0.007 **.00028** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 130 **425** | 0.010 **.00039** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 130 **425** | 0.010 **.00039** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 130 **425** | 0.012 **.00047** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 130 **425** | 0.012 **.00047** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 130 **425** | 0.012 **.00047** |
| | | 2.1020 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 130 **425** | 0.010 **.00039** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 110 **361** | 0.005 **.00020** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 110 **361** | 0.009 **.00035** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 110 **361** | 0.009 **.00035** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 110 **361** | 0.005 **.00020** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| Ød1 | 1/16" 1.5 mm \| .059" | | 3/32" 2.0 mm \| .079" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .157" | | 3/16" - 7/32" 5.0 mm \| .197" | | 1/4" 6.0 mm \| .236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.026<br>**.00102** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.044<br>**.00173** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.040<br>**.00157** |
| | 180<br>**591** | 0.012<br>**.00047** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.023<br>**.00091** | 220<br>**722** | 0.024<br>**.00094** | 220<br>**722** | 0.026<br>**.00102** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.035<br>**.00138** |
| | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 260<br>**853** | 0.040<br>**.00157** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.025<br>**.00098** | 220<br>**722** | 0.027<br>**.00106** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.032<br>**.00126** | 260<br>**853** | 0.038<br>**.00150** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.025<br>**.00098** | 220<br>**722** | 0.027<br>**.00106** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.032<br>**.00126** | 260<br>**853** | 0.038<br>**.00150** |
| | 180<br>**591** | 0.009<br>**.00035** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 220<br>**722** | 0.030<br>**.00118** | 260<br>**853** | 0.037<br>**.00146** |
| | 130<br>**427** | 0.014<br>**.00055** | 150<br>**492** | 0.016<br>**.00063** | 160<br>**525** | 0.025<br>**.00098** | 170<br>**558** | 0.029<br>**.00114** | 170<br>**558** | 0.033<br>**.00130** | 170<br>**558** | 0.036<br>**.00142** | 200<br>**656** | 0.042<br>**.00165** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 180<br>**591** | 0.015<br>**.00059** | 200<br>**656** | 0.021<br>**.00083** | 210<br>**688** | 0.033<br>**.00130** | 220<br>**722** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 220<br>**722** | 0.041<br>**.00161** | 270<br>**886** | 0.047<br>**.00185** |
| | 120<br>**394** | 0.006<br>**.00024** | 130<br>**427** | 0.006<br>**.00024** | 130<br>**427** | 0.009<br>**.00035** | 140<br>**459** | 0.012<br>**.00047** | 140<br>**459** | 0.013<br>**.00051** | 150<br>**492** | 0.014<br>**.00055** | 160<br>**525** | 0.020<br>**.00079** |
| | 120<br>**394** | 0.012<br>**.00047** | 130<br>**427** | 0.016<br>**.00063** | 130<br>**427** | 0.023<br>**.00091** | 140<br>**459** | 0.025<br>**.00098** | 140<br>**459** | 0.028<br>**.00110** | 150<br>**492** | 0.030<br>**.00118** | 160<br>**525** | 0.036<br>**.00142** |
| | 120<br>**394** | 0.012<br>**.00047** | 130<br>**427** | 0.016<br>**.00063** | 130<br>**427** | 0.023<br>**.00091** | 140<br>**459** | 0.025<br>**.00098** | 140<br>**459** | 0.028<br>**.00110** | 150<br>**492** | 0.030<br>**.00118** | 160<br>**525** | 0.036<br>**.00142** |
| | 120<br>**394** | 0.006<br>**.00024** | 130<br>**427** | 0.006<br>**.00024** | 130<br>**427** | 0.009<br>**.00035** | 140<br>**459** | 0.012<br>**.00047** | 140<br>**459** | 0.013<br>**.00051** | 150<br>**492** | 0.014<br>**.00055** | 160<br>**525** | 0.020<br>**.00079** |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

# Process CrazyMill Cool Square / Corner radius - Z4

## ACCURATE AND EFFICIENT MILLING

### Coolant type, pressure and filtration

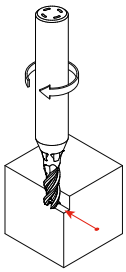
**Coolant:** for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

**Filter:** the large cooling channels permit the use of a standard filter with filter quality of ≤ .002" (0.05 mm).

**Coolant pressure:** at least 15 bar (218 psi) coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

| | | | |
|---|---|---|---|
| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
| **Minimal pressure** | [bar] | 15 | 30 |
| | **[psi]** | **218** | **435** |

### Climb milling and conventional milling



Mikron tool recommends climb milling for the machining of side and pocket milling. The chip thickness here is greater at the beginning and decreases continuously; the cutting forces remain low. With conventional milling, however, high cutting forces would push the milling tool away from the part.Thus surface quality decreases.

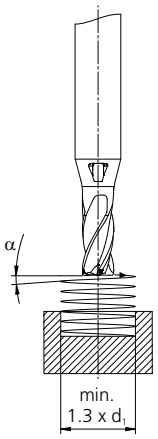
Suggested ramp angle (calculated on the endmill center)



## MILLING PROCESS

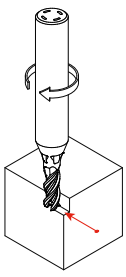
### Maximum ramp angles in linear ramping or helical interpolation (calculated on the endmill center)

| | Material | α - Linear ramp | α - Helical interpolation |
|---|---|---|---|
| P | Unalloyed carbon steel | 45° | 47° |
| P | Low alloyed steel | 45° | 47° |
| P | High alloyed tool steel | 27° | 28° |
| M | Stainless steel ferritic | 45° | 47° |
| M | Stainless steel martensitic | 27° | 28° |
| M | Stainless steel martensitic - PH | 27° | 28° |
| M | Stainless steel austenitic | 45° | 47° |
| K | Cast iron | 45° | 47° |
| N | Aluminium alloy wrought | 45° | 47° |
| N | Aluminium alloy cast | 45° | 47° |
| N | Copper | 45° | 47° |
| N | Brass lead free | 45° | 47° |
| N | Brass, Bronze Rm < 400 N/mm² | 45° | 47° |
| N | Bronze Rm < 600 N/mm² | 45° | 47° |
| $S_1$ | Super alloys | 14° | 15° |
| $S_2$ | Titanium pure and titanium alloys | 14° | 15° |
| $S_3$ | CrCo alloys | 27° | 28° |




**Note: In case of linear ramping or helical interpolation refer to cutting data for pre-machining with a reduction by 35% of $f_z$**

### Pre-machining

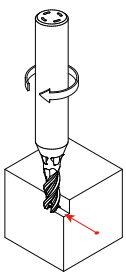


**Recommended cutting parameters**

$v_c$ and $f_z$ = as specified in the cutting data table

| Strategy | Type A | Type M | Type N | Type C |
|---|---|---|---|---|
| ① | $a_p$ = 1.5 x d<br>$a_e$ = 0.3 x d | $a_p$ = 1.5 x d<br>$a_e$ = 0.2 x d | $a_p$ = 2 x d<br>$a_e$ = 0.1 x d | $a_p$ = 2 x d<br>$a_e$ = 0.1 x d |
| ② | $a_p$ = 2 x d<br>$a_e$ = 0.2 x d | $a_p$ = 3 x d<br>$a_e$ = 0.1 x d | $a_p$ = 4 x d<br>$a_e$ = 0.05 x d | - |
| ③ | - | $a_p$ = 3 x d<br>$a_e$ = 0.05 x d | - | - |

### Finishing



**Recommended cutting parameters**

$v_c$ and $f_z$ = as specified in the cutting data table

| Strategy | Type A | Type M | Type N | Type C |
|---|---|---|---|---|
| ① | $a_p$ = 2 x d<br>$a_e$ = 0.04 x d | $a_p$ = 3 x d<br>$a_e$ = 0.02 x d | $a_p$ = 4 x d<br>$a_e$ = 0.02 x d | $a_p$ = 2 x d<br>$a_e$ = 0.02 x d |
| ② | $a_p$ = 2 x d<br>$a_e$ = 0.02 x d | - | - | - |

# NEW CrazyMill Hexalobe



NEW

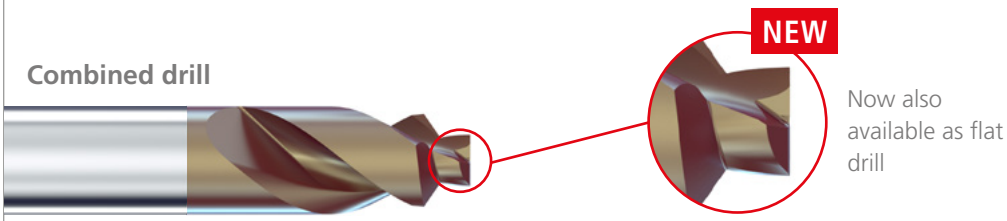
## THE NEW CONCEPT FOR MACHINING YOUR TORX® SOCKET

### New concept

- Drilling - Chamfering - Milling - Deburring: Four operations in three steps with two tools.
- High efficient machining in shorter time for titanium, stainless steel and cobalt chrome.

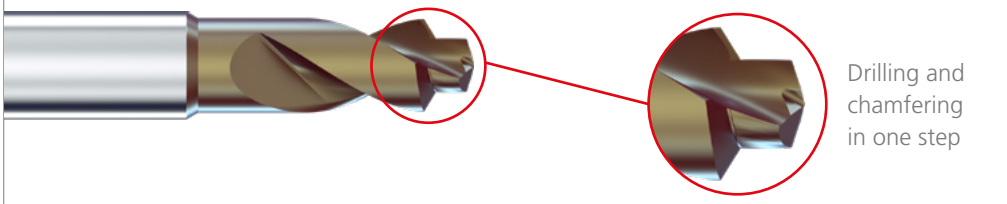
CRAZYDRILL Hexalobe FLAT

Combined drill




Now also available as flat drill

CRAZYDRILL Hexalobe



Drilling and chamfering in one step

CRAZYMILL Hexalobe

Micro endmill




Now also available for cobalt chrome geometry

### Performance features

- Highest stiffness
- New cutting geometry

### Your advantages

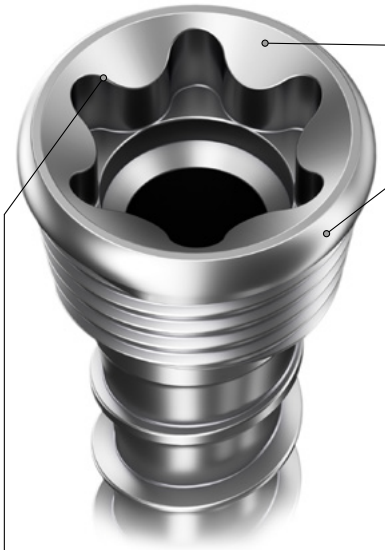
- Shorter milling process
- Highest profile precision
- Excellent surface quality
- Minimal burr

**Regrinding:** These products are not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the CrazyDrill Hexalobe / CrazyMill Hexalobe (diameter, length, cutting direction…)? Ask us about our customized versions!

# NEW Best performance on hexalobular sockets

**TURNKEY SOLUTION FOR TITANIUM, STAINLESS STEEL AND COBALT CHROME**



## Material

### ■ Titanium

S2

Ti Gr.5 ELI
TiAl6V4 ELI
3.7165

### ■ Stainless Steel

M

316 LM
X2CrNiMo18-15-3
1.4441

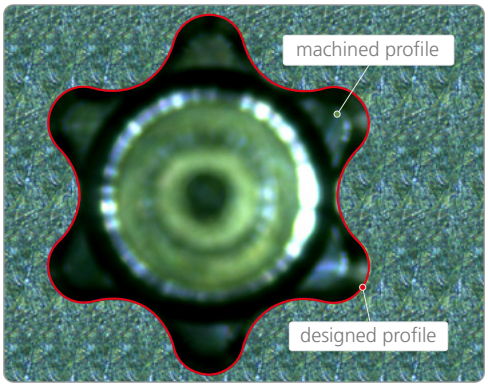
### ■ Cobalt chrome

S3

ASTM F1537
CrCoMo28
ISO 5832-12

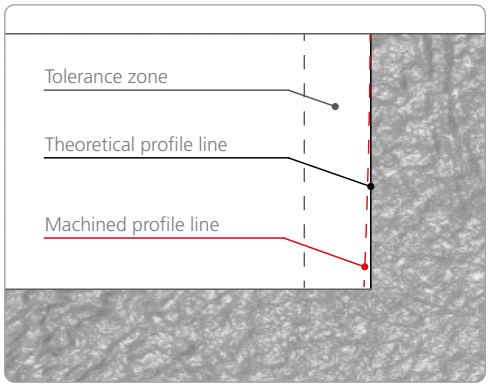
## Shape precision

### ■ Nearly perfect profile




Perfect profile matching.

### ■ Perpendicularity



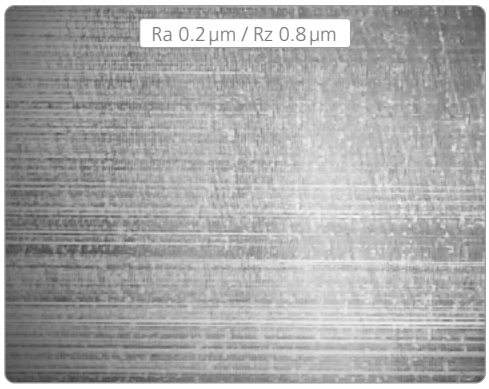

Guaranteed profile geometry.

NEW

07

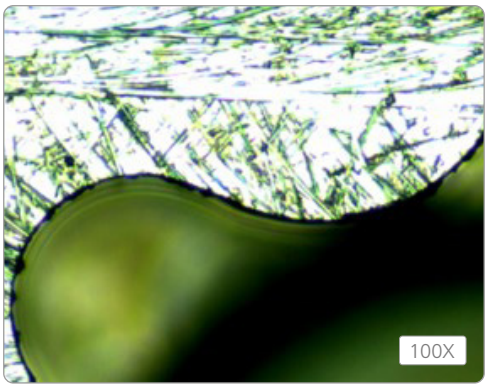
## Quality and performance

### ■ Surface quality



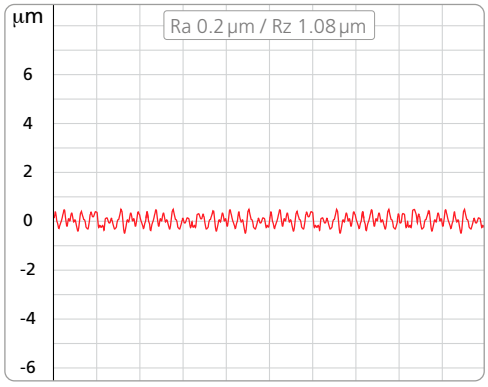

Excellent surface quality.*

### ■ Nearly burr free




Machining profile with minimal burrs.

### ■ Chamfer roughness




Lowest roughness on chamfer surface.*

### ■ Milling cycle time

| TORX® type | Time [s] |
|---|---|
| T6 | 27 |
| T8 | 24 |
| T10 | 22 |
| T15 | 22 |
| T20 | 21 |
| T25 | 20 |

Machined on titanium with version 3.5 x d and p = 0.4 x d.*

**Note *:** The quality and cycle time depends on cutting parameters and machine conditions.

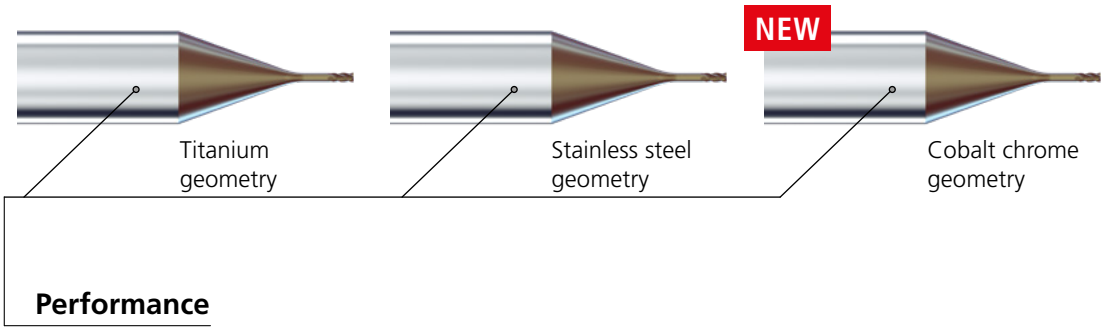
CRAZYMILL by Mikron Tool Hexalobe

# NEW High efficient milling hexalobular socket

**THE MICRO ENDMILL**

## CrazyMill Hexalobe

**The new endmill for TORX® socket machining**

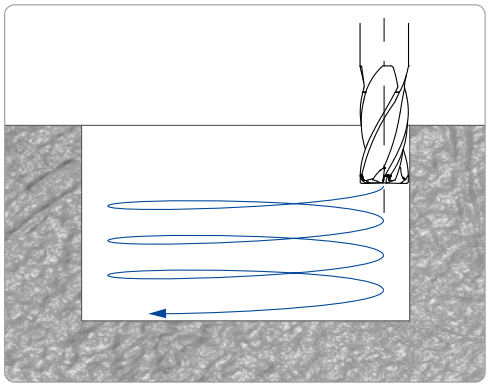



### Performance

#### ■ Real cutting conditions

Tested and approved cutting conditions for best process execution and tool life.

#### ■ Helical interpolation



Higher pitch up to 0.8 x d.

#### ■ New carbide

A special micro-grain carbide with high stiffness and edge chipping resistence has been developed to guarantee high profile precision.

#### ■ Three cutting geometries

Three types of endmills have been developed for vibration free machining in titanium, stainless steel and cobalt chrome.

#### ■ Coating

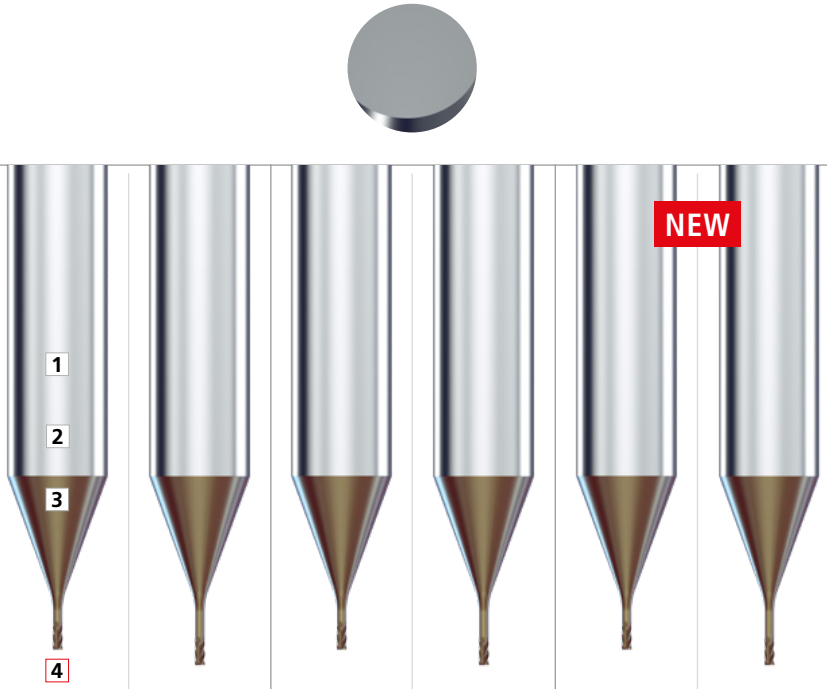
Cr

Chrome free coating to avoid cross contamination on medical parts.

# CrazyMill Hexalobe

| 3.5xd | 5xd | 3.5xd | 5xd | 3.5xd | 5xd |
|---|---|---|---|---|---|
| Ti | | SST-Inox | | CoCr | |

■ Coated
■ External cooling




page 522 | page 523 | page 522 | page 523 | page 522 | page 523

## NEW

**1 | SHANK**
The robust carbide shank guarantees stable and vibration free milling. A high degree of precision and excellent surface quality are achieved.

**2 | NEW CARBIDE**
Due to the high degree of toughness and low thermal conductivity of titanium, stainless steel and cobalt chrom, a specially micro-grain carbide with high stiffnessand edge chipping resistence has been developed to perfectly meet all requirements in terms of mechanical properties.

**3 | NEW COATING**
The high-performance coating eXedur SNP is heat and wear resistant, prevents buildup edges and guarantees optimum chip flushing. The result is a long tool life.

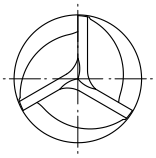
**4 | CUTTING GEOMETRY**
Three specific geometries have been developed for the machining of:

- **Titanium**
- **Stainless steel**
- **Cobalt chrome**

Vibration free cutting for machining with helical interpolation.

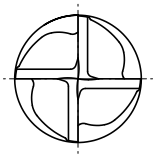
Mill tip form

3 Flutes



Diameter range
**Ø .008" - .012"**
Ø 0.2 - 0.3 mm

4 Flutes



Diameter range
**Ø .016" - .039"**
Ø 0.4 - 1.0 mm

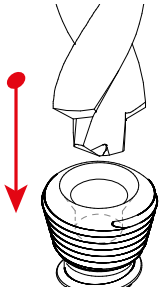
# NEW Machining process

## HELICAL INTERPOLATION FOR TITANIUM

Ti
S2

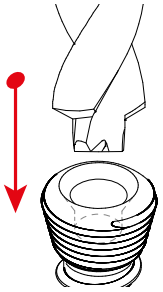
### Step 1

**Pre-hole drilling with 120° chamfer**



**140° tip angle**

**or**

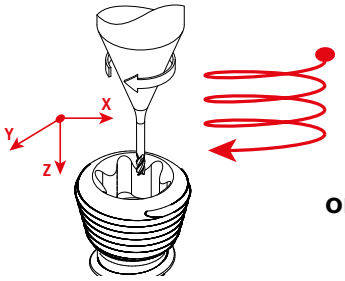


**180° tip angle**

### Step 2

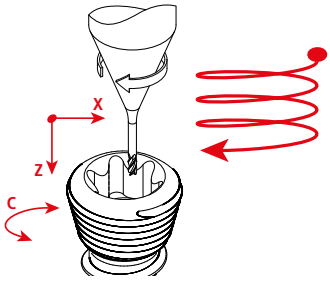
**Helical interpolation XYZ**

**XYZ**
Interpolation of linear axes X, Y and Z with stationary workpiece.




**or**

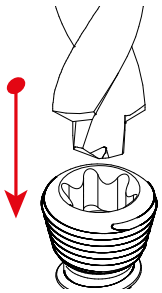
**Helical interpolation XCZ**




**XCZ**
Interpolation of linear axes X, Z and subspindle axis C with workpiece on rotation.

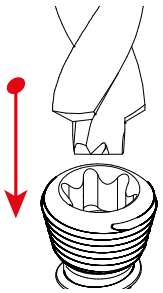
### Step 3

**Deburring**



**140° tip angle**

**or**



**180° tip angle**

Repeat chamfering to clean the burrs.

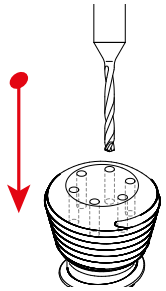
**Titanium:** Helical interpolation is the optimum process, ssaving up to 20% of cycle time in comparison to side milling process (see page 180).

## LOBE DRILLING AND HELICAL INTERPOLATION FOR STAINLESS STEEL AND COBALT CHROME

### Step 1

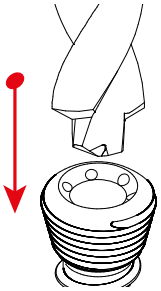
**Lobe drilling**

SST M | CoCr S3



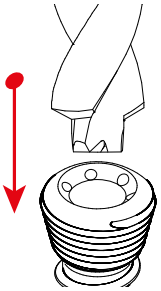
### Step 2

**Pre-hole drilling with 120° chamfer**



**140° tip angle**

**or**

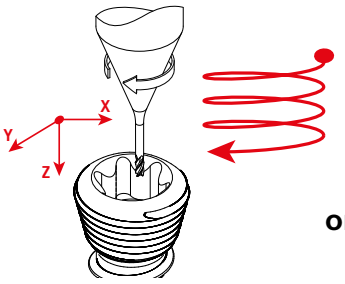


**180° tip angle**

### Step 3

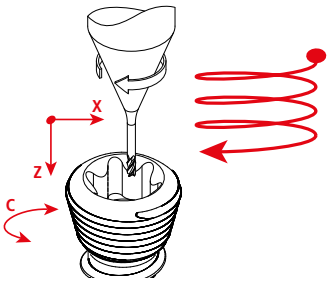
**Helical interpolation XYZ**

**XYZ**
Interpolation of linear axes X, Y and Z with stationary workpiece.




**or**

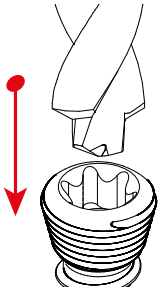
**Helical interpolation XCZ**




**XCZ**
Interpolation of linear axes X, Z and subspindle axis C with workpiece on rotation.

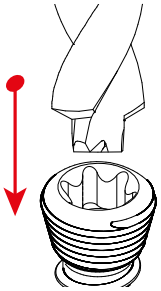
### Step 4

**Deburring**



**140° tip angle**

**or**



**180° tip angle**

Repeat chamfering to clean the burrs.

**Stainless steel:** With helical iterpolation, drilling of the lobes is required. Result: longer tool life, better dimensional control of the TORX® shape and a more stable process in comparison to side milling process (see page 180).

**Cobalt Chrome:** Helical interpolation is the optimum process, ssaving up to 20% of cycle time in comparison to side milling process (see page 181).

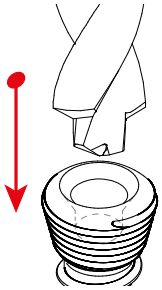
# NEW Machining process

## SIDE MILLING FOR TITANIUM AND STAINLESS STEEL

Ti S2 | SST M

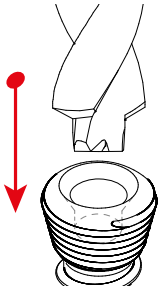
### Step 1

**Pre-hole drilling with 120° chamfer**



**140° tip angle**

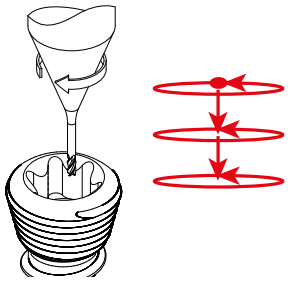
**or**



**180° tip angle**

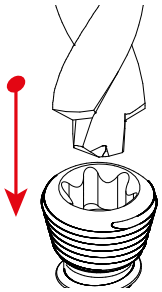
### Step 2

**Side milling**



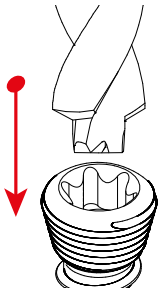
### Step 3

**Deburring**



**140° tip angle**

**or**



**180° tip angle**

Repeat chamfering to clean the burrs.

**Titanium:** Helical interpolation is the optimum process (see page 178), saving up to 20% of cycle time in comparison to side milling process.

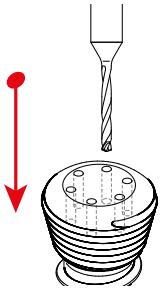
**Stainless steel:** With helical iterpolation, drilling of the lobes is required (see page 179). Result: longer tool life, better dimensional control of the TORX® shape and a more stable process in comparison to side milling process.

## LOBE DRILLING AND SIDE MILLING FOR COBALT CHROME

CoCr
S3

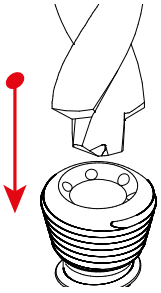
### Step 1

**Lobe drilling**



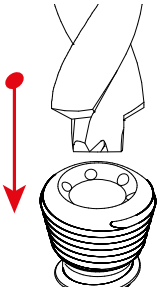
### Step 2

**Pre-hole drilling with 120° chamfer**



**140° tip angle**

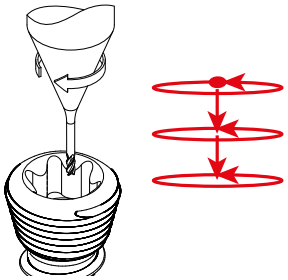
**or**



**180° tip angle**

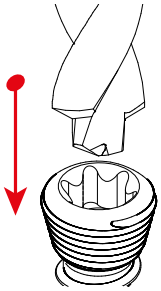
### Step 3

**Side milling**



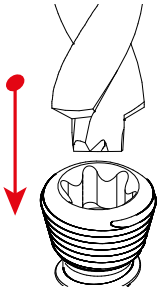
### Step 4

**Deburring**



**140° tip angle**

**or**



**180° tip angle**

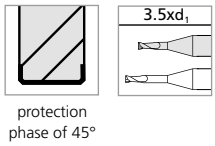
Repeat chamfering to clean the burrs.

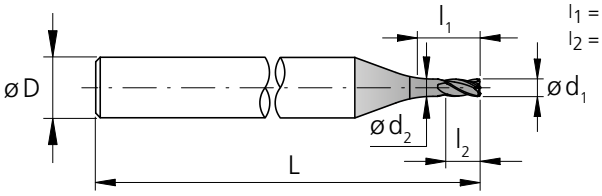
**Cobalt chrome:** Helical interpolation is the optimum process (see page 179), saving up to 20% of cycle time in comparison to side milling process.

# CrazyMill Hexalobe

## MILLING WITH EXTERNAL COOLING

### Short version




$l_1$ = Effective length
$l_2$ = Cutting length

SST M | Ti S2

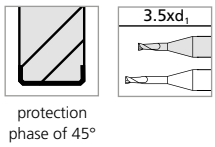
| TORX® type | $d_1$ 0/-.0004 [inch] | $d_1$ 0/-0.01 [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [Teeth] | Item number **Titanium** | Item number **SST-Inox** | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T4 | **.008** | 0.20 | **.028** | 0.70 | 0.30 | 0.19 | 4 | **1.57** | 40 | 3 | 2.CMT35.B1Z3.020.1 | 2.CMI35.B1Z3.020.1 | ■ |
| T5 | **.010** | 0.25 | **.034** | 0.875 | 0.40 | 0.23 | 4 | **1.57** | 40 | 3 | 2.CMT35.B1Z3.025.1 | 2.CMI35.B1Z3.025.1 | ■ |
| T6 / T7 | **.012** | 0.30 | **.041** | 1.05 | 0.45 | 0.28 | 4 | **1.57** | 40 | 3 | 2.CMT35.B1Z3.030.1 | 2.CMI35.B1Z3.030.1 | ■ |
| T8 / T10 | **.016** | 0.40 | **.055** | 1.40 | 0.60 | 0.38 | 4 | **1.57** | 40 | 4 | 2.CMT35.B1Z4.040.1 | 2.CMI35.B1Z4.040.1 | ■ |
| T10 / T15 | **.020** | 0.50 | **.069** | 1.75 | 0.75 | 0.47 | 4 | **1.57** | 40 | 4 | 2.CMT35.B1Z4.050.1 | 2.CMI35.B1Z4.050.1 | ■ |
| T20 | **.024** | 0.60 | **.083** | 2.10 | 0.90 | 0.56 | 4 | **1.57** | 40 | 4 | 2.CMT35.B1Z4.060.1 | 2.CMI35.B1Z4.060.1 | ■ |
| T25 | **.031** | 0.80 | **.110** | 2.80 | 1.20 | 0.75 | 4 | **1.57** | 40 | 4 | 2.CMT35.B1Z4.080.1 | 2.CMI35.B1Z4.080.1 | ■ |
| T30 | **.039** | 1.00 | **.138** | 3.50 | 1.50 | 0.94 | 4 | **1.57** | 40 | 4 | 2.CMT35.B1Z4.100.1 | 2.CMI35.B1Z4.100.1 | ■ |

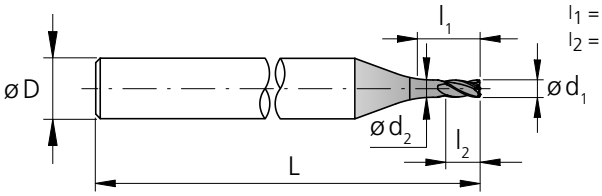
■ Stock item

Complementary products

CrazyDrill Hexalobe p.182
CrazyDrill Hexalobe Flat p.183

### NEW Short version




$l_1$ = Effective length
$l_2$ = Cutting length

CoCr S3

| TORX® type | $d_1$ 0/-.0004 [inch] | $d_1$ 0/-0.01 [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [Teeth] | Item number **Cobalt - Chrome** | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T4 | **.008** | 0.20 | **.028** | 0.70 | 0.30 | 0.19 | 4 | **1.57** | 40 | 3 | 2.CMR35.B1Z3.020.1 | ■ |
| T5 | **.010** | 0.25 | **.034** | 0.875 | 0.40 | 0.23 | 4 | **1.57** | 40 | 3 | 2.CMR35.B1Z3.025.1 | ■ |
| T6 / T7 | **.012** | 0.30 | **.041** | 1.05 | 0.45 | 0.28 | 4 | **1.57** | 40 | 3 | 2.CMR35.B1Z3.030.1 | ■ |
| T8 / T10 | **.016** | 0.40 | **.055** | 1.40 | 0.60 | 0.38 | 4 | **1.57** | 40 | 4 | 2.CMR35.B1Z4.040.1 | ■ |
| T10 / T15 | **.020** | 0.50 | **.069** | 1.75 | 0.75 | 0.47 | 4 | **1.57** | 40 | 4 | 2.CMR35.B1Z4.050.1 | ■ |
| T20 | **.024** | 0.60 | **.083** | 2.10 | 0.90 | 0.56 | 4 | **1.57** | 40 | 4 | 2.CMR35.B1Z4.060.1 | ■ |
| T25 | **.031** | 0.80 | **.110** | 2.80 | 1.20 | 0.75 | 4 | **1.57** | 40 | 4 | 2.CMR35.B1Z4.080.1 | ■ |
| T30 | **.039** | 1.00 | **.138** | 3.50 | 1.50 | 0.94 | 4 | **1.57** | 40 | 4 | 2.CMR35.B1Z4.100.1 | ■ |

■ Stock item

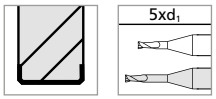
Complementary products

CrazyDrill Hexalobe p.182
CrazyDrill Hexalobe Flat p.183

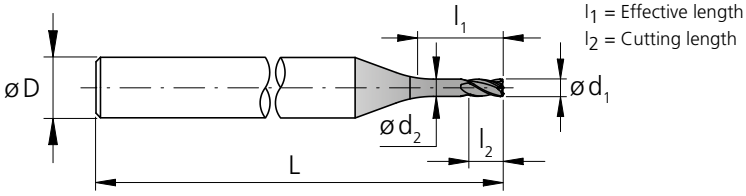
| Carbide | Z 3-4 | 35° | | eXedur SNP | |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| Ø$d_1$ | **.008" - .039"** (0.2 - 1.0 mm) | |
| Tolerance | **0 - .0004"** | 0 - 0.01 mm |

## Long version




protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

SST M | Ti S2

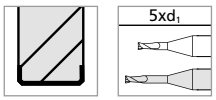
| TORX® type | $d_1$ 0/-.0004 [inch] | $d_1$ 0/-0.01 [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [Teeth] | Item number **Titanium** | Item number **SST-Inox** | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T4 | **.008** | 0.20 | **.039** | 1.00 | 0.30 | 0.19 | 4 | **1.57** | 40 | 3 | 2.CMT35.C1Z3.020.1 | 2.CMI35.C1Z3.020.1 | ■ |
| T5 | **.010** | 0.25 | **.049** | 1.25 | 0.40 | 0.23 | 4 | **1.57** | 40 | 3 | 2.CMT35.C1Z3.025.1 | 2.CMI35.C1Z3.025.1 | ■ |
| T6 / T7 | **.012** | 0.30 | **.059** | 1.50 | 0.45 | 0.28 | 4 | **1.57** | 40 | 3 | 2.CMT35.C1Z3.030.1 | 2.CMI35.C1Z3.030.1 | ■ |
| T8 / T10 | **.016** | 0.40 | **.079** | 2.00 | 0.60 | 0.38 | 4 | **1.57** | 40 | 4 | 2.CMT35.C1Z4.040.1 | 2.CMI35.C1Z4.040.1 | ■ |
| T10 / T15 | **.020** | 0.50 | **.098** | 2.50 | 0.75 | 0.47 | 4 | **1.57** | 40 | 4 | 2.CMT35.C1Z4.050.1 | 2.CMI35.C1Z4.050.1 | ■ |
| T20 | **.024** | 0.60 | **.118** | 3.00 | 0.90 | 0.56 | 4 | **1.57** | 40 | 4 | 2.CMT35.C1Z4.060.1 | 2.CMI35.C1Z4.060.1 | ■ |
| T25 | **.031** | 0.80 | **.157** | 4.00 | 1.20 | 0.75 | 4 | **1.57** | 40 | 4 | 2.CMT35.C1Z4.080.1 | 2.CMI35.C1Z4.080.1 | ■ |
| T30 | **.039** | 1.00 | **.197** | 5.00 | 1.50 | 0.94 | 4 | **1.57** | 40 | 4 | 2.CMT35.C1Z4.100.1 | 2.CMI35.C1Z4.100.1 | ■ |

■ Stock item

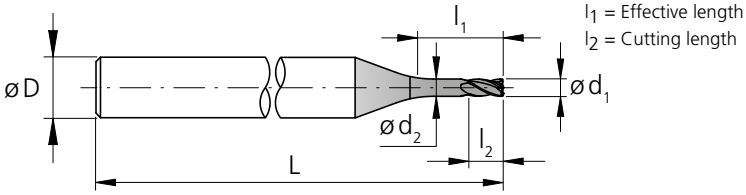
Complementary products
CrazyDrill Hexalobe p.182
CrazyDrill Hexalobe Flat p.183

NEW

## Long version




protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

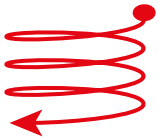
CoCr S3

| TORX® type | $d_1$ 0/-.0004 [inch] | $d_1$ 0/-0.01 [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [Teeth] | Item number **Cobalt - Chrome** | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T4 | **.008** | 0.20 | **.039** | 1.00 | 0.30 | 0.19 | 4 | **1.57** | 40 | 3 | 2.CMR35.C1Z3.020.1 | ■ |
| T5 | **.010** | 0.25 | **.049** | 1.25 | 0.40 | 0.23 | 4 | **1.57** | 40 | 3 | 2.CMR35.C1Z3.025.1 | ■ |
| T6 / T7 | **.012** | 0.30 | **.059** | 1.50 | 0.45 | 0.28 | 4 | **1.57** | 40 | 3 | 2.CMR35.C1Z3.030.1 | ■ |
| T8 / T10 | **.016** | 0.40 | **.079** | 2.00 | 0.60 | 0.38 | 4 | **1.57** | 40 | 4 | 2.CMR35.C1Z4.040.1 | ■ |
| T10 / T15 | **.020** | 0.50 | **.098** | 2.50 | 0.75 | 0.47 | 4 | **1.57** | 40 | 4 | 2.CMR35.C1Z4.050.1 | ■ |
| T20 | **.024** | 0.60 | **.118** | 3.00 | 0.90 | 0.56 | 4 | **1.57** | 40 | 4 | 2.CMR35.C1Z4.060.1 | ■ |
| T25 | **.031** | 0.80 | **.157** | 4.00 | 1.20 | 0.75 | 4 | **1.57** | 40 | 4 | 2.CMR35.C1Z4.080.1 | ■ |
| T30 | **.039** | 1.00 | **.197** | 5.00 | 1.50 | 0.94 | 4 | **1.57** | 40 | 4 | 2.CMR35.C1Z4.100.1 | ■ |

■ Stock item

Complementary products
CrazyDrill Hexalobe p.182
CrazyDrill Hexalobe Flat p.183

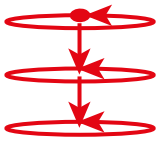
# NEW Helical interpolation (XYZ / XCZ) - 3.5 x d / 5 x d



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | p (pitch) 3.5 x d1 | p (pitch) 5 x d1 |
|---|---|---|---|---|---|---|
| M | Stainless steel austenitic | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | 0.2 - 0.8 x d1 | 0.1 - 0.4 x d1 |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| $S_2$ | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 0.2 - 0.8 x d1 | 0.1 - 0.4 x d1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 0.2 - 0.8 x d1 | 0.1 - 0.4 x d1 |
| | | | CrCoMo28 | ASTM F1537 | | |

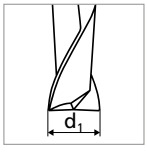
**Note:** In case of p = 0.8 x d1 decrease the feed fz by 30% to increase tool life and profile precision.

# NEW Side milling - 3.5 x d / 5 x d



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $a_{p, max}$ | $a_e$ |
|---|---|---|---|---|---|---|
| M | Stainless steel austenitic | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | 0.5 x d1 | 0.1 x d1 |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| $S_2$ | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 0.5 x d1 | variable |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 0.5 x d1 | 0.1 x d1 |
| | | | CrCoMo28 | ASTM F1537 | | |

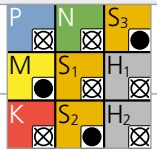





**General advise:** Cutting conditions have been tested and approved with n = 30'000 - 40'000 rpm, different cutting speeds may affect tool life.

$v_c$ **[SFM]** | [m/min]
$f_z$ **[IPT]** | [mm]
**p** **[inch]** | [mm]

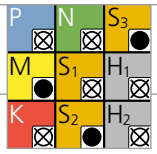
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| T4 Ød1 .0079" \| 0.20 mm | | T5 Ød1 .0098" \| 0.25 mm | | T6 - T7 Ød1 .0118" \| 0.30 mm | | T8 - T10 Ød1 .0157" \| 0.40 mm | | T10 - T15 Ød1 .0197" \| 0.50 mm | | T20 Ød1 .0236" \| 0.60 mm | | T25 Ød1 .0315" \| 0.80 mm | | T30 Ød1 .0394" \| 1.00 mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| **66 – 131**<br>20 - 40 | **.00004**<br>0.0010 | **82 – 164**<br>25 - 50 | **.00004**<br>0.0010 | **98 – 197**<br>30 - 60 | **.00004**<br>0.0010 | **131 – 246**<br>40 - 75 | **.00006**<br>0.0015 | **164 – 295**<br>50 - 90 | **.00008**<br>0.0020 | **197 – 328**<br>60 - 100 | **.00010**<br>0.0025 | **230 – 427**<br>70 - 130 | **.00012**<br>0.0030 | **263 – 459**<br>80 - 140 | **.00016**<br>0.0040 |
| **66 – 131**<br>20 - 40 | **.00004**<br>0.0010 | **82 – 164**<br>25 - 50 | **.00004**<br>0.0010 | **98 – 197**<br>30 - 60 | **.00004**<br>0.0010 | **131 – 246**<br>40 - 75 | **.00006**<br>0.0015 | **164 – 295**<br>50 - 90 | **.00008**<br>0.0020 | **197 – 328**<br>60 - 100 | **.00010**<br>0.0025 | **230 – 427**<br>70 - 130 | **.00012**<br>0.0030 | **263 – 459**<br>80 - 140 | **.00016**<br>0.0040 |
| **66 – 131**<br>20 - 40 | **.00003**<br>0.0008 | **82 – 164**<br>25 - 50 | **.00003**<br>0.0008 | **98 – 197**<br>30 - 60 | **.00003**<br>0.0008 | **131 – 246**<br>40 - 75 | **.00005**<br>0.0012 | **164 – 295**<br>50 - 90 | **.00006**<br>0.0015 | **197 – 328**<br>60 - 100 | **.00008**<br>0.0020 | **230 – 427**<br>70 - 130 | **.00010**<br>0.0025 | **263 – 459**<br>80 - 140 | **.00012**<br>0.0030 |

$v_c$ **[SFM]** | [m/min]
$f_z$ **[IPT]** | [mm]
$a_p$ **[inch]** | [mm]
$a_e$ **[inch]** | [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| T4 Ød1 .0079" \| 0.20 mm | | T5 Ød1 .0098" \| 0.25 mm | | T6 - T7 Ød1 .0118" \| 0.30 mm | | T8 - T10 Ød1 .0157" \| 0.40 mm | | T10 - T15 Ød1 .0197" \| 0.50 mm | | T20 Ød1 .0236" \| 0.60 mm | | T25 Ød1 .0315" \| 0.80 mm | | T30 Ød1 .0394" \| 1.00 mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| **66 – 131**<br>20 - 40 | **.00006**<br>0.0015 | **82 – 164**<br>25 - 50 | **.00010**<br>0.0025 | **98 – 197**<br>30 - 60 | **.00012**<br>0.0030 | **131 – 246**<br>40 - 75 | **.00018**<br>0.0045 | **164 – 295**<br>50 - 90 | **.00024**<br>0.0060 | **197 – 328**<br>60 - 100 | **.00026**<br>0.0065 | **230 – 427**<br>70 - 130 | **.00032**<br>0.0080 | **263 – 459**<br>80 - 140 | **.00039**<br>0.0100 |
| **66 – 131**<br>20 - 40 | **.00006**<br>0.0015 | **82 – 164**<br>25 - 50 | **.00010**<br>0.0025 | **98 – 197**<br>30 - 60 | **.00012**<br>0.0030 | **131 – 246**<br>40 - 75 | **.00018**<br>0.0045 | **164 – 295**<br>50 - 90 | **.00024**<br>0.0060 | **197 – 328**<br>60 - 100 | **.00026**<br>0.0065 | **230 – 427**<br>70 - 130 | **.00032**<br>0.0080 | **263 – 459**<br>80 - 140 | **.00039**<br>0.0100 |
| **66 – 131**<br>20 - 40 | **.00005**<br>0.0012 | **82 – 164**<br>25 - 50 | **.00008**<br>0.0020 | **98 – 197**<br>30 - 60 | **.00010**<br>0.0025 | **131 – 246**<br>40 - 75 | **.00014**<br>0.0035 | **164 – 295**<br>50 - 90 | **.00018**<br>0.0045 | **197 – 328**<br>60 - 100 | **.00020**<br>0.0050 | **230 – 427**<br>70 - 130 | **.00024**<br>0.0060 | **263 – 459**<br>80 - 140 | **.00030**<br>0.0075 |

### Coolant type, pressure, filtration and flowrate

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

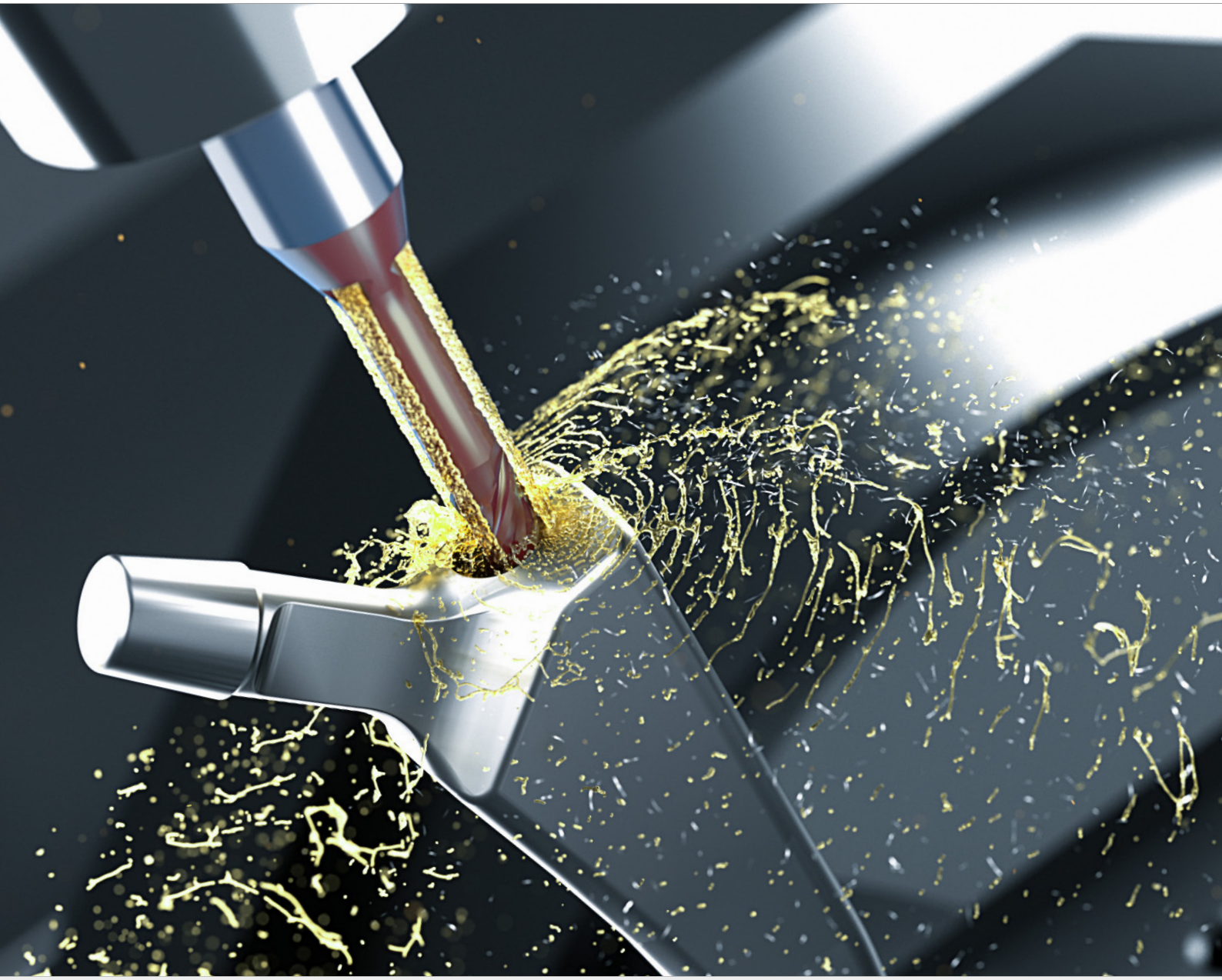
For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling medium is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical information".

PATENTED

# CrazyMill Cool P&S Square / Corner radius - Z3



NEW

CRAZYMILL Cool

## PLUNGE MILL FOR SLOTS AND POCKETS IN MINIMAL SPACES



With CrazyMill Cool P&S, Mikron Tool introduces a new 3-flutes milling cutter for the rough and finish milling of many materials, with emphasis on stainless steels, titanium, super alloys and CrCo alloys. Two versions of micro endmill are available in diameters of .039" to .315" (1 mm to 8 mm):

- **Variant square** - sharp-edged with small, defined protection phase of 45°, for a maximum machining depth of 5 x d.
- **Variant corner radius** - sharp-edged with a corner radius for a maximum machining depth of 5 x d.

Its strengths include high cutting speeds, high removal rate, a long tool life and excellent surface quality. The special edge geometry provides a stable and vibration-free "Drilling" (perpendicular plunging) up to 1 x d. A correction in the center stabilizes the web (no breakout), reduces penetration force and helps increase tool life. Due to the specially designed chip space in the head of the tool, chips are evacuated into the flutes when plunging. The design of the flutes creates enough space for perfect chip evacuation and simultaneously guarantees robust stability for the lateral milling process up to 5 x d.

In the shank integrated ducts provide a constant and massive coolant flow instrumental for an efficient chip evacuation from the milling area. This concept is ideally suited to machine groves, slots and pockets since chips are flushed out even from tight and angled spaces. The surface quality improves significantly and reaches finishing quality when milling into solid material. Moreover, the cooling prevents an over-heating of the cutting edges and thus guarantees long tool life and significantly higher chip removal compared to conventional milling.

**Regrinding:** This product is not suitable for regrinding.

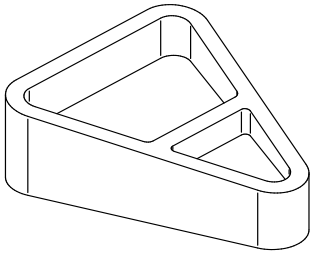
**Please note:** You couldn't find your suitable version of the CrazyMill Cool P&S Square / Corner radius - Z3 (diameter, length, cutting direction…)? Ask us about our customized versions!

NEW

# Features and benefits

## ROUGHING AND FINISHING CUTTER WITH INTEGRATED COOLING, FROM .039" (1 MM)

- **SHORT MACHINING TIME** | up to 5 times faster
- **LONG TOOL LIFE** | due to efficient cooling
- **HIGH SURFACE QUALITY** | Ra ≤ 20 µin (0.5 µm)
- **PERFECT CHIP CONTROL** | Thanks to specific geometry and greater coolant flow

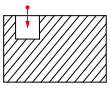
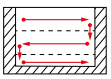
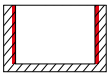


**COMPONENT**
Steering component

**MATERIAL**
X2CrNiMo18-14-3 / 1.4435 / AISI 316L

**MACHINING**
- ① Plunging
- ② Slotting
- ③ Finishing
- d = 6 mm | **.236"**
- Milling depth 14.4 mm | **.567"**

**MILLING TOOL**
Mikron Tool - CrazyMill Cool P&S

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyMill Cool P&S Square - Z3<br>- Carbide<br>- Coated<br>- Integrated cooling |
| Item number | 2.CMC42.A8Z3.600.1 |
| Cutting data | ① Plunging<br>$v_c$ = 160 m/min \| **525 SFM**<br>$f_{z,p}$ = 0.005 mm \| **.00020 IPT**<br>$a_p$ = 1 x d<br>  <br>② Slotting<br>$v_c$ = 160 m/min \| **525 SFM**<br>$f_{z,s}$ = 0.025 mm \| **.00098 IPT**<br>$a_p$ = 1 x d<br>  <br>③ Finishing<br>$v_c$ = 220 m/min \| **722 SFM**<br>$f_z$ = 0.026 mm \| **.00102 IPT**<br>$a_p$ = 2.5 x d<br>$a_e$ = 0.3 mm \| **.0118"**<br>  |

## 2.5 x d

### Type A

- Coated
- Through-tool cooling
- l1: 2.5xd, l2: 2.5xd





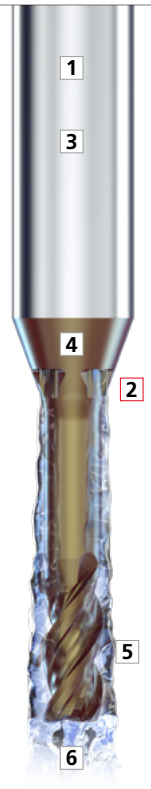
page 532

## 5 x d

### Type C

- Coated
- Through-tool cooling
- l1: 5xd, l2: 2xd




page 544

## PATENTED

**1 | SHANK**
The robust carbide shank guarantees stable and vibration-free milling. A high degree of precision and excellent surface quality is achieved.

**2 | INTEGRATED COOLING – PATENTED**
The integrated cooling channels guarantee constant and maximal cooling of the cutting edges and optimal chip removal. The result is higher cutting speed and depth as well as improved surface quality.

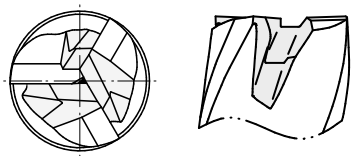
**3 | CARBIDE**
The specially developed micro-grain carbide meets all requirements in terms of mechanical properties.

**4 | COATING**
The high-performance eXedur SNP coating is heat and wear resistant, prevents material build-up on cutting edges and guarantees optimum chip flushing. The result is long tool life.

**5 | FLUTE GEOMETRY**
The specially designed flutes provide high stability and sufficient space for perfect chip evacuation.

**6 | GEOMETRY OF THE END FACE**
The specially designed expanded chip collection section in the end face guarantees good chip evacuation when plunging. A correction in the web prevents edge breakout, reduces the penetration force and increases tool life.

End face geometry - 3 Flute



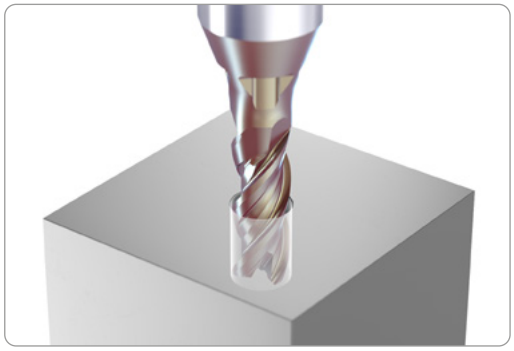
$l_1$ = Effective length  $l_2$ = Cutting length

CRAZYMILL by Mikron Tool Cool

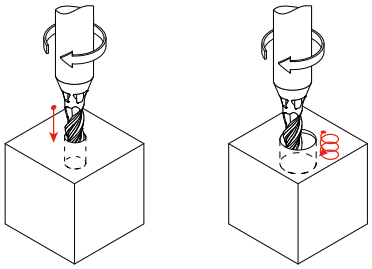
# NEW One tool for many applications

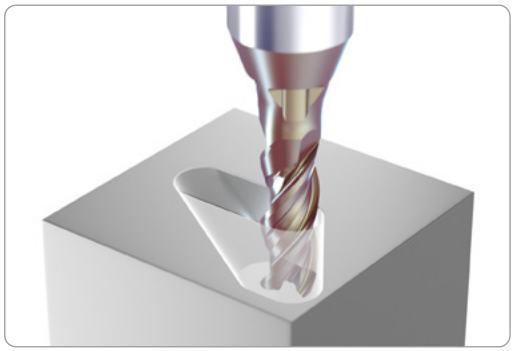
## FOR DIFFICULT TO MACHINE MATERIALS

**CrazyMill Cool P&S for:**

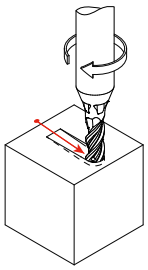


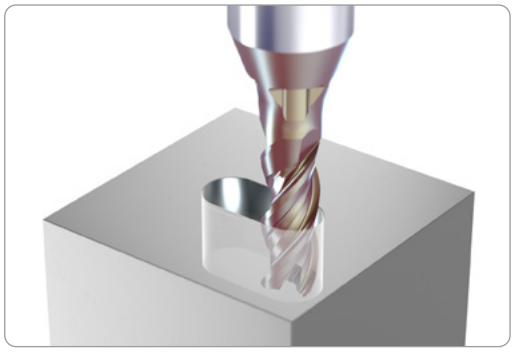
**1. Plunge milling**
Direct or with helical interpolation



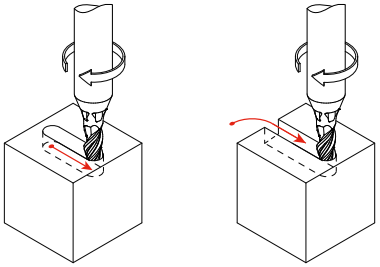


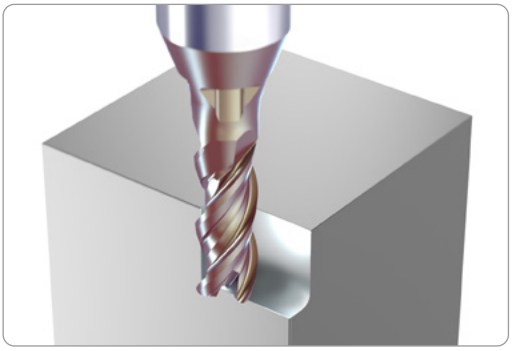
**2. Linear ramp milling**
Angle depending on material





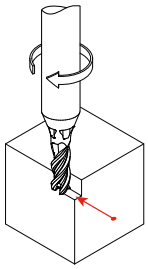
**3. Slot milling**
Pockets or through slots

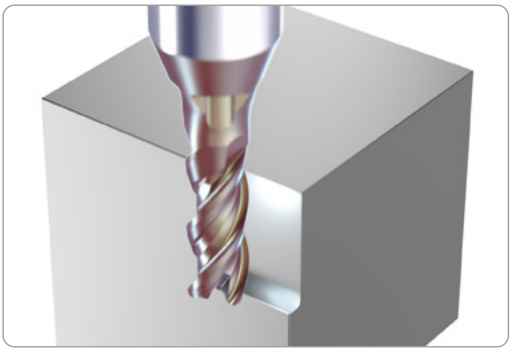




**4. Side milling - Semi-finishing**

$a_p$ = 1 - 2 x d

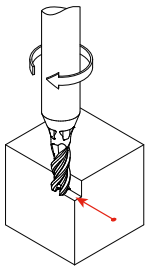




**5. Side milling - Finishing**

Type A: $a_p$ = 2.5 x d

Type C: $a_p$ = 2 x d



CRAZYMILL by Mikron Tool Cool

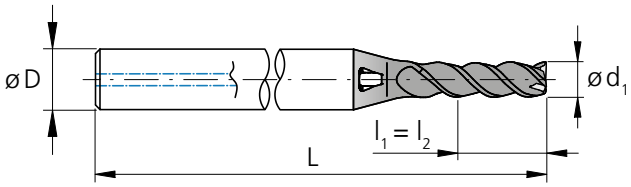
# Type A - 2.5 x d - Square - Z3

## MILLING WITH INTEGRATED COOLING

### Square



protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | **.098** | 2.50 | 2.50 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.100.1 | ■ |
| | **.043** | 1.1 | **.108** | 2.75 | 2.75 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.110.1 | ■ |
| | **.047** | 1.2 | **.118** | 3.00 | 3.00 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.120.1 | ■ |
| | **.051** | 1.3 | **.128** | 3.25 | 3.25 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.130.1 | ■ |
| | **.055** | 1.4 | **.138** | 3.50 | 3.50 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.140.1 | ■ |
| | **.059** | 1.5 | **.148** | 3.75 | 3.75 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.157** | 3.97 | 3.97 | 4 | **1.57** | 40 | 2.CMC.PSSAZ3.F116 | ■ |
| | **.063** | 1.6 | **.157** | 4.00 | 4.00 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.160.1 | ■ |
| | **.067** | 1.7 | **.167** | 4.25 | 4.25 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.170.1 | ■ |
| | **.071** | 1.8 | **.177** | 4.50 | 4.50 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.180.1 | ■ |
| | **.075** | 1.9 | **.187** | 4.75 | 4.75 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.190.1 | ■ |
| | **.079** | 2.0 | **.197** | 5.00 | 5.00 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.200.1 | ■ |
| | **.083** | 2.1 | **.207** | 5.25 | 5.25 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.210.1 | ■ |
| | **.087** | 2.2 | **.217** | 5.50 | 5.50 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.220.1 | ■ |
| | **.091** | 2.3 | **.226** | 5.75 | 5.75 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.230.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.236** | 5.95 | 5.95 | 4 | **1.57** | 40 | 2.CMC.PSSAZ3.F332 | ■ |
| | **.094** | 2.4 | **.236** | 6.00 | 6.00 | 4 | **1.57** | 40 | 2.CMC42.A8Z3.240.1 | ■ |
| | **.098** | 2.5 | **.246** | 6.25 | 6.25 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.250.1 | ■ |
| | **.102** | 2.6 | **.256** | 6.50 | 6.50 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.260.1 | ■ |
| | **.106** | 2.7 | **.266** | 6.75 | 6.75 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.270.1 | ■ |

■ Stock item

Carbide | 2.5xd1 | Z3 | 42° | eXedur SNP

| Ø $d_1$ | .004" - .118" (0.1 - 3.0 mm) | | .122" - .236" (3.1 - 6.0 mm) | | .240" - .315" (6.1 - 8.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | - .00055"<br>- .00110" | - 0.014 mm<br>- 0.028 mm | - .00079"<br>- .00150" | - 0.020 mm<br>- 0.038 mm | - .00098"<br>- .00185" | - 0.025 mm<br>- 0.047 mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.110** | 2.8 | **.276** | 7.00 | 7.00 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.280.1 | ■ |
| | **.114** | 2.9 | **.285** | 7.25 | 7.25 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.290.1 | ■ |
| | **.118** | 3.0 | **.295** | 7.50 | 7.50 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.300.1 | ■ |
| | **.122** | 3.1 | **.305** | 7.75 | 7.75 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.310.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.325** | 7.94 | 7.94 | 6 | **1.97** | 50 | 2.CMC.PSSAZ3.F18 | ■ |
| | **.130** | 3.3 | **.325** | 8.25 | 8.25 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.330.1 | ■ |
| | **.146** | 3.7 | **.364** | 9.25 | 9.25 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.370.1 | ■ |
| **5/32** | **.1562** | 3.968 | **.394** | 9.92 | 9.92 | 6 | **1.97** | 50 | 2.CMC.PSSAZ3.F532 | ■ |
| | **.157** | 4.0 | **.394** | 10.00 | 10.00 | 6 | **1.97** | 50 | 2.CMC42.A8Z3.400.1 | ■ |
| | **.169** | 4.3 | **.423** | 10.75 | 10.75 | 8 | **2.36** | 60 | 2.CMC42.A8Z3.430.1 | ■ |
| | **.185** | 4.7 | **.463** | 11.75 | 11.75 | 8 | **2.36** | 60 | 2.CMC42.A8Z3.470.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.472** | 11.91 | 11.91 | 8 | **2.36** | 60 | 2.CMC.PSSAZ3.F316 | ■ |
| | **.189** | 4.8 | **.472** | 12.00 | 12.00 | 8 | **2.36** | 60 | 2.CMC42.A8Z3.480.1 | ■ |
| | **.197** | 5.0 | **.492** | 12.50 | 12.50 | 8 | **2.36** | 60 | 2.CMC42.A8Z3.500.1 | ■ |
| | **.209** | 5.3 | **.522** | 13.25 | 13.25 | 10 | **2.56** | 65 | 2.CMC42.A8Z3.530.1 | ■ |
| **7/32** | **.2189** | 5.560 | **.561** | 13.90 | 13.90 | 10 | **2.56** | 65 | 2.CMC.PSSAZ3.F732 | ■ |
| | **.224** | 5.7 | **.561** | 14.25 | 14.25 | 10 | **2.56** | 65 | 2.CMC42.A8Z3.570.1 | ■ |
| | **.236** | 6.0 | **.591** | 15.00 | 15.00 | 10 | **2.56** | 65 | 2.CMC42.A8Z3.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **.625** | 15.88 | 15.88 | 10 | **2.56** | 65 | 2.CMC.PSSAZ3.F14 | ■ |
| | **.315** | 8.0 | **.787** | 20.00 | 20.00 | 12 | **2.76** | 70 | 2.CMC42.A8Z3.800.1 | ■ |

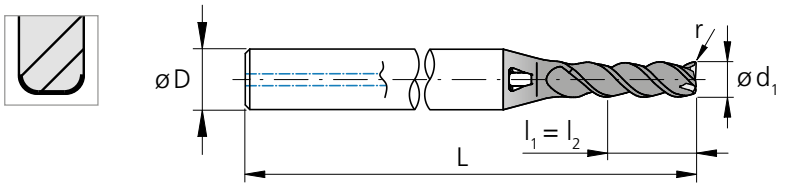
■ Stock item

CRAZYMILL by Mikron Tool Cool

# NEW Type A - 2.5 x d - Corner radius - Z3

## MILLING WITH INTEGRATED COOLING

### Corner radius




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .039 | 1.0 | .098 | 2.50 | 2.50 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.100.1 | ■ |
| | .039 | 1.0 | .098 | 2.50 | 2.50 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A3Z3.100.1 | ■ |
| | .043 | 1.1 | .108 | 2.75 | 2.75 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.110.1 | ■ |
| | .043 | 1.1 | .108 | 2.75 | 2.75 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A3Z3.110.1 | ■ |
| | .047 | 1.2 | .118 | 3.00 | 3.00 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.120.1 | ■ |
| | .047 | 1.2 | .118 | 3.00 | 3.00 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A3Z3.120.1 | ■ |
| | .051 | 1.3 | .128 | 3.25 | 3.25 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.130.1 | ■ |
| | .051 | 1.3 | .128 | 3.25 | 3.25 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A3Z3.130.1 | ■ |
| | .055 | 1.4 | .138 | 3.50 | 3.50 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.140.1 | ■ |
| | .055 | 1.4 | .138 | 3.50 | 3.50 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A3Z3.140.1 | ■ |
| | .059 | 1.5 | .148 | 3.75 | 3.75 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.150.1 | ■ |
| | .059 | 1.5 | .148 | 3.75 | 3.75 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.A3Z3.150.1 | ■ |
| 1/16 | .0625 | 1.587 | .157 | 3.97 | 3.97 | 4 | 1.57 | 40 | .0050 | 0.127 | 2.CMC.PSRA2Z3.F116 | ■ |
| 1/16 | .0625 | 1.587 | .157 | 3.97 | 3.97 | 4 | 1.57 | 40 | .0100 | 0.254 | 2.CMC.PSRA3Z3.F116 | ■ |
| | .063 | 1.6 | .157 | 4.00 | 4.00 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.160.1 | ■ |
| | .063 | 1.6 | .157 | 4.00 | 4.00 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.A3Z3.160.1 | ■ |
| | .067 | 1.7 | .167 | 4.25 | 4.25 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.170.1 | ■ |
| | .067 | 1.7 | .167 | 4.25 | 4.25 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.A3Z3.170.1 | ■ |
| | .071 | 1.8 | .177 | 4.50 | 4.50 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.180.1 | ■ |
| | .071 | 1.8 | .177 | 4.50 | 4.50 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.A3Z3.180.1 | ■ |
| | .075 | 1.9 | .187 | 4.75 | 4.75 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.190.1 | ■ |
| | .075 | 1.9 | .187 | 4.75 | 4.75 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.A3Z3.190.1 | ■ |
| | .079 | 2.0 | .197 | 5.00 | 5.00 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.A2Z3.200.1 | ■ |
| | .079 | 2.0 | .197 | 5.00 | 5.00 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A3Z3.200.1 | ■ |
| | .079 | 2.0 | .197 | 5.00 | 5.00 | 4 | 1.57 | 40 | .0197 | 0.50 | 2.CMC42.A4Z3.200.1 | ■ |
| | .083 | 2.1 | .207 | 5.25 | 5.25 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A2Z3.210.1 | ■ |
| | .083 | 2.1 | .207 | 5.25 | 5.25 | 4 | 1.57 | 40 | .0197 | 0.50 | 2.CMC42.A3Z3.210.1 | ■ |
| | .087 | 2.2 | .217 | 5.50 | 5.50 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A2Z3.220.1 | ■ |
| | .087 | 2.2 | .217 | 5.50 | 5.50 | 4 | 1.57 | 40 | .0197 | 0.50 | 2.CMC42.A3Z3.220.1 | ■ |
| | .091 | 2.3 | .226 | 5.75 | 5.75 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A2Z3.230.1 | ■ |
| | .091 | 2.3 | .226 | 5.75 | 5.75 | 4 | 1.57 | 40 | .0197 | 0.50 | 2.CMC42.A3Z3.230.1 | ■ |
| 3/32 | .0937 | 2.381 | .236 | 5.95 | 5.95 | 4 | 1.57 | 40 | .0050 | 0.127 | 2.CMC.PSRA2Z3.F332 | ■ |
| 3/32 | .0937 | 2.381 | .236 | 5.95 | 5.95 | 4 | 1.57 | 40 | .0100 | 0.254 | 2.CMC.PSRA3Z3.F332 | ■ |
| 3/32 | .0937 | 2.381 | .236 | 5.95 | 5.95 | 4 | 1.57 | 40 | .0150 | 0.381 | 2.CMC.PSRA4Z3.F332 | ■ |
| | .094 | 2.4 | .236 | 6.00 | 6.00 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.A2Z3.240.1 | ■ |
| | .094 | 2.4 | .236 | 6.00 | 6.00 | 4 | 1.57 | 40 | .0197 | 0.50 | 2.CMC42.A3Z3.240.1 | ■ |
| | .098 | 2.5 | .246 | 6.25 | 6.25 | 6 | 1.97 | 50 | .0079 | 0.20 | 2.CMC42.A2Z3.250.1 | ■ |
| | .098 | 2.5 | .246 | 6.25 | 6.25 | 6 | 1.97 | 50 | .0197 | 0.50 | 2.CMC42.A3Z3.250.1 | ■ |

■ Stock item

Carbide | 2.5xd1 | Z3 | 42° | eXedur SNP

| | | | | | | |
|---|---|---|---|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.122" - .236"** (3.1 - 6.0 mm) | | **.240" - .315"** (6.1 - 8.0 mm) | |
| Tolerance | **- .00055"**<br>**- .00110"** | - 0.014 mm<br>- 0.028 mm | **- .00079"**<br>**- .00150"** | - 0.020 mm<br>- 0.038 mm | **- .00098"**<br>**- .00185"** | - 0.025 mm<br>- 0.047 mm |

| | | |
|---|---|---|
| r | **.004" - .060"** (0.1 - 1.524 mm) | |
| Tolerance | **± .0020 · r inch** | ± 0.05 · r mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.102** | 2.6 | **.256** | 6.50 | 6.50 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC42.A2Z3.260.1 | ■ |
| | **.102** | 2.6 | **.256** | 6.50 | 6.50 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC42.A3Z3.260.1 | ■ |
| | **.106** | 2.7 | **.266** | 6.75 | 6.75 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC42.A2Z3.270.1 | ■ |
| | **.106** | 2.7 | **.266** | 6.75 | 6.75 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC42.A3Z3.270.1 | ■ |
| | **.110** | 2.8 | **.276** | 7.00 | 7.00 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC42.A2Z3.280.1 | ■ |
| | **.110** | 2.8 | **.276** | 7.00 | 7.00 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC42.A3Z3.280.1 | ■ |
| | **.114** | 2.9 | **.285** | 7.25 | 7.25 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC42.A2Z3.290.1 | ■ |
| | **.114** | 2.9 | **.285** | 7.25 | 7.25 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC42.A3Z3.290.1 | ■ |
| | **.118** | 3.0 | **.295** | 7.50 | 7.50 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC42.A2Z3.300.1 | ■ |
| | **.118** | 3.0 | **.295** | 7.50 | 7.50 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC42.A3Z3.300.1 | ■ |
| | **.122** | 3.1 | **.305** | 7.75 | 7.75 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC42.A2Z3.310.1 | ■ |
| | **.122** | 3.1 | **.305** | 7.75 | 7.75 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC42.A3Z3.310.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.325** | 7.94 | 7.94 | 6 | **1.97** | 50 | **.0100** | 0.254 | 2.CMC.PSRA2Z3.F18 | ■ |
| **1/8** | **.1250** | 3.175 | **.325** | 7.94 | 7.94 | 6 | **1.97** | 50 | **.0150** | 0.381 | 2.CMC.PSRA3Z3.F18 | ■ |
| | **.130** | 3.3 | **.325** | 8.25 | 8.25 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC42.A2Z3.330.1 | ■ |
| | **.130** | 3.3 | **.325** | 8.25 | 8.25 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC42.A3Z3.330.1 | ■ |
| | **.146** | 3.7 | **.364** | 9.25 | 9.25 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC42.A2Z3.370.1 | ■ |
| | **.146** | 3.7 | **.364** | 9.25 | 9.25 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC42.A3Z3.370.1 | ■ |
| **5/32** | **.1562** | 3.968 | **.394** | 9.92 | 9.92 | 6 | **1.97** | 50 | **.0100** | 0.254 | 2.CMC.PSRA2Z3.F532 | ■ |
| **5/32** | **.1562** | 3.968 | **.394** | 9.92 | 9.92 | 6 | **1.97** | 50 | **.0150** | 0.381 | 2.CMC.PSRA3Z3.F532 | ■ |
| | **.157** | 4.0 | **.394** | 10.00 | 10.00 | 6 | **1.97** | 50 | **.0079** | 0.20 | 2.CMC42.A2Z3.400.1 | ■ |
| | **.157** | 4.0 | **.394** | 10.00 | 10.00 | 6 | **1.97** | 50 | **.0197** | 0.50 | 2.CMC42.A3Z3.400.1 | ■ |
| | **.169** | 4.3 | **.423** | 10.75 | 10.75 | 8 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC42.A2Z3.430.1 | ■ |
| | **.169** | 4.3 | **.423** | 10.75 | 10.75 | 8 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC42.A3Z3.430.1 | ■ |
| | **.185** | 4.7 | **.463** | 11.75 | 11.75 | 8 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC42.A2Z3.470.1 | ■ |
| | **.185** | 4.7 | **.463** | 11.75 | 11.75 | 8 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC42.A3Z3.470.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.472** | 11.91 | 11.91 | 8 | **2.36** | 60 | **.0100** | 0.254 | 2.CMC.PSRA2Z3.F316 | ■ |
| **3/16** | **.1875** | 4.762 | **.472** | 11.91 | 11.91 | 8 | **2.36** | 60 | **.0150** | 0.381 | 2.CMC.PSRA3Z3.F316 | ■ |
| | **.189** | 4.8 | **.472** | 12.00 | 12.00 | 8 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC42.A2Z3.480.1 | ■ |
| | **.189** | 4.8 | **.472** | 12.00 | 12.00 | 8 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC42.A3Z3.480.1 | ■ |
| | **.197** | 5.0 | **.492** | 12.50 | 12.50 | 8 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC42.A2Z3.500.1 | ■ |
| | **.197** | 5.0 | **.492** | 12.50 | 12.50 | 8 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC42.A3Z3.500.1 | ■ |
| | **.209** | 5.3 | **.522** | 13.25 | 13.25 | 10 | **2.56** | 65 | **.0079** | 0.20 | 2.CMC42.A2Z3.530.1 | ■ |
| | **.209** | 5.3 | **.522** | 13.25 | 13.25 | 10 | **2.56** | 65 | **.0197** | 0.50 | 2.CMC42.A3Z3.530.1 | ■ |
| **7/32** | **.2189** | 5.560 | **.561** | 13.90 | 13.90 | 10 | **2.56** | 65 | **.0150** | 0.381 | 2.CMC.PSRA2Z3.F732 | ■ |
| **7/32** | **.2189** | 5.560 | **.561** | 13.90 | 13.90 | 10 | **2.56** | 65 | **.0300** | 0.762 | 2.CMC.PSRA3Z3.F732 | ■ |
| | **.224** | 5.7 | **.561** | 14.25 | 14.25 | 10 | **2.56** | 65 | **.0079** | 0.20 | 2.CMC42.A2Z3.570.1 | ■ |
| | **.224** | 5.7 | **.561** | 14.25 | 14.25 | 10 | **2.56** | 65 | **.0197** | 0.50 | 2.CMC42.A3Z3.570.1 | ■ |
| | **.236** | 6.0 | **.591** | 15.00 | 15.00 | 10 | **2.56** | 65 | **.0079** | 0.20 | 2.CMC42.A2Z3.600.1 | ■ |
| | **.236** | 6.0 | **.591** | 15.00 | 15.00 | 10 | **2.56** | 65 | **.0197** | 0.50 | 2.CMC42.A3Z3.600.1 | ■ |
| | **.236** | 6.0 | **.591** | 15.00 | 15.00 | 10 | **2.56** | 65 | **.0394** | 1.00 | 2.CMC42.A4Z3.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **.625** | 15.88 | 15.88 | 10 | **2.56** | 65 | **.0150** | 0.381 | 2.CMC.PSRA2Z3.F14 | ■ |
| **1/4** | **.2500** | 6.350 | **.625** | 15.88 | 15.88 | 10 | **2.56** | 65 | **.0300** | 0.762 | 2.CMC.PSRA3Z3.F14 | ■ |
| **1/4** | **.2500** | 6.350 | **.625** | 15.88 | 15.88 | 10 | **2.56** | 65 | **.0600** | 1.524 | 2.CMC.PSRA4Z3.F14 | ■ |
| | **.315** | 8.0 | **.787** | 20.00 | 20.00 | 12 | **2.76** | 70 | **.0079** | 0.20 | 2.CMC42.A2Z3.800.1 | ■ |
| | **.315** | 8.0 | **.787** | 20.00 | 20.00 | 12 | **2.76** | 70 | **.0197** | 0.50 | 2.CMC42.A3Z3.800.1 | ■ |
| | **.315** | 8.0 | **.787** | 20.00 | 20.00 | 12 | **2.76** | 70 | **.0591** | 1.50 | 2.CMC42.A4Z3.800.1 | ■ |

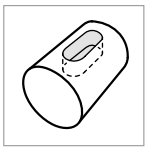
■ Stock item

CRAZYMILL by Mikron Tool Cool

# NEW Type A - Keyways - Plunge - Slot milling

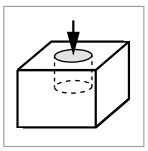
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Keyway slot milling**



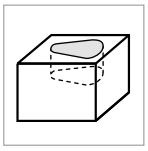
- $f_{z,p}$: for plunge milling
- $f_{z,s}$: for slot milling

**Plunge milling**



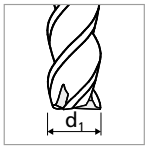
- $f_{z,p}$: for plunge milling

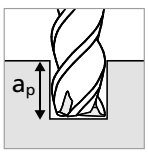
**Slot milling**



- $f_{z,p}$: for plunge milling
- $f_{z,s}$: for slot milling





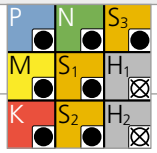

| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 100 **328** | 0.0013 **.00005** | 0.0046 **.00018** | 1xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 100 **328** | 0.0014 **.00006** | 0.0049 **.00019** | 1xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 100 **328** | 0.0012 **.00005** | 0.0042 **.00017** | 0.5xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 80 **262** | 0.0010 **.00004** | 0.0035 **.00014** | 1xd1 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 80 **262** | 0.0010 **.00004** | 0.0035 **.00014** | 0.5xd1 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 80 **262** | 0.0010 **.00004** | 0.0035 **.00014** | 0.5xd1 |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 80 **262** | 0.0010 **.00004** | 0.0035 **.00014** | 1xd1 |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 100 **328** | 0.0013 **.00005** | 0.0042 **.00017** | 1xd1 |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 1xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 1xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 1xd1 |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 1xd1 |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 1xd1 |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 40 **131** | 0.0010 **.00004** | 0.0035 **.00014** | 0.25xd1 |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 80 **262** | 0.0010 **.00004** | 0.0032 **.00012** | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 80 **262** | 0.0010 **.00004** | 0.0032 **.00012** | 0.25xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 **197** | 0.0010 **.00004** | 0.0035 **.00014** | 0.5xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]** $a_p$ [mm] | **[inch]**

$f_{z,p}$ [mm] | **[IPT]** $f_{z,s}$ [mm] | **[IPT]**

RECOMMENDATION FOR USE

● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





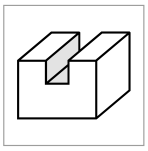

| Ød1 | 1/16" 1.5 mm \| .059" | | | | 3/32" 2.0 mm \| .079" | | | | 1/8" 3.0 mm \| .118" | | | | 5/32" 4.0 mm \| .157" | | | | 3/16" - 7/32" 5.0 mm \| .197" | | | | 1/4" 6.0 mm - 8.0 mm \| .236" - .315" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ |
| | 120<br>**394** | 0.0020<br>**.00008** | 0.0065<br>**.00026** | 1xd1 | 120<br>**394** | 0.0026<br>**.00010** | 0.0091<br>**.00036** | 1xd1 | 140<br>**459** | 0.004<br>**.00014** | 0.013<br>**.00051** | 1xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.020<br>**.00077** | 1xd1 | 150<br>**492** | 0.005<br>**.00020** | 0.026<br>**.00102** | 1xd1 | 160<br>**525** | 0.006<br>**.00024** | 0.033<br>**.00128** | 1xd1 |
| | 120<br>**394** | 0.0021<br>**.00008** | 0.0070<br>**.00028** | 1xd1 | 120<br>**394** | 0.0028<br>**.00011** | 0.0098<br>**.00039** | 1xd1 | 140<br>**459** | 0.004<br>**.00014** | 0.014<br>**.00055** | 1xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.021<br>**.00083** | 1xd1 | 150<br>**492** | 0.006<br>**.00022** | 0.027<br>**.00106** | 1xd1 | 160<br>**525** | 0.006<br>**.00024** | 0.034<br>**.00133** | 1xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0060<br>**.00024** | 0.5xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0084<br>**.00033** | 0.5xd1 | 140<br>**459** | 0.003<br>**.00012** | 0.012<br>**.00047** | 0.5xd1 | 140<br>**459** | 0.004<br>**.00016** | 0.017<br>**.00068** | 0.5xd1 | 150<br>**492** | 0.004<br>**.00016** | 0.022<br>**.00087** | 0.5xd1 | 160<br>**525** | 0.005<br>**.00020** | 0.028<br>**.00108** | 0.5xd1 |
| | 100<br>**328** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 1xd1 | 100<br>**328** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 1xd1 | 120<br>**394** | 0.003<br>**.00012** | 0.010<br>**.00039** | 1xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.015<br>**.00059** | 1xd1 | 130<br>**427** | 0.004<br>**.00016** | 0.020<br>**.00079** | 1xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.025<br>**.00098** | 1xd1 |
| | 100<br>**328** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.5xd1 | 100<br>**328** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.5xd1 | 120<br>**394** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.5xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.015<br>**.00059** | 0.5xd1 | 130<br>**427** | 0.004<br>**.00016** | 0.020<br>**.00079** | 0.5xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.025<br>**.00098** | 0.5xd1 |
| | 100<br>**328** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.5xd1 | 100<br>**328** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.5xd1 | 120<br>**394** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.5xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.015<br>**.00059** | 0.5xd1 | 130<br>**427** | 0.004<br>**.00016** | 0.020<br>**.00079** | 0.5xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.025<br>**.00098** | 0.5xd1 |
| | 100<br>**328** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 1xd1 | 100<br>**328** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 1xd1 | 120<br>**394** | 0.003<br>**.00012** | 0.010<br>**.00039** | 1xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.015<br>**.00059** | 1xd1 | 130<br>**427** | 0.004<br>**.00016** | 0.020<br>**.00079** | 1xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.025<br>**.00098** | 1xd1 |
| | 120<br>**394** | 0.0019<br>**.00007** | 0.0060<br>**.00024** | 1xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0084<br>**.00033** | 1xd1 | 140<br>**459** | 0.004<br>**.00014** | 0.012<br>**.00047** | 1xd1 | 140<br>**459** | 0.004<br>**.00016** | 0.017<br>**.00068** | 1xd1 | 150<br>**492** | 0.005<br>**.00019** | 0.022<br>**.00087** | 1xd1 | 160<br>**525** | 0.005<br>**.00020** | 0.028<br>**.00108** | 1xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 1xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 1xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 1xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 1xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 1xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 1xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 1xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 1xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 1xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 1xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 1xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 1xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 1xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 1xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 1xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 1xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 1xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 1xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 1xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 1xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 1xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 1xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 1xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 1xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 1xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 1xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 1xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 1xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 1xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 1xd1 |
| | 40<br>**131** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.25xd1 | 50<br>**164** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.25xd1 | 50<br>**164** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.25xd1 | 60<br>**197** | 0.004<br>**.00016** | 0.014<br>**.00053** | 0.25xd1 | 80<br>**262** | 0.004<br>**.00016** | 0.018<br>**.00071** | 0.25xd1 | 80<br>**262** | 0.005<br>**.00020** | 0.021<br>**.00084** | 0.25xd1 |
| | 90<br>**295** | 0.0014<br>**.00005** | 0.0045<br>**.00018** | 0.25xd1 | 100<br>**328** | 0.0018<br>**.00007** | 0.0063<br>**.00025** | 0.25xd1 | 110<br>**361** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.013<br>**.00050** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.016<br>**.00064** | 0.25xd1 | 120<br>**394** | 0.005<br>**.00020** | 0.019<br>**.00075** | 0.25xd1 |
| | 90<br>**295** | 0.0014<br>**.00005** | 0.0045<br>**.00018** | 0.25xd1 | 100<br>**328** | 0.0018<br>**.00007** | 0.0063<br>**.00025** | 0.25xd1 | 110<br>**361** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.013<br>**.00050** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.016<br>**.00064** | 0.25xd1 | 120<br>**394** | 0.005<br>**.00020** | 0.019<br>**.00075** | 0.25xd1 |
| | 60<br>**197** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.5xd1 | 80<br>**262** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.5xd1 | 80<br>**262** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.5xd1 | 100<br>**328** | 0.004<br>**.00016** | 0.014<br>**.00053** | 0.5xd1 | 100<br>**328** | 0.004<br>**.00016** | 0.018<br>**.00071** | 0.5xd1 | 120<br>**394** | 0.005<br>**.00020** | 0.021<br>**.00084** | 0.5xd1 |

CRAZYMILL by Mikron Tool Cool

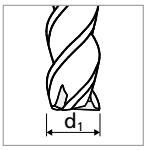
# NEW Type A - Milling of through slots

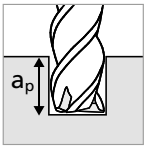
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Through slot milling**





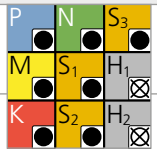



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_z$ | $a_p$ |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.009 **.00035** | 1xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.008 **.00032** | 1xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.006 **.00024** | 0.5xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 120 **394** | 0.009 **.00035** | 1xd1 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 120 **394** | 0.009 **.00035** | 1xd1 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 120 **394** | 0.009 **.00035** | 1xd1 |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 120 **394** | 0.007 **.00028** | 1xd1 |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.007 **.00028** | 1xd1 |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.010 **.00039** | 1xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.010 **.00039** | 1xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.012 **.00047** | 1xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.012 **.00047** | 1xd1 |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.012 **.00047** | 1xd1 |
| | | 2.1020 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.011 **.00043** | 1xd1 |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 80 **262** | 0.005 **.00020** | 0.5xd1 |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 100 **328** | 0.009 **.00035** | 0.5xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 100 **328** | 0.009 **.00035** | 0.5xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 80 **262** | 0.005 **.00020** | 0.5xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**
$a_p$ [mm] | **[inch]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



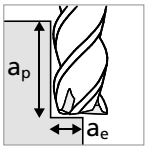

| Ød1 | 1/16" 1.5 mm \| .059" | | | 3/32" 2.0 mm \| .079" | | | 1/8" 3.0 mm \| .118" | | | 5/32" 4.0 mm \| .157" | | | 3/16" - 7/32" 5.0 mm \| .197" | | | 1/4" 6.0 mm - 8.0 mm \| .236" - .315" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ |
| | 180<br>**591** | 0.015<br>**.00059** | 1xd1 | 200<br>**656** | 0.020<br>**.00079** | 1xd1 | 220<br>**722** | 0.029<br>**.00114** | 1xd1 | 230<br>**755** | 0.031<br>**.00122** | 1xd1 | 240<br>**787** | 0.031<br>**.00122** | 1xd1 | 260<br>**853** | 0.032<br>**.00126** | 1xd1 |
| | 180<br>**591** | 0.013<br>**.00051** | 1xd1 | 200<br>**656** | 0.019<br>**.00075** | 1xd1 | 220<br>**722** | 0.028<br>**.00110** | 1xd1 | 230<br>**755** | 0.029<br>**.00114** | 1xd1 | 240<br>**787** | 0.030<br>**.00118** | 1xd1 | 260<br>**853** | 0.031<br>**.00122** | 1xd1 |
| | 180<br>**591** | 0.012<br>**.00047** | 0.5xd1 | 200<br>**656** | 0.017<br>**.00067** | 0.5xd1 | 220<br>**722** | 0.025<br>**.00098** | 0.5xd1 | 230<br>**755** | 0.026<br>**.00102** | 0.5xd1 | 240<br>**787** | 0.026<br>**.00102** | 0.5xd1 | 260<br>**853** | 0.027<br>**.00106** | 0.5xd1 |
| | 160<br>**525** | 0.015<br>**.00059** | 1xd1 | 180<br>**591** | 0.020<br>**.00079** | 1xd1 | 200<br>**656** | 0.028<br>**.00110** | 1xd1 | 200<br>**656** | 0.029<br>**.00114** | 1xd1 | 220<br>**722** | 0.030<br>**.00118** | 1xd1 | 240<br>**787** | 0.031<br>**.00122** | 1xd1 |
| | 160<br>**525** | 0.013<br>**.00051** | 1xd1 | 180<br>**591** | 0.019<br>**.00075** | 1xd1 | 200<br>**656** | 0.027<br>**.00106** | 1xd1 | 200<br>**656** | 0.028<br>**.00110** | 1xd1 | 220<br>**722** | 0.029<br>**.00114** | 1xd1 | 240<br>**787** | 0.029<br>**.00114** | 1xd1 |
| | 160<br>**525** | 0.013<br>**.00051** | 1xd1 | 180<br>**591** | 0.019<br>**.00075** | 1xd1 | 200<br>**656** | 0.027<br>**.00106** | 1xd1 | 200<br>**656** | 0.028<br>**.00110** | 1xd1 | 220<br>**722** | 0.029<br>**.00114** | 1xd1 | 240<br>**787** | 0.029<br>**.00114** | 1xd1 |
| | 160<br>**525** | 0.011<br>**.00043** | 1xd1 | 180<br>**591** | 0.017<br>**.00067** | 1xd1 | 200<br>**656** | 0.025<br>**.00098** | 1xd1 | 200<br>**656** | 0.027<br>**.00106** | 1xd1 | 220<br>**722** | 0.027<br>**.00106** | 1xd1 | 240<br>**787** | 0.028<br>**.00110** | 1xd1 |
| | 140<br>**459** | 0.015<br>**.00059** | 1xd1 | 160<br>**525** | 0.017<br>**.00067** | 1xd1 | 180<br>**591** | 0.025<br>**.00098** | 1xd1 | 200<br>**656** | 0.031<br>**.00122** | 1xd1 | 200<br>**656** | 0.031<br>**.00122** | 1xd1 | 200<br>**656** | 0.032<br>**.00126** | 1xd1 |
| | 180<br>**591** | 0.016<br>**.00063** | 1xd1 | 200<br>**656** | 0.021<br>**.00083** | 1xd1 | 220<br>**722** | 0.034<br>**.00134** | 1xd1 | 260<br>**853** | 0.035<br>**.00139** | 1xd1 | 300<br>**984** | 0.036<br>**.00142** | 1xd1 | 340<br>**1115** | 0.037<br>**.00146** | 1xd1 |
| | 180<br>**591** | 0.016<br>**.00063** | 1xd1 | 200<br>**656** | 0.021<br>**.00083** | 1xd1 | 220<br>**722** | 0.032<br>**.00126** | 1xd1 | 260<br>**853** | 0.034<br>**.00134** | 1xd1 | 300<br>**984** | 0.034<br>**.00134** | 1xd1 | 340<br>**1115** | 0.036<br>**.00142** | 1xd1 |
| | 180<br>**591** | 0.016<br>**.00063** | 1xd1 | 200<br>**656** | 0.021<br>**.00083** | 1xd1 | 220<br>**722** | 0.034<br>**.00134** | 1xd1 | 260<br>**853** | 0.035<br>**.00139** | 1xd1 | 300<br>**984** | 0.036<br>**.00142** | 1xd1 | 340<br>**1115** | 0.037<br>**.00146** | 1xd1 |
| | 180<br>**591** | 0.016<br>**.00063** | 1xd1 | 200<br>**656** | 0.021<br>**.00083** | 1xd1 | 220<br>**722** | 0.034<br>**.00134** | 1xd1 | 260<br>**853** | 0.035<br>**.00139** | 1xd1 | 300<br>**984** | 0.036<br>**.00142** | 1xd1 | 340<br>**1115** | 0.037<br>**.00146** | 1xd1 |
| | 180<br>**591** | 0.016<br>**.00063** | 1xd1 | 200<br>**656** | 0.021<br>**.00083** | 1xd1 | 220<br>**722** | 0.034<br>**.00134** | 1xd1 | 260<br>**853** | 0.035<br>**.00139** | 1xd1 | 300<br>**984** | 0.036<br>**.00142** | 1xd1 | 340<br>**1115** | 0.037<br>**.00146** | 1xd1 |
| | 180<br>**591** | 0.016<br>**.00063** | 1xd1 | 200<br>**656** | 0.021<br>**.00083** | 1xd1 | 220<br>**722** | 0.034<br>**.00134** | 1xd1 | 260<br>**853** | 0.035<br>**.00139** | 1xd1 | 300<br>**984** | 0.036<br>**.00142** | 1xd1 | 340<br>**1115** | 0.037<br>**.00146** | 1xd1 |
| | 80<br>**262** | 0.006<br>**.00024** | 0.5xd1 | 100<br>**328** | 0.007<br>**.00028** | 0.5xd1 | 100<br>**328** | 0.010<br>**.00039** | 0.5xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.5xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.5xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.5xd1 |
| | 100<br>**328** | 0.012<br>**.00047** | 0.5xd1 | 120<br>**394** | 0.017<br>**.00067** | 0.5xd1 | 120<br>**394** | 0.027<br>**.00106** | 0.5xd1 | 140<br>**459** | 0.027<br>**.00106** | 0.5xd1 | 140<br>**459** | 0.027<br>**.00106** | 0.5xd1 | 140<br>**459** | 0.028<br>**.00110** | 0.5xd1 |
| | 100<br>**328** | 0.012<br>**.00047** | 0.5xd1 | 120<br>**394** | 0.017<br>**.00067** | 0.5xd1 | 120<br>**394** | 0.027<br>**.00106** | 0.5xd1 | 140<br>**459** | 0.027<br>**.00106** | 0.5xd1 | 140<br>**459** | 0.027<br>**.00106** | 0.5xd1 | 140<br>**459** | 0.028<br>**.00110** | 0.5xd1 |
| | 80<br>**262** | 0.006<br>**.00024** | 0.5xd1 | 100<br>**328** | 0.007<br>**.00028** | 0.5xd1 | 100<br>**328** | 0.010<br>**.00039** | 0.5xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.5xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.5xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.5xd1 |

CRAZYMILL by Mikron Tool Cool

# NEW Type A - Side milling - Semi-finishing

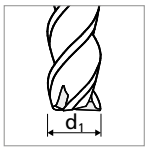
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Semi-finishing**




- $a_p = 1 \times d_1 - 2 \times d_1$
- $a_e = 0.2 \times d_1$

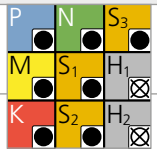





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.013 **.00051** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.012 **.00047** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.009 **.00035** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 120 **394** | 0.014 **.00055** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 120 **394** | 0.013 **.00051** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 120 **394** | 0.013 **.00051** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 120 **394** | 0.010 **.00039** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.009 **.00035** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.015 **.00059** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.015 **.00059** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.017 **.00067** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.017 **.00067** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.017 **.00067** |
| | | 2.1020 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.015 **.00059** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 80 **262** | 0.006 **.00024** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.014 **.00054** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.014 **.00054** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 80 **262** | 0.006 **.00024** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



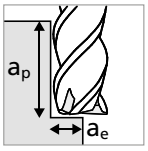

| Ød1 | 1/16" 1.5 mm \| .059" | | 3/32" 2.0 mm \| .079" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .157" | | 3/16" - 7/32" 5.0 mm \| .197" | | 1/4" 6.0 mm \| .236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.020<br>**.00079** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.037<br>**.00146** | 260<br>**853** | 0.040<br>**.00158** | 260<br>**853** | 0.040<br>**.00158** | 260<br>**853** | 0.043<br>**.00169** | 260<br>**853** | 0.051<br>**.00169** |
| | 200<br>**656** | 0.019<br>**.00075** | 220<br>**722** | 0.027<br>**.00106** | 240<br>**787** | 0.035<br>**.00138** | 260<br>**853** | 0.038<br>**.00150** | 260<br>**853** | 0.038<br>**.00150** | 260<br>**853** | 0.041<br>**.00161** | 260<br>**853** | 0.049<br>**.00193** |
| | 200<br>**656** | 0.017<br>**.00067** | 220<br>**722** | 0.026<br>**.00102** | 240<br>**787** | 0.032<br>**.00126** | 260<br>**853** | 0.034<br>**.00134** | 260<br>**853** | 0.034<br>**.00134** | 260<br>**853** | 0.036<br>**.00141** | 260<br>**853** | 0.043<br>**.00169** |
| | 180<br>**591** | 0.020<br>**.00079** | 200<br>**656** | 0.029<br>**.00114** | 200<br>**656** | 0.035<br>**.00138** | 220<br>**722** | 0.038<br>**.00150** | 240<br>**787** | 0.038<br>**.00150** | 240<br>**787** | 0.041<br>**.00161** | 240<br>**787** | 0.046<br>**.00161** |
| | 180<br>**591** | 0.019<br>**.00075** | 200<br>**656** | 0.027<br>**.00106** | 200<br>**656** | 0.035<br>**.00138** | 220<br>**722** | 0.037<br>**.00146** | 240<br>**787** | 0.037<br>**.00146** | 240<br>**787** | 0.039<br>**.00154** | 240<br>**787** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.019<br>**.00075** | 200<br>**656** | 0.027<br>**.00106** | 200<br>**656** | 0.035<br>**.00138** | 220<br>**722** | 0.037<br>**.00146** | 240<br>**787** | 0.037<br>**.00146** | 240<br>**787** | 0.039<br>**.00154** | 240<br>**787** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.032<br>**.00126** | 220<br>**722** | 0.035<br>**.00138** | 240<br>**787** | 0.035<br>**.00138** | 240<br>**787** | 0.037<br>**.00146** | 240<br>**787** | 0.043<br>**.00146** |
| | 140<br>**459** | 0.020<br>**.00079** | 160<br>**525** | 0.024<br>**.00095** | 180<br>**591** | 0.034<br>**.00134** | 200<br>**656** | 0.040<br>**.00158** | 200<br>**656** | 0.042<br>**.00165** | 200<br>**656** | 0.044<br>**.00173** | 200<br>**656** | 0.052<br>**.00173** |
| | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.031<br>**.00122** | 240<br>**787** | 0.046<br>**.00181** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** | 260<br>**853** | 0.063<br>**.00248** |
| | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.031<br>**.00122** | 240<br>**787** | 0.046<br>**.00181** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** | 260<br>**853** | 0.063<br>**.00248** |
| | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.031<br>**.00122** | 240<br>**787** | 0.046<br>**.00181** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** | 260<br>**853** | 0.063<br>**.00248** |
| | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.031<br>**.00122** | 240<br>**787** | 0.046<br>**.00181** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** | 260<br>**853** | 0.063<br>**.00248** |
| | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.031<br>**.00122** | 240<br>**787** | 0.046<br>**.00181** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** | 260<br>**853** | 0.063<br>**.00248** |
| | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.031<br>**.00122** | 240<br>**787** | 0.046<br>**.00181** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** | 260<br>**853** | 0.063<br>**.00248** |
| | 100<br>**328** | 0.008<br>**.00032** | 100<br>**328** | 0.009<br>**.00035** | 100<br>**328** | 0.012<br>**.00047** | 120<br>**394** | 0.016<br>**.00063** | 120<br>**394** | 0.016<br>**.00063** | 120<br>**394** | 0.017<br>**.00067** | 120<br>**394** | 0.018<br>**.00071** |
| | 120<br>**394** | 0.017<br>**.00067** | 130<br>**427** | 0.024<br>**.00095** | 130<br>**427** | 0.032<br>**.00126** | 150<br>**492** | 0.035<br>**.00138** | 150<br>**492** | 0.035<br>**.00138** | 150<br>**492** | 0.037<br>**.00146** | 150<br>**492** | 0.040<br>**.00146** |
| | 120<br>**394** | 0.017<br>**.00067** | 130<br>**427** | 0.024<br>**.00095** | 130<br>**427** | 0.032<br>**.00126** | 150<br>**492** | 0.035<br>**.00138** | 150<br>**492** | 0.035<br>**.00138** | 150<br>**492** | 0.037<br>**.00146** | 150<br>**492** | 0.040<br>**.00146** |
| | 100<br>**328** | 0.008<br>**.00032** | 100<br>**328** | 0.009<br>**.00035** | 100<br>**328** | 0.012<br>**.00047** | 120<br>**394** | 0.016<br>**.00063** | 120<br>**394** | 0.016<br>**.00063** | 120<br>**394** | 0.017<br>**.00067** | 120<br>**394** | 0.018<br>**.00071** |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

CRAZYMILL by Mikron Tool Cool

# NEW Type A - Side milling - Finishing

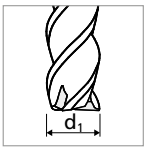
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Finishing**




- $a_p = 2.5 \times d_1$
- $a_e = 0.05 - 0.10 \times d_1$

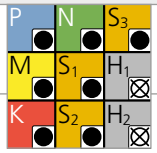





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 130 **425** | 0.008 **.00032** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 130 **425** | 0.007 **.00028** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 130 **425** | 0.006 **.00024** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 100 **328** | 0.008 **.00032** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 100 **328** | 0.008 **.00032** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 100 **328** | 0.008 **.00032** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 100 **328** | 0.006 **.00024** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 110 **361** | 0.006 **.00024** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 130 **425** | 0.009 **.00035** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 130 **425** | 0.009 **.00035** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 130 **425** | 0.010 **.00039** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 130 **425** | 0.010 **.00039** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 130 **425** | 0.010 **.00039** |
| | | 2.1020 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 130 **425** | 0.009 **.00035** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 110 **361** | 0.004 **.00016** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 110 **361** | 0.008 **.00032** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 110 **361** | 0.008 **.00032** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 110 **361** | 0.004 **.00016** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






| Ød1 | 1/16" 1.5 mm \| .059" | | 3/32" 2.0 mm \| .079" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .157" | | 3/16" - 7/32" 5.0 mm \| .197" | | 1/4" 6.0 mm \| .236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 180<br>**591** | 0.012<br>**.00047** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.023<br>**.000091** | 220<br>**772** | 0.025<br>**.00098** | 220<br>**772** | 0.028<br>**.00110** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.042<br>**.00165** |
| | 180<br>**591** | 0.011<br>**.00043** | 200<br>**656** | 0.016<br>**.00063** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**772** | 0.024<br>**.00095** | 220<br>**772** | 0.026<br>**.00102** | 220<br>**772** | 0.029<br>**.00114** | 220<br>**772** | 0.038<br>**.00150** |
| | 180<br>**591** | 0.010<br>**.00039** | 200<br>**656** | 0.015<br>**.00059** | 210<br>**688** | 0.020<br>**.00079** | 220<br>**772** | 0.021<br>**.00083** | 220<br>**772** | 0.023<br>**.00091** | 220<br>**772** | 0.025<br>**.00098** | 220<br>**772** | 0.034<br>**.00134** |
| | 150<br>**492** | 0.012<br>**.00047** | 170<br>**558** | 0.017<br>**.00067** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00095** | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.029<br>**.00114** | 200<br>**656** | 0.036<br>**.00142** |
| | 150<br>**492** | 0.011<br>**.00043** | 170<br>**558** | 0.016<br>**.00063** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.023<br>**.00091** | 200<br>**656** | 0.025<br>**.00098** | 200<br>**656** | 0.028<br>**.00110** | 200<br>**656** | 0.037<br>**.00146** |
| | 150<br>**492** | 0.011<br>**.00043** | 170<br>**558** | 0.016<br>**.00063** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.023<br>**.00091** | 200<br>**656** | 0.025<br>**.00098** | 200<br>**656** | 0.028<br>**.00110** | 200<br>**656** | 0.037<br>**.00146** |
| | 150<br>**492** | 0.008<br>**.00032** | 170<br>**558** | 0.015<br>**.00059** | 180<br>**591** | 0.020<br>**.00079** | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00095** | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.035<br>**.00138** |
| | 130<br>**427** | 0.012<br>**.00047** | 150<br>**492** | 0.014<br>**.00055** | 160<br>**525** | 0.022<br>**.00087** | 170<br>**558** | 0.025<br>**.00098** | 170<br>**558** | 0.029<br>**.00114** | 170<br>**558** | 0.031<br>**.00122** | 200<br>**656** | 0.040<br>**.00157** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 120<br>**394** | 0.005<br>**.00020** | 130<br>**427** | 0.005<br>**.00020** | 130<br>**427** | 0.008<br>**.00032** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.011<br>**.00043** | 150<br>**492** | 0.012<br>**.00047** | 160<br>**525** | 0.021<br>**.00083** |
| | 120<br>**394** | 0.010<br>**.00039** | 130<br>**427** | 0.014<br>**.00055** | 130<br>**427** | 0.020<br>**.00079** | 140<br>**459** | 0.022<br>**.00087** | 150<br>**492** | 0.024<br>**.00095** | 150<br>**492** | 0.026<br>**.00102** | 160<br>**525** | 0.035<br>**.00138** |
| | 120<br>**394** | 0.010<br>**.00039** | 130<br>**427** | 0.014<br>**.00055** | 130<br>**427** | 0.020<br>**.00079** | 140<br>**459** | 0.022<br>**.00087** | 150<br>**492** | 0.024<br>**.00095** | 150<br>**492** | 0.026<br>**.00102** | 160<br>**525** | 0.035<br>**.00138** |
| | 120<br>**394** | 0.005<br>**.00020** | 130<br>**427** | 0.005<br>**.00020** | 130<br>**427** | 0.008<br>**.00032** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.011<br>**.00043** | 150<br>**492** | 0.012<br>**.00047** | 160<br>**525** | 0.021<br>**.00083** |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

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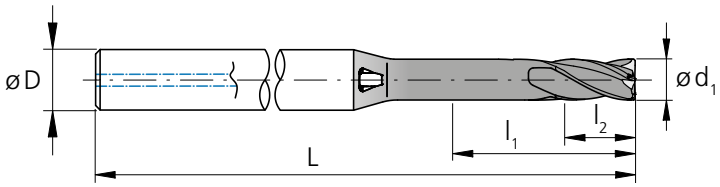
# Type C - 5 x d - Square - Z3

## MILLING WITH INTEGRATED COOLING

### Square



protection phase of 45°




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | **.197** | 5.00 | 2.00 | 4 | **1.57** | 40 | 2.CMC42.C1Z3.100.1 | ■ |
| | **.043** | 1.1 | **.217** | 5.50 | 2.20 | 4 | **1.57** | 40 | 2.CMC42.C1Z3.110.1 | ■ |
| | **.047** | 1.2 | **.236** | 6.00 | 2.40 | 4 | **1.57** | 40 | 2.CMC42.C1Z3.120.1 | ■ |
| | **.051** | 1.3 | **.256** | 6.50 | 2.60 | 4 | **1.57** | 40 | 2.CMC42.C1Z3.130.1 | ■ |
| | **.055** | 1.4 | **.276** | 7.00 | 2.80 | 4 | **1.57** | 40 | 2.CMC42.C1Z3.140.1 | ■ |
| | **.059** | 1.5 | **.295** | 7.50 | 3.00 | 4 | **1.57** | 40 | 2.CMC42.C1Z3.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | **.312** | 7.94 | 3.17 | 4 | **1.77** | 45 | 2.CMC.PSSCZ3.F116 | ■ |
| | **.063** | 1.6 | **.315** | 8.00 | 3.20 | 4 | **1.77** | 45 | 2.CMC42.C1Z3.160.1 | ■ |
| | **.067** | 1.7 | **.335** | 8.50 | 3.40 | 4 | **1.77** | 45 | 2.CMC42.C1Z3.170.1 | ■ |
| | **.071** | 1.8 | **.354** | 9.00 | 3.60 | 4 | **1.77** | 45 | 2.CMC42.C1Z3.180.1 | ■ |
| | **.075** | 1.9 | **.374** | 9.50 | 3.80 | 4 | **1.73** | 44 | 2.CMC42.C1Z3.190.1 | ■ |
| | **.079** | 2.0 | **.394** | 10.00 | 4.00 | 4 | **1.73** | 44 | 2.CMC42.C1Z3.200.1 | ■ |
| | **.083** | 2.1 | **.413** | 10.50 | 4.20 | 4 | **1.73** | 44 | 2.CMC42.C1Z3.210.1 | ■ |
| | **.087** | 2.2 | **.433** | 11.00 | 4.40 | 4 | **1.73** | 44 | 2.CMC42.C1Z3.220.1 | ■ |
| | **.091** | 2.3 | **.453** | 11.50 | 4.60 | 4 | **1.73** | 44 | 2.CMC42.C1Z3.230.1 | ■ |
| **3/32** | **.0937** | 2.381 | **.469** | 11.91 | 4.76 | 4 | **1.73** | 44 | 2.CMC.PSSCZ3.F332 | ■ |
| | **.094** | 2.4 | **.472** | 12.00 | 4.80 | 4 | **1.73** | 44 | 2.CMC42.C1Z3.240.1 | ■ |
| | **.098** | 2.5 | **.492** | 12.50 | 5.00 | 6 | **2.17** | 55 | 2.CMC42.C1Z3.250.1 | ■ |
| | **.102** | 2.6 | **.512** | 13.00 | 5.20 | 6 | **2.17** | 55 | 2.CMC42.C1Z3.260.1 | ■ |
| | **.106** | 2.7 | **.531** | 13.50 | 5.40 | 6 | **2.17** | 55 | 2.CMC42.C1Z3.270.1 | ■ |

■ Stock item

Carbide | 5xd$_1$ | Z3 | 42° | eXedur SNP

| Ø d$_1$ | .004" - .118" (0.1 - 3.0 mm) | | .122" - .236" (3.1 - 6.0 mm) | | .240" - .315" (6.1 - 8.0 mm) | |
|---|---|---|---|---|---|---|
| Tolerance | - .00055"<br>- .00110" | - 0.014 mm<br>- 0.028 mm | - .00079"<br>- .00150" | - 0.020 mm<br>- 0.038 mm | - .00098"<br>- .00185" | - 0.025 mm<br>- 0.047 mm |

| d$_1$ [inch] | d$_1$ [inch] | d$_1$ [mm] | l$_1$ [inch] | l$_1$ [mm] | l$_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| | .110 | 2.8 | .551 | 14.00 | 5.60 | 6 | 2.17 | 55 | 2.CMC42.C1Z3.280.1 | ■ |
| | .114 | 2.9 | .571 | 14.50 | 5.80 | 6 | 2.17 | 55 | 2.CMC42.C1Z3.290.1 | ■ |
| | .118 | 3.0 | .591 | 15.00 | 6.00 | 6 | 2.17 | 55 | 2.CMC42.C1Z3.300.1 | ■ |
| | .122 | 3.1 | .610 | 15.50 | 6.20 | 6 | 2.36 | 60 | 2.CMC42.C1Z3.310.1 | ■ |
| 1/8 | .1250 | 3.175 | .625 | 15.88 | 6.35 | 6 | 2.36 | 60 | 2.CMC.PSSCZ3.F18 | ■ |
| | .130 | 3.3 | .650 | 16.50 | 6.60 | 6 | 2.36 | 60 | 2.CMC42.C1Z3.330.1 | ■ |
| | .146 | 3.7 | .728 | 18.50 | 7.40 | 6 | 2.36 | 60 | 2.CMC42.C1Z3.370.1 | ■ |
| 5/32 | .1562 | 3.968 | .781 | 19.84 | 7.94 | 6 | 2.36 | 60 | 2.CMC.PSSCZ3.F532 | ■ |
| | .157 | 4.0 | .787 | 20.00 | 8.00 | 6 | 2.36 | 60 | 2.CMC42.C1Z3.400.1 | ■ |
| | .169 | 4.3 | .846 | 21.50 | 8.60 | 8 | 2.36 | 60 | 2.CMC42.C1Z3.430.1 | ■ |
| | .185 | 4.7 | .925 | 23.50 | 9.40 | 8 | 2.76 | 70 | 2.CMC42.C1Z3.470.1 | ■ |
| 3/16 | .1875 | 4.762 | .937 | 23.81 | 9.52 | 8 | 2.76 | 70 | 2.CMC.PSSCZ3.F316 | ■ |
| | .189 | 4.8 | .945 | 24.00 | 9.60 | 8 | 2.76 | 70 | 2.CMC42.C1Z3.480.1 | ■ |
| | .197 | 5.0 | .984 | 25.00 | 10.00 | 8 | 2.76 | 70 | 2.CMC42.C1Z3.500.1 | ■ |
| | .209 | 5.3 | 1.04 | 26.50 | 10.60 | 10 | 2.76 | 70 | 2.CMC42.C1Z3.530.1 | ■ |
| 7/32 | .2189 | 5.560 | 1.09 | 27.80 | 11.12 | 10 | 2.76 | 70 | 2.CMC.PSSCZ3.F732 | ■ |
| | .224 | 5.7 | 1.12 | 28.50 | 11.40 | 10 | 2.76 | 70 | 2.CMC42.C1Z3.570.1 | ■ |
| | .236 | 6.0 | 1.18 | 30.00 | 12.00 | 10 | 2.76 | 70 | 2.CMC42.C1Z3.600.1 | ■ |
| 1/4 | .2500 | 6.350 | 1.25 | 31.75 | 12.70 | 10 | 2.76 | 70 | 2.CMC.PSSCZ3.F14 | ■ |
| | .315 | 8.0 | 1.57 | 40.00 | 16.00 | 12 | 3.54 | 90 | 2.CMC42.C1Z3.800.1 | ■ |

■ Stock item

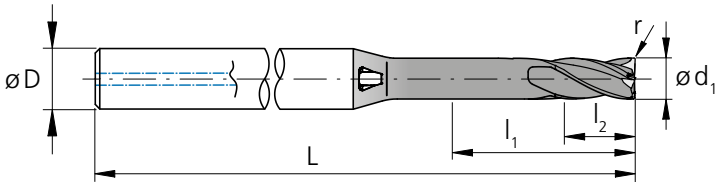
CRAZYMILL by Mikron Tool Cool

# NEW Type C - 5 x d - Corner radius - Z3

## MILLING WITH INTEGRATED COOLING

### Corner radius






$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .039 | 1.0 | .197 | 5.00 | 2.00 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.C2Z3.100.1 | ■ |
| | .039 | 1.0 | .197 | 5.00 | 2.00 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.C3Z3.100.1 | ■ |
| | .043 | 1.1 | .217 | 5.50 | 2.20 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.C2Z3.110.1 | ■ |
| | .043 | 1.1 | .217 | 5.50 | 2.20 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.C3Z3.110.1 | ■ |
| | .047 | 1.2 | .236 | 6.00 | 2.40 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.C2Z3.120.1 | ■ |
| | .047 | 1.2 | .236 | 6.00 | 2.40 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.C3Z3.120.1 | ■ |
| | .051 | 1.3 | .256 | 6.50 | 2.60 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.C2Z3.130.1 | ■ |
| | .051 | 1.3 | .256 | 6.50 | 2.60 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.C3Z3.130.1 | ■ |
| | .055 | 1.4 | .276 | 7.00 | 2.80 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.C2Z3.140.1 | ■ |
| | .055 | 1.4 | .276 | 7.00 | 2.80 | 4 | 1.57 | 40 | .0079 | 0.20 | 2.CMC42.C3Z3.140.1 | ■ |
| | .059 | 1.5 | .295 | 7.50 | 3.00 | 4 | 1.57 | 40 | .0039 | 0.10 | 2.CMC42.C2Z3.150.1 | ■ |
| | .059 | 1.5 | .295 | 7.50 | 3.00 | 4 | 1.57 | 40 | .0118 | 0.30 | 2.CMC42.C3Z3.150.1 | ■ |
| 1/16 | .0625 | 1.587 | .312 | 7.94 | 3.17 | 4 | 1.77 | 45 | .0050 | 0.127 | 2.CMC.PSRC2Z3.F116 | ■ |
| 1/16 | .0625 | 1.587 | .312 | 7.94 | 3.17 | 4 | 1.77 | 45 | .0100 | 0.254 | 2.CMC.PSRC3Z3.F116 | ■ |
| | .063 | 1.6 | .315 | 8.00 | 3.20 | 4 | 1.77 | 45 | .0039 | 0.10 | 2.CMC42.C2Z3.160.1 | ■ |
| | .063 | 1.6 | .315 | 8.00 | 3.20 | 4 | 1.77 | 45 | .0118 | 0.30 | 2.CMC42.C3Z3.160.1 | ■ |
| | .067 | 1.7 | .335 | 8.50 | 3.40 | 4 | 1.77 | 45 | .0039 | 0.10 | 2.CMC42.C2Z3.170.1 | ■ |
| | .067 | 1.7 | .335 | 8.50 | 3.40 | 4 | 1.77 | 45 | .0118 | 0.30 | 2.CMC42.C3Z3.170.1 | ■ |
| | .071 | 1.8 | .354 | 9.00 | 3.60 | 4 | 1.77 | 45 | .0039 | 0.10 | 2.CMC42.C2Z3.180.1 | ■ |
| | .071 | 1.8 | .354 | 9.00 | 3.60 | 4 | 1.77 | 45 | .0118 | 0.30 | 2.CMC42.C3Z3.180.1 | ■ |
| | .075 | 1.9 | .374 | 9.50 | 3.80 | 4 | 1.73 | 44 | .0039 | 0.10 | 2.CMC42.C2Z3.190.1 | ■ |
| | .075 | 1.9 | .374 | 9.50 | 3.80 | 4 | 1.73 | 44 | .0118 | 0.30 | 2.CMC42.C3Z3.190.1 | ■ |
| | .079 | 2.0 | .394 | 10.00 | 4.00 | 4 | 1.73 | 44 | .0039 | 0.10 | 2.CMC42.C2Z3.200.1 | ■ |
| | .079 | 2.0 | .394 | 10.00 | 4.00 | 4 | 1.73 | 44 | .0079 | 0.20 | 2.CMC42.C3Z3.200.1 | ■ |
| | .079 | 2.0 | .394 | 10.00 | 4.00 | 4 | 1.73 | 44 | .0197 | 0.50 | 2.CMC42.C4Z3.200.1 | ■ |
| | .083 | 2.1 | .413 | 10.50 | 4.20 | 4 | 1.73 | 44 | .0079 | 0.20 | 2.CMC42.C2Z3.210.1 | ■ |
| | .083 | 2.1 | .413 | 10.50 | 4.20 | 4 | 1.73 | 44 | .0197 | 0.50 | 2.CMC42.C3Z3.210.1 | ■ |
| | .087 | 2.2 | .433 | 11.00 | 4.40 | 4 | 1.73 | 44 | .0079 | 0.20 | 2.CMC42.C2Z3.220.1 | ■ |
| | .087 | 2.2 | .433 | 11.00 | 4.40 | 4 | 1.73 | 44 | .0197 | 0.50 | 2.CMC42.C3Z3.220.1 | ■ |
| | .091 | 2.3 | .453 | 11.50 | 4.60 | 4 | 1.73 | 44 | .0079 | 0.20 | 2.CMC42.C2Z3.230.1 | ■ |
| | .091 | 2.3 | .453 | 11.50 | 4.60 | 4 | 1.73 | 44 | .0197 | 0.50 | 2.CMC42.C3Z3.230.1 | ■ |
| 3/32 | .0937 | 2.381 | .469 | 11.91 | 4.76 | 4 | 1.73 | 44 | .0050 | 0.127 | 2.CMC.PSRC2Z3.F332 | ■ |
| 3/32 | .0937 | 2.381 | .469 | 11.91 | 4.76 | 4 | 1.73 | 44 | .0100 | 0.254 | 2.CMC.PSRC3Z3.F332 | ■ |
| 3/32 | .0937 | 2.381 | .469 | 11.91 | 4.76 | 4 | 1.73 | 44 | .0150 | 0.381 | 2.CMC.PSRC4Z3.F332 | ■ |
| | .094 | 2.4 | .472 | 12.00 | 4.80 | 4 | 1.73 | 44 | .0079 | 0.20 | 2.CMC42.C2Z3.240.1 | ■ |
| | .094 | 2.4 | .472 | 12.00 | 4.80 | 4 | 1.73 | 44 | .0197 | 0.50 | 2.CMC42.C3Z3.240.1 | ■ |
| | .098 | 2.5 | .492 | 12.50 | 5.00 | 6 | 2.17 | 55 | .0079 | 0.20 | 2.CMC42.C2Z3.250.1 | ■ |
| | .098 | 2.5 | .492 | 12.50 | 5.00 | 6 | 2.17 | 55 | .0197 | 0.50 | 2.CMC42.C3Z3.250.1 | ■ |

■ Stock item

Carbide | 5xd1 | Z3 | 42° | eXedur SNP

| | | | | | | |
|---|---|---|---|---|---|---|
| Ø $d_1$ | **.004" - .118"** (0.1 - 3.0 mm) | | **.122" - .236"** (3.1 - 6.0 mm) | | **.240" - .315"** (6.1 - 8.0 mm) | |
| Tolerance | **- .00055"**<br>**- .00110"** | - 0.014 mm<br>- 0.028 mm | **- .00079"**<br>**- .00150"** | - 0.020 mm<br>- 0.038 mm | **- .00098"**<br>**- .00185"** | - 0.025 mm<br>- 0.047 mm |

| | | |
|---|---|---|
| r | **.004" - .060"** (0.1 - 1.524 mm) | |
| Tolerance | **± .0020·r inch** | ± 0.05·r mm |

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | r [inch] | r [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.102** | 2.6 | **.512** | 13.00 | 5.20 | 6 | **2.17** | 55 | **.0079** | 0.20 | 2.CMC42.A2Z3.260.1 | ■ |
| | **.102** | 2.6 | **.512** | 13.00 | 5.20 | 6 | **2.17** | 55 | **.0197** | 0.50 | 2.CMC42.A3Z3.260.1 | ■ |
| | **.106** | 2.7 | **.531** | 13.50 | 5.40 | 6 | **2.17** | 55 | **.0079** | 0.20 | 2.CMC42.A2Z3.270.1 | ■ |
| | **.106** | 2.7 | **.531** | 13.50 | 5.40 | 6 | **2.17** | 55 | **.0197** | 0.50 | 2.CMC42.A3Z3.270.1 | ■ |
| | **.110** | 2.8 | **.551** | 14.00 | 5.60 | 6 | **2.17** | 55 | **.0079** | 0.20 | 2.CMC42.C2Z3.280.1 | ■ |
| | **.110** | 2.8 | **.551** | 14.00 | 5.60 | 6 | **2.17** | 55 | **.0197** | 0.50 | 2.CMC42.C3Z3.280.1 | ■ |
| | **.114** | 2.9 | **.571** | 14.50 | 5.80 | 6 | **2.17** | 55 | **.0079** | 0.20 | 2.CMC42.C2Z3.290.1 | ■ |
| | **.114** | 2.9 | **.571** | 14.50 | 5.80 | 6 | **2.17** | 55 | **.0197** | 0.50 | 2.CMC42.C3Z3.290.1 | ■ |
| | **.118** | 3.0 | **.591** | 15.00 | 6.00 | 6 | **2.17** | 55 | **.0079** | 0.20 | 2.CMC42.C2Z3.300.1 | ■ |
| | **.118** | 3.0 | **.591** | 15.00 | 6.00 | 6 | **2.17** | 55 | **.0197** | 0.50 | 2.CMC42.C3Z3.300.1 | ■ |
| | **.122** | 3.1 | **.610** | 15.50 | 6.20 | 6 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC42.C2Z3.310.1 | ■ |
| | **.122** | 3.1 | **.610** | 15.50 | 6.20 | 6 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC42.C3Z3.310.1 | ■ |
| **1/8** | **.1250** | 3.175 | **.625** | 15.88 | 6.35 | 6 | **2.36** | 60 | **.0100** | 0.254 | 2.CMC.PSRC2Z3.F18 | ■ |
| **1/8** | **.1250** | 3.175 | **.625** | 15.88 | 6.35 | 6 | **2.36** | 60 | **.0150** | 0.381 | 2.CMC.PSRC3Z3.F18 | ■ |
| | **.130** | 3.3 | **.650** | 16.50 | 6.60 | 6 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC42.C2Z3.330.1 | ■ |
| | **.130** | 3.3 | **.650** | 16.50 | 6.60 | 6 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC42.C3Z3.330.1 | ■ |
| | **.146** | 3.7 | **.728** | 18.50 | 7.40 | 6 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC42.C2Z3.370.1 | ■ |
| | **.146** | 3.7 | **.728** | 18.50 | 7.40 | 6 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC42.C3Z3.370.1 | ■ |
| **5/32** | **.1562** | 3.968 | **.781** | 19.84 | 7.94 | 6 | **2.36** | 60 | **.0100** | 0.254 | 2.CMC.PSRC2Z3.F532 | ■ |
| **5/32** | **.1562** | 3.968 | **.781** | 19.84 | 7.94 | 6 | **2.36** | 60 | **.0150** | 0.381 | 2.CMC.PSRC3Z3.F532 | ■ |
| | **.157** | 4.0 | **.787** | 20.00 | 8.00 | 6 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC42.C2Z3.400.1 | ■ |
| | **.157** | 4.0 | **.787** | 20.00 | 8.00 | 6 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC42.C3Z3.400.1 | ■ |
| | **.169** | 4.3 | **.846** | 21.50 | 8.60 | 8 | **2.36** | 60 | **.0079** | 0.20 | 2.CMC42.C2Z3.430.1 | ■ |
| | **.169** | 4.3 | **.846** | 21.50 | 8.60 | 8 | **2.36** | 60 | **.0197** | 0.50 | 2.CMC42.C3Z3.430.1 | ■ |
| | **.185** | 4.7 | **.925** | 23.50 | 9.40 | 8 | **2.76** | 70 | **.0079** | 0.20 | 2.CMC42.C2Z3.470.1 | ■ |
| | **.185** | 4.7 | **.925** | 23.50 | 9.40 | 8 | **2.76** | 70 | **.0197** | 0.50 | 2.CMC42.C3Z3.470.1 | ■ |
| **3/16** | **.1875** | 4.762 | **.937** | 23.81 | 9.52 | 8 | **2.76** | 70 | **.0100** | 0.254 | 2.CMC.PSRC2Z3.F316 | ■ |
| **3/16** | **.1875** | 4.762 | **.937** | 23.81 | 9.52 | 8 | **2.76** | 70 | **.0150** | 0.381 | 2.CMC.PSRC3Z3.F316 | ■ |
| | **.189** | 4.8 | **.945** | 24.00 | 9.60 | 8 | **2.76** | 70 | **.0079** | 0.20 | 2.CMC42.C2Z3.480.1 | ■ |
| | **.189** | 4.8 | **.945** | 24.00 | 9.60 | 8 | **2.76** | 70 | **.0197** | 0.50 | 2.CMC42.C3Z3.480.1 | ■ |
| | **.197** | 5.0 | **.984** | 25.00 | 10.00 | 8 | **2.76** | 70 | **.0079** | 0.20 | 2.CMC42.C2Z3.500.1 | ■ |
| | **.197** | 5.0 | **.984** | 25.00 | 10.00 | 8 | **2.76** | 70 | **.0197** | 0.50 | 2.CMC42.C3Z3.500.1 | ■ |
| | **.209** | 5.3 | **1.04** | 26.50 | 10.60 | 10 | **2.76** | 70 | **.0079** | 0.20 | 2.CMC42.C2Z3.530.1 | ■ |
| | **.209** | 5.3 | **1.04** | 26.50 | 10.60 | 10 | **2.76** | 70 | **.0197** | 0.50 | 2.CMC42.C3Z3.530.1 | ■ |
| **7/32** | **.2189** | 5.560 | **1.09** | 27.80 | 11.12 | 10 | **2.76** | 70 | **.0150** | 0.381 | 2.CMC.PSRC2Z3.F732 | ■ |
| **7/32** | **.2189** | 5.560 | **1.09** | 27.80 | 11.12 | 10 | **2.76** | 70 | **.0300** | 0.762 | 2.CMC.PSRC3Z3.F732 | ■ |
| | **.224** | 5.7 | **1.12** | 28.50 | 11.40 | 10 | **2.76** | 70 | **.0079** | 0.20 | 2.CMC42.C2Z3.570.1 | ■ |
| | **.224** | 5.7 | **1.12** | 28.50 | 11.40 | 10 | **2.76** | 70 | **.0197** | 0.50 | 2.CMC42.C3Z3.570.1 | ■ |
| | **.236** | 6.0 | **1.18** | 30.00 | 12.00 | 10 | **2.76** | 70 | **.0079** | 0.20 | 2.CMC42.C2Z3.600.1 | ■ |
| | **.236** | 6.0 | **1.18** | 30.00 | 12.00 | 10 | **2.76** | 70 | **.0197** | 0.50 | 2.CMC42.C3Z3.600.1 | ■ |
| | **.236** | 6.0 | **1.18** | 30.00 | 12.00 | 10 | **2.76** | 70 | **.0394** | 1.00 | 2.CMC42.C4Z3.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | **1.25** | 31.75 | 12.70 | 10 | **2.76** | 70 | **.0150** | 0.381 | 2.CMC.PSRC2Z3.F14 | ■ |
| **1/4** | **.2500** | 6.350 | **1.25** | 31.75 | 12.70 | 10 | **2.76** | 70 | **.0300** | 0.762 | 2.CMC.PSRC3Z3.F14 | ■ |
| **1/4** | **.2500** | 6.350 | **1.25** | 31.75 | 12.70 | 10 | **2.76** | 70 | **.0600** | 1.524 | 2.CMC.PSRC4Z3.F14 | ■ |
| | **.315** | 8.0 | **1.57** | 40.00 | 16.00 | 12 | **3.54** | 90 | **.0079** | 0.20 | 2.CMC42.C2Z3.800.1 | ■ |
| | **.315** | 8.0 | **1.57** | 40.00 | 16.00 | 12 | **3.54** | 90 | **.0197** | 0.50 | 2.CMC42.C3Z3.800.1 | ■ |
| | **.315** | 8.0 | **1.57** | 40.00 | 16.00 | 12 | **3.54** | 90 | **.0591** | 1.50 | 2.CMC42.C4Z3.800.1 | ■ |

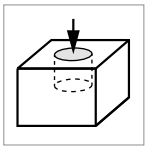
■ Stock item

CRAZYMILL by Mikron Tool Cool

# NEW Type C - Plunge - Slot milling

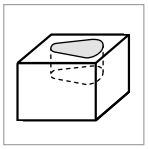
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Plunge milling**



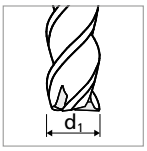
■ $f_{z,p}$: for plunge milling

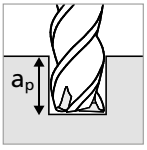
**Slot milling**



■ $f_{z,p}$: for plunge milling
■ $f_{z,s}$: for slot milling





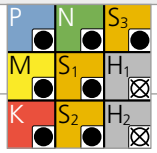

| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 100 **328** | 0.0013 **.00005** | 0.0046 **.00018** | 0.5xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 100 **328** | 0.0014 **.00006** | 0.0049 **.00019** | 0.5xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 100 **328** | 0.0012 **.00005** | 0.0042 **.00017** | 0.25xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 80 **262** | 0.0010 **.00004** | 0.0035 **.00014** | 0.5xd1 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 80 **262** | 0.0010 **.00004** | 0.0035 **.00014** | 0.25xd1 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 80 **262** | 0.0010 **.00004** | 0.0035 **.00014** | 0.25xd1 |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 80 **262** | 0.0010 **.00004** | 0.0035 **.00014** | 0.5xd1 |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 100 **328** | 0.0013 **.00005** | 0.0042 **.00017** | 0.5xd1 |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 0.5xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 0.5xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 0.5xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 0.5xd1 |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 0.5xd1 |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 100 **328** | 0.0012 **.00005** | 0.0100 **.00039** | 0.5xd1 |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 40 **131** | 0.0010 **.00004** | 0.0035 **.00014** | 0.25xd1 |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 80 **262** | 0.0010 **.00004** | 0.0032 **.00012** | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 80 **262** | 0.0010 **.00004** | 0.0032 **.00012** | 0.25xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 **197** | 0.0010 **.00004** | 0.0035 **.00014** | 0.25xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]** $a_p$ [mm] | **[inch]**

$f_{z,p}$ [mm] | **[IPT]** $f_{z,s}$ [mm] | **[IPT]**

RECOMMENDATION FOR USE

● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





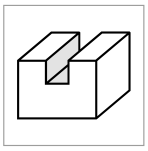

| Ød1 | 1/16" 1.5 mm \| .059" | | | | 3/32" 2.0 mm \| .079" | | | | 1/8" 3.0 mm \| .118" | | | | 5/32" 4.0 mm \| .157" | | | | 3/16" - 7/32" 5.0 mm \| .197" | | | | 1/4" 6.0 mm - 8.0 mm \| .236" - .315" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ | $v_c$ | $f_{z,p}$ | $f_{z,s}$ | $a_p$ |
| | 120<br>**394** | 0.0020<br>**.00008** | 0.0065<br>**.00026** | 0.5xd1 | 120<br>**394** | 0.0026<br>**.00010** | 0.0091<br>**.00036** | 0.5xd1 | 140<br>**459** | 0.004<br>**.00014** | 0.013<br>**.00051** | 0.5xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.020<br>**.00077** | 0.5xd1 | 150<br>**492** | 0.005<br>**.00020** | 0.026<br>**.00102** | 0.5xd1 | 160<br>**525** | 0.006<br>**.00024** | 0.033<br>**.00128** | 0.5xd1 |
| | 120<br>**394** | 0.0021<br>**.00008** | 0.0070<br>**.00028** | 0.5xd1 | 120<br>**394** | 0.0028<br>**.00011** | 0.0098<br>**.00039** | 0.5xd1 | 140<br>**459** | 0.004<br>**.00014** | 0.014<br>**.00055** | 0.5xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.021<br>**.00083** | 0.5xd1 | 150<br>**492** | 0.006<br>**.00022** | 0.027<br>**.00106** | 0.5xd1 | 160<br>**525** | 0.006<br>**.00024** | 0.034<br>**.00133** | 0.5xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0060<br>**.00024** | 0.25xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0084<br>**.00033** | 0.25xd1 | 140<br>**459** | 0.003<br>**.00012** | 0.012<br>**.00047** | 0.25xd1 | 140<br>**459** | 0.004<br>**.00016** | 0.017<br>**.00068** | 0.25xd1 | 150<br>**492** | 0.004<br>**.00016** | 0.022<br>**.00087** | 0.25xd1 | 160<br>**525** | 0.005<br>**.00020** | 0.028<br>**.00108** | 0.25xd1 |
| | 100<br>**328** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.5xd1 | 100<br>**328** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.5xd1 | 120<br>**394** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.5xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.015<br>**.00059** | 0.5xd1 | 130<br>**427** | 0.004<br>**.00016** | 0.020<br>**.00079** | 0.5xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.025<br>**.00098** | 0.5xd1 |
| | 100<br>**328** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.25xd1 | 100<br>**328** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.25xd1 | 120<br>**394** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.015<br>**.00059** | 0.25xd1 | 130<br>**427** | 0.004<br>**.00016** | 0.020<br>**.00079** | 0.25xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.025<br>**.00098** | 0.25xd1 |
| | 100<br>**328** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.25xd1 | 100<br>**328** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.25xd1 | 120<br>**394** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.015<br>**.00059** | 0.25xd1 | 130<br>**427** | 0.004<br>**.00016** | 0.020<br>**.00079** | 0.25xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.025<br>**.00098** | 0.25xd1 |
| | 100<br>**328** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.5xd1 | 100<br>**328** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.5xd1 | 120<br>**394** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.5xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.015<br>**.00059** | 0.5xd1 | 130<br>**427** | 0.004<br>**.00016** | 0.020<br>**.00079** | 0.5xd1 | 140<br>**459** | 0.005<br>**.00020** | 0.025<br>**.00098** | 0.5xd1 |
| | 120<br>**394** | 0.0019<br>**.00007** | 0.0060<br>**.00024** | 0.5xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0084<br>**.00033** | 0.5xd1 | 140<br>**459** | 0.004<br>**.00014** | 0.012<br>**.00047** | 0.5xd1 | 140<br>**459** | 0.004<br>**.00016** | 0.017<br>**.00068** | 0.5xd1 | 150<br>**492** | 0.005<br>**.00019** | 0.022<br>**.00087** | 0.5xd1 | 160<br>**525** | 0.005<br>**.00020** | 0.028<br>**.00108** | 0.5xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 0.5xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 0.5xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 0.5xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 0.5xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 0.5xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 0.5xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 0.5xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 0.5xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 0.5xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 0.5xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 0.5xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 0.5xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 0.5xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 0.5xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 0.5xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 0.5xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 0.5xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 0.5xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 0.5xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 0.5xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 0.5xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 0.5xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 0.5xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 0.5xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 0.5xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 0.5xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 0.5xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 0.5xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 0.5xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 0.5xd1 |
| | 120<br>**394** | 0.0018<br>**.00007** | 0.0160<br>**.00063** | 0.5xd1 | 120<br>**394** | 0.0024<br>**.00009** | 0.0210<br>**.00083** | 0.5xd1 | 150<br>**492** | 0.004<br>**.00014** | 0.034<br>**.00134** | 0.5xd1 | 160<br>**525** | 0.004<br>**.00016** | 0.035<br>**.00138** | 0.5xd1 | 170<br>**558** | 0.005<br>**.00019** | 0.036<br>**.00142** | 0.5xd1 | 180<br>**591** | 0.005<br>**.00020** | 0.037<br>**.00146** | 0.5xd1 |
| | 40<br>**131** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.25xd1 | 50<br>**164** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.25xd1 | 50<br>**164** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.25xd1 | 60<br>**197** | 0.004<br>**.00016** | 0.014<br>**.00053** | 0.25xd1 | 80<br>**262** | 0.004<br>**.00016** | 0.018<br>**.00071** | 0.25xd1 | 80<br>**262** | 0.005<br>**.00020** | 0.021<br>**.00084** | 0.25xd1 |
| | 90<br>**295** | 0.0014<br>**.00005** | 0.0045<br>**.00018** | 0.25xd1 | 100<br>**328** | 0.0018<br>**.00007** | 0.0063<br>**.00025** | 0.25xd1 | 110<br>**361** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.013<br>**.00050** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.016<br>**.00064** | 0.25xd1 | 120<br>**394** | 0.005<br>**.00020** | 0.019<br>**.00075** | 0.25xd1 |
| | 90<br>**295** | 0.0014<br>**.00005** | 0.0045<br>**.00018** | 0.25xd1 | 100<br>**328** | 0.0018<br>**.00007** | 0.0063<br>**.00025** | 0.25xd1 | 110<br>**361** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.013<br>**.00050** | 0.25xd1 | 120<br>**394** | 0.004<br>**.00016** | 0.016<br>**.00064** | 0.25xd1 | 120<br>**394** | 0.005<br>**.00020** | 0.019<br>**.00075** | 0.25xd1 |
| | 60<br>**197** | 0.0015<br>**.00006** | 0.0050<br>**.00020** | 0.25xd1 | 80<br>**262** | 0.0020<br>**.00008** | 0.0070<br>**.00028** | 0.25xd1 | 80<br>**262** | 0.003<br>**.00012** | 0.010<br>**.00039** | 0.25xd1 | 100<br>**328** | 0.004<br>**.00016** | 0.014<br>**.00053** | 0.25xd1 | 100<br>**328** | 0.004<br>**.00016** | 0.018<br>**.00071** | 0.25xd1 | 120<br>**394** | 0.005<br>**.00020** | 0.021<br>**.00084** | 0.25xd1 |

CRAZYMILL by Mikron Tool Cool

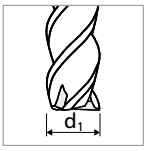
# NEW Type C - Milling of through slots

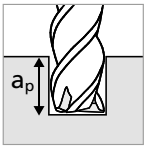
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Through slot milling**





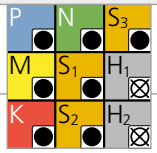



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_z$ | $a_p$ |
|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 120 **394** | 0.009 **.00035** | 0.5xd1 |
| | | 1.0401 | C15 | AISI 1015 | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 120 **394** | 0.008 **.00032** | 0.5xd1 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 120 **394** | 0.006 **.00024** | 0.25xd1 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 100 **328** | 0.009 **.00035** | 0.5xd1 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 100 **328** | 0.009 **.00035** | 0.5xd1 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 100 **328** | 0.009 **.00035** | 0.5xd1 |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 100 **328** | 0.007 **.00028** | 0.5xd1 |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 100 **328** | 0.007 **.00028** | 0.5xd1 |
| | | 0.6030 | GG30 | ASTM 40B | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 170 **558** | 0.010 **.00039** | 0.5xd1 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 170 **558** | 0.010 **.00039** | 0.5xd1 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 170 **558** | 0.012 **.00047** | 0.5xd1 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 170 **558** | 0.012 **.00047** | 0.5xd1 |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 170 **558** | 0.012 **.00047** | 0.5xd1 |
| | | 2.1020 | CuSn6 | UNS C51900 | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 170 **558** | 0.011 **.00043** | 0.5xd1 |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 80 **262** | 0.005 **.00020** | 0.25xd1 |
| | | 2.4668 | | Inconel 718 | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 80 **262** | 0.009 **.00035** | 0.25xd1 |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 80 **262** | 0.009 **.00035** | 0.25xd1 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 80 **262** | 0.005 **.00020** | 0.25xd1 |
| | | | CrCoMo28 | ASTM F1537 | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**
$a_p$ [mm] | **[inch]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





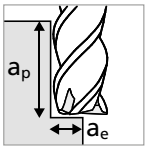

| Ød1 | 1/16" 1.5 mm \| .059" | | | 3/32" 2.0 mm \| .079" | | | 1/8" 3.0 mm \| .118" | | | 5/32" 4.0 mm \| .157" | | | 3/16" - 7/32" 5.0 mm \| .197" | | | 1/4" 6.0 mm - 8.0 mm \| .236" - .315" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ | $v_c$ | $f_z$ | $a_p$ |
| | 140<br>**459** | 0.015<br>**.00059** | 0.5xd1 | 160<br>**525** | 0.020<br>**.00079** | 0.5xd1 | 180<br>**591** | 0.029<br>**.00114** | 0.5xd1 | 200<br>**656** | 0.031<br>**.00122** | 0.5xd1 | 200<br>**656** | 0.031<br>**.00122** | 0.5xd1 | 220<br>**722** | 0.032<br>**.00126** | 0.5xd1 |
| | 140<br>**459** | 0.013<br>**.00051** | 0.5xd1 | 160<br>**525** | 0.019<br>**.00075** | 0.5xd1 | 180<br>**591** | 0.028<br>**.00110** | 0.5xd1 | 200<br>**656** | 0.029<br>**.00114** | 0.5xd1 | 200<br>**656** | 0.030<br>**.00118** | 0.5xd1 | 220<br>**722** | 0.031<br>**.00122** | 0.5xd1 |
| | 140<br>**459** | 0.012<br>**.00047** | 0.25xd1 | 160<br>**525** | 0.017<br>**.00067** | 0.25xd1 | 180<br>**591** | 0.025<br>**.00098** | 0.25xd1 | 200<br>**656** | 0.026<br>**.00102** | 0.25xd1 | 200<br>**656** | 0.026<br>**.00102** | 0.25xd1 | 220<br>**722** | 0.027<br>**.00106** | 0.25xd1 |
| | 120<br>**394** | 0.015<br>**.00059** | 0.5xd1 | 140<br>**459** | 0.020<br>**.00079** | 0.5xd1 | 160<br>**525** | 0.028<br>**.00110** | 0.5xd1 | 180<br>**591** | 0.029<br>**.00114** | 0.5xd1 | 180<br>**591** | 0.030<br>**.00118** | 0.5xd1 | 200<br>**656** | 0.031<br>**.00122** | 0.5xd1 |
| | 120<br>**394** | 0.013<br>**.00051** | 0.5xd1 | 140<br>**459** | 0.019<br>**.00075** | 0.5xd1 | 160<br>**525** | 0.027<br>**.00106** | 0.5xd1 | 180<br>**591** | 0.028<br>**.00110** | 0.5xd1 | 180<br>**591** | 0.029<br>**.00114** | 0.5xd1 | 200<br>**656** | 0.029<br>**.00114** | 0.5xd1 |
| | 120<br>**394** | 0.013<br>**.00051** | 0.5xd1 | 140<br>**459** | 0.019<br>**.00075** | 0.5xd1 | 160<br>**525** | 0.027<br>**.00106** | 0.5xd1 | 180<br>**591** | 0.028<br>**.00110** | 0.5xd1 | 180<br>**591** | 0.029<br>**.00114** | 0.5xd1 | 200<br>**656** | 0.029<br>**.00114** | 0.5xd1 |
| | 120<br>**394** | 0.011<br>**.00043** | 0.5xd1 | 140<br>**459** | 0.017<br>**.00067** | 0.5xd1 | 160<br>**525** | 0.025<br>**.00098** | 0.5xd1 | 180<br>**591** | 0.027<br>**.00106** | 0.5xd1 | 180<br>**591** | 0.027<br>**.00106** | 0.5xd1 | 200<br>**656** | 0.028<br>**.00110** | 0.5xd1 |
| | 120<br>**394** | 0.015<br>**.00059** | 0.5xd1 | 140<br>**459** | 0.017<br>**.00067** | 0.5xd1 | 160<br>**525** | 0.025<br>**.00098** | 0.5xd1 | 180<br>**591** | 0.031<br>**.00122** | 0.5xd1 | 200<br>**656** | 0.031<br>**.00122** | 0.5xd1 | 200<br>**656** | 0.032<br>**.00126** | 0.5xd1 |
| | 190<br>**623** | 0.016<br>**.00063** | 0.5xd1 | 210<br>**689** | 0.021<br>**.00083** | 0.5xd1 | 230<br>**755** | 0.034<br>**.00134** | 0.5xd1 | 250<br>**820** | 0.035<br>**.00139** | 0.5xd1 | 250<br>**820** | 0.036<br>**.00142** | 0.5xd1 | 270<br>**886** | 0.037<br>**.00146** | 0.5xd1 |
| | 190<br>**623** | 0.016<br>**.00063** | 0.5xd1 | 210<br>**689** | 0.021<br>**.00083** | 0.5xd1 | 230<br>**755** | 0.032<br>**.00126** | 0.5xd1 | 250<br>**820** | 0.034<br>**.00134** | 0.5xd1 | 250<br>**820** | 0.034<br>**.00134** | 0.5xd1 | 270<br>**886** | 0.036<br>**.00142** | 0.5xd1 |
| | 190<br>**623** | 0.016<br>**.00063** | 0.5xd1 | 210<br>**689** | 0.021<br>**.00083** | 0.5xd1 | 230<br>**755** | 0.034<br>**.00134** | 0.5xd1 | 250<br>**820** | 0.035<br>**.00139** | 0.5xd1 | 250<br>**820** | 0.036<br>**.00142** | 0.5xd1 | 270<br>**886** | 0.037<br>**.00146** | 0.5xd1 |
| | 190<br>**623** | 0.016<br>**.00063** | 0.5xd1 | 210<br>**689** | 0.021<br>**.00083** | 0.5xd1 | 230<br>**755** | 0.034<br>**.00134** | 0.5xd1 | 250<br>**820** | 0.035<br>**.00139** | 0.5xd1 | 250<br>**820** | 0.036<br>**.00142** | 0.5xd1 | 270<br>**886** | 0.037<br>**.00146** | 0.5xd1 |
| | 190<br>**623** | 0.016<br>**.00063** | 0.5xd1 | 210<br>**689** | 0.021<br>**.00083** | 0.5xd1 | 230<br>**755** | 0.034<br>**.00134** | 0.5xd1 | 250<br>**820** | 0.035<br>**.00139** | 0.5xd1 | 250<br>**820** | 0.036<br>**.00142** | 0.5xd1 | 270<br>**886** | 0.037<br>**.00146** | 0.5xd1 |
| | 190<br>**623** | 0.016<br>**.00063** | 0.5xd1 | 210<br>**689** | 0.021<br>**.00083** | 0.5xd1 | 230<br>**755** | 0.034<br>**.00134** | 0.5xd1 | 250<br>**820** | 0.035<br>**.00139** | 0.5xd1 | 250<br>**820** | 0.036<br>**.00142** | 0.5xd1 | 270<br>**886** | 0.037<br>**.00146** | 0.5xd1 |
| | 80<br>**262** | 0.006<br>**.00024** | 0.25xd1 | 100<br>**328** | 0.007<br>**.00028** | 0.25xd1 | 100<br>**328** | 0.010<br>**.00039** | 0.25xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.25xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.25xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.25xd1 |
| | 80<br>**262** | 0.012<br>**.00047** | 0.25xd1 | 100<br>**328** | 0.017<br>**.00067** | 0.25xd1 | 100<br>**328** | 0.027<br>**.00106** | 0.25xd1 | 120<br>**394** | 0.027<br>**.00106** | 0.25xd1 | 120<br>**394** | 0.027<br>**.00106** | 0.25xd1 | 140<br>**459** | 0.028<br>**.00110** | 0.25xd1 |
| | 80<br>**262** | 0.012<br>**.00047** | 0.25xd1 | 100<br>**328** | 0.017<br>**.00067** | 0.25xd1 | 100<br>**328** | 0.027<br>**.00106** | 0.25xd1 | 120<br>**394** | 0.027<br>**.00106** | 0.25xd1 | 120<br>**394** | 0.027<br>**.00106** | 0.25xd1 | 140<br>**459** | 0.028<br>**.00110** | 0.25xd1 |
| | 80<br>**262** | 0.006<br>**.00024** | 0.25xd1 | 100<br>**328** | 0.007<br>**.00028** | 0.25xd1 | 100<br>**328** | 0.010<br>**.00039** | 0.25xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.25xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.25xd1 | 120<br>**394** | 0.013<br>**.00051** | 0.25xd1 |

CRAZYMILL by Mikron Tool Cool

# NEW Type C - Side milling - Semi-finishing

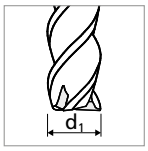
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Semi-finishing**




- $a_p = 1 \times d_1 - 2 \times d_1$
- $a_e = 0.1 \times d_1$

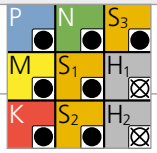





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 120 **394** | 0.017 **.00067** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 120 **394** | 0.016 **.00063** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 120 **328** | 0.012 **.00035** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 100 **328** | 0.018 **.00055** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 100 **328** | 0.017 **.00067** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 100 **328** | 0.017 **.00067** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 100 **328** | 0.013 **.00039** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 100 **328** | 0.012 **.00035** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 170 **558** | 0.020 **.00059** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 170 **558** | 0.020 **.00059** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 170 **558** | 0.022 **.00087** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 170 **558** | 0.022 **.00087** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 170 **558** | 0.022 **.00087** |
| | | 2.1020 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 170 **558** | 0.020 **.00059** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 100 **328** | 0.008 **.00032** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 100 **328** | 0.018 **.00071** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 100 **328** | 0.018 **.00071** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 100 **328** | 0.008 **.00032** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



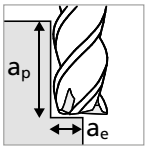

| Ød1 | 1/16" 1.5 mm \| .059" | | 3/32" 2.0 mm \| .079" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .157" | | 3/16" - 7/32" 5.0 mm \| .197" | | 1/4" 6.0 mm \| .236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 140<br>**459** | 0.026<br>**.00079** | 160<br>**525** | 0.038<br>**.00150** | 180<br>**591** | 0.048<br>**.00146** | 200<br>**656** | 0.050<br>**.00197** | 220<br>**722** | 0.052<br>**.00205** | 220<br>**722** | 0.056<br>**.00169** | 220<br>**722** | 0.068<br>**.00268** |
| | 140<br>**459** | 0.025<br>**.00075** | 160<br>**525** | 0.036<br>**.00106** | 180<br>**591** | 0.044<br>**.00138** | 200<br>**656** | 0.048<br>**.00150** | 220<br>**722** | 0.050<br>**.00150** | 220<br>**722** | 0.054<br>**.00213** | 220<br>**722** | 0.066<br>**.00260** |
| | 140<br>**459** | 0.022<br>**.00087** | 160<br>**525** | 0.035<br>**.00102** | 180<br>**591** | 0.042<br>**.00165** | 200<br>**656** | 0.043<br>**.00134** | 220<br>**722** | 0.045<br>**.00134** | 220<br>**722** | 0.048<br>**.00189** | 220<br>**722** | 0.058<br>**.00228** |
| | 120<br>**394** | 0.026<br>**.00079** | 140<br>**459** | 0.038<br>**.00150** | 160<br>**525** | 0.046<br>**.00138** | 180<br>**591** | 0.048<br>**.00150** | 180<br>**591** | 0.050<br>**.00150** | 200<br>**656** | 0.055<br>**.00161** | 200<br>**656** | 0.062<br>**.00244** |
| | 120<br>**394** | 0.025<br>**.00075** | 140<br>**459** | 0.036<br>**.00106** | 160<br>**525** | 0.044<br>**.00138** | 180<br>**591** | 0.046<br>**.00146** | 180<br>**591** | 0.048<br>**.00146** | 200<br>**656** | 0.052<br>**.00205** | 200<br>**656** | 0.060<br>**.00236** |
| | 120<br>**394** | 0.025<br>**.00075** | 140<br>**459** | 0.036<br>**.00106** | 160<br>**525** | 0.044<br>**.00138** | 180<br>**591** | 0.046<br>**.00146** | 180<br>**591** | 0.048<br>**.00146** | 200<br>**656** | 0.052<br>**.00205** | 200<br>**656** | 0.060<br>**.00236** |
| | 120<br>**394** | 0.016<br>**.00055** | 140<br>**459** | 0.034<br>**.00102** | 160<br>**525** | 0.042<br>**.00165** | 180<br>**591** | 0.044<br>**.00138** | 180<br>**591** | 0.046<br>**.00138** | 200<br>**656** | 0.049<br>**.00146** | 200<br>**656** | 0.058<br>**.00228** |
| | 120<br>**394** | 0.026<br>**.00079** | 140<br>**459** | 0.032<br>**.00095** | 160<br>**525** | 0.043<br>**.00134** | 180<br>**591** | 0.054<br>**.00213** | 200<br>**656** | 0.056<br>**.00165** | 200<br>**656** | 0.058<br>**.00173** | 200<br>**656** | 0.070<br>**.00276** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00122** | 230<br>**755** | 0.060<br>**.00181** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00122** | 230<br>**755** | 0.060<br>**.00181** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00122** | 230<br>**755** | 0.060<br>**.00181** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00122** | 230<br>**755** | 0.060<br>**.00181** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00122** | 230<br>**755** | 0.060<br>**.00181** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 190<br>**623** | 0.029<br>**.00114** | 210<br>**689** | 0.040<br>**.00122** | 230<br>**755** | 0.060<br>**.00181** | 250<br>**820** | 0.062<br>**.00244** | 270<br>**886** | 0.064<br>**.00252** | 270<br>**886** | 0.068<br>**.00268** | 270<br>**886** | 0.084<br>**.00331** |
| | 100<br>**328** | 0.010<br>**.00032** | 120<br>**394** | 0.012<br>**.00035** | 120<br>**394** | 0.016<br>**.00063** | 140<br>**459** | 0.018<br>**.00071** | 160<br>**525** | 0.020<br>**.00079** | 160<br>**525** | 0.022<br>**.00087** | 160<br>**525** | 0.024<br>**.00094** |
| | 100<br>**328** | 0.022<br>**.00087** | 120<br>**394** | 0.032<br>**.00095** | 120<br>**394** | 0.042<br>**.00165** | 140<br>**459** | 0.044<br>**.00138** | 160<br>**525** | 0.046<br>**.00138** | 160<br>**525** | 0.048<br>**.00146** | 160<br>**525** | 0.054<br>**.00213** |
| | 100<br>**328** | 0.022<br>**.00087** | 120<br>**394** | 0.032<br>**.00095** | 120<br>**394** | 0.042<br>**.00165** | 140<br>**459** | 0.044<br>**.00138** | 160<br>**525** | 0.046<br>**.00138** | 160<br>**525** | 0.048<br>**.00146** | 160<br>**525** | 0.054<br>**.00213** |
| | 100<br>**328** | 0.010<br>**.00032** | 120<br>**394** | 0.012<br>**.00035** | 120<br>**394** | 0.016<br>**.00063** | 140<br>**459** | 0.018<br>**.00071** | 160<br>**525** | 0.020<br>**.00079** | 160<br>**525** | 0.022<br>**.00087** | 160<br>**525** | 0.024<br>**.00094** |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

CRAZYMILL by Mikron Tool Cool

# NEW Type C - Side milling - Finishing

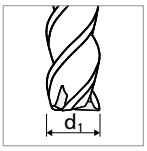
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Finishing**




- $a_p = 2 \times d_1$
- $a_e = 0.02 - 0.05 \times d_1$

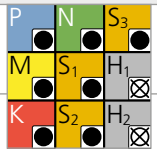





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 130 **425** | 0.008 **.00032** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 130 **425** | 0.007 **.00028** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 130 **425** | 0.006 **.00024** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 100 **328** | 0.008 **.00032** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 100 **328** | 0.008 **.00032** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 100 **328** | 0.008 **.00032** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 100 **328** | 0.006 **.00024** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 110 **361** | 0.006 **.00024** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 130 **425** | 0.009 **.00035** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 130 **425** | 0.009 **.00035** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 130 **425** | 0.010 **.00039** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 130 **425** | 0.010 **.00039** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 130 **425** | 0.010 **.00039** |
| | | 2.1020 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 130 **425** | 0.009 **.00035** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 110 **361** | 0.004 **.00016** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 110 **361** | 0.008 **.00032** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 110 **361** | 0.008 **.00032** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 110 **361** | 0.004 **.00016** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| Ød1 | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/16" 1.5 mm \| .059" | | 3/32" 2.0 mm \| .079" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .157" | | 3/16" - 7/32" 5.0 mm \| .197" | | 1/4" 6.0 mm \| .236" | | 8.0 mm \| .315" | |
| | 180<br>**591** | 0.012<br>**.00047** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.023<br>**.000091** | 220<br>**772** | 0.025<br>**.00098** | 220<br>**772** | 0.028<br>**.00110** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.042<br>**.00165** |
| | 180<br>**591** | 0.011<br>**.00043** | 200<br>**656** | 0.016<br>**.00063** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**772** | 0.024<br>**.00095** | 220<br>**772** | 0.026<br>**.00102** | 220<br>**772** | 0.029<br>**.00114** | 220<br>**772** | 0.038<br>**.00150** |
| | 180<br>**591** | 0.010<br>**.00039** | 200<br>**656** | 0.015<br>**.00059** | 210<br>**688** | 0.020<br>**.00079** | 220<br>**772** | 0.021<br>**.00083** | 220<br>**772** | 0.023<br>**.00091** | 220<br>**772** | 0.025<br>**.00098** | 220<br>**772** | 0.034<br>**.00134** |
| | 150<br>**492** | 0.012<br>**.00047** | 170<br>**558** | 0.017<br>**.00067** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00095** | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.029<br>**.00114** | 200<br>**656** | 0.036<br>**.00142** |
| | 150<br>**492** | 0.011<br>**.00043** | 170<br>**558** | 0.016<br>**.00063** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.023<br>**.00091** | 200<br>**656** | 0.025<br>**.00098** | 200<br>**656** | 0.028<br>**.00110** | 200<br>**656** | 0.037<br>**.00146** |
| | 150<br>**492** | 0.011<br>**.00043** | 170<br>**558** | 0.016<br>**.00063** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.023<br>**.00091** | 200<br>**656** | 0.025<br>**.00098** | 200<br>**656** | 0.028<br>**.00110** | 200<br>**656** | 0.037<br>**.00146** |
| | 150<br>**492** | 0.008<br>**.00032** | 170<br>**558** | 0.015<br>**.00059** | 180<br>**591** | 0.020<br>**.00079** | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00095** | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.035<br>**.00138** |
| | 130<br>**425** | 0.012<br>**.00047** | 150<br>**492** | 0.014<br>**.00055** | 160<br>**525** | 0.022<br>**.00087** | 170<br>**558** | 0.025<br>**.00098** | 170<br>**558** | 0.029<br>**.00114** | 170<br>**558** | 0.031<br>**.00122** | 200<br>**656** | 0.040<br>**.00157** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**772** | 0.030<br>**.00118** | 220<br>**772** | 0.033<br>**.00130** | 220<br>**772** | 0.036<br>**.00142** | 270<br>**886** | 0.045<br>**.00177** |
| | 120<br>**394** | 0.005<br>**.00020** | 130<br>**427** | 0.005<br>**.00020** | 130<br>**427** | 0.008<br>**.00032** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.011<br>**.00043** | 150<br>**492** | 0.012<br>**.00047** | 160<br>**525** | 0.021<br>**.00083** |
| | 120<br>**394** | 0.010<br>**.00039** | 130<br>**427** | 0.014<br>**.00055** | 130<br>**427** | 0.020<br>**.00079** | 140<br>**459** | 0.022<br>**.00087** | 150<br>**492** | 0.024<br>**.00095** | 150<br>**492** | 0.026<br>**.00102** | 160<br>**525** | 0.035<br>**.00138** |
| | 120<br>**394** | 0.010<br>**.00039** | 130<br>**427** | 0.014<br>**.00055** | 150<br>**492** | 0.020<br>**.00079** | 140<br>**459** | 0.022<br>**.00087** | 150<br>**492** | 0.024<br>**.00095** | 150<br>**492** | 0.026<br>**.00102** | 160<br>**525** | 0.035<br>**.00138** |
| | 120<br>**394** | 0.005<br>**.00020** | 130<br>**427** | 0.005<br>**.00020** | 130<br>**427** | 0.008<br>**.00032** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.011<br>**.00043** | 150<br>**492** | 0.012<br>**.00047** | 160<br>**525** | 0.021<br>**.00083** |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

07

CRAZYMILL by Mikron Tool Cool

# NEW Process CrazyMill Cool P&S

## ACCURATE AND EFFICIENT MILLING

### Coolant type, pressure and filtration

**Coolant:** for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

**Filter:** the large cooling channels permit the use of a standard filter with filter quality of ≤ .002" (0.05 mm).

**Coolant pressure:** at least 218 psi (15 bar) coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

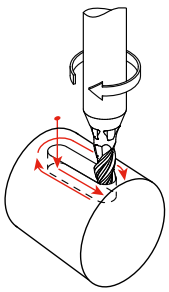
| | | | |
|---|---|---|---|
| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
| **Minimal pressure** | [bar] | 15 | 30 |
| | **[psi]** | **218** | **435** |

### Tool holders

For optimal use of the tool, Mikron Tool recommends a shrink fit collet as per DIN 69871 or as an alternative a hydraulic tool holder. For additional information regarding tool holding refer to "Technical Information" in our main catalogue.

### Milling process

**A. Milling of keyways - only for Type A**



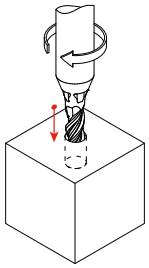
Mikron Tool recommends a machining process in 3 steps to guarantee the tolerance of the slot:

- **1. Plunge milling or plunging with a linear ramp**
- **2. Slot milling**
- **3. Side milling (finishing milling)**

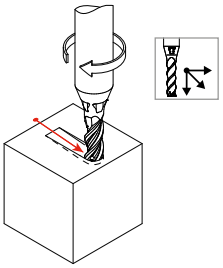
Mikron Tool generally recommends the time and space saving plunge milling (vertical). As an alternative, plunging with a linear ramp is also possible.

## MILLING PROCESS

### 1. Plunge milling or Linear ramp

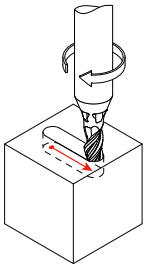


When plunge milling, an increase of the drilling diameter of approx. .002" (0.05 mm) respect to the tool diameter needs to be applied. The maximum milling depth is 2.5 x $d_1$ ($a_{p,max}$ = 1 x $d_1$). For data regarding feed **$f_{z,p}$** refer to cutting data for plunge milling (page 536).



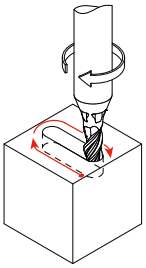
The maximum plunge angle α depends on the material and cannot be overcut (see table below). For data regarding feed **$f_{z,s}$** refer to cutting data for keyway milling (page 536).

### 2. Slot milling



Attention: a finishing operation is provided after slot milling. For data regarding feed **$f_{z,s}$** refer to cutting data for slot milling (page 536). For the corresponding selection of tool (diameter) refer to the table "Tool selection" (page 560).

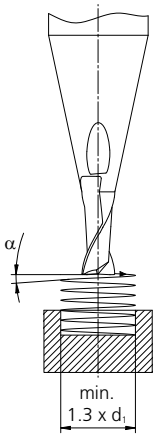
### 3. Side milling



A finishing operation is necessary to reach the required tolerance and highest squareness.

**Maximum plunge angles in linear ramp or helical interpolation (calculated on the endmill center)**

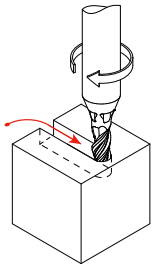
| | Material | α - Linear ramp | α - Helical interpolation |
|---|---|---|---|
| P | Unalloyed carbon steel | 45° | 47° |
| P | Low alloyed steel | 45° | 47° |
| P | High alloyed tool steel | 27° | 28° |
| M | Stainless steel ferritic | 45° | 47° |
| M | Stainless steel martensitic | 27° | 28° |
| M | Stainless steel martensitic - PH | 27° | 28° |
| M | Stainless steel austenitic | 45° | 47° |
| K | Cast iron | 45° | 47° |
| N | Aluminium alloy wrought | 45° | 47° |
| N | Aluminium alloy cast | 45° | 47° |
| N | Copper | 45° | 47° |
| N | Brass lead free | 45° | 47° |
| N | Brass, Bronze Rm < 400 N/mm² | 45° | 47° |
| N | Bronze Rm < 600 N/mm² | 45° | 47° |
| $S_1$ | Super alloys | 14° | 15° |
| $S_2$ | Titanium pure and titanium alloys | 14° | 15° |
| $S_3$ | CrCo alloys | 27° | 28° |



# NEW Process CrazyMill Cool P&S

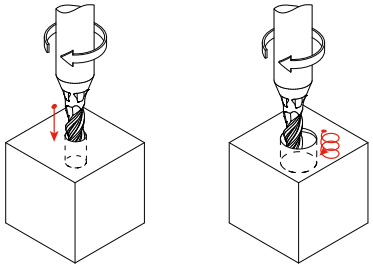
## MILLING PROCESS

### B. Milling of through slots



When milling through slots, the maximum cutting parameters can be applied. Refer to the cutting data page 538 / page 550.

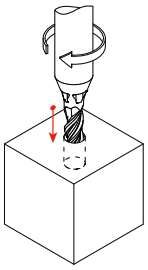
### C. Plunge milling



With CrazyMill Cool P&S, plunge milling (drilling) can be executed in two versions:

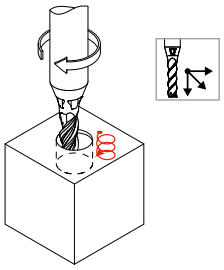
- **1. Direct plunge milling**
- **2. Plunging with helical interpolation**

#### 1. Direct plunge milling



When plunge milling, an increase of the drilling diameter of approx. .002" (0.05 mm) respect to the tool diameter needs to be applied. The maximum milling depth is 2.5 x $d_1$ - Type A / 2 x $d_1$ - Type C ($a_{p,max}$ = 1 x $d_1$). For data regarding feed $f_{z,p}$ refer to cutting data for plunge milling (page 536 / page 548).

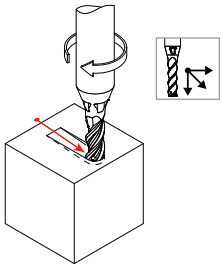
#### 2. Plunging with helical interpolation



The maximum plunge angle $\alpha$ depends on the material and cannot be overcut (see table page 557). For data regarding feed $f_{z,s}$ refer to cutting data for keyway milling (page 536 / page 548). Attention: the minimum diameter of the hole is $d_{hole} = 1.3 \times d_{tool}$

## MILLING PROCESS

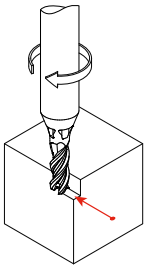
### D. Linear ramp



The maximum plunge angle $\alpha$ depends on the material and cannot be overcut (see table page 557). For data regarding feed $f_{z,s}$ refer to cutting data for keyway milling (page 536 / page 548).

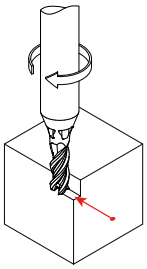
### E. Side milling

#### Semi-finishing



Recommended cutting parameters:
$v_c$ and $f_z$ = as specified in the cutting data table
$a_p$ = 1 - 2 x d
Type A: $a_e$ = 0.2 x d
Type C: $a_e$ = 0.1 x d

#### Finishing



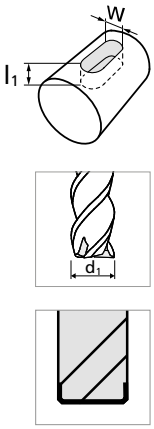
Recommended cutting parameters:
$v_c$ and $f_z$ = as specified in the cutting data table
Type A: $a_p$ = 2.5 x d; $a_e$ = 0.05 – 0.10 x d depending on required surface quality
Type C: $a_p$ = 2 x d; $a_e$ = 0.02 – 0.05 x d depending on required surface quality

CRAZYMILL by Mikron Tool Cool

# Process CrazyMill Cool P&S Square - Type A

## THE RIGHT TOOL FOR KEYWAY SLOTTING - ONLY FOR TYPE A

### Tool selection




| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | Item number |
|---|---|---|---|---|---|---|
| .043 | 1.1 | .039 | 1.0 | .098 | 2.50 | 2.CMC42.A8Z3.100.1 |
| .047 | 1.2 | .039 | 1.0 | .098 | 2.50 | 2.CMC42.A8Z3.100.1 |
| | | .043 | 1.1 | .108 | 2.75 | 2.CMC42.A8Z3.110.1 |
| .051 | 1.3 | .043 | 1.1 | .108 | 2.75 | 2.CMC42.A8Z3.110.1 |
| | | .047 | 1.2 | .118 | 3.00 | 2.CMC42.A8Z3.120.1 |
| .055 | 1.4 | .047 | 1.2 | .118 | 3.00 | 2.CMC42.A8Z3.120.1 |
| | | .051 | 1.3 | .128 | 3.25 | 2.CMC42.A8Z3.130.1 |
| .059 | 1.5 | .051 | 1.3 | .128 | 3.25 | 2.CMC42.A8Z3.130.1 |
| | | .055 | 1.4 | .138 | 3.50 | 2.CMC42.A8Z3.140.1 |
| 1/16 | 1.587 | .051 | 1.3 | .128 | 3.25 | 2.CMC42.A8Z3.130.1 |
| | | .055 | 1.4 | .138 | 3.50 | 2.CMC42.A8Z3.140.1 |
| .063 | 1.6 | .055 | 1.4 | .138 | 3.50 | 2.CMC42.A8Z3.140.1 |
| | | .059 | 1.5 | .148 | 3.75 | 2.CMC42.A8Z3.150.1 |
| .067 | 1.7 | .059 | 1.5 | .148 | 3.75 | 2.CMC42.A8Z3.150.1 |
| | | 1/16 | 1.587 | .156 | 3.97 | 2.CMC.PSSAZ3.F116 |
| | | .063 | 1.6 | .157 | 4.00 | 2.CMC42.A8Z3.160.1 |
| .071 | 1.8 | .059 | 1.5 | .148 | 3.75 | 2.CMC42.A8Z3.150.1 |
| | | 1/16 | 1.587 | .156 | 3.97 | 2.CMC.PSSAZ3.F116 |
| | | .063 | 1.6 | .157 | 4.00 | 2.CMC42.A8Z3.160.1 |
| .075 | 1.9 | .063 | 1.6 | .157 | 4.00 | 2.CMC42.A8Z3.160.1 |
| | | .067 | 1.7 | .167 | 4.25 | 2.CMC42.A8Z3.170.1 |
| .079 | 2.0 | .067 | 1.7 | .167 | 4.25 | 2.CMC42.A8Z3.170.1 |
| | | .071 | 1.8 | .177 | 4.50 | 2.CMC42.A8Z3.180.1 |
| .083 | 2.1 | .071 | 1.8 | .177 | 4.50 | 2.CMC42.A8Z3.180.1 |
| | | .075 | 1.9 | .187 | 4.75 | 2.CMC42.A8Z3.190.1 |
| .087 | 2.2 | .075 | 1.9 | .187 | 4.75 | 2.CMC42.A8Z3.190.1 |
| | | .079 | 2.0 | .197 | 5.00 | 2.CMC42.A8Z3.200.1 |
| .091 | 2.3 | .079 | 2.0 | .197 | 5.00 | 2.CMC42.A8Z3.200.1 |
| | | .083 | 2.1 | .207 | 5.25 | 2.CMC42.A8Z3.210.1 |
| 3/32 | 2.381 | .079 | 2.0 | .197 | 5.00 | 2.CMC42.A8Z3.200.1 |
| | | .083 | 2.1 | .207 | 5.25 | 2.CMC42.A8Z3.210.1 |
| | | .087 | 2.2 | .217 | 5.50 | 2.CMC42.A8Z3.220.1 |
| .094 | 2.4 | .079 | 2.0 | .197 | 5.00 | 2.CMC42.A8Z3.200.1 |
| | | .083 | 2.1 | .207 | 5.25 | 2.CMC42.A8Z3.210.1 |
| | | .087 | 2.2 | .217 | 5.50 | 2.CMC42.A8Z3.220.1 |
| .098 | 2.5 | .083 | 2.1 | .207 | 5.25 | 2.CMC42.A8Z3.210.1 |
| | | .087 | 2.2 | .217 | 5.50 | 2.CMC42.A8Z3.220.1 |
| | | .091 | 2.3 | .226 | 5.75 | 2.CMC42.A8Z3.230.1 |
| .102 | 2.6 | .087 | 2.2 | .217 | 5.50 | 2.CMC42.A8Z3.220.1 |
| | | .091 | 2.3 | .226 | 5.75 | 2.CMC42.A8Z3.230.1 |
| | | 3/32 | 2.381 | .234 | 5.95 | 2.CMC.PSSAZ3.F332 |
| | | .094 | 2.4 | .236 | 6.00 | 2.CMC42.A8Z3.240.1 |
| .106 | 2.7 | .091 | 2.3 | .226 | 5.75 | 2.CMC42.A8Z3.230.1 |
| | | 3/32 | 2.381 | .234 | 5.95 | 2.CMC.PSSAZ3.F332 |
| | | .094 | 2.4 | .236 | 6.00 | 2.CMC42.A8Z3.240.1 |
| | | .098 | 2.5 | .246 | 6.25 | 2.CMC42.A8Z3.250.1 |
| .110 | 2.8 | .094 | 2.4 | .236 | 6.00 | 2.CMC42.A8Z3.240.1 |
| | | .098 | 2.5 | .246 | 6.25 | 2.CMC42.A8Z3.250.1 |
| | | .102 | 2.6 | .256 | 6.50 | 2.CMC42.A8Z3.260.1 |
| .114 | 2.9 | .098 | 2.5 | .246 | 6.25 | 2.CMC42.A8Z3.250.1 |
| | | .102 | 2.6 | .256 | 6.50 | 2.CMC42.A8Z3.260.1 |
| | | .106 | 2.7 | .266 | 6.75 | 2.CMC42.A8Z3.270.1 |
| .118 | 3.0 | .102 | 2.6 | .256 | 6.50 | 2.CMC42.A8Z3.260.1 |
| | | .106 | 2.7 | .266 | 6.75 | 2.CMC42.A8Z3.270.1 |
| | | .110 | 2.8 | .276 | 7.00 | 2.CMC42.A8Z3.280.1 |

| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | Item number |
|---|---|---|---|---|---|---|
| .122 | 3.1 | .102 | 2.6 | .256 | 6.50 | 2.CMC42.A8Z3.260.1 |
| | | .106 | 2.7 | .266 | 6.75 | 2.CMC42.A8Z3.270.1 |
| | | .110 | 2.8 | .276 | 7.00 | 2.CMC42.A8Z3.280.1 |
| | | .114 | 2.9 | .285 | 7.25 | 2.CMC42.A8Z3.290.1 |
| 1/8 | 3.175 | .106 | 2.7 | .266 | 6.75 | 2.CMC42.A8Z3.270.1 |
| | | .110 | 2.8 | .276 | 7.00 | 2.CMC42.A8Z3.280.1 |
| | | .114 | 2.9 | .285 | 7.25 | 2.CMC42.A8Z3.290.1 |
| .126 | 3.2 | .106 | 2.7 | .266 | 6.75 | 2.CMC42.A8Z3.270.1 |
| | | .110 | 2.8 | .276 | 7.00 | 2.CMC42.A8Z3.280.1 |
| | | .114 | 2.9 | .285 | 7.25 | 2.CMC42.A8Z3.290.1 |
| | | .118 | 3.0 | .295 | 7.50 | 2.CMC42.A8Z3.300.1 |
| .130 | 3.3 | .110 | 2.8 | .276 | 7.00 | 2.CMC42.A8Z3.280.1 |
| | | .114 | 2.9 | .285 | 7.25 | 2.CMC42.A8Z3.290.1 |
| | | .118 | 3.0 | .295 | 7.50 | 2.CMC42.A8Z3.300.1 |
| | | .122 | 3.1 | .305 | 7.75 | 2.CMC42.A8Z3.310.1 |
| .134 | 3.4 | .114 | 2.9 | .285 | 7.25 | 2.CMC42.A8Z3.290.1 |
| | | .118 | 3.0 | .295 | 7.50 | 2.CMC42.A8Z3.300.1 |
| | | .122 | 3.1 | .305 | 7.75 | 2.CMC42.A8Z3.310.1 |
| .138 | 3.5 | .118 | 3.0 | .295 | 7.50 | 2.CMC42.A8Z3.300.1 |
| | | .122 | 3.1 | .305 | 7.75 | 2.CMC42.A8Z3.310.1 |
| | | 1/8 | 3.175 | .313 | 7.94 | 2.CMC.PSSAZ3.F18 |
| | | .130 | 3.3 | .325 | 8.25 | 2.CMC42.A8Z3.330.1 |
| .142 | 3.6 | .118 | 3.0 | .295 | 7.50 | 2.CMC42.A8Z3.300.1 |
| | | .122 | 3.1 | .305 | 7.75 | 2.CMC42.A8Z3.310.1 |
| | | 1/8 | 3.175 | .313 | 7.94 | 2.CMC.PSSAZ3.F18 |
| | | .130 | 3.3 | .325 | 8.25 | 2.CMC42.A8Z3.330.1 |
| .146 | 3.7 | .122 | 3.1 | .305 | 7.75 | 2.CMC42.A8Z3.310.1 |
| | | 1/8 | 3.175 | .313 | 7.94 | 2.CMC.PSSAZ3.F18 |
| | | .130 | 3.3 | .325 | 8.25 | 2.CMC42.A8Z3.330.1 |
| .150 | 3.8 | .130 | 3.3 | .325 | 8.25 | 2.CMC42.A8Z3.330.1 |
| .154 | 3.9 | .130 | 3.3 | .325 | 8.25 | 2.CMC42.A8Z3.330.1 |
| | | .146 | 3.7 | .364 | 9.25 | 2.CMC42.A8Z3.370.1 |
| 5/32 | 3.968 | .130 | 3.3 | .325 | 8.25 | 2.CMC42.A8Z3.330.1 |
| | | .146 | 3.7 | .364 | 9.25 | 2.CMC42.A8Z3.370.1 |
| .157 | 4.0 | .146 | 3.7 | .364 | 9.25 | 2.CMC42.A8Z3.370.1 |
| .161 | 4.1 | .146 | 3.7 | .364 | 9.25 | 2.CMC42.A8Z3.370.1 |
| .165 | 4.2 | .146 | 3.7 | .364 | 9.25 | 2.CMC42.A8Z3.370.1 |
| | | 5/32 | 3.968 | .391 | 9.92 | 2.CMC.PSSAZ3.F532 |
| | | .157 | 4.0 | .394 | 10.00 | 2.CMC42.A8Z3.400.1 |
| .169 | 4.3 | .146 | 3.7 | .364 | 9.25 | 2.CMC42.A8Z3.370.1 |
| | | 5/32 | 3.968 | .391 | 9.92 | 2.CMC.PSSAZ3.F532 |
| | | .157 | 4.0 | .394 | 10.00 | 2.CMC42.A8Z3.400.1 |
| .173 | 4.4 | .146 | 3.7 | .364 | 9.25 | 2.CMC42.A8Z3.370.1 |
| | | 5/32 | 3.968 | .391 | 9.92 | 2.CMC.PSSAZ3.F532 |
| | | .157 | 4.0 | .394 | 10.00 | 2.CMC42.A8Z3.400.1 |
| .177 | 4.5 | .157 | 4.0 | .394 | 10.00 | 2.CMC42.A8Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 2.CMC42.A8Z3.430.1 |
| .181 | 4.6 | .157 | 4.0 | .394 | 10.00 | 2.CMC42.A8Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 2.CMC42.A8Z3.430.1 |
| .185 | 4.7 | .157 | 4.0 | .394 | 10.00 | 2.CMC42.A8Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 2.CMC42.A8Z3.430.1 |
| 3/16 | 4.762 | .157 | 4.0 | .394 | 10.00 | 2.CMC42.A8Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 2.CMC42.A8Z3.430.1 |
| .189 | 4.8 | .157 | 4.0 | .394 | 10.00 | 2.CMC42.A8Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 2.CMC42.A8Z3.430.1 |

| **w** slot **[inch]** | **w** slot [mm] | **$d_1$** Tool **[inch]** | **$d_1$** Tool [mm] | **$l_{1,\,max}$** **[inch]** | **$l_{1,\,max}$** [mm] | Item number |
|---|---|---|---|---|---|---|
| **.193** | 4.9 | **.169** | 4.3 | **.423** | 10.75 | 2.CMC42.A8Z3.430.1 |
| | | **.185** | 4.7 | **.463** | 11.75 | 2.CMC42.A8Z3.470.1 |
| **.197** | 5.0 | **.169** | 4.3 | **.423** | 10.75 | 2.CMC42.A8Z3.430.1 |
| | | **.185** | 4.7 | **.463** | 11.75 | 2.CMC42.A8Z3.470.1 |
| | | **3/16** | 4.762 | **.469** | 11.91 | 2.CMC.PSSAZ3.F316 |
| | | **.189** | 4.8 | **.472** | 12.00 | 2.CMC42.A8Z3.480.1 |
| **.201** | 5.1 | **.169** | 4.3 | **.423** | 10.75 | 2.CMC42.A8Z3.430.1 |
| | | **.185** | 4.7 | **.463** | 11.75 | 2.CMC42.A8Z3.470.1 |
| | | **3/16** | 4.762 | **.469** | 11.91 | 2.CMC.PSSAZ3.F316 |
| | | **.189** | 4.8 | **.472** | 12.00 | 2.CMC42.A8Z3.480.1 |
| **.205** | 5.2 | **.185** | 4.7 | **.463** | 11.75 | 2.CMC42.A8Z3.470.1 |
| | | **3/16** | 4.762 | **.469** | 11.91 | 2.CMC.PSSAZ3.F316 |
| | | **.189** | 4.8 | **.472** | 12.00 | 2.CMC42.A8Z3.480.1 |
| | | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| **.209** | 5.3 | **.185** | 4.7 | **.463** | 11.75 | 2.CMC42.A8Z3.470.1 |
| | | **3/16** | 4.762 | **.469** | 11.91 | 2.CMC.PSSAZ3.F316 |
| | | **.189** | 4.8 | **.472** | 12.00 | 2.CMC42.A8Z3.480.1 |
| | | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| **.213** | 5.4 | **.185** | 4.7 | **.463** | 11.75 | 2.CMC42.A8Z3.470.1 |
| | | **3/16** | 4.762 | **.469** | 11.91 | 2.CMC.PSSAZ3.F316 |
| | | **.189** | 4.8 | **.472** | 12.00 | 2.CMC42.A8Z3.480.1 |
| | | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| **.217** | 5.5 | **.185** | 4.7 | **.463** | 11.75 | 2.CMC42.A8Z3.470.1 |
| | | **3/16** | 4.762 | **.469** | 11.91 | 2.CMC.PSSAZ3.F316 |
| | | **.189** | 4.8 | **.472** | 12.00 | 2.CMC42.A8Z3.480.1 |
| | | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| **7/32** | 5.560 | **.185** | 4.7 | **.463** | 11.75 | 2.CMC42.A8Z3.470.1 |
| | | **3/16** | 4.762 | **.469** | 11.91 | 2.CMC.PSSAZ3.F316 |
| | | **.189** | 4.8 | **.472** | 12.00 | 2.CMC42.A8Z3.480.1 |
| | | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| **.220** | 5.6 | **.185** | 4.7 | **.463** | 11.75 | 2.CMC42.A8Z3.470.1 |
| | | **3/16** | 4.762 | **.469** | 11.91 | 2.CMC.PSSAZ3.F316 |
| | | **.189** | 4.8 | **.472** | 12.00 | 2.CMC42.A8Z3.480.1 |
| | | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| **.224** | 5.7 | **.189** | 4.8 | **.472** | 12.00 | 2.CMC42.A8Z3.480.1 |
| | | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| **.228** | 5.8 | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| **.232** | 5.9 | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| | | **7/32** | 5.560 | **.547** | 13.90 | 2.CMC.PSSAZ3.F732 |
| | | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |

| **w** slot **[inch]** | **w** slot [mm] | **$d_1$** Tool **[inch]** | **$d_1$** Tool [mm] | **$l_{1,\,max}$** **[inch]** | **$l_{1,\,max}$** [mm] | Item number |
|---|---|---|---|---|---|---|
| **.236** | 6.0 | **.197** | 5.0 | **.492** | 12.50 | 2.CMC42.A8Z3.500.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| | | **7/32** | 5.560 | **.547** | 13.90 | 2.CMC.PSSAZ3.F732 |
| | | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| **.240** | 6.1 | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| | | **7/32** | 5.560 | **.547** | 13.90 | 2.CMC.PSSAZ3.F732 |
| | | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| **.244** | 6.2 | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| | | **7/32** | 5.560 | **.547** | 13.90 | 2.CMC.PSSAZ3.F732 |
| | | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| **.248** | 6.3 | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| | | **7/32** | 5.560 | **.547** | 13.90 | 2.CMC.PSSAZ3.F732 |
| | | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| **1/4** | 6.350 | **.209** | 5.3 | **.522** | 13.25 | 2.CMC42.A8Z3.530.1 |
| | | **7/32** | 5.560 | **.547** | 13.90 | 2.CMC.PSSAZ3.F732 |
| | | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| **.252** | 6.4 | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| **.256** | 6.5 | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| **.260** | 6.6 | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| | | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.264** | 6.7 | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| | | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.268** | 6.8 | **.224** | 5.7 | **.561** | 14.25 | 2.CMC42.A8Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| | | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.272** | 6.9 | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| | | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.276** | 7.0 | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| | | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.280** | 7.1 | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| | | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.283** | 7.2 | **.236** | 6.0 | **.591** | 15.00 | 2.CMC42.A8Z3.600.1 |
| | | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.287** | 7.3 | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.291** | 7.4 | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.295** | 7.5 | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.299** | 7.6 | **1/4** | 6.350 | **.625** | 15.88 | 2.CMC.PSSAZ3.F14 |
| **.323 - .378** | 8.2 - 9.6 | **.315** | 8.0 | **.787** | 20.00 | 2.CMC42.A8Z3.800.1 |

**Example:**

Milling of keyway slot 3x1.8 mm DIN 6885

Width of keyway: **w** = 3 mm**|.118"**; Depth of keyway: $l_1$ = 1.8 mm**|.071"**;

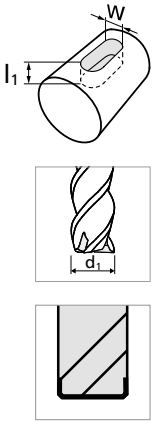
Mikron Tool recommends the following diameters: $d_1$ = 2.6 mm**|.102"** or $d_1$ = 2.7 mm**|.106"** or $d_1$ = 2.8 mm**|.110"**

CRAZYMILL by Mikron Tool Cool

# NEW Process CrazyMill Cool P&S Corner radius - Type A

## THE RIGHT TOOL FOR KEYWAY SLOTTING

### Tool selection




| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | r [mm] | r [inch] | Item number |
|---|---|---|---|---|---|---|---|---|
| .043 | 1.1 | .039 | 1.0 | .098 | 2.50 | 0.10 | | 2.CMC42.A2Z3.100.1 |
| | | .039 | 1.0 | .098 | 2.50 | 0.20 | | 2.CMC42.A3Z3.100.1 |
| .047 | 1.2 | .039 | 1.0 | .098 | 2.50 | 0.10 | | 2.CMC42.A2Z3.100.1 |
| | | .039 | 1.0 | .098 | 2.50 | 0.20 | | 2.CMC42.A3Z3.100.1 |
| | | .043 | 1.1 | .108 | 2.75 | 0.10 | | 2.CMC42.A2Z3.110.1 |
| | | .043 | 1.1 | .108 | 2.75 | 0.20 | | 2.CMC42.A3Z3.110.1 |
| .051 | 1.3 | .043 | 1.1 | .108 | 2.75 | 0.10 | | 2.CMC42.A2Z3.110.1 |
| | | .043 | 1.1 | .108 | 2.75 | 0.20 | | 2.CMC42.A3Z3.110.1 |
| | | .047 | 1.2 | .118 | 3.00 | 0.10 | | 2.CMC42.A2Z3.120.1 |
| | | .047 | 1.2 | .118 | 3.00 | 0.20 | | 2.CMC42.A3Z3.120.1 |
| .055 | 1.4 | .047 | 1.2 | .118 | 3.00 | 0.10 | | 2.CMC42.A2Z3.120.1 |
| | | .047 | 1.2 | .118 | 3.00 | 0.20 | | 2.CMC42.A3Z3.120.1 |
| | | .051 | 1.3 | .128 | 3.25 | 0.10 | | 2.CMC42.A2Z3.130.1 |
| | | .051 | 1.3 | .128 | 3.25 | 0.20 | | 2.CMC42.A3Z3.130.1 |
| .059 | 1.5 | .051 | 1.3 | .128 | 3.25 | 0.10 | | 2.CMC42.A2Z3.130.1 |
| | | .051 | 1.3 | .128 | 3.25 | 0.20 | | 2.CMC42.A3Z3.130.1 |
| | | .055 | 1.4 | .138 | 3.50 | 0.10 | | 2.CMC42.A2Z3.140.1 |
| | | .055 | 1.4 | .138 | 3.50 | 0.20 | | 2.CMC42.A3Z3.140.1 |
| 1/16 | 1.587 | .055 | 1.4 | .138 | 3.50 | 0.10 | | 2.CMC42.A2Z3.140.1 |
| | | .055 | 1.4 | .138 | 3.50 | 0.20 | | 2.CMC42.A3Z3.140.1 |
| | | .059 | 1.5 | .148 | 3.75 | 0.10 | | 2.CMC42.A2Z3.150.1 |
| | | .059 | 1.5 | .148 | 3.75 | 0.30 | | 2.CMC42.A3Z3.150.1 |
| .063 | 1.6 | .055 | 1.4 | .138 | 3.50 | 0.10 | | 2.CMC42.A2Z3.140.1 |
| | | .055 | 1.4 | .138 | 3.50 | 0.20 | | 2.CMC42.A3Z3.140.1 |
| | | .059 | 1.5 | .148 | 3.75 | 0.10 | | 2.CMC42.A2Z3.150.1 |
| | | .059 | 1.5 | .148 | 3.75 | 0.30 | | 2.CMC42.A3Z3.150.1 |
| .067 | 1.7 | .059 | 1.5 | .148 | 3.75 | 0.10 | | 2.CMC42.A2Z3.150.1 |
| | | .059 | 1.5 | .148 | 3.75 | 0.30 | | 2.CMC42.A3Z3.150.1 |
| | | 1/16 | 1.587 | .156 | 3.97 | 0.127 | | 2.CMC.PSRA2Z3.F116 |
| | | 1/16 | 1.587 | .156 | 3.97 | 0.254 | | 2.CMC.PSRA3Z3.F116 |
| | | .063 | 1.6 | .157 | 4.00 | 0.10 | | 2.CMC42.A2Z3.160.1 |
| | | .063 | 1.6 | .157 | 4.00 | 0.30 | | 2.CMC42.A3Z3.160.1 |
| .071 | 1.8 | .059 | 1.5 | .148 | 3.75 | 0.10 | | 2.CMC42.A2Z3.150.1 |
| | | .059 | 1.5 | .148 | 3.75 | 0.30 | | 2.CMC42.A3Z3.150.1 |
| | | 1/16 | 1.587 | .156 | 3.97 | 0.127 | | 2.CMC.PSRA2Z3.F116 |
| | | 1/16 | 1.587 | .156 | 3.97 | 0.254 | | 2.CMC.PSRA3Z3.F116 |
| | | .063 | 1.6 | .157 | 4.00 | 0.10 | | 2.CMC42.A2Z3.160.1 |
| | | .063 | 1.6 | .157 | 4.00 | 0.30 | | 2.CMC42.A3Z3.160.1 |
| .075 | 1.9 | .063 | 1.6 | .157 | 4.00 | 0.10 | | 2.CMC42.A2Z3.160.1 |
| | | .063 | 1.6 | .157 | 4.00 | 0.30 | | 2.CMC42.A3Z3.160.1 |
| | | .067 | 1.7 | .167 | 4.25 | 0.10 | | 2.CMC42.A2Z3.170.1 |
| | | .067 | 1.7 | .167 | 4.25 | 0.30 | | 2.CMC42.A3Z3.170.1 |
| .079 | 2.0 | .067 | 1.7 | .167 | 4.25 | 0.10 | | 2.CMC42.A2Z3.170.1 |
| | | .067 | 1.7 | .167 | 4.25 | 0.30 | | 2.CMC42.A3Z3.170.1 |
| | | .071 | 1.8 | .177 | 4.50 | 0.10 | | 2.CMC42.A2Z3.180.1 |
| | | .071 | 1.8 | .177 | 4.50 | 0.30 | | 2.CMC42.A3Z3.180.1 |
| .083 | 2.1 | .071 | 1.8 | .177 | 4.50 | 0.10 | | 2.CMC42.A2Z3.180.1 |
| | | .071 | 1.8 | .177 | 4.50 | 0.30 | | 2.CMC42.A3Z3.180.1 |
| | | .075 | 1.9 | .187 | 4.75 | 0.10 | | 2.CMC42.A2Z3.190.1 |
| | | .075 | 1.9 | .187 | 4.75 | 0.30 | | 2.CMC42.A3Z3.190.1 |
| .087 | 2.2 | .075 | 1.9 | .187 | 4.75 | 0.10 | | 2.CMC42.A2Z3.190.1 |
| | | .075 | 1.9 | .187 | 4.75 | 0.30 | | 2.CMC42.A3Z3.190.1 |
| | | .079 | 2.0 | .197 | 5.00 | 0.10 | | 2.CMC42.A2Z3.200.1 |
| | | .079 | 2.0 | .197 | 5.00 | 0.20 | | 2.CMC42.A3Z3.200.1 |
| | | .079 | 2.0 | .197 | 5.00 | 0.50 | | 2.CMC42.A4Z3.200.1 |

| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | r [mm] | r [inch] | Item number |
|---|---|---|---|---|---|---|---|---|
| .091 | 2.3 | .079 | 2.0 | .197 | 5.00 | 0.10 | | 2.CMC42.A2Z3.200.1 |
| | | .079 | 2.0 | .197 | 5.00 | 0.20 | | 2.CMC42.A3Z3.200.1 |
| | | .079 | 2.0 | .197 | 5.00 | 0.50 | | 2.CMC42.A4Z3.200.1 |
| | | .083 | 2.1 | .207 | 5.25 | 0.20 | | 2.CMC42.A2Z3.210.1 |
| | | .083 | 2.1 | .207 | 5.25 | 0.50 | | 2.CMC42.A3Z3.210.1 |
| 3/32 | 2.381 | .079 | 2.0 | .197 | 5.00 | 0.10 | | 2.CMC42.A2Z3.200.1 |
| | | .079 | 2.0 | .197 | 5.00 | 0.20 | | 2.CMC42.A3Z3.200.1 |
| | | .079 | 2.0 | .197 | 5.00 | 0.50 | | 2.CMC42.A4Z3.200.1 |
| | | .083 | 2.1 | .207 | 5.25 | 0.20 | | 2.CMC42.A2Z3.210.1 |
| | | .083 | 2.1 | .207 | 5.25 | 0.50 | | 2.CMC42.A3Z3.210.1 |
| | | .087 | 2.2 | .217 | 5.50 | 0.20 | | 2.CMC42.A2Z3.220.1 |
| | | .087 | 2.2 | .217 | 5.50 | 0.50 | | 2.CMC42.A3Z3.220.1 |
| .094 | 2.4 | .079 | 2.0 | .197 | 5.00 | 0.10 | | 2.CMC42.A2Z3.200.1 |
| | | .079 | 2.0 | .197 | 5.00 | 0.20 | | 2.CMC42.A3Z3.200.1 |
| | | .079 | 2.0 | .197 | 5.00 | 0.50 | | 2.CMC42.A4Z3.200.1 |
| | | .083 | 2.1 | .207 | 5.25 | 0.20 | | 2.CMC42.A2Z3.210.1 |
| | | .083 | 2.1 | .207 | 5.25 | 0.50 | | 2.CMC42.A3Z3.210.1 |
| | | .087 | 2.2 | .217 | 5.50 | 0.20 | | 2.CMC42.A2Z3.220.1 |
| | | .087 | 2.2 | .217 | 5.50 | 0.50 | | 2.CMC42.A3Z3.220.1 |
| .098 | 2.5 | .083 | 2.1 | .207 | 5.25 | 0.20 | | 2.CMC42.A2Z3.210.1 |
| | | .083 | 2.1 | .207 | 5.25 | 0.50 | | 2.CMC42.A3Z3.210.1 |
| | | .087 | 2.2 | .217 | 5.50 | 0.20 | | 2.CMC42.A2Z3.220.1 |
| | | .087 | 2.2 | .217 | 5.50 | 0.50 | | 2.CMC42.A3Z3.220.1 |
| | | .091 | 2.3 | .226 | 5.75 | 0.20 | | 2.CMC42.A2Z3.230.1 |
| | | .091 | 2.3 | .226 | 5.75 | 0.50 | | 2.CMC42.A3Z3.230.1 |
| .102 | 2.6 | .087 | 2.2 | .217 | 5.50 | 0.20 | | 2.CMC42.A2Z3.220.1 |
| | | .087 | 2.2 | .217 | 5.50 | 0.50 | | 2.CMC42.A3Z3.220.1 |
| | | .091 | 2.3 | .226 | 5.75 | 0.20 | | 2.CMC42.A2Z3.230.1 |
| | | .091 | 2.3 | .226 | 5.75 | 0.50 | | 2.CMC42.A3Z3.230.1 |
| | | 3/32 | 2.381 | .234 | 5.95 | 0.127 | | 2.CMC.PSRA2Z3.F332 |
| | | 3/32 | 2.381 | .234 | 5.95 | 0.254 | | 2.CMC.PSRA3Z3.F332 |
| | | 3/32 | 2.381 | .234 | 5.95 | 0.381 | | 2.CMC.PSRA4Z3.F332 |
| | | .094 | 2.4 | .236 | 6.00 | 0.20 | | 2.CMC42.A2Z3.240.1 |
| | | .094 | 2.4 | .236 | 6.00 | 0.50 | | 2.CMC42.A3Z3.240.1 |
| .106 | 2.7 | .091 | 2.3 | .226 | 5.75 | 0.20 | | 2.CMC42.A2Z3.230.1 |
| | | .091 | 2.3 | .226 | 5.75 | 0.50 | | 2.CMC42.A3Z3.230.1 |
| | | 3/32 | 2.381 | .234 | 5.95 | 0.127 | | 2.CMC.PSRA2Z3.F332 |
| | | 3/32 | 2.381 | .234 | 5.95 | 0.254 | | 2.CMC.PSRA3Z3.F332 |
| | | 3/32 | 2.381 | .234 | 5.95 | 0.381 | | 2.CMC.PSRA4Z3.F332 |
| | | .094 | 2.4 | .236 | 6.00 | 0.20 | | 2.CMC42.A2Z3.240.1 |
| | | .094 | 2.4 | .236 | 6.00 | 0.50 | | 2.CMC42.A3Z3.240.1 |
| | | .098 | 2.5 | .246 | 6.25 | 0.20 | | 2.CMC42.A2Z3.250.1 |
| | | .098 | 2.5 | .246 | 6.25 | 0.50 | | 2.CMC42.A3Z3.250.1 |
| .110 | 2.8 | .094 | 2.4 | .236 | 6.00 | 0.20 | | 2.CMC42.A2Z3.240.1 |
| | | .094 | 2.4 | .236 | 6.00 | 0.50 | | 2.CMC42.A3Z3.240.1 |
| | | .098 | 2.5 | .246 | 6.25 | 0.20 | | 2.CMC42.A2Z3.250.1 |
| | | .098 | 2.5 | .246 | 6.25 | 0.50 | | 2.CMC42.A3Z3.250.1 |
| | | .102 | 2.6 | .256 | 6.50 | 0.20 | | 2.CMC42.A2Z3.260.1 |
| | | .102 | 2.6 | .256 | 6.50 | 0.50 | | 2.CMC42.A3Z3.260.1 |
| .114 | 2.9 | .098 | 2.5 | .246 | 6.25 | 0.20 | | 2.CMC42.A2Z3.250.1 |
| | | .098 | 2.5 | .246 | 6.25 | 0.50 | | 2.CMC42.A3Z3.250.1 |
| | | .102 | 2.6 | .256 | 6.50 | 0.20 | | 2.CMC42.A2Z3.260.1 |
| | | .102 | 2.6 | .256 | 6.50 | 0.50 | | 2.CMC42.A3Z3.260.1 |
| | | .106 | 2.7 | .266 | 6.75 | 0.20 | | 2.CMC42.A2Z3.270.1 |
| | | .106 | 2.7 | .266 | 6.75 | 0.50 | | 2.CMC42.A3Z3.270.1 |

| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | r [mm] | r [inch] | Item number |
|---|---|---|---|---|---|---|---|---|
| .118 | 3.0 | .102 | 2.6 | .256 | 6.50 | 0.20 | | 2.CMC42.A2Z3.260.1 |
| | | .102 | 2.6 | .256 | 6.50 | 0.50 | | 2.CMC42.A3Z3.260.1 |
| | | .106 | 2.7 | .266 | 6.75 | 0.20 | | 2.CMC42.A2Z3.270.1 |
| | | .106 | 2.7 | .266 | 6.75 | 0.50 | | 2.CMC42.A3Z3.270.1 |
| | | .110 | 2.8 | .276 | 7.00 | 0.20 | | 2.CMC42.A2Z3.280.1 |
| | | .110 | 2.8 | .276 | 7.00 | 0.50 | | 2.CMC42.A3Z3.280.1 |
| .122 | 3.1 | .102 | 2.6 | .256 | 6.50 | 0.20 | | 2.CMC42.A2Z3.260.1 |
| | | .102 | 2.6 | .256 | 6.50 | 0.50 | | 2.CMC42.A3Z3.260.1 |
| | | .106 | 2.7 | .266 | 6.75 | 0.20 | | 2.CMC42.A2Z3.270.1 |
| | | .106 | 2.7 | .266 | 6.75 | 0.50 | | 2.CMC42.A3Z3.270.1 |
| | | .110 | 2.8 | .276 | 7.00 | 0.20 | | 2.CMC42.A2Z3.280.1 |
| | | .110 | 2.8 | .276 | 7.00 | 0.50 | | 2.CMC42.A3Z3.280.1 |
| | | .114 | 2.9 | .285 | 7.25 | 0.20 | | 2.CMC42.A2Z3.290.1 |
| | | .114 | 2.9 | .285 | 7.25 | 0.50 | | 2.CMC42.A3Z3.290.1 |
| 1/8 | 3.175 | .106 | 2.7 | .266 | 6.75 | 0.20 | | 2.CMC42.A2Z3.270.1 |
| | | .106 | 2.7 | .266 | 6.75 | 0.50 | | 2.CMC42.A3Z3.270.1 |
| | | .110 | 2.8 | .276 | 7.00 | 0.20 | | 2.CMC42.A2Z3.280.1 |
| | | .110 | 2.8 | .276 | 7.00 | 0.50 | | 2.CMC42.A3Z3.280.1 |
| | | .114 | 2.9 | .285 | 7.25 | 0.20 | | 2.CMC42.A2Z3.290.1 |
| | | .114 | 2.9 | .285 | 7.25 | 0.50 | | 2.CMC42.A3Z3.290.1 |
| .126 | 3.2 | .106 | 2.7 | .266 | 6.75 | 0.20 | | 2.CMC42.A2Z3.270.1 |
| | | .106 | 2.7 | .266 | 6.75 | 0.50 | | 2.CMC42.A3Z3.270.1 |
| | | .110 | 2.8 | .276 | 7.00 | 0.20 | | 2.CMC42.A2Z3.280.1 |
| | | .110 | 2.8 | .276 | 7.00 | 0.50 | | 2.CMC42.A3Z3.280.1 |
| | | .114 | 2.9 | .285 | 7.25 | 0.20 | | 2.CMC42.A2Z3.290.1 |
| | | .114 | 2.9 | .285 | 7.25 | 0.50 | | 2.CMC42.A3Z3.290.1 |
| | | .118 | 3.0 | .285 | 7.50 | 0.20 | | 2.CMC42.A2Z3.300.1 |
| | | .118 | 3.0 | .285 | 7.50 | 0.50 | | 2.CMC42.A3Z3.300.1 |
| .130 | 3.3 | .110 | 2.8 | .276 | 7.00 | 0.20 | | 2.CMC42.A2Z3.280.1 |
| | | .110 | 2.8 | .276 | 7.00 | 0.50 | | 2.CMC42.A3Z3.280.1 |
| | | .114 | 2.9 | .285 | 7.25 | 0.20 | | 2.CMC42.A2Z3.290.1 |
| | | .114 | 2.9 | .285 | 7.25 | 0.50 | | 2.CMC42.A3Z3.290.1 |
| | | .118 | 3.0 | .285 | 7.50 | 0.20 | | 2.CMC42.A2Z3.300.1 |
| | | .118 | 3.0 | .285 | 7.50 | 0.50 | | 2.CMC42.A3Z3.300.1 |
| | | .122 | 3.1 | .305 | 7.75 | 0.20 | | 2.CMC42.A2Z3.310.1 |
| | | .122 | 3.1 | .305 | 7.75 | 0.50 | | 2.CMC42.A3Z3.310.1 |
| .134 | 3.4 | .114 | 2.9 | .285 | 7.25 | 0.20 | | 2.CMC42.A2Z3.290.1 |
| | | .114 | 2.9 | .285 | 7.25 | 0.50 | | 2.CMC42.A3Z3.290.1 |
| | | .118 | 3.0 | .285 | 7.50 | 0.20 | | 2.CMC42.A2Z3.300.1 |
| | | .118 | 3.0 | .285 | 7.50 | 0.50 | | 2.CMC42.A3Z3.300.1 |
| | | .122 | 3.1 | .305 | 7.75 | 0.20 | | 2.CMC42.A2Z3.310.1 |
| | | .122 | 3.1 | .305 | 7.75 | 0.50 | | 2.CMC42.A3Z3.310.1 |
| .138 | 3.5 | .118 | 3.0 | .285 | 7.50 | 0.20 | | 2.CMC42.A2Z3.300.1 |
| | | .118 | 3.0 | .285 | 7.50 | 0.50 | | 2.CMC42.A3Z3.300.1 |
| | | .122 | 3.1 | .305 | 7.75 | 0.20 | | 2.CMC42.A2Z3.310.1 |
| | | .122 | 3.1 | .305 | 7.75 | 0.50 | | 2.CMC42.A3Z3.310.1 |
| | | 1/8 | 3.175 | .313 | 7.94 | 0.254 | | 2.CMC.PSRA2Z3.F18 |
| | | 1/8 | 3.175 | .313 | 7.94 | 0.381 | | 2.CMC.PSRA3Z3.F18 |
| | | .130 | 3.3 | .325 | 8.25 | 0.20 | | 2.CMC42.A2Z3.330.1 |
| | | .130 | 3.3 | .325 | 8.25 | 0.50 | | 2.CMC42.A3Z3.330.1 |
| .142 | 3.6 | .118 | 3.0 | .285 | 7.50 | 0.20 | | 2.CMC42.A2Z3.300.1 |
| | | .118 | 3.0 | .285 | 7.50 | 0.50 | | 2.CMC42.A3Z3.300.1 |
| | | .122 | 3.1 | .305 | 7.75 | 0.20 | | 2.CMC42.A2Z3.310.1 |
| | | .122 | 3.1 | .305 | 7.75 | 0.50 | | 2.CMC42.A3Z3.310.1 |
| | | 1/8 | 3.175 | .313 | 7.94 | 0.254 | | 2.CMC.PSRA2Z3.F18 |
| | | 1/8 | 3.175 | .313 | 7.94 | 0.381 | | 2.CMC.PSRA3Z3.F18 |
| | | .130 | 3.3 | .325 | 8.25 | 0.20 | | 2.CMC42.A2Z3.330.1 |
| | | .130 | 3.3 | .325 | 8.25 | 0.50 | | 2.CMC42.A3Z3.330.1 |

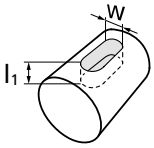
| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | r [mm] | r [inch] | Item number |
|---|---|---|---|---|---|---|---|---|
| | 3.7 | .122 | 3.1 | .305 | 7.75 | 0.20 | | 2.CMC42.A2Z3.310.1 |
| | | .122 | 3.1 | .305 | 7.75 | 0.50 | | 2.CMC42.A3Z3.310.1 |
| | | 1/8 | 3.175 | .313 | 7.94 | 0.254 | | 2.CMC.PSRA2Z3.F18 |
| | | 1/8 | 3.175 | .313 | 7.94 | 0.381 | | 2.CMC.PSRA3Z3.F18 |
| | | .130 | 3.3 | .325 | 8.25 | 0.20 | | 2.CMC42.A2Z3.330.1 |
| | | .130 | 3.3 | .325 | 8.25 | 0.50 | | 2.CMC42.A3Z3.330.1 |
| | 3.8 | .130 | 3.3 | .325 | 8.25 | 0.20 | | 2.CMC42.A2Z3.330.1 |
| | | .130 | 3.3 | .325 | 8.25 | 0.50 | | 2.CMC42.A3Z3.330.1 |
| | 3.9 | .130 | 3.3 | .325 | 8.25 | 0.20 | | 2.CMC42.A2Z3.330.1 |
| | | .130 | 3.3 | .325 | 8.25 | 0.50 | | 2.CMC42.A3Z3.330.1 |
| | | .146 | 3.7 | .364 | 9.25 | 0.20 | | 2.CMC42.A2Z3.370.1 |
| | | .146 | 3.7 | .364 | 9.25 | 0.50 | | 2.CMC42.A3Z3.370.1 |
| 5/32 | 3.968 | .130 | 3.3 | .325 | 8.25 | 0.20 | | 2.CMC42.A2Z3.330.1 |
| | | .130 | 3.3 | .325 | 8.25 | 0.50 | | 2.CMC42.A3Z3.330.1 |
| | | .146 | 3.7 | .364 | 9.25 | 0.20 | | 2.CMC42.A2Z3.370.1 |
| | | .146 | 3.7 | .364 | 9.25 | 0.50 | | 2.CMC42.A3Z3.370.1 |
| | 4.0 | .146 | 3.7 | .364 | 9.25 | 0.20 | | 2.CMC42.A2Z3.370.1 |
| | | .146 | 3.7 | .364 | 9.25 | 0.50 | | 2.CMC42.A3Z3.370.1 |
| | 4.1 | .146 | 3.7 | .364 | 9.25 | 0.20 | | 2.CMC42.A2Z3.370.1 |
| | | .146 | 3.7 | .364 | 9.25 | 0.50 | | 2.CMC42.A3Z3.370.1 |
| | 4.2 | .146 | 3.7 | .364 | 9.25 | 0.20 | | 2.CMC42.A2Z3.370.1 |
| | | .146 | 3.7 | .364 | 9.25 | 0.50 | | 2.CMC42.A3Z3.370.1 |
| | | 5/32 | 3.968 | .391 | 9.92 | 0.254 | | 2.CMC.PSRA2Z3.F532 |
| | | 5/32 | 3.968 | .391 | 9.92 | 0.381 | | 2.CMC.PSRA3Z3.F532 |
| | | .157 | 4.0 | .394 | 10.00 | 0.20 | | 2.CMC42.A2Z3.400.1 |
| | | .157 | 4.0 | .394 | 10.00 | 0.50 | | 2.CMC42.A3Z3.400.1 |
| | 4.3 | .146 | 3.7 | .364 | 9.25 | 0.20 | | 2.CMC42.A2Z3.370.1 |
| | | .146 | 3.7 | .364 | 9.25 | 0.50 | | 2.CMC42.A3Z3.370.1 |
| | | 5/32 | 3.968 | .391 | 9.92 | 0.254 | | 2.CMC.PSRA2Z3.F532 |
| | | 5/32 | 3.968 | .391 | 9.92 | 0.381 | | 2.CMC.PSRA3Z3.F532 |
| | | .157 | 4.0 | .394 | 10.00 | 0.20 | | 2.CMC42.A2Z3.400.1 |
| | | .157 | 4.0 | .394 | 10.00 | 0.50 | | 2.CMC42.A3Z3.400.1 |
| | 4.4 | .146 | 3.7 | .364 | 9.25 | 0.20 | | 2.CMC42.A2Z3.370.1 |
| | | .146 | 3.7 | .364 | 9.25 | 0.50 | | 2.CMC42.A3Z3.370.1 |
| | | 5/32 | 3.968 | .391 | 9.92 | 0.254 | | 2.CMC.PSRA2Z3.F532 |
| | | 5/32 | 3.968 | .391 | 9.92 | 0.381 | | 2.CMC.PSRA3Z3.F532 |
| | | .157 | 4.0 | .394 | 10.00 | 0.20 | | 2.CMC42.A2Z3.400.1 |
| | | .157 | 4.0 | .394 | 10.00 | 0.50 | | 2.CMC42.A3Z3.400.1 |
| | 4.5 | .157 | 4.0 | .394 | 10.00 | 0.20 | | 2.CMC42.A2Z3.400.1 |
| | | .157 | 4.0 | .394 | 10.00 | 0.50 | | 2.CMC42.A3Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.20 | | 2.CMC42.A2Z3.430.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.50 | | 2.CMC42.A3Z3.430.1 |
| | 4.6 | .157 | 4.0 | .394 | 10.00 | 0.20 | | 2.CMC42.A2Z3.400.1 |
| | | .157 | 4.0 | .394 | 10.00 | 0.50 | | 2.CMC42.A3Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.20 | | 2.CMC42.A2Z3.430.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.50 | | 2.CMC42.A3Z3.430.1 |
| | 4.7 | .157 | 4.0 | .394 | 10.00 | 0.20 | | 2.CMC42.A2Z3.400.1 |
| | | .157 | 4.0 | .394 | 10.00 | 0.50 | | 2.CMC42.A3Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.20 | | 2.CMC42.A2Z3.430.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.50 | | 2.CMC42.A3Z3.430.1 |
| 3/16 | 4.762 | .157 | 4.0 | .394 | 10.00 | 0.20 | | 2.CMC42.A2Z3.400.1 |
| | | .157 | 4.0 | .394 | 10.00 | 0.50 | | 2.CMC42.A3Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.20 | | 2.CMC42.A2Z3.430.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.50 | | 2.CMC42.A3Z3.430.1 |
| | 4.8 | .157 | 4.0 | .394 | 10.00 | 0.20 | | 2.CMC42.A2Z3.400.1 |
| | | .157 | 4.0 | .394 | 10.00 | 0.50 | | 2.CMC42.A3Z3.400.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.20 | | 2.CMC42.A2Z3.430.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.50 | | 2.CMC42.A3Z3.430.1 |

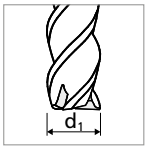
CRAZYMILL by Mikron Tool Cool

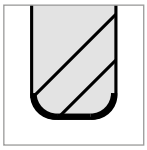
# NEW Process CrazyMill Cool P&S Corner radius - Type A

## THE RIGHT TOOL FOR KEYWAY SLOTTING

### Tool selection



| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | r [mm] | r [inch] | Item number |
|---|---|---|---|---|---|---|---|---|
| .193 | 4.9 | .169 | 4.3 | .423 | 10.75 | 0.20 | | 2.CMC42.A2Z3.430.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.50 | | 2.CMC42.A3Z3.430.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.20 | | 2.CMC42.A2Z3.470.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.50 | | 2.CMC42.A3Z3.470.1 |
| .197 | 5.0 | .169 | 4.3 | .423 | 10.75 | 0.20 | | 2.CMC42.A2Z3.430.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.50 | | 2.CMC42.A3Z3.430.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.20 | | 2.CMC42.A2Z3.470.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.50 | | 2.CMC42.A3Z3.470.1 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.254 | | 2.CMC.PSRA2Z3.F316 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.381 | | 2.CMC.PSRA3Z3.F316 |
| | | .189 | 4.8 | .472 | 12.00 | 0.20 | | 2.CMC42.A2Z3.480.1 |
| | | .189 | 4.8 | .472 | 12.00 | 0.50 | | 2.CMC42.A3Z3.480.1 |
| .201 | 5.1 | .169 | 4.3 | .423 | 10.75 | 0.20 | | 2.CMC42.A2Z3.430.1 |
| | | .169 | 4.3 | .423 | 10.75 | 0.50 | | 2.CMC42.A3Z3.430.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.20 | | 2.CMC42.A2Z3.470.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.50 | | 2.CMC42.A3Z3.470.1 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.254 | | 2.CMC.PSRA2Z3.F316 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.381 | | 2.CMC.PSRA3Z3.F316 |
| | | .189 | 4.8 | .472 | 12.00 | 0.20 | | 2.CMC42.A2Z3.480.1 |
| | | .189 | 4.8 | .472 | 12.00 | 0.50 | | 2.CMC42.A3Z3.480.1 |
| .205 | 5.2 | .185 | 4.7 | .463 | 11.75 | 0.20 | | 2.CMC42.A2Z3.470.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.50 | | 2.CMC42.A3Z3.470.1 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.254 | | 2.CMC.PSRA2Z3.F316 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.381 | | 2.CMC.PSRA3Z3.F316 |
| | | .189 | 4.8 | .472 | 12.00 | 0.20 | | 2.CMC42.A2Z3.480.1 |
| | | .189 | 4.8 | .472 | 12.00 | 0.50 | | 2.CMC42.A3Z3.480.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| .209 | 5.3 | .185 | 4.7 | .463 | 11.75 | 0.20 | | 2.CMC42.A2Z3.470.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.50 | | 2.CMC42.A3Z3.470.1 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.254 | | 2.CMC.PSRA2Z3.F316 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.381 | | 2.CMC.PSRA3Z3.F316 |
| | | .189 | 4.8 | .472 | 12.00 | 0.20 | | 2.CMC42.A2Z3.480.1 |
| | | .189 | 4.8 | .472 | 12.00 | 0.50 | | 2.CMC42.A3Z3.480.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| .213 | 5.4 | .185 | 4.7 | .463 | 11.75 | 0.20 | | 2.CMC42.A2Z3.470.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.50 | | 2.CMC42.A3Z3.470.1 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.254 | | 2.CMC.PSRA2Z3.F316 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.381 | | 2.CMC.PSRA3Z3.F316 |
| | | .189 | 4.8 | .472 | 12.00 | 0.20 | | 2.CMC42.A2Z3.480.1 |
| | | .189 | 4.8 | .472 | 12.00 | 0.50 | | 2.CMC42.A3Z3.480.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| .217 | 5.5 | .185 | 4.7 | .463 | 11.75 | 0.20 | | 2.CMC42.A2Z3.470.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.50 | | 2.CMC42.A3Z3.470.1 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.254 | | 2.CMC.PSRA2Z3.F316 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.381 | | 2.CMC.PSRA3Z3.F316 |
| | | .189 | 4.8 | .472 | 12.00 | 0.20 | | 2.CMC42.A2Z3.480.1 |
| | | .189 | 4.8 | .472 | 12.00 | 0.50 | | 2.CMC42.A3Z3.480.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |

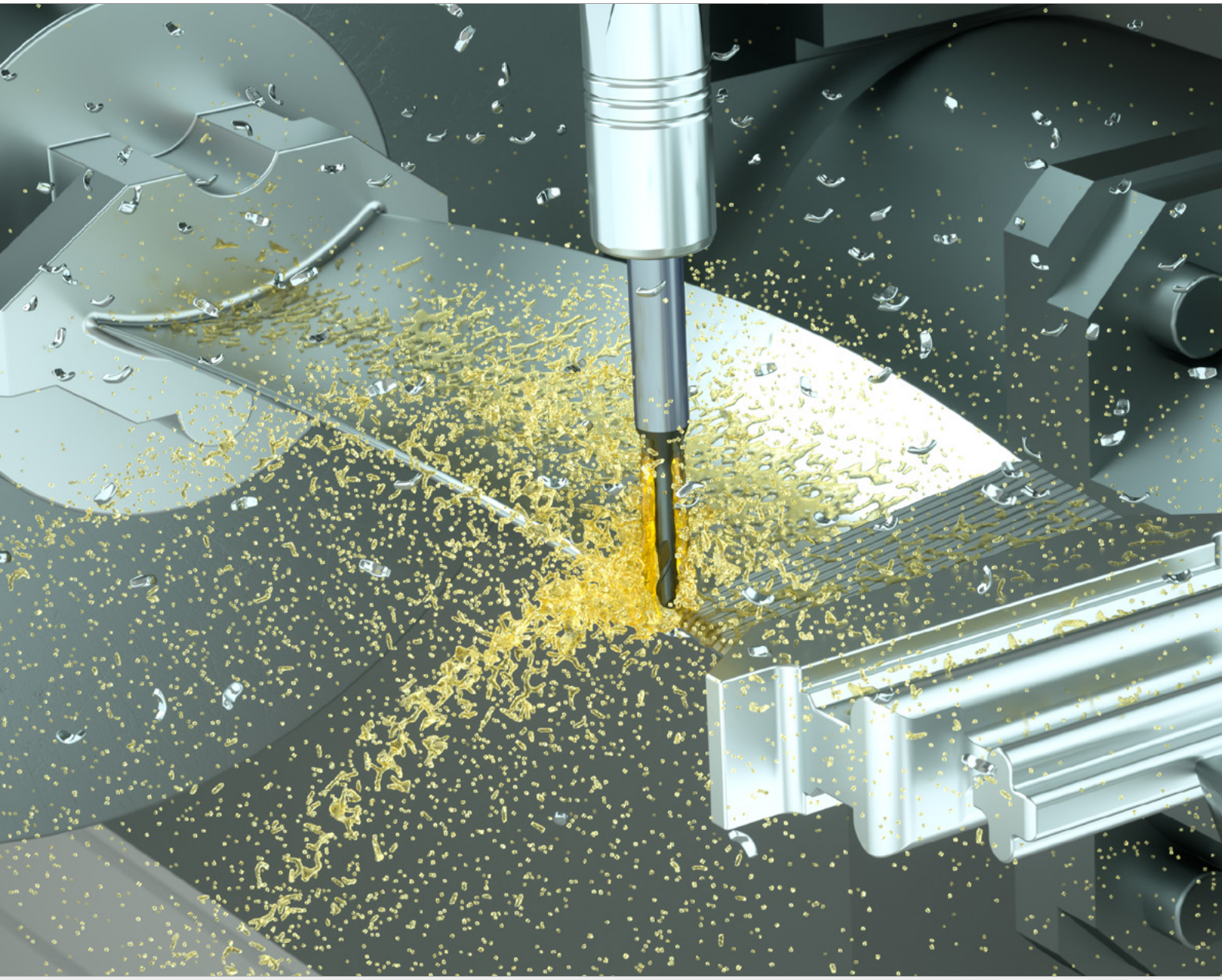
| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | r [mm] | r [inch] | Item number |
|---|---|---|---|---|---|---|---|---|
| 7/32 | 5.560 | .185 | 4.7 | .463 | 11.75 | 0.20 | | 2.CMC42.A2Z3.470.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.50 | | 2.CMC42.A3Z3.470.1 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.254 | | 2.CMC.PSRA2Z3.F316 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.381 | | 2.CMC.PSRA3Z3.F316 |
| | | .189 | 4.8 | .472 | 12.00 | 0.20 | | 2.CMC42.A2Z3.480.1 |
| | | .189 | 4.8 | .472 | 12.00 | 0.50 | | 2.CMC42.A3Z3.480.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| .220 | 5.6 | .185 | 4.7 | .463 | 11.75 | 0.20 | | 2.CMC42.A2Z3.470.1 |
| | | .185 | 4.7 | .463 | 11.75 | 0.50 | | 2.CMC42.A3Z3.470.1 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.254 | | 2.CMC.PSRA2Z3.F316 |
| | | 3/16 | 4.762 | .469 | 11.91 | 0.381 | | 2.CMC.PSRA3Z3.F316 |
| | | .189 | 4.8 | .472 | 12.00 | 0.20 | | 2.CMC42.A2Z3.480.1 |
| | | .189 | 4.8 | .472 | 12.00 | 0.50 | | 2.CMC42.A3Z3.480.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| .224 | 5.7 | .189 | 4.8 | .472 | 12.00 | 0.20 | | 2.CMC42.A2Z3.480.1 |
| | | .189 | 4.8 | .472 | 12.00 | 0.50 | | 2.CMC42.A3Z3.480.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| .228 | 5.8 | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| .232 | 5.9 | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| | | 7/32 | 5.560 | .547 | 13.90 | 0.381 | | 2.CMC.PSRA2Z3.F732 |
| | | 7/32 | 5.560 | .547 | 13.90 | 0.762 | | 2.CMC.PSRA3Z3.F732 |
| | | .224 | 5.7 | .561 | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | .224 | 5.7 | .561 | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| .236 | 6.0 | .197 | 5.0 | .492 | 12.50 | 0.20 | | 2.CMC42.A2Z3.500.1 |
| | | .197 | 5.0 | .492 | 12.50 | 0.50 | | 2.CMC42.A3Z3.500.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| | | 7/32 | 5.560 | .547 | 13.90 | 0.381 | | 2.CMC.PSRA2Z3.F732 |
| | | 7/32 | 5.560 | .547 | 13.90 | 0.762 | | 2.CMC.PSRA3Z3.F732 |
| | | .224 | 5.7 | .561 | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | .224 | 5.7 | .561 | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| .240 | 6.1 | .209 | 5.3 | .522 | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | .209 | 5.3 | .522 | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| | | 7/32 | 5.560 | .547 | 13.90 | 0.381 | | 2.CMC.PSRA2Z3.F732 |
| | | 7/32 | 5.560 | .547 | 13.90 | 0.762 | | 2.CMC.PSRA3Z3.F732 |
| | | .224 | 5.7 | .561 | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | .224 | 5.7 | .561 | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |

| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | r [mm] | r [inch] | Item number |
|---|---|---|---|---|---|---|---|---|
| | | **.209** | 5.3 | **.522** | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| | | **7/32** | 5.560 | **.547** | 13.90 | **0.381** | | 2.CMC.PSRA2Z3.F732 |
| | | **7/32** | 5.560 | **.547** | 13.90 | **0.762** | | 2.CMC.PSRA3Z3.F732 |
| **.244** | 6.2 | **.224** | 5.7 | **.561** | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| | | **7/32** | 5.560 | **.547** | 13.90 | **0.381** | | 2.CMC.PSRA2Z3.F732 |
| | | **7/32** | 5.560 | **.547** | 13.90 | **0.762** | | 2.CMC.PSRA3Z3.F732 |
| **.248** | 6.3 | **.224** | 5.7 | **.561** | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 0.20 | | 2.CMC42.A2Z3.530.1 |
| | | **.209** | 5.3 | **.522** | 13.25 | 0.50 | | 2.CMC42.A3Z3.530.1 |
| | | **7/32** | 5.560 | **.547** | 13.90 | **0.381** | | 2.CMC.PSRA2Z3.F732 |
| | | **7/32** | 5.560 | **.547** | 13.90 | **0.762** | | 2.CMC.PSRA3Z3.F732 |
| **1/4** | 6.350 | **.224** | 5.7 | **.561** | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| **.252** | 6.4 | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| **.256** | 6.5 | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| **.260** | 6.6 | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| **.264** | 6.7 | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |

| w slot [inch] | w slot [mm] | $d_1$ Tool [inch] | $d_1$ Tool [mm] | $l_{1,max}$ [inch] | $l_{1,max}$ [mm] | r [mm] | r [inch] | Item number |
|---|---|---|---|---|---|---|---|---|
| | | **.224** | 5.7 | **.561** | 14.25 | 0.20 | | 2.CMC42.A2Z3.570.1 |
| | | **.224** | 5.7 | **.561** | 14.25 | 0.50 | | 2.CMC42.A3Z3.570.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| **.268** | 6.8 | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| **.272** | 6.9 | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| **.276** | 7.0 | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| **.280** | 7.1 | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.20 | | 2.CMC42.A2Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 0.50 | | 2.CMC42.A3Z3.600.1 |
| | | **.236** | 6.0 | **.591** | 15.00 | 1.00 | | 2.CMC42.A4Z3.600.1 |
| **.283** | 7.2 | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| **.287** | 7.3 | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| **.291** | 7.4 | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| **.295** | 7.5 | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **0.381** | | 2.CMC.PSRA2Z3.F14 |
| **.299** | 7.6 | **1/4** | 6.350 | **.625** | 15.88 | **0.762** | | 2.CMC.PSRA3Z3.F14 |
| | | **1/4** | 6.350 | **.625** | 15.88 | **1.524** | | 2.CMC.PSRA4Z3.F14 |
| **.323 - .378** | 8.2 - 9.6 | **.315** | 8.0 | **.787** | 20.00 | 0.20 | | 2.CMC42.A2Z3.800.1 |
| | | **.315** | 8.0 | **.787** | 20.00 | 0.50 | | 2.CMC42.A3Z3.800.1 |
| | | **.315** | 8.0 | **.787** | 20.00 | 1.50 | | 2.CMC42.A4Z3.800.1 |

PATENTED

# CrazyMill Cool Ball - Z2



CRAZYMILL Cool

## HSPC MILLING TOOL FOR DIFFICULT TO MACHINE MATERIALS



CrazyMill Cool Ball is an innovative ball endmill from Mikron Tool developed for the roughing and finishing of stainless steels, titanium alloys, CrCo alloys and super alloys. With a very efficient integrated coolant supply it reaches the highest speeds and depth of cutting and guarantees a high chip removal rate as well as a long tool life. It is available in the diameter range of .012" to .315" (0.3 mm to 8.0 mm) and a maximum milling depth up to 5 x d.

The milling tools have three to five integrated cooling channels depending on the shaft diameter.

The cutting geometry is especially designed to improve speed and surface quality in a manner to limit oscillation and vibration. The extended cutting depths facilitate machining on the radius and on the cylindrical part, and make the milling cutter into a versatile tool.

CrazyMill Cool Ball combines HSC (high-speed cutting) and HPC (high-performance cutting), thus becoming an HSPC (high-speed performance cutting) ball endmill.

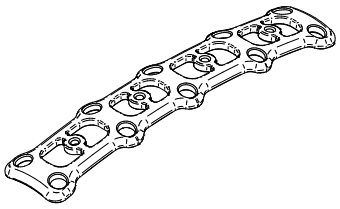
**Regrinding:** This product is not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the CrazyMill Cool Ball - Z2 (diameter, length, cutting direction…)? Ask us about our customized versions!

# Features and benefits

## BALL ENDMILL WITH COOLANT THROUGH THE SHANK FOR ROUGHING AND FINISHING

- **SHORT MACHINING TIME** | up to 2 times faster
- **LONG TOOL LIFE** | due to efficient cooling
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to through shank coolant
- **HIGH SURFACE QUALITY** | due to anti-vibration geometry
- **LOW PRODUCTION COSTS** | roughing and finishing with one tool



**COMPONENT**
Bone plate

**MATERIAL**
TiAl6V4 / 3.7165 / B348 (Grade 5)

**MACHINING**
- Roughing
- d = 6 mm | **.236"**

**MILLING TOOL**
Mikron Tool - CrazyMill Cool Ball - Z2 - Type C

| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyMill Cool Ball - Z2<br>- Carbide<br>- Coated<br>- Integrated cooling |
| Item number | 2.CMC30.C5Z2.600.1 |
| Cutting data | Roughing<br>$v_c$ = 170 m/min | **558 SFM**<br>$f_z$ = 0.042 mm | **.00165 IPT**<br>$a_{p,\,max}$ = 1 x d<br>$a_e$ = 1 mm | **.039"**<br>Z = 2 |

| 2 x d | 3 x d | 5 x d |
|---|---|---|
| Type A | Type B | Type C |
| Coated<br>Integrated cooling<br>$l_1$: 2xd, $l_2$: 2xd | Coated<br>Integrated cooling<br>$l_1$: 3xd, $l_2$: 2xd | Coated<br>Integrated cooling<br>$l_1$: 5xd, $l_2$: 2xd |
|  |  |  |
|  |  |  |
| page 570 | page 571 | page 572 |

## PATENTED

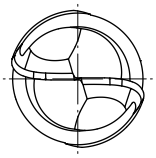
**1 | SHANK**
The robust carbide shank guarantees stable and vibration-free milling. A high degree of precision and excellent surface quality are achieved.

**2 | INTEGRATED COOLING - PATENTED**
The integrated cooling channels guarantee constant and maximal cooling of the cutting edges and optimal chip removal. The result is higher cutting speed and depth as well as improved surface quality.

**3 | CARBIDE**
The specially developed micro-grain carbide meets all requirements in terms of mechanical properties.

**4 | COATING**
The high-performance RIP coating is heat-resistant and wear-resistant, prevents build up edges and guarantees optimum chip flushing. The result is long tool life.

**5 | CUTTING GEOMETRY**
Developed for the machining of difficult-to-machine materials such as stainless steels, titanium, titanium alloys and heat-resistant alloys. Ensures roughing and finishing with high surface quality. Due to its highly smooth running, it will work with no vibration.

Mill tip 

$l_1$ = Effective length $l_2$ = Cutting length

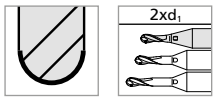
CRAZYMILL by Mikron Tool Cool

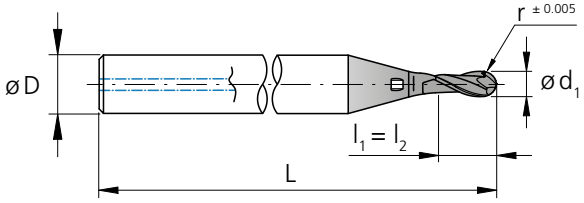
# Type A - 2 x d - Ball - Z2

Carbide | Z2 | 30° | eXedur RIP

| | | |
|---|---|---|
| Ø$d_1$ | **.039" - .315"** (1.0 - 8.0 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Ball




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | r [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [teeth] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.012** | 0.3 | 0.15 | **.024** | 0.60 | 0.60 | 3 | **1.50** | 38 | 2 | 2.CMC30.A5Z2.030.1 | ■ |
| **1/64** | **.0156** | 0.396 | 0.198 | **.031** | 0.79 | 0.79 | 3 | **1.50** | 38 | 2 | 2.CMC.BAZ2.F164 | ■ |
| | **.016** | 0.4 | 0.20 | **.031** | 0.80 | 0.80 | 3 | **1.50** | 38 | 2 | 2.CMC30.A5Z2.040.1 | ■ |
| | **.020** | 0.5 | 0.25 | **.039** | 1.00 | 1.00 | 3 | **1.50** | 38 | 2 | 2.CMC30.A5Z2.050.1 | ■ |
| | **.024** | 0.6 | 0.30 | **.047** | 1.20 | 1.20 | 3 | **1.50** | 38 | 2 | 2.CMC30.A5Z2.060.1 | ■ |
| **1/32** | **.0312** | 0.793 | 0.397 | **.063** | 1.59 | 1.59 | 3 | **1.50** | 38 | 2 | 2.CMC.BAZ2.F132 | ■ |
| | **.031** | 0.8 | 0.40 | **.063** | 1.60 | 1.60 | 3 | **1.50** | 38 | 2 | 2.CMC30.A5Z2.080.1 | ■ |
| | **.039** | 1.0 | 0.50 | **.079** | 2.00 | 2.00 | 4 | **1.57** | 40 | 2 | 2.CMC30.A5Z2.100.1 | ■ |
| | **.047** | 1.2 | 0.60 | **.094** | 2.40 | 2.40 | 4 | **1.57** | 40 | 2 | 2.CMC30.A5Z2.120.1 | ■ |
| | **.059** | 1.5 | 0.75 | **.118** | 3.00 | 3.00 | 4 | **1.57** | 40 | 2 | 2.CMC30.A5Z2.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | 0.794 | **.125** | 3.17 | 3.17 | 4 | **1.57** | 40 | 2 | 2.CMC.BAZ2.F116 | ■ |
| | **.071** | 1.8 | 0.90 | **.142** | 3.60 | 3.60 | 4 | **1.57** | 40 | 2 | 2.CMC30.A5Z2.180.1 | ■ |
| | **.079** | 2.0 | 1.00 | **.157** | 4.00 | 4.00 | 4 | **1.57** | 40 | 2 | 2.CMC30.A5Z2.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | 1.191 | **.187** | 4.76 | 4.76 | 4 | **1.77** | 40 | 2 | 2.CMC.BAZ2.F332 | ■ |
| | **.098** | 2.5 | 1.25 | **.197** | 5.00 | 5.00 | 6 | **1.77** | 45 | 2 | 2.CMC30.A5Z2.250.1 | ■ |
| | **.118** | 3.0 | 1.50 | **.236** | 6.00 | 6.00 | 6 | **1.97** | 50 | 2 | 2.CMC30.A5Z2.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | 1.588 | **.250** | 6.35 | 6.35 | 6 | **1.97** | 50 | 2 | 2.CMC.BAZ2.F18 | ■ |
| **5/32** | **.1562** | 3.968 | 1.984 | **.313** | 7.94 | 7.94 | 6 | **1.97** | 50 | 2 | 2.CMC.BAZ2.F532 | ■ |
| | **.157** | 4.0 | 2.00 | **.315** | 8.00 | 8.00 | 6 | **1.97** | 50 | 2 | 2.CMC30.A5Z2.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | 2.381 | **.375** | 9.52 | 9.52 | 8 | **2.36** | 60 | 2 | 2.CMC.BAZ2.F316 | ■ |
| **7/32** | **.2189** | 5.560 | 2.780 | **.438** | 11.12 | 11.12 | 10 | **2.36** | 60 | 2 | 2.CMC.BAZ2.F732 | ■ |
| | **.236** | 6.0 | 3.00 | **.472** | 12.00 | 12.00 | 10 | **2.36** | 60 | 2 | 2.CMC30.A5Z2.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | 3.175 | **.500** | 12.70 | 12.70 | 10 | **2.36** | 60 | 2 | 2.CMC.BAZ2.F14 | ■ |
| | **.315** | 8.0 | 4.00 | **.630** | 16.00 | 16.00 | 12 | **2.76** | 70 | 2 | 2.CMC30.A5Z2.800.1 | ■ |

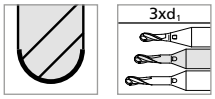
■ Stock item

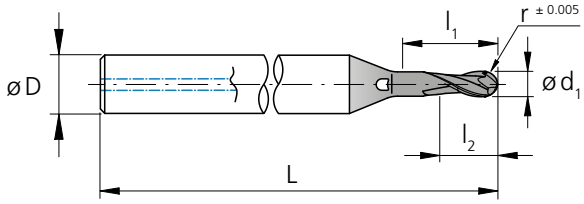
# Type B - 3 x d - Ball - Z2

Carbide | Z2 | 30° | eXedur RIP | $a_p$ | $a_e$

| | | |
|---|---|---|
| Ø$d_1$ | **.039" - .315"** (1.0 - 8.0 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Ball




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | r [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [teeth] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.012** | 0.3 | 0.15 | **.035** | 0.90 | 0.60 | 3 | **1.50** | 38 | 2 | 2.CMC30.B5Z2.030.1 | ■ |
| **1/64** | **.0156** | 0.396 | 0.198 | **.047** | 1.19 | 0.79 | 3 | **1.50** | 38 | 2 | 2.CMC.BBZ2.F164 | ■ |
| | **.016** | 0.4 | 0.20 | **.047** | 1.20 | 0.80 | 3 | **1.50** | 38 | 2 | 2.CMC30.B5Z2.040.1 | ■ |
| | **.020** | 0.5 | 0.25 | **.059** | 1.50 | 1.00 | 3 | **1.50** | 38 | 2 | 2.CMC30.B5Z2.050.1 | ■ |
| | **.024** | 0.6 | 0.30 | **.071** | 1.80 | 1.20 | 3 | **1.50** | 38 | 2 | 2.CMC30.B5Z2.060.1 | ■ |
| **1/32** | **.0312** | 0.793 | 0.397 | **.094** | 2.38 | 1.59 | 3 | **1.50** | 38 | 2 | 2.CMC.BBZ2.F132 | ■ |
| | **.031** | 0.8 | 0.40 | **.094** | 2.40 | 1.60 | 3 | **1.50** | 38 | 2 | 2.CMC30.B5Z2.080.1 | ■ |
| | **.039** | 1.0 | 0.50 | **.118** | 3.00 | 2.00 | 4 | **1.57** | 40 | 2 | 2.CMC30.B5Z2.100.1 | ■ |
| | **.047** | 1.2 | 0.60 | **.142** | 3.60 | 2.40 | 4 | **1.57** | 40 | 2 | 2.CMC30.B5Z2.120.1 | ■ |
| | **.059** | 1.5 | 0.75 | **.177** | 4.50 | 3.00 | 4 | **1.57** | 40 | 2 | 2.CMC30.B5Z2.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | 0.794 | **.187** | 4.76 | 3.17 | 4 | **1.57** | 40 | 2 | 2.CMC.BBZ2.F116 | ■ |
| | **.071** | 1.8 | 0.90 | **.213** | 5.40 | 3.60 | 4 | **1.57** | 40 | 2 | 2.CMC30.B5Z2.180.1 | ■ |
| | **.079** | 2.0 | 1.00 | **.236** | 6.00 | 4.00 | 4 | **1.57** | 40 | 2 | 2.CMC30.B5Z2.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | 1.191 | **.281** | 7.14 | 4.76 | 4 | **1.77** | 40 | 2 | 2.CMC.BBZ2.F332 | ■ |
| | **.098** | 2.5 | 1.25 | **.295** | 7.50 | 5.00 | 6 | **1.77** | 45 | 2 | 2.CMC30.B5Z2.250.1 | ■ |
| | **.118** | 3.0 | 1.50 | **.354** | 9.00 | 6.00 | 6 | **1.97** | 50 | 2 | 2.CMC30.B5Z2.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | 1.588 | **.375** | 9.53 | 6.35 | 6 | **2.17** | 55 | 2 | 2.CMC.BBZ2.F18 | ■ |
| **5/32** | **.1562** | 3.968 | 1.984 | **.469** | 11.90 | 7.94 | 6 | **2.17** | 55 | 2 | 2.CMC.BBZ2.F532 | ■ |
| | **.157** | 4.0 | 2.00 | **.472** | 12.00 | 8.00 | 6 | **2.17** | 55 | 2 | 2.CMC30.B5Z2.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | 2.381 | **.563** | 14.29 | 9.52 | 8 | **2.56** | 65 | 2 | 2.CMC.BBZ2.F316 | ■ |
| **7/32** | **.2189** | 5.560 | 2.780 | **.657** | 16.68 | 11.12 | 10 | **2.56** | 65 | 2 | 2.CMC.BBZ2.F732 | ■ |
| | **.236** | 6.0 | 3.00 | **.709** | 18.00 | 12.00 | 10 | **2.56** | 65 | 2 | 2.CMC30.B5Z2.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | 3.175 | **.750** | 19.05 | 12.70 | 10 | **2.56** | 65 | 2 | 2.CMC.BBZ2.F14 | ■ |
| | **.315** | 8.0 | 4.00 | **.945** | 24.00 | 16.00 | 12 | **3.15** | 80 | 2 | 2.CMC30.B5Z2.800.1 | ■ |

■ Stock item

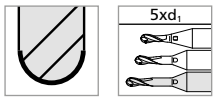
CRAZYMILL by Mikron Tool Cool

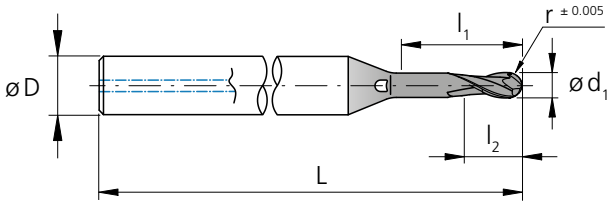
# Type C - 5 x d - Ball - Z2

Carbide | Z2 | 30° | eXedur RIP

| | | |
|---|---|---|
| Ø$d_1$ | **.039" - .315"** (1.0 - 8.0 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Ball




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | r [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [teeth] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.012** | 0.3 | 0.15 | **.059** | 1.50 | 0.60 | 3 | **1.50** | 38 | 2 | 2.CMC30.C5Z2.030.1 | ■ |
| **1/64** | **.0156** | 0.396 | 0.198 | **.078** | 1.98 | 0.79 | 3 | **1.50** | 38 | 2 | 2.CMC.BCZ2.F164 | ■ |
| | **.016** | 0.4 | 0.20 | **.079** | 2.00 | 0.80 | 3 | **1.50** | 38 | 2 | 2.CMC30.C5Z2.040.1 | ■ |
| | **.020** | 0.5 | 0.25 | **.098** | 2.50 | 1.00 | 3 | **1.50** | 38 | 2 | 2.CMC30.C5Z2.050.1 | ■ |
| | **.024** | 0.6 | 0.30 | **.118** | 3.00 | 1.20 | 3 | **1.50** | 38 | 2 | 2.CMC30.C5Z2.060.1 | ■ |
| **1/32** | **.0312** | 0.793 | 0.397 | **.156** | 3.97 | 1.59 | 3 | **1.50** | 38 | 2 | 2.CMC.BCZ2.F132 | ■ |
| | **.031** | 0.8 | 0.40 | **.157** | 4.00 | 1.60 | 3 | **1.50** | 38 | 2 | 2.CMC30.C5Z2.080.1 | ■ |
| | **.039** | 1.0 | 0.50 | **.197** | 5.00 | 2.00 | 4 | **1.57** | 40 | 2 | 2.CMC30.C5Z2.100.1 | ■ |
| | **.047** | 1.2 | 0.60 | **.236** | 6.00 | 2.40 | 4 | **1.57** | 40 | 2 | 2.CMC30.C5Z2.120.1 | ■ |
| | **.059** | 1.5 | 0.75 | **.295** | 7.50 | 3.00 | 4 | **1.57** | 40 | 2 | 2.CMC30.C5Z2.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | 0.794 | **.313** | 7.94 | 3.17 | 4 | **1.73** | 40 | 2 | 2.CMC.BCZ2.F116 | ■ |
| | **.071** | 1.8 | 0.90 | **.354** | 9.00 | 3.60 | 4 | **1.73** | 44 | 2 | 2.CMC30.C5Z2.180.1 | ■ |
| | **.079** | 2.0 | 1.00 | **.394** | 10.00 | 4.00 | 4 | **1.73** | 44 | 2 | 2.CMC30.C5Z2.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | 1.191 | **.469** | 11.91 | 4.76 | 4 | **1.97** | 44 | 2 | 2.CMC.BCZ2.F332 | ■ |
| | **.098** | 2.5 | 1.25 | **.492** | 12.50 | 5.00 | 6 | **1.97** | 50 | 2 | 2.CMC30.C5Z2.250.1 | ■ |
| | **.118** | 3.0 | 1.50 | **.591** | 15.00 | 6.00 | 6 | **2.17** | 55 | 2 | 2.CMC30.C5Z2.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | 1.588 | **.625** | 15.88 | 6.35 | 6 | **2.36** | 60 | 2 | 2.CMC.BCZ2.F18 | ■ |
| **5/32** | **.1562** | 3.968 | 1.984 | **.781** | 19.84 | 7.94 | 6 | **2.36** | 60 | 2 | 2.CMC.BCZ2.F532 | ■ |
| | **.157** | 4.0 | 2.00 | **.787** | 20.00 | 8.00 | 6 | **2.36** | 60 | 2 | 2.CMC30.C5Z2.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | 2.381 | **.937** | 23.81 | 9.52 | 8 | **2.76** | 70 | 2 | 2.CMC.BCZ2.F316 | ■ |
| **7/32** | **.2189** | 5.560 | 2.780 | **1.09** | 27.80 | 11.12 | 10 | **2.76** | 70 | 2 | 2.CMC.BCZ2.F732 | ■ |
| | **.236** | 6.0 | 3.00 | **1.18** | 30.00 | 12.00 | 10 | **2.76** | 70 | 2 | 2.CMC30.C5Z2.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | 3.175 | **1.25** | 31.75 | 12.70 | 10 | **2.76** | 70 | 2 | 2.CMC.BCZ2.F14 | ■ |
| | **.315** | 8.0 | 4.00 | **1.57** | 40.00 | 16.00 | 12 | **3.54** | 90 | 2 | 2.CMC30.C5Z2.800.1 | ■ |

■ Stock item

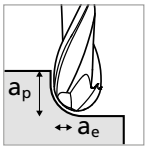


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# Type A - Roughing

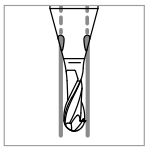
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

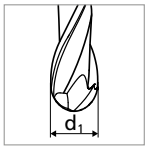
**Roughing**




- $a_p = 0.5 \times d_1$ ($Ød_1 \leq 0.5$ mm | **.020"**)
- $a_p = 1 \times d_1$ ($Ød_1 > 0.5$ mm | **.020"**)
- $a_e = 0.3 \times d_1$

**Machining angle = 0°**

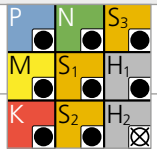





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3–0.4 mm \| .012"–.016" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| **197** | 0.005–0.007 **.00020–.00028** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| **197** | 0.005–0.007 **.00020–.00028** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| **197** | 0.003–0.005 **.00012–.00020** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 60 \| **197** | 0.003–0.004 **.00012–.00016** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 \| **197** | 0.003–0.004 **.00012–.00016** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





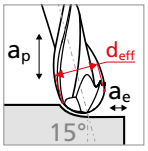

| Ød1 | 1/32" 0.5–0.8 mm \| .020"–.032" | | 1.0–1.2 mm \| .039"–.047" | | 1/16" 1.5–1.8 mm \| .059"–.071" | | 3/32" 2.0–2.5 mm \| .079"–.098" | | 1/8" 3.0 mm \| .118" | | 5/32–3/16–7/32–1/4" 4.0–6 mm \| .158"–.236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 100 \| **328** | 0.010–0.014 **.00039–.00055** | 140 \| **459** | 0.015–0.017 **.00059–.00067** | 200 \| **656** | 0.024–0.026 **.00094–.00102** | 220 \| **722** | 0.034–0.036 **.00134–.00142** | 240 \| **787** | 0.048 **.00189** | 280 \| **919** | 0.050 **.00197** | 280 \| **919** | 0.050 **.00197** |
| | 100 \| **328** | 0.009–0.012 **.00035–.00047** | 140 \| **459** | 0.014–0.016 **.00055–.00063** | 200 \| **656** | 0.022–0.024 **.00087–.00094** | 220 \| **722** | 0.032–0.034 **.00126–.00134** | 240 \| **787** | 0.046 **.00181** | 280 \| **919** | 0.048 **.00189** | 280 \| **919** | 0.048 **.00189** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 140 \| **459** | 0.011–0.013 **.00043–.00051** | 200 \| **656** | 0.020–0.022 **.00079–.00087** | 220 \| **722** | 0.030–0.032 **.00118–.00126** | 240 \| **787** | 0.042 **.00165** | 280 \| **919** | 0.044 **.00173** | 280 \| **919** | 0.044 **.00173** |
| | 100 \| **328** | 0.010–0.014 **.00039–.00055** | 140 \| **459** | 0.016–0.018 **.00063–.00071** | 200 \| **656** | 0.024–0.026 **.00094–.00102** | 220 \| **722** | 0.034–0.036 **.00134–.00142** | 240 \| **787** | 0.046 **.00181** | 280 \| **919** | 0.048 **.00189** | 280 \| **919** | 0.048 **.00189** |
| | 100 \| **328** | 0.009–0.012 **.00035–.00047** | 140 \| **459** | 0.015–0.017 **.00059–.00067** | 200 \| **656** | 0.022–0.024 **.00087–.00094** | 220 \| **722** | 0.032–0.034 **.00126–.00134** | 240 \| **787** | 0.044 **.00173** | 280 \| **919** | 0.046 **.00181** | 280 \| **919** | 0.046 **.00181** |
| | 100 \| **328** | 0.009–0.012 **.00035–.00047** | 140 \| **459** | 0.015–0.017 **.00059–.00067** | 200 \| **656** | 0.022–0.024 **.00087–.00094** | 220 \| **722** | 0.032–0.034 **.00126–.00134** | 240 \| **787** | 0.044 **.00173** | 280 \| **919** | 0.046 **.00181** | 280 \| **919** | 0.046 **.00181** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 140 \| **459** | 0.012–0.014 **.00047–.00055** | 200 \| **656** | 0.016–0.018 **.00063–.00071** | 220 \| **722** | 0.030–0.032 **.00118–.00126** | 240 \| **787** | 0.042 **.00165** | 280 \| **919** | 0.044 **.00173** | 280 \| **919** | 0.044 **.00173** |
| | 100 \| **328** | 0.006–0.009 **.00024–.00035** | 120 \| **394** | 0.011–0.022 **.00043–.00087** | 140 \| **459** | 0.024–0.026 **.00094–.00102** | 160 \| **525** | 0.028–0.036 **.00110–.00142** | 180 \| **591** | 0.042–0.048 **.00165–.00189** | 200 \| **656** | 0.052–0.057 **.00205–.00224** | 200 \| **656** | 0.052–0.057 **.00205–.00224** |
| | 100 \| **328** | 0.012–0.016 **.00047–.00063** | 140 \| **459** | 0.018–0.020 **.00071–.00079** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.012–0.016 **.00047–.00063** | 140 \| **459** | 0.018–0.020 **.00071–.00079** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.014–0.018 **.00055–.00071** | 140 \| **459** | 0.020–0.022 **.00079–.00087** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.014–0.018 **.00055–.00071** | 140 \| **459** | 0.020–0.022 **.00079–.00087** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.014–0.018 **.00055–.00071** | 140 \| **459** | 0.020–0.022 **.00079–.00087** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.012–0.016 **.00047–.00063** | 140 \| **459** | 0.018–0.020 **.00071–.00079** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.004–0.006 **.00016–.00024** | 120 \| **394** | 0.007–0.008 **.00028–.00031** | 130 \| **427** | 0.009–0.010 **.00035–.00039** | 140 \| **459** | 0.010–0.012 **.00039–.00047** | 150 \| **492** | 0.015 **.00059** | 170 \| **558** | 0.020 **.00079** | 170 \| **558** | 0.020 **.00079** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 120 \| **394** | 0.016–0.018 **.00063–.00071** | 130 \| **427** | 0.020–0.022 **.00079–.00087** | 140 \| **459** | 0.028–0.030 **.00110–.00118** | 150 \| **492** | 0.042 **.00165** | 170 \| **558** | 0.044 **.00173** | 170 \| **558** | 0.044 **.00173** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 120 \| **394** | 0.016–0.018 **.00063–.00071** | 130 \| **427** | 0.020–0.022 **.00079–.00087** | 140 \| **459** | 0.028–0.030 **.00110–.00118** | 150 \| **492** | 0.042 **.00165** | 170 \| **558** | 0.044 **.00173** | 170 \| **558** | 0.044 **.00173** |
| | 100 \| **328** | 0.004–0.006 **.00016–.00024** | 140 \| **459** | 0.007–0.008 **.00028–.00031** | 180 \| **591** | 0.009–0.010 **.00035–.00039** | 200 \| **656** | 0.010–0.012 **.00039–.00047** | 220 \| **722** | 0.015 **.00059** | 240 \| **787** | 0.020 **.00079** | 240 \| **787** | 0.020 **.00079** |
| | 80 \| **262** | 0.007–0.009 **.00028–.00035** | 100 \| **328** | 0.010–0.012 **.000639–.00047** | 140 \| **459** | 0.014–0.018 **.00055–.00071** | 180 \| **591** | 0.020–0.026 **.00079–.00102** | 200 \| **656** | 0.035 **.00138** | 240 \| **787** | 0.040 **.00157** | 240 \| **787** | 0.040 **.00157** |

CRAZYMILL by Mikron Tool Cool

# Type A - Semi-finishing

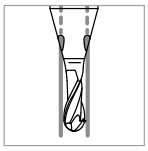
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

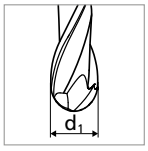
**Semi-finishing**




- $a_p = 0.25 \times d_1$ ($Ød_1 \leq 0.5$ mm **|.020"**)
- $a_p = 0.5 \times d_1$ ($Ød_1 > 0.5$ mm **|.020"**)
- $a_e = 0.1 \times d_1$

**Machining angle = 15°**

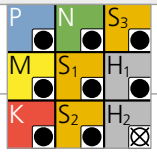





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3 mm \| .012" $v_c$ | $d_{eff}$ | $f_z$ | 0.4 mm \| .016" $v_c$ | $d_{eff}$ | $f_z$ | 0.5 mm \| .020" $v_c$ | $d_{eff}$ | $f_z$ | 0.6 mm \| .024" $v_c$ | $d_{eff}$ | $f_z$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 55 | 0.29 | 0.005 | 73 | 0.39 | 0.007 | 92 | 0.48 | 0.010 | 100 | 0.60 | 0.012 |
| | | 1.0401 | C15 | AISI 1015 | **180** | **.011** | **.00020** | **240** | **.015** | **.00028** | **302** | **.019** | **.00039** | **328** | **.024** | **.00047** |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.009 | 100 | 0.60 | 0.011 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00035** | **328** | **.024** | **.00043** |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | | | | | | | |
| | High alloyed tool steel Rm<1200N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 55 | 0.29 | **0.004** | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.009 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00031** | **328** | **.024** | **.00035** |
| | | 1.3343 | HS6-5-2C | AISI M2 | | | | | | | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 | | | | | | | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 | 55 | 0.29 | 0.005 | 73 | 0.39 | 0.007 | 92 | 0.48 | 0.010 | 100 | 0.60 | 0.012 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | **180** | **.011** | **.00020** | **240** | **.015** | **.00028** | **302** | **.019** | **.00039** | **328** | **.024** | **.00047** |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.009 | 100 | 0.60 | 0.010 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00035** | **328** | **.024** | **.00039** |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.009 | 100 | 0.60 | 0.010 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00035** | **328** | **.024** | **.00039** |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.010 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00031** | **328** | **.024** | **.00039** |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | | | | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 55 | 0.29 | 0.003 | 73 | 0.39 | 0.005 | 92 | 0.48 | 0.006 | 100 | 0.60 | 0.008 |
| | | 0.6030 | GG30 | ASTM 40B | **180** | **.011** | **.00012** | **240** | **.015** | **.00020** | **302** | **.019** | **.00024** | **328** | **.024** | **.00030** |
| | | 0.7040 | GGG40 | ASTM60-40-18 | | | | | | | | | | | | |
| | | 0.7060 | GGG60 | ASTM80-60-03 | | | | | | | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.012 | 100 | 0.60 | 0.014 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00047** | **328** | **.024** | **.00055** |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.012 | 100 | 0.60 | 0.014 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00047** | **328** | **.024** | **.00055** |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.014 | 100 | 0.60 | 0.016 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00055** | **328** | **.024** | **.00063** |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.014 | 100 | 0.60 | 0.016 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00055** | **328** | **.024** | **.00063** |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 | UNS C38500 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.014 | 100 | 0.60 | 0.016 |
| | | 2.102 | CuSn6 | UNS C51900 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00055** | **328** | **.024** | **.00063** |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.012 | 100 | 0.60 | 0.014 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00047** | **328** | **.024** | **.00055** |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 55 | 0.29 | 0.003 | 73 | 0.39 | 0.004 | 92 | 0.48 | 0.004 | 100 | 0.60 | 0.005 |
| | | 2.4668 | | Inconel 718 | **180** | **.011** | **.00012** | **240** | **.015** | **.00016** | **302** | **.019** | **.00016** | **328** | **.024** | **.00020** |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.004 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.009 |
| | | 3.7065 | Gr.4 | ASTM B348 | **180** | **.011** | **.00016** | **240** | **.015** | **.00016** | **302** | **.019** | **.00031** | **328** | **.024** | **.00035** |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.004 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.009 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | **180** | **.011** | **.00016** | **240** | **.015** | **.00016** | **302** | **.019** | **.00031** | **328** | **.024** | **.00035** |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 55 | 0.29 | 0.003 | 73 | 0.39 | 0.003 | 92 | 0.48 | 0.005 | 100 | 0.60 | 0.005 |
| | | | CrCoMo28 | ASTM F1537 | **180** | **.011** | **.00012** | **240** | **.015** | **.00012** | **302** | **.019** | **.00020** | **328** | **.024** | **.00020** |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.007 | 80 | 0.60 | 0.008 |
| | | | | | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00028** | **262** | **.024** | **.00031** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**
$d_{eff}$ [mm] | **[inch]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




Ød1

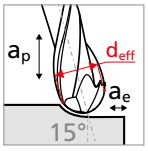
| 1/32" 0.8mm \| .032" | | | 1.0mm \| .039" | | | 1.2mm \| .047" | | | 1/16" 1.5 \| .059" | | | 1.8mm \| .071" | | | 2.0mm \| .079" | | | 3/32" 2.5mm \| .098" | | | 1/8" 3.0mm \| .118" | | | 5/32" 4.0mm \| .158" | | | 3/16–7/32–1/4" 6.0mm \| .236" | | | 8.0mm \| .315" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ |
| 100 | 0.80 | 0.014 | 140 | 1.00 | 0.015 | 140 | 1.20 | 0.017 | 200 | 1.50 | 0.024 | 200 | 1.80 | 0.026 | 220 | 2.00 | 0.034 | 220 | 2.50 | 0.036 | 240 | 3.00 | 0.048 | 260 | 4.00 | 0.050 | 260 | 6.00 | 0.050 | 260 | 8.00 | 0.050 |
| **328** | **.032** | **.00055** | **459** | **.039** | **.00059** | **459** | **.047** | **.00067** | **656** | **.059** | **.00094** | **656** | **.071** | **.00102** | **722** | **.079** | **.00134** | **722** | **.098** | **.00142** | **787** | **.118** | **.00189** | **853** | **.158** | **.00197** | **853** | **.236** | **.00197** | **853** | **.315** | **.00197** |
| 100 | 0.80 | 0.012 | 140 | 1.00 | 0.014 | 140 | 1.20 | 0.016 | 200 | 1.50 | 0.022 | 200 | 1.80 | 0.024 | 220 | 2.00 | 0.032 | 220 | 2.50 | 0.034 | 240 | 3.00 | 0.046 | 260 | 4.00 | 0.048 | 260 | 6.00 | 0.048 | 260 | 8.00 | 0.048 |
| **328** | **.032** | **.00047** | **459** | **.039** | **.00055** | **459** | **.047** | **.00063** | **656** | **.059** | **.00087** | **656** | **.071** | **.00094** | **722** | **.079** | **.00126** | **722** | **.098** | **.00134** | **787** | **.118** | **.00181** | **853** | **.158** | **.00189** | **853** | **.236** | **.00189** | **853** | **.315** | **.00189** |
| 100 | 0.80 | 0.011 | 140 | 1.00 | 0.011 | 140 | 1.20 | 0.013 | 200 | 1.50 | 0.020 | 200 | 1.80 | 0.022 | 220 | 2.00 | 0.030 | 220 | 2.50 | 0.032 | 240 | 3.00 | 0.042 | 260 | 4.00 | 0.044 | 260 | 6.00 | 0.044 | 260 | 8.00 | 0.044 |
| **328** | **.032** | **.00043** | **459** | **.039** | **.00043** | **459** | **.047** | **.00051** | **656** | **.059** | **.00079** | **656** | **.071** | **.00087** | **722** | **.079** | **.00118** | **722** | **.098** | **.00126** | **787** | **.118** | **.00165** | **853** | **.158** | **.00173** | **853** | **.236** | **.00173** | **853** | **.315** | **.00173** |
| 100 | 0.80 | 0.014 | 140 | 1.00 | 0.016 | 140 | 1.20 | 0.018 | 200 | 1.50 | 0.024 | 200 | 1.80 | 0.026 | 220 | 2.00 | 0.034 | 220 | 2.50 | 0.036 | 240 | 3.00 | 0.046 | 260 | 4.00 | 0.048 | 260 | 6.00 | 0.048 | 260 | 8.00 | 0.048 |
| **328** | **.032** | **.00055** | **459** | **.039** | **.00063** | **459** | **.047** | **.00071** | **656** | **.059** | **.00094** | **656** | **.071** | **.00102** | **722** | **.079** | **.00134** | **722** | **.098** | **.00142** | **787** | **.118** | **.00181** | **853** | **.158** | **.00189** | **853** | **.236** | **.00189** | **853** | **.315** | **.00189** |
| 100 | 0.80 | 0.012 | 140 | 1.00 | 0.015 | 140 | 1.20 | 0.017 | 200 | 1.50 | 0.022 | 200 | 1.80 | 0.024 | 220 | 2.00 | 0.032 | 220 | 2.50 | 0.034 | 240 | 3.00 | 0.044 | 260 | 4.00 | 0.046 | 260 | 6.00 | 0.046 | 260 | 8.00 | 0.046 |
| **328** | **.032** | **.00047** | **459** | **.039** | **.00059** | **459** | **.047** | **.00067** | **656** | **.059** | **.00087** | **656** | **.071** | **.00094** | **722** | **.079** | **.00126** | **722** | **.098** | **.00134** | **787** | **.118** | **.00173** | **853** | **.158** | **.00181** | **853** | **.236** | **.00181** | **853** | **.315** | **.00181** |
| 100 | 0.80 | 0.012 | 140 | 1.00 | 0.015 | 140 | 1.20 | 0.017 | 200 | 1.50 | 0.022 | 200 | 1.80 | 0.024 | 220 | 2.00 | 0.032 | 220 | 2.50 | 0.034 | 240 | 3.00 | 0.044 | 260 | 4.00 | 0.046 | 260 | 6.00 | 0.046 | 260 | 8.00 | 0.046 |
| **328** | **.032** | **.00047** | **459** | **.039** | **.00059** | **459** | **.047** | **.00067** | **656** | **.059** | **.00087** | **656** | **.071** | **.00094** | **722** | **.079** | **.00126** | **722** | **.098** | **.00134** | **787** | **.118** | **.00173** | **853** | **.158** | **.00181** | **853** | **.236** | **.00181** | **853** | **.315** | **.00181** |
| 100 | 0.80 | 0.011 | 140 | 1.00 | 0.012 | 140 | 1.20 | 0.014 | 200 | 1.50 | 0.016 | 200 | 1.80 | 0.018 | 220 | 2.00 | 0.030 | 220 | 2.50 | 0.032 | 240 | 3.00 | 0.042 | 260 | 4.00 | 0.044 | 260 | 6.00 | 0.044 | 260 | 8.00 | 0.044 |
| **328** | **.032** | **.00043** | **459** | **.039** | **.00047** | **459** | **.047** | **.00055** | **656** | **.059** | **.00063** | **656** | **.071** | **.00071** | **722** | **.079** | **.00118** | **722** | **.098** | **.00126** | **787** | **.118** | **.00165** | **853** | **.158** | **.00173** | **853** | **.236** | **.00173** | **853** | **.315** | **.00173** |
| 100 | 0.80 | 0.009 | 120 | 1.00 | 0.011 | 120 | 1.20 | 0.022 | 140 | 1.50 | 0.024 | 140 | 1.80 | 0.026 | 160 | 2.00 | 0.028 | 160 | 2.50 | 0.036 | 180 | 3.00 | 0.044 | 200 | 4.00 | 0.055 | 200 | 6.00 | 0.055 | 200 | 8.00 | 0.055 |
| **328** | **.032** | **.00035** | **394** | **.039** | **.00043** | **394** | **.047** | **.00087** | **459** | **.059** | **.00094** | **459** | **.071** | **.00102** | **525** | **.079** | **.00110** | **525** | **.098** | **.00142** | **591** | **.118** | **.00173** | **656** | **.158** | **.00217** | **656** | **.236** | **.00217** | **656** | **.315** | **.00217** |
| 100 | 0.80 | 0.016 | 140 | 1.00 | 0.018 | 140 | 1.20 | 0.020 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00063** | **459** | **.039** | **.00071** | **459** | **.047** | **.00079** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.016 | 140 | 1.00 | 0.018 | 140 | 1.20 | 0.020 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00063** | **459** | **.039** | **.00071** | **459** | **.047** | **.00079** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.018 | 140 | 1.00 | 0.020 | 140 | 1.20 | 0.022 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00071** | **459** | **.039** | **.00079** | **459** | **.047** | **.00087** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.018 | 140 | 1.00 | 0.020 | 140 | 1.20 | 0.022 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00071** | **459** | **.039** | **.00079** | **459** | **.047** | **.00087** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.018 | 140 | 1.00 | 0.020 | 140 | 1.20 | 0.022 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00071** | **459** | **.039** | **.00079** | **459** | **.047** | **.00087** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.016 | 140 | 1.00 | 0.018 | 140 | 1.20 | 0.020 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00063** | **459** | **.039** | **.00071** | **459** | **.047** | **.00079** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.006 | 120 | 1.00 | 0.007 | 120 | 1.20 | 0.008 | 130 | 1.50 | 0.009 | 130 | 1.80 | 0.010 | 140 | 2.00 | 0.010 | 140 | 2.50 | 0.012 | 150 | 3.00 | 0.015 | 170 | 4.00 | 0.020 | 170 | 6.00 | 0.020 | 170 | 8.00 | 0.020 |
| **328** | **.032** | **.00024** | **394** | **.039** | **.00028** | **394** | **.047** | **.00031** | **427** | **.059** | **.00035** | **427** | **.071** | **.00039** | **459** | **.079** | **.00039** | **459** | **.098** | **.00047** | **492** | **.118** | **.00059** | **558** | **.158** | **.00079** | **558** | **.236** | **.00079** | **558** | **.315** | **.00079** |
| 100 | 0.80 | 0.011 | 120 | 1.00 | 0.016 | 120 | 1.20 | 0.018 | 130 | 1.50 | 0.020 | 130 | 1.80 | 0.022 | 140 | 2.00 | 0.028 | 140 | 2.50 | 0.030 | 150 | 3.00 | 0.042 | 170 | 4.00 | 0.044 | 170 | 6.00 | 0.044 | 170 | 8.00 | 0.044 |
| **328** | **.032** | **.00043** | **394** | **.039** | **.00063** | **394** | **.047** | **.00071** | **427** | **.059** | **.00079** | **427** | **.071** | **.00087** | **459** | **.079** | **.00110** | **459** | **.098** | **.00118** | **492** | **.118** | **.00165** | **558** | **.158** | **.00173** | **558** | **.236** | **.00173** | **558** | **.315** | **.00173** |
| 100 | 0.80 | 0.011 | 120 | 1.00 | 0.016 | 120 | 1.20 | 0.018 | 130 | 1.50 | 0.020 | 130 | 1.80 | 0.022 | 140 | 2.00 | 0.028 | 140 | 2.50 | 0.030 | 150 | 3.00 | 0.042 | 170 | 4.00 | 0.044 | 170 | 6.00 | 0.044 | 170 | 8.00 | 0.044 |
| **328** | **.032** | **.00043** | **394** | **.039** | **.00063** | **394** | **.047** | **.00071** | **427** | **.059** | **.00079** | **427** | **.071** | **.00087** | **459** | **.079** | **.00110** | **459** | **.098** | **.00118** | **492** | **.118** | **.00165** | **558** | **.158** | **.00173** | **558** | **.236** | **.00173** | **558** | **.315** | **.00173** |
| 100 | 0.80 | 0.006 | 140 | 1.00 | 0.007 | 140 | 1.20 | 0.008 | 180 | 1.50 | 0.009 | 180 | 1.80 | 0.010 | 200 | 2.00 | 0.010 | 200 | 2.50 | 0.012 | 220 | 3.00 | 0.015 | 240 | 4.00 | 0.020 | 240 | 6.00 | 0.020 | 240 | 8.00 | 0.020 |
| **328** | **.032** | **.00024** | **459** | **.039** | **.00028** | **459** | **.047** | **.00031** | **591** | **.059** | **.00035** | **591** | **.071** | **.00039** | **656** | **.079** | **.00039** | **656** | **.098** | **.00047** | **722** | **.118** | **.00059** | **787** | **.158** | **.00079** | **787** | **.236** | **.00079** | **787** | **.315** | **.00079** |
| 80 | 0.80 | 0.009 | 100 | 1.00 | 0.010 | 100 | 1.20 | 0.012 | 140 | 1.50 | 0.014 | 140 | 1.80 | 0.018 | 180 | 2.00 | 0.020 | 180 | 2.50 | 0.026 | 200 | 3.00 | 0.035 | 240 | 4.00 | 0.040 | 240 | 6.00 | 0.040 | 240 | 8.00 | 0.040 |
| **262** | **.032** | **.00035** | **328** | **.039** | **.00039** | **328** | **.047** | **.00047** | **459** | **.059** | **.00055** | **459** | **.071** | **.00071** | **591** | **.079** | **.00079** | **591** | **.098** | **.00102** | **656** | **.118** | **.00138** | **787** | **.158** | **.00157** | **787** | **.236** | **.00157** | **787** | **.315** | **.00157** |

CRAZYMILL by Mikron Tool Cool

# Type A - Finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

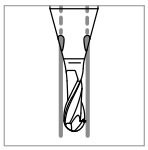
**Finishing**

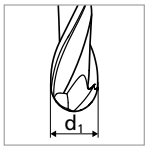



- $a_p = 0.1 \times d_1$
- $a_e = 0.05 \times d_1$

**Machining angle = 15°**

**$n_{max}$ = 60'000 rpm**

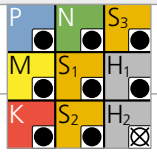





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3 mm \| .012" $v_c$ | $d_{eff}$ | $f_z$ | 0.4 mm \| .016" $v_c$ | $d_{eff}$ | $f_z$ | 0.5 mm \| .020" $v_c$ | $d_{eff}$ | $f_z$ | 0.6 mm \| .024" $v_c$ | $d_{eff}$ | $f_z$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 45 | 0.24 | 0.006 | 59 | 0.31 | 0.008 | 74 | 0.39 | 0.012 | 89 | 0.47 | 0.014 |
| | | 1.0401 | C15 | AISI 1015 | **148** | **.009** | **.00024** | **194** | **.012** | **.00031** | **243** | **.015** | **.00047** | **292** | **.019** | **.00055** |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.011 | 89 | 0.47 | 0.013 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00043** | **292** | **.019** | **.00051** |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | | | | | | | |
| | High alloyed tool steel Rm<1200N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.010 | 89 | 0.47 | 0.011 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00039** | **292** | **.019** | **.00043** |
| | | 1.3343 | HS6-5-2C | AISI M2 | | | | | | | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 | | | | | | | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 | 45 | 0.24 | 0.006 | 59 | 0.31 | 0.008 | 74 | 0.39 | 0.012 | 89 | 0.47 | 0.014 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | **148** | **.009** | **.00024** | **194** | **.012** | **.00031** | **243** | **.015** | **.00047** | **292** | **.019** | **.00055** |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.011 | 89 | 0.47 | 0.012 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00043** | **292** | **.019** | **.00047** |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.011 | 89 | 0.47 | 0.012 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00043** | **292** | **.019** | **.00047** |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.010 | 89 | 0.47 | 0.012 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00039** | **292** | **.019** | **.00047** |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | | | | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 45 | 0.24 | 0.004 | 59 | 0.31 | 0.006 | 74 | 0.39 | 0.007 | 89 | 0.47 | 0.009 |
| | | 0.6030 | GG30 | ASTM 40B | **148** | **.009** | **.00016** | **194** | **.012** | **.00024** | **243** | **.015** | **.00028** | **292** | **.019** | **.00035** |
| | | 0.7040 | GGG40 | ASTM60-40-18 | | | | | | | | | | | | |
| | | 0.7060 | GGG60 | ASTM80-60-03 | | | | | | | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.014 | 89 | 0.47 | 0.017 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00055** | **292** | **.019** | **.00067** |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.014 | 89 | 0.47 | 0.017 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00055** | **292** | **.019** | **.00067** |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.017 | 89 | 0.47 | 0.019 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00067** | **292** | **.019** | **.00075** |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.017 | 89 | 0.47 | 0.019 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00067** | **292** | **.019** | **.00075** |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 | UNS C38500 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.017 | 89 | 0.47 | 0.019 |
| | | 2.102 | CuSn6 | UNS C51900 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00067** | **292** | **.019** | **.00075** |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.014 | 89 | 0.47 | 0.017 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00055** | **292** | **.019** | **.00067** |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 45 | 0.24 | 0.004 | 59 | 0.31 | 0.005 | 74 | 0.39 | 0.005 | 89 | 0.47 | 0.006 |
| | | 2.4668 | | Inconel 718 | **148** | **.009** | **.00016** | **194** | **.012** | **.00020** | **243** | **.015** | **.00020** | **292** | **.019** | **.00024** |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.005 | 74 | 0.39 | 0.010 | 100 | 0.47 | 0.011 |
| | | 3.7065 | Gr.4 | ASTM B348 | **148** | **.009** | **.00020** | **194** | **.012** | **.00020** | **243** | **.015** | **.00039** | **328** | **.019** | **.00043** |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.005 | 74 | 0.39 | 0.010 | 89 | 0.47 | 0.011 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | **148** | **.009** | **.00020** | **194** | **.012** | **.00020** | **243** | **.015** | **.00039** | **292** | **.019** | **.00043** |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 45 | 0.24 | 0.004 | 59 | 0.31 | 0.004 | 74 | 0.39 | 0.006 | 89 | 0.47 | 0.006 |
| | | | CrCoMo28 | ASTM F1537 | **148** | **.009** | **.00016** | **194** | **.012** | **.00016** | **243** | **.015** | **.00024** | **292** | **.019** | **.00024** |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.008 | 80 | 0.47 | 0.010 |
| | | | | | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00031** | **262** | **.019** | **.00039** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]
**$d_{eff}$ [inch] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




Ød1

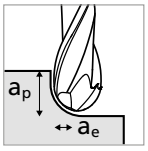
| 1/32" | | | 1/16" | | | | | | | | | 3/32" | | | 1/8" | | | 5/32" | | | 3/16–7/32–1/4" | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.8mm\|.032" | | | 1.0mm\|.039" | | | 1.2mm\|.047" | | | 1.5\|.059" | | | 1.8mm\|.071" | | | 2.0mm\|.079" | | | 2.5mm\|.098" | | | 3.0mm\|.118" | | | 4.0mm\|.158" | | | 6.0mm\|.236" | | | 8.0mm\|.315" | | |
| $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ |
| 100 | 0.63 | 0.017 | 140 | 0.79 | 0.018 | 140 | 0.94 | 0.020 | 200 | 1.18 | 0.029 | 200 | 1.42 | 0.031 | 220 | 1.57 | 0.041 | 220 | 1.97 | 0.043 | 240 | 2.36 | 0.058 | 260 | 3.15 | 0.060 | 260 | 4.72 | 0.060 | 260 | 6.29 | 0.060 |
| **328** | **.025** | **.00067** | **459** | **.031** | **.00071** | **459** | **.037** | **.00079** | **656** | **.046** | **.00114** | **656** | **.056** | **.00122** | **722** | **.062** | **.00161** | **722** | **.077** | **.00169** | **787** | **.093** | **.00228** | **853** | **.124** | **.00236** | **853** | **.186** | **.00236** | **853** | **.248** | **.00236** |
| 100 | 0.63 | 0.014 | 140 | 0.79 | 0.017 | 140 | 0.94 | 0.019 | 200 | 1.18 | 0.026 | 200 | 1.42 | 0.029 | 220 | 1.57 | 0.038 | 220 | 1.97 | 0.041 | 240 | 2.36 | 0.055 | 260 | 3.15 | 0.058 | 260 | 4.72 | 0.058 | 260 | 6.29 | 0.058 |
| **328** | **.025** | **.00055** | **459** | **.031** | **.00067** | **459** | **.037** | **.00075** | **656** | **.046** | **.00102** | **656** | **.056** | **.00114** | **722** | **.062** | **.00150** | **722** | **.077** | **.00161** | **787** | **.093** | **.00217** | **853** | **.124** | **.00228** | **853** | **.186** | **.00228** | **853** | **.248** | **.00228** |
| 100 | 0.63 | 0.013 | 140 | 0.79 | 0.013 | 140 | 0.94 | 0.016 | 200 | 1.18 | 0.024 | 200 | 1.42 | 0.026 | 220 | 1.57 | 0.036 | 220 | 1.97 | 0.038 | 240 | 2.36 | 0.050 | 260 | 3.15 | 0.053 | 260 | 4.72 | 0.053 | 260 | 6.29 | 0.053 |
| **328** | **.025** | **.00051** | **459** | **.031** | **.00051** | **459** | **.037** | **.00063** | **656** | **.046** | **.00094** | **656** | **.056** | **.00102** | **722** | **.062** | **.00142** | **722** | **.077** | **.00150** | **787** | **.093** | **.00197** | **853** | **.124** | **.00209** | **853** | **.186** | **.00209** | **853** | **.248** | **.00209** |
| 100 | 0.63 | 0.017 | 140 | 0.79 | 0.019 | 140 | 0.94 | 0.022 | 200 | 1.18 | 0.029 | 200 | 1.42 | 0.031 | 220 | 1.57 | 0.041 | 220 | 1.97 | 0.043 | 240 | 2.36 | 0.055 | 260 | 3.15 | 0.058 | 260 | 4.72 | 0.058 | 260 | 6.29 | 0.058 |
| **328** | **.025** | **.00067** | **459** | **.031** | **.00075** | **459** | **.037** | **.00087** | **656** | **.046** | **.00114** | **656** | **.056** | **.00122** | **722** | **.062** | **.00161** | **722** | **.077** | **.00169** | **787** | **.093** | **.00217** | **853** | **.124** | **.00228** | **853** | **.186** | **.00228** | **853** | **.248** | **.00228** |
| 100 | 0.63 | 0.014 | 140 | 0.79 | 0.018 | 140 | 0.94 | 0.020 | 200 | 1.18 | 0.026 | 200 | 1.42 | 0.029 | 220 | 1.57 | 0.038 | 220 | 1.97 | 0.041 | 240 | 2.36 | 0.053 | 260 | 3.15 | 0.055 | 260 | 4.72 | 0.055 | 260 | 6.29 | 0.055 |
| **328** | **.025** | **.00055** | **459** | **.031** | **.00071** | **459** | **.037** | **.00079** | **656** | **.046** | **.00102** | **656** | **.056** | **.00114** | **722** | **.062** | **.00150** | **722** | **.077** | **.00161** | **787** | **.093** | **.00209** | **853** | **.124** | **.00217** | **853** | **.186** | **.00217** | **853** | **.248** | **.00217** |
| 100 | 0.63 | 0.014 | 140 | 0.79 | 0.018 | 140 | 0.94 | 0.020 | 200 | 1.18 | 0.026 | 200 | 1.42 | 0.029 | 220 | 1.57 | 0.038 | 220 | 1.97 | 0.041 | 240 | 2.36 | 0.053 | 260 | 3.15 | 0.055 | 260 | 4.72 | 0.055 | 260 | 6.29 | 0.055 |
| **328** | **.025** | **.00055** | **459** | **.031** | **.00071** | **459** | **.037** | **.00079** | **656** | **.046** | **.00102** | **656** | **.056** | **.00114** | **722** | **.062** | **.00150** | **722** | **.077** | **.00161** | **787** | **.093** | **.00209** | **853** | **.124** | **.00217** | **853** | **.186** | **.00217** | **853** | **.248** | **.00217** |
| 100 | 0.63 | 0.013 | 140 | 0.79 | 0.014 | 140 | 0.94 | 0.017 | 200 | 1.18 | 0.019 | 200 | 1.42 | 0.022 | 220 | 1.57 | 0.036 | 220 | 1.97 | 0.038 | 240 | 2.36 | 0.050 | 260 | 3.15 | 0.053 | 260 | 4.72 | 0.053 | 260 | 6.29 | 0.053 |
| **328** | **.025** | **.00051** | **459** | **.031** | **.00055** | **459** | **.037** | **.00067** | **656** | **.046** | **.00075** | **656** | **.056** | **.00087** | **722** | **.062** | **.00142** | **722** | **.077** | **.00150** | **787** | **.093** | **.00197** | **853** | **.124** | **.00209** | **853** | **.186** | **.00209** | **853** | **.248** | **.00209** |
| 100 | 0.63 | 0.011 | 120 | 0.79 | 0.013 | 120 | 0.94 | 0.026 | 140 | 1.18 | 0.029 | 140 | 1.42 | 0.031 | 160 | 1.57 | 0.034 | 160 | 1.97 | 0.043 | 180 | 2.36 | 0.053 | 200 | 3.15 | 0.066 | 200 | 4.72 | 0.066 | 200 | 6.29 | 0.066 |
| **328** | **.025** | **.00043** | **394** | **.031** | **.00051** | **394** | **.037** | **.00102** | **459** | **.046** | **.00114** | **459** | **.056** | **.00122** | **525** | **.062** | **.00134** | **525** | **.077** | **.00169** | **591** | **.093** | **.00209** | **656** | **.124** | **.00260** | **656** | **.186** | **.00260** | **656** | **.248** | **.00260** |
| 100 | 0.63 | 0.019 | 140 | 0.79 | 0.022 | 140 | 0.94 | 0.024 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00075** | **459** | **.031** | **.00087** | **459** | **.037** | **.00094** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.019 | 140 | 0.79 | 0.022 | 140 | 0.94 | 0.024 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00075** | **459** | **.031** | **.00087** | **459** | **.037** | **.00094** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.019 | 140 | 0.79 | 0.022 | 140 | 0.94 | 0.024 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00075** | **459** | **.031** | **.00087** | **459** | **.037** | **.00094** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.007 | 120 | 0.79 | 0.008 | 120 | 0.94 | 0.010 | 130 | 1.18 | 0.011 | 130 | 1.42 | 0.012 | 140 | 1.57 | 0.012 | 140 | 1.97 | 0.014 | 150 | 2.36 | 0.018 | 170 | 3.15 | 0.024 | 170 | 4.72 | 0.024 | 170 | 6.29 | 0.024 |
| **328** | **.025** | **.00028** | **394** | **.031** | **.00031** | **394** | **.037** | **.00039** | **427** | **.046** | **.00043** | **427** | **.056** | **.00047** | **459** | **.062** | **.00047** | **459** | **.077** | **.00055** | **492** | **.093** | **.00071** | **558** | **.124** | **.00094** | **558** | **.186** | **.00094** | **558** | **.248** | **.00094** |
| 100 | 0.63 | 0.013 | 120 | 0.79 | 0.019 | 120 | 0.94 | 0.022 | 130 | 1.18 | 0.024 | 130 | 1.42 | 0.026 | 140 | 1.57 | 0.034 | 140 | 1.97 | 0.036 | 150 | 2.36 | 0.050 | 170 | 3.15 | 0.053 | 170 | 4.72 | 0.053 | 170 | 6.29 | 0.053 |
| **328** | **.025** | **.00051** | **394** | **.031** | **.00075** | **394** | **.037** | **.00087** | **427** | **.046** | **.00094** | **427** | **.056** | **.00102** | **459** | **.062** | **.00134** | **459** | **.077** | **.00142** | **492** | **.093** | **.00197** | **558** | **.124** | **.00209** | **558** | **.186** | **.00209** | **558** | **.248** | **.00209** |
| 100 | 0.63 | 0.013 | 120 | 0.79 | 0.019 | 120 | 0.94 | 0.022 | 130 | 1.18 | 0.024 | 130 | 1.42 | 0.026 | 140 | 1.57 | 0.034 | 140 | 1.97 | 0.036 | 150 | 2.36 | 0.050 | 170 | 3.15 | 0.053 | 170 | 4.72 | 0.053 | 170 | 6.29 | 0.053 |
| **328** | **.025** | **.00051** | **394** | **.031** | **.00075** | **394** | **.037** | **.00087** | **427** | **.046** | **.00094** | **427** | **.056** | **.00102** | **459** | **.062** | **.00134** | **459** | **.077** | **.00142** | **492** | **.093** | **.00197** | **558** | **.124** | **.00209** | **558** | **.186** | **.00209** | **558** | **.248** | **.00209** |
| 100 | 0.63 | 0.007 | 140 | 0.79 | 0.008 | 140 | 0.94 | 0.010 | 180 | 1.18 | 0.011 | 180 | 1.42 | 0.012 | 200 | 1.57 | 0.012 | 200 | 1.97 | 0.014 | 220 | 2.36 | 0.018 | 240 | 3.15 | 0.024 | 240 | 4.72 | 0.024 | 240 | 6.29 | 0.024 |
| **328** | **.025** | **.00028** | **459** | **.031** | **.00031** | **459** | **.037** | **.00039** | **591** | **.046** | **.00043** | **591** | **.056** | **.00047** | **656** | **.062** | **.00047** | **656** | **.077** | **.00055** | **722** | **.093** | **.00071** | **787** | **.124** | **.00094** | **787** | **.186** | **.00094** | **787** | **.248** | **.00094** |
| 80 | 0.63 | 0.011 | 100 | 0.79 | 0.012 | 100 | 0.94 | 0.014 | 140 | 1.18 | 0.017 | 140 | 1.42 | 0.022 | 180 | 1.57 | 0.024 | 180 | 1.97 | 0.031 | 200 | 2.36 | 0.042 | 240 | 3.15 | 0.048 | 240 | 4.72 | 0.048 | 240 | 6.29 | 0.048 |
| **262** | **.025** | **.00043** | **328** | **.031** | **.00047** | **328** | **.037** | **.00055** | **459** | **.046** | **.00067** | **459** | **.056** | **.00087** | **591** | **.062** | **.00094** | **591** | **.077** | **.00122** | **656** | **.093** | **.00165** | **787** | **.124** | **.00189** | **787** | **.186** | **.00189** | **787** | **.248** | **.00189** |

CRAZYMILL by Mikron Tool Cool

# Type B - Roughing

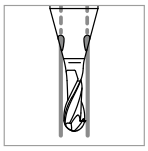
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

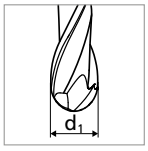
**Roughing**




- $a_p = 0.5 \times d_1$ ($Ød_1 \leq 0.5$ mm | **.020"**)
- $a_p = 1 \times d_1$ ($Ød_1 > 0.5$ mm | **.020"**)
- $a_e = 0.3 \times d_1$

**Machining angle = 0°**

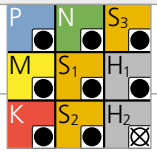





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3–0.4 mm \| .012"–.016" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| **197** | 0.005–0.007 **.00020–.00028** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| **197** | 0.005–0.007 **.00020–.00028** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| **197** | 0.003–0.005 **.00012–.00020** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 60 \| **197** | 0.003–0.004 **.00012–.00016** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 \| **197** | 0.003–0.004 **.00012–.00016** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





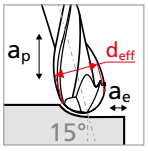

| Ød1 | 1/32" 0.5–0.8 mm \| .020"–.032" | | 1.0–1.2 mm \| .039"–.047" | | 1/16" 1.5–1.8 mm \| .059"–.071" | | 3/32" 2.0–2.5 mm \| .079"–.098" | | 1/8" 3.0 mm \| .118" | | 5/32–3/16–7/32–1/4" 4.0–6 mm \| .158"–.236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 100 \| **328** | 0.010–0.014 **.00039–.00055** | 140 \| **459** | 0.015–0.017 **.00059–.00067** | 200 \| **656** | 0.024–0.026 **.00094–.00102** | 220 \| **722** | 0.034–0.036 **.00134–.00142** | 240 \| **787** | 0.046 **.00181** | 280 \| **919** | 0.050 **.00197** | 280 \| **919** | 0.050 **.00197** |
| | 100 \| **328** | 0.009–0.012 **.00035–.00047** | 140 \| **459** | 0.014–0.016 **.00055–.00063** | 200 \| **656** | 0.022–0.024 **.00087–.00094** | 220 \| **722** | 0.032–0.034 **.00126–.00134** | 240 \| **787** | 0.044 **.00173** | 280 \| **919** | 0.048 **.00189** | 280 \| **919** | 0.048 **.00189** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 140 \| **459** | 0.011–0.013 **.00043–.00051** | 200 \| **656** | 0.020–0.022 **.00079–.00087** | 220 \| **722** | 0.030–0.032 **.00118–.00126** | 240 \| **787** | 0.040 **.00157** | 280 \| **919** | 0.042 **.00165** | 280 \| **919** | 0.042 **.00165** |
| | 100 \| **328** | 0.010–0.014 **.00039–.00055** | 140 \| **459** | 0.016–0.018 **.00063–.00071** | 200 \| **656** | 0.024–0.026 **.00094–.00102** | 220 \| **722** | 0.034–0.036 **.00134–.00142** | 240 \| **787** | 0.044 **.00173** | 280 \| **919** | 0.048 **.00189** | 280 \| **919** | 0.048 **.00189** |
| | 100 \| **328** | 0.009–0.012 **.00035–.00047** | 140 \| **459** | 0.015–0.017 **.00059–.00067** | 200 \| **656** | 0.022–0.024 **.00087–.00094** | 220 \| **722** | 0.032–0.034 **.00126–.00134** | 240 \| **787** | 0.044 **.00173** | 280 \| **919** | 0.046 **.00181** | 280 \| **919** | 0.046 **.00181** |
| | 100 \| **328** | 0.009–0.012 **.00035–.00047** | 140 \| **459** | 0.015–0.017 **.00059–.00067** | 200 \| **656** | 0.022–0.024 **.00087–.00094** | 220 \| **722** | 0.032–0.034 **.00126–.00134** | 240 \| **787** | 0.044 **.00173** | 280 \| **919** | 0.046 **.00181** | 280 \| **919** | 0.046 **.00181** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 140 \| **459** | 0.012–0.014 **.00047–.00055** | 200 \| **656** | 0.016–0.018 **.00063–.00071** | 220 \| **722** | 0.030–0.032 **.00118–.00126** | 240 \| **787** | 0.040 **.00157** | 280 \| **919** | 0.044 **.00173** | 280 \| **919** | 0.044 **.00173** |
| | 100 \| **328** | 0.006–0.009 **.00024–.00035** | 120 \| **394** | 0.011–0.022 **.00043–.00087** | 140 \| **459** | 0.024–0.026 **.00094–.00102** | 160 \| **525** | 0.028–0.036 **.00110–.00142** | 180 \| **591** | 0.040–0.047 **.00157–.00185** | 200 \| **656** | 0.050–0.054 **.00197–.00213** | 200 \| **656** | 0.050–0.054 **.00197–.00213** |
| | 100 \| **328** | 0.012–0.016 **.00047–.00063** | 140 \| **459** | 0.018–0.020 **.00071–.00079** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.012–0.016 **.00047–.00063** | 140 \| **459** | 0.018–0.020 **.00071–.00079** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.014–0.018 **.00055–.00071** | 140 \| **459** | 0.020–0.022 **.00079–.00087** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.014–0.018 **.00055–.00071** | 140 \| **459** | 0.020–0.022 **.00079–.00087** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.014–0.018 **.00055–.00071** | 140 \| **459** | 0.020–0.022 **.00079–.00087** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.012–0.016 **.00047–.00063** | 140 \| **459** | 0.018–0.020 **.00071–.00079** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.060 **.00236** | 280 \| **919** | 0.060 **.00236** |
| | 100 \| **328** | 0.004–0.006 **.00016–.00024** | 120 \| **394** | 0.007–0.008 **.00028–.00031** | 130 \| **427** | 0.009–0.010 **.00035–.00039** | 140 \| **459** | 0.010–0.012 **.00039–.00047** | 150 \| **492** | 0.015 **.00059** | 170 \| **558** | 0.020 **.00079** | 170 \| **558** | 0.020 **.00079** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 120 \| **394** | 0.016–0.018 **.00063–.00071** | 130 \| **427** | 0.020–0.022 **.00079–.00087** | 140 \| **459** | 0.028–0.030 **.00110–.00118** | 150 \| **492** | 0.040 **.00157** | 170 \| **558** | 0.044 **.00173** | 170 \| **558** | 0.044 **.00173** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 120 \| **394** | 0.016–0.018 **.00063–.00071** | 130 \| **427** | 0.020–0.022 **.00079–.00087** | 140 \| **459** | 0.028–0.030 **.00110–.00118** | 150 \| **492** | 0.040 **.00157** | 170 \| **558** | 0.044 **.00173** | 170 \| **558** | 0.044 **.00173** |
| | 100 \| **328** | 0.004–0.006 **.00016–.00024** | 140 \| **459** | 0.007–0.008 **.00028–.00031** | 180 \| **591** | 0.009–0.010 **.00035–.00039** | 200 \| **656** | 0.010–0.012 **.00039–.00047** | 220 \| **722** | 0.015 **.00059** | 240 \| **787** | 0.020 **.00079** | 240 \| **787** | 0.020 **.00079** |
| | 80 \| **262** | 0.007–0.009 **.00028–.00035** | 100 \| **328** | 0.010–0.012 **.00039–.00047** | 140 \| **459** | 0.014–0.018 **.00055–.00071** | 180 \| **591** | 0.020–0.026 **.00079–.00102** | 200 \| **656** | 0.033 **.00130** | 240 \| **787** | 0.040 **.00157** | 240 \| **787** | 0.040 **.00157** |

CRAZYMILL by Mikron Tool Cool

# Type B - Semi-finishing

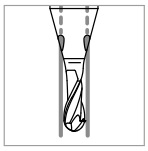
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

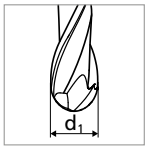
**Semi-finishing**




- $a_p = 0.25 \times d_1$ ($Ød_1 \leq 0.5$ mm **|.020"**)
- $a_p = 0.5 \times d_1$ ($Ød_1 > 0.5$ mm **|.020"**)
- $a_e = 0.1 \times d_1$

**Machining angle = 15°**

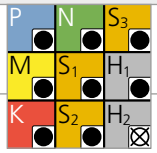





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3 mm \| .012" $v_c$ | $d_{eff}$ | $f_z$ | 0.4 mm \| .016" $v_c$ | $d_{eff}$ | $f_z$ | 0.5 mm \| .020" $v_c$ | $d_{eff}$ | $f_z$ | 0.6 mm \| .024" $v_c$ | $d_{eff}$ | $f_z$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 55 | 0.29 | 0.005 | 73 | 0.39 | 0.007 | 92 | 0.48 | 0.010 | 100 | 0.60 | 0.012 |
| | | 1.0401 | C15 | AISI 1015 | **180** | **.011** | **.00020** | **240** | **.015** | **.00028** | **302** | **.019** | **.00039** | **328** | **.024** | **.00047** |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.009 | 100 | 0.60 | 0.011 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00035** | **328** | **.024** | **.00043** |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | | | | | | | |
| | High alloyed tool steel Rm<1200N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 55 | 0.29 | **0.004** | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.009 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00031** | **328** | **.024** | **.00035** |
| | | 1.3343 | HS6-5-2C | AISI M2 | | | | | | | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 | | | | | | | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 | 55 | 0.29 | 0.005 | 73 | 0.39 | 0.007 | 92 | 0.48 | 0.010 | 100 | 0.60 | 0.012 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | **180** | **.011** | **.00020** | **240** | **.015** | **.00028** | **302** | **.019** | **.00039** | **328** | **.024** | **.00047** |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.009 | 100 | 0.60 | 0.010 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00035** | **328** | **.024** | **.00039** |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.009 | 100 | 0.60 | 0.010 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00035** | **328** | **.024** | **.00039** |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.010 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00031** | **328** | **.024** | **.00039** |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | | | | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 55 | 0.29 | 0.003 | 73 | 0.39 | 0.005 | 92 | 0.48 | 0.006 | 100 | 0.60 | 0.008 |
| | | 0.6030 | GG30 | ASTM 40B | **180** | **.011** | **.00012** | **240** | **.015** | **.00020** | **302** | **.019** | **.00024** | **328** | **.024** | **.00030** |
| | | 0.7040 | GGG40 | ASTM60-40-18 | | | | | | | | | | | | |
| | | 0.7060 | GGG60 | ASTM80-60-03 | | | | | | | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.012 | 100 | 0.60 | 0.014 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00047** | **328** | **.024** | **.00055** |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.012 | 100 | 0.60 | 0.014 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00047** | **328** | **.024** | **.00055** |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.014 | 100 | 0.60 | 0.016 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00055** | **328** | **.024** | **.00063** |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.014 | 100 | 0.60 | 0.016 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00055** | **328** | **.024** | **.00063** |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 | UNS C38500 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.014 | 100 | 0.60 | 0.016 |
| | | 2.102 | CuSn6 | UNS C51900 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00055** | **328** | **.024** | **.00063** |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.012 | 100 | 0.60 | 0.014 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00047** | **328** | **.024** | **.00055** |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 55 | 0.29 | 0.003 | 73 | 0.39 | 0.004 | 92 | 0.48 | 0.004 | 100 | 0.60 | 0.005 |
| | | 2.4668 | | Inconel 718 | **180** | **.011** | **.00012** | **240** | **.015** | **.00016** | **302** | **.019** | **.00016** | **328** | **.024** | **.00020** |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.004 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.009 |
| | | 3.7065 | Gr.4 | ASTM B348 | **180** | **.011** | **.00016** | **240** | **.015** | **.00016** | **302** | **.019** | **.00031** | **328** | **.024** | **.00035** |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.004 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.009 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | **180** | **.011** | **.00016** | **240** | **.015** | **.00016** | **302** | **.019** | **.00031** | **328** | **.024** | **.00035** |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 55 | 0.29 | 0.003 | 73 | 0.39 | 0.003 | 92 | 0.48 | 0.005 | 100 | 0.60 | 0.005 |
| | | | CrCoMo28 | ASTM F1537 | **180** | **.011** | **.00012** | **240** | **.015** | **.00012** | **302** | **.019** | **.00020** | **328** | **.024** | **.00020** |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.007 | 80 | 0.60 | 0.008 |
| | | | | | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00028** | **262** | **.024** | **.00031** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**
$d_{eff}$ [mm] | **[inch]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






Ød1

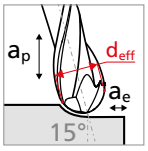
| 1/32" 0.8mm \| .032" | | | 1.0mm \| .039" | | | 1.2mm \| .047" | | | 1/16" 1.5 \| .059" | | | 1.8mm \| .071" | | | 2.0mm \| .079" | | | 3/32" 2.5mm \| .098" | | | 1/8" 3.0mm \| .118" | | | 5/32" 4.0mm \| .158" | | | 3/16–7/32–1/4" 6.0mm \| .236" | | | 8.0mm \| .315" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ |
| 100 | 0.80 | 0.014 | 140 | 1.00 | 0.015 | 140 | 1.20 | 0.017 | 200 | 1.50 | 0.024 | 200 | 1.80 | 0.026 | 220 | 2.00 | 0.034 | 220 | 2.50 | 0.036 | 240 | 3.00 | 0.046 | 260 | 4.00 | 0.050 | 260 | 6.00 | 0.050 | 260 | 8.00 | 0.050 |
| **328** | **.032** | **.00055** | **459** | **.039** | **.00059** | **459** | **.047** | **.00067** | **656** | **.059** | **.00094** | **656** | **.071** | **.00102** | **722** | **.079** | **.00134** | **722** | **.098** | **.00142** | **787** | **.118** | **.00181** | **853** | **.158** | **.00197** | **853** | **.236** | **.00197** | **853** | **.315** | **.00197** |
| 100 | 0.80 | 0.012 | 140 | 1.00 | 0.014 | 140 | 1.20 | 0.016 | 200 | 1.50 | 0.022 | 200 | 1.80 | 0.024 | 220 | 2.00 | 0.032 | 220 | 2.50 | 0.034 | 240 | 3.00 | 0.044 | 260 | 4.00 | 0.048 | 260 | 6.00 | 0.048 | 260 | 8.00 | 0.048 |
| **328** | **.032** | **.00047** | **459** | **.039** | **.00055** | **459** | **.047** | **.00063** | **656** | **.059** | **.00087** | **656** | **.071** | **.00094** | **722** | **.079** | **.00126** | **722** | **.098** | **.00134** | **787** | **.118** | **.00173** | **853** | **.158** | **.00189** | **853** | **.236** | **.00189** | **853** | **.315** | **.00189** |
| 100 | 0.80 | 0.011 | 140 | 1.00 | 0.011 | 140 | 1.20 | 0.013 | 200 | 1.50 | 0.020 | 200 | 1.80 | 0.022 | 220 | 2.00 | 0.030 | 220 | 2.50 | 0.032 | 240 | 3.00 | 0.040 | 260 | 4.00 | 0.042 | 260 | 6.00 | 0.042 | 260 | 8.00 | 0.042 |
| **328** | **.032** | **.00043** | **459** | **.039** | **.00043** | **459** | **.047** | **.00051** | **656** | **.059** | **.00079** | **656** | **.071** | **.00087** | **722** | **.079** | **.00118** | **722** | **.098** | **.00126** | **787** | **.118** | **.00157** | **853** | **.158** | **.00165** | **853** | **.236** | **.00165** | **853** | **.315** | **.00165** |
| 100 | 0.80 | 0.014 | 140 | 1.00 | 0.016 | 140 | 1.20 | 0.018 | 200 | 1.50 | 0.024 | 200 | 1.80 | 0.026 | 220 | 2.00 | 0.034 | 220 | 2.50 | 0.036 | 240 | 3.00 | 0.044 | 260 | 4.00 | 0.048 | 260 | 6.00 | 0.048 | 260 | 8.00 | 0.048 |
| **328** | **.032** | **.00055** | **459** | **.039** | **.00063** | **459** | **.047** | **.00071** | **656** | **.059** | **.00094** | **656** | **.071** | **.00102** | **722** | **.079** | **.00134** | **722** | **.098** | **.00142** | **787** | **.118** | **.00173** | **853** | **.158** | **.00189** | **853** | **.236** | **.00189** | **853** | **.315** | **.00189** |
| 100 | 0.80 | 0.012 | 140 | 1.00 | 0.015 | 140 | 1.20 | 0.017 | 200 | 1.50 | 0.022 | 200 | 1.80 | 0.024 | 220 | 2.00 | 0.032 | 220 | 2.50 | 0.034 | 240 | 3.00 | 0.044 | 260 | 4.00 | 0.046 | 260 | 6.00 | 0.046 | 260 | 8.00 | 0.046 |
| **328** | **.032** | **.00047** | **459** | **.039** | **.00059** | **459** | **.047** | **.00067** | **656** | **.059** | **.00087** | **656** | **.071** | **.00094** | **722** | **.079** | **.00126** | **722** | **.098** | **.00134** | **787** | **.118** | **.00173** | **853** | **.158** | **.00181** | **853** | **.236** | **.00181** | **853** | **.315** | **.00181** |
| 100 | 0.80 | 0.012 | 140 | 1.00 | 0.015 | 140 | 1.20 | 0.017 | 200 | 1.50 | 0.022 | 200 | 1.80 | 0.024 | 220 | 2.00 | 0.032 | 220 | 2.50 | 0.034 | 240 | 3.00 | 0.044 | 260 | 4.00 | 0.046 | 260 | 6.00 | 0.046 | 260 | 8.00 | 0.046 |
| **328** | **.032** | **.00047** | **459** | **.039** | **.00059** | **459** | **.047** | **.00067** | **656** | **.059** | **.00087** | **656** | **.071** | **.00094** | **722** | **.079** | **.00126** | **722** | **.098** | **.00134** | **787** | **.118** | **.00173** | **853** | **.158** | **.00181** | **853** | **.236** | **.00181** | **853** | **.315** | **.00181** |
| 100 | 0.80 | 0.011 | 140 | 1.00 | 0.012 | 140 | 1.20 | 0.014 | 200 | 1.50 | 0.016 | 200 | 1.80 | 0.018 | 220 | 2.00 | 0.030 | 220 | 2.50 | 0.032 | 240 | 3.00 | 0.040 | 260 | 4.00 | 0.044 | 260 | 6.00 | 0.044 | 260 | 8.00 | 0.044 |
| **328** | **.032** | **.00043** | **459** | **.039** | **.00047** | **459** | **.047** | **.00055** | **656** | **.059** | **.00063** | **656** | **.071** | **.00071** | **722** | **.079** | **.00118** | **722** | **.098** | **.00126** | **787** | **.118** | **.00157** | **853** | **.158** | **.00173** | **853** | **.236** | **.00173** | **853** | **.315** | **.00173** |
| 100 | 0.80 | 0.009 | 120 | 1.00 | 0.011 | 120 | 1.20 | 0.022 | 140 | 1.50 | 0.024 | 140 | 1.80 | 0.026 | 160 | 2.00 | 0.028 | 160 | 2.50 | 0.036 | 180 | 3.00 | 0.043 | 200 | 4.00 | 0.050 | 200 | 6.00 | 0.052 | 200 | 8.00 | 0.052 |
| **328** | **.032** | **.00035** | **394** | **.039** | **.00043** | **394** | **.047** | **.00087** | **459** | **.059** | **.00094** | **459** | **.071** | **.00102** | **525** | **.079** | **.00110** | **525** | **.098** | **.00142** | **591** | **.118** | **.00169** | **656** | **.158** | **.00197** | **656** | **.236** | **.00205** | **656** | **.315** | **.00205** |
| 100 | 0.80 | 0.016 | 140 | 1.00 | 0.018 | 140 | 1.20 | 0.020 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00063** | **459** | **.039** | **.00071** | **459** | **.047** | **.00079** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.016 | 140 | 1.00 | 0.018 | 140 | 1.20 | 0.020 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00063** | **459** | **.039** | **.00071** | **459** | **.047** | **.00079** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.018 | 140 | 1.00 | 0.020 | 140 | 1.20 | 0.022 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00071** | **459** | **.039** | **.00079** | **459** | **.047** | **.00087** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.018 | 140 | 1.00 | 0.020 | 140 | 1.20 | 0.022 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00071** | **459** | **.039** | **.00079** | **459** | **.047** | **.00087** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.018 | 140 | 1.00 | 0.020 | 140 | 1.20 | 0.022 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00071** | **459** | **.039** | **.00079** | **459** | **.047** | **.00087** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.016 | 140 | 1.00 | 0.018 | 140 | 1.20 | 0.020 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.060 | 260 | 6.00 | 0.060 | 260 | 8.00 | 0.060 |
| **328** | **.032** | **.00063** | **459** | **.039** | **.00071** | **459** | **.047** | **.00079** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00236** | **853** | **.236** | **.00236** | **853** | **.315** | **.00236** |
| 100 | 0.80 | 0.006 | 120 | 1.00 | 0.007 | 120 | 1.20 | 0.008 | 130 | 1.50 | 0.009 | 130 | 1.80 | 0.010 | 140 | 2.00 | 0.010 | 140 | 2.50 | 0.012 | 150 | 3.00 | 0.015 | 170 | 4.00 | 0.020 | 170 | 6.00 | 0.020 | 170 | 8.00 | 0.020 |
| **328** | **.032** | **.00024** | **394** | **.039** | **.00028** | **394** | **.047** | **.00031** | **427** | **.059** | **.00035** | **427** | **.071** | **.00039** | **459** | **.079** | **.00039** | **459** | **.098** | **.00047** | **492** | **.118** | **.00059** | **558** | **.158** | **.00079** | **558** | **.236** | **.00079** | **558** | **.315** | **.00079** |
| 100 | 0.80 | 0.011 | 120 | 1.00 | 0.016 | 120 | 1.20 | 0.018 | 130 | 1.50 | 0.020 | 130 | 1.80 | 0.022 | 140 | 2.00 | 0.028 | 140 | 2.50 | 0.030 | 150 | 3.00 | 0.040 | 170 | 4.00 | 0.044 | 170 | 6.00 | 0.044 | 170 | 8.00 | 0.044 |
| **328** | **.032** | **.00043** | **394** | **.039** | **.00063** | **394** | **.047** | **.00071** | **427** | **.059** | **.00079** | **427** | **.071** | **.00087** | **459** | **.079** | **.00110** | **459** | **.098** | **.00118** | **492** | **.118** | **.00157** | **558** | **.158** | **.00173** | **558** | **.236** | **.00173** | **558** | **.315** | **.00173** |
| 100 | 0.80 | 0.011 | 120 | 1.00 | 0.016 | 120 | 1.20 | 0.018 | 130 | 1.50 | 0.020 | 130 | 1.80 | 0.022 | 140 | 2.00 | 0.028 | 140 | 2.50 | 0.030 | 150 | 3.00 | 0.040 | 170 | 4.00 | 0.044 | 170 | 6.00 | 0.044 | 170 | 8.00 | 0.044 |
| **328** | **.032** | **.00043** | **394** | **.039** | **.00063** | **394** | **.047** | **.00071** | **427** | **.059** | **.00079** | **427** | **.071** | **.00087** | **459** | **.079** | **.00110** | **459** | **.098** | **.00118** | **492** | **.118** | **.00157** | **558** | **.158** | **.00173** | **558** | **.236** | **.00173** | **558** | **.315** | **.00173** |
| 100 | 0.80 | 0.006 | 140 | 1.00 | 0.007 | 140 | 1.20 | 0.008 | 180 | 1.50 | 0.009 | 180 | 1.80 | 0.010 | 200 | 2.00 | 0.010 | 200 | 2.50 | 0.012 | 220 | 3.00 | 0.015 | 240 | 4.00 | 0.020 | 240 | 6.00 | 0.020 | 240 | 8.00 | 0.020 |
| **328** | **.032** | **.00024** | **459** | **.039** | **.00028** | **459** | **.047** | **.00031** | **591** | **.059** | **.00035** | **591** | **.071** | **.00039** | **656** | **.079** | **.00039** | **656** | **.098** | **.00047** | **722** | **.118** | **.00059** | **787** | **.158** | **.00079** | **787** | **.236** | **.00079** | **787** | **.315** | **.00079** |
| 80 | 0.80 | 0.009 | 100 | 1.00 | 0.010 | 100 | 1.20 | 0.012 | 140 | 1.50 | 0.014 | 140 | 1.80 | 0.018 | 180 | 2.00 | 0.020 | 180 | 2.50 | 0.026 | 200 | 3.00 | 0.033 | 240 | 4.00 | 0.040 | 240 | 6.00 | 0.040 | 240 | 8.00 | 0.040 |
| **262** | **.032** | **.00035** | **328** | **.039** | **.00039** | **328** | **.047** | **.00047** | **459** | **.059** | **.00055** | **459** | **.071** | **.00071** | **591** | **.079** | **.00079** | **591** | **.098** | **.00102** | **656** | **.118** | **.00130** | **787** | **.158** | **.00157** | **787** | **.236** | **.00157** | **787** | **.315** | **.00157** |

CRAZYMILL by Mikron Tool Cool

# Type B - Finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

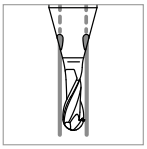
**Finishing**

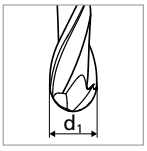



- $a_p = 0.1 \times d_1$
- $a_e = 0.05 \times d_1$

**Machining angle = 15°**

$n_{max}$ = 60'000 rpm

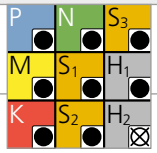





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3 mm \| .012" $v_c$ | $d_{eff}$ | $f_z$ | 0.4 mm \| .016" $v_c$ | $d_{eff}$ | $f_z$ | 0.5 mm \| .020" $v_c$ | $d_{eff}$ | $f_z$ | 0.6 mm \| .024" $v_c$ | $d_{eff}$ | $f_z$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 45 | 0.24 | 0.006 | 59 | 0.31 | 0.008 | 74 | 0.39 | 0.012 | 89 | 0.47 | 0.014 |
| | | 1.0401 | C15 | AISI 1015 | **148** | **.009** | **.00024** | **194** | **.012** | **.00031** | **243** | **.015** | **.00047** | **292** | **.019** | **.00055** |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.011 | 89 | 0.47 | 0.013 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00043** | **292** | **.019** | **.00051** |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | | | | | | | |
| | High alloyed tool steel Rm<1200N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.010 | 89 | 0.47 | 0.011 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00039** | **292** | **.019** | **.00043** |
| | | 1.3343 | HS6-5-2C | AISI M2 | | | | | | | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 | | | | | | | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 | 45 | 0.24 | 0.006 | 59 | 0.31 | 0.008 | 74 | 0.39 | 0.012 | 89 | 0.47 | 0.014 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | **148** | **.009** | **.00024** | **194** | **.012** | **.00031** | **243** | **.015** | **.00047** | **292** | **.019** | **.00055** |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.011 | 89 | 0.47 | 0.012 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00043** | **292** | **.019** | **.00047** |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.011 | 89 | 0.47 | 0.012 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00043** | **292** | **.019** | **.00047** |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.010 | 89 | 0.47 | 0.012 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00039** | **292** | **.019** | **.00047** |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | | | | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 45 | 0.24 | 0.004 | 59 | 0.31 | 0.006 | 74 | 0.39 | 0.007 | 89 | 0.47 | 0.009 |
| | | 0.6030 | GG30 | ASTM 40B | **148** | **.009** | **.00016** | **194** | **.012** | **.00024** | **243** | **.015** | **.00028** | **292** | **.019** | **.00035** |
| | | 0.7040 | GGG40 | ASTM60-40-18 | | | | | | | | | | | | |
| | | 0.7060 | GGG60 | ASTM80-60-03 | | | | | | | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.014 | 89 | 0.47 | 0.017 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00055** | **292** | **.019** | **.00067** |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.014 | 89 | 0.47 | 0.017 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00055** | **292** | **.019** | **.00067** |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.017 | 89 | 0.47 | 0.019 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00067** | **292** | **.019** | **.00075** |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.017 | 89 | 0.47 | 0.019 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00067** | **292** | **.019** | **.00075** |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 | UNS C38500 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.017 | 89 | 0.47 | 0.019 |
| | | 2.102 | CuSn6 | UNS C51900 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00067** | **292** | **.019** | **.00075** |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.014 | 89 | 0.47 | 0.017 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00055** | **292** | **.019** | **.00067** |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 45 | 0.24 | 0.004 | 59 | 0.31 | 0.005 | 74 | 0.39 | 0.005 | 89 | 0.47 | 0.006 |
| | | 2.4668 | | Inconel 718 | **148** | **.009** | **.00016** | **194** | **.012** | **.00020** | **243** | **.015** | **.00020** | **292** | **.019** | **.00024** |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.005 | 74 | 0.39 | 0.010 | 100 | 0.47 | 0.011 |
| | | 3.7065 | Gr.4 | ASTM B348 | **148** | **.009** | **.00020** | **194** | **.012** | **.00020** | **243** | **.015** | **.00039** | **328** | **.019** | **.00043** |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.005 | 74 | 0.39 | 0.010 | 89 | 0.47 | 0.011 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | **148** | **.009** | **.00020** | **194** | **.012** | **.00020** | **243** | **.015** | **.00039** | **292** | **.019** | **.00043** |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 45 | 0.24 | 0.004 | 59 | 0.31 | 0.004 | 74 | 0.39 | 0.006 | 89 | 0.47 | 0.006 |
| | | | CrCoMo28 | ASTM F1537 | **148** | **.009** | **.00016** | **194** | **.012** | **.00016** | **243** | **.015** | **.00024** | **292** | **.019** | **.00024** |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.008 | 80 | 0.47 | 0.010 |
| | | | | | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00031** | **262** | **.019** | **.00039** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | |

**$v_c$ [SFM] |** [m/min]
**$f_z$ [IPT] |** [mm]
**$d_{eff}$ [inch] |** [mm]

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




Ød1

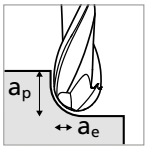
| 1/32" | | | 1/16" | | | | | | | | | 3/32" | | | 1/8" | | | 5/32" | | | 3/16–7/32–1/4" | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.8mm\|.032" | | | 1.0mm\|.039" | | | 1.2mm\|.047" | | | 1.5\|.059" | | | 1.8mm\|.071" | | | 2.0mm\|.079" | | | 2.5mm\|.098" | | | 3.0mm\|.118" | | | 4.0mm\|.158" | | | 6.0mm\|.236" | | | 8.0mm\|.315" | | |
| $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ |
| 100 | 0.63 | 0.017 | 140 | 0.79 | 0.018 | 140 | 0.94 | 0.020 | 200 | 1.18 | 0.029 | 200 | 1.42 | 0.031 | 220 | 1.57 | 0.041 | 220 | 1.97 | 0.043 | 240 | 2.36 | 0.055 | 260 | 3.15 | 0.060 | 260 | 4.72 | 0.060 | 260 | 6.29 | 0.060 |
| **328** | **.025** | **.00067** | **459** | **.031** | **.00071** | **459** | **.037** | **.00079** | **656** | **.046** | **.00114** | **656** | **.056** | **.00122** | **722** | **.062** | **.00161** | **722** | **.077** | **.00169** | **787** | **.093** | **.00217** | **853** | **.124** | **.00236** | **853** | **.186** | **.00236** | **853** | **.248** | **.00236** |
| 100 | 0.63 | 0.014 | 140 | 0.79 | 0.017 | 140 | 0.94 | 0.019 | 200 | 1.18 | 0.026 | 200 | 1.42 | 0.029 | 220 | 1.57 | 0.038 | 220 | 1.97 | 0.041 | 240 | 2.36 | 0.053 | 260 | 3.15 | 0.058 | 260 | 4.72 | 0.058 | 260 | 6.29 | 0.058 |
| **328** | **.025** | **.00055** | **459** | **.031** | **.00067** | **459** | **.037** | **.00075** | **656** | **.046** | **.00102** | **656** | **.056** | **.00114** | **722** | **.062** | **.00150** | **722** | **.077** | **.00161** | **787** | **.093** | **.00209** | **853** | **.124** | **.00228** | **853** | **.186** | **.00228** | **853** | **.248** | **.00228** |
| 100 | 0.63 | 0.013 | 140 | 0.79 | 0.013 | 140 | 0.94 | 0.016 | 200 | 1.18 | 0.024 | 200 | 1.42 | 0.026 | 220 | 1.57 | 0.036 | 220 | 1.97 | 0.038 | 240 | 2.36 | 0.048 | 260 | 3.15 | 0.050 | 260 | 4.72 | 0.050 | 260 | 6.29 | 0.050 |
| **328** | **.025** | **.00051** | **459** | **.031** | **.00051** | **459** | **.037** | **.00063** | **656** | **.046** | **.00094** | **656** | **.056** | **.00102** | **722** | **.062** | **.00142** | **722** | **.077** | **.00150** | **787** | **.093** | **.00189** | **853** | **.124** | **.00197** | **853** | **.186** | **.00197** | **853** | **.248** | **.00197** |
| 100 | 0.63 | 0.017 | 140 | 0.79 | 0.019 | 140 | 0.94 | 0.022 | 200 | 1.18 | 0.029 | 200 | 1.42 | 0.031 | 220 | 1.57 | 0.041 | 220 | 1.97 | 0.043 | 240 | 2.36 | 0.053 | 260 | 3.15 | 0.058 | 260 | 4.72 | 0.058 | 260 | 6.29 | 0.058 |
| **328** | **.025** | **.00067** | **459** | **.031** | **.00075** | **459** | **.037** | **.00087** | **656** | **.046** | **.00114** | **656** | **.056** | **.00122** | **722** | **.062** | **.00161** | **722** | **.077** | **.00169** | **787** | **.093** | **.00209** | **853** | **.124** | **.00228** | **853** | **.186** | **.00228** | **853** | **.248** | **.00228** |
| 100 | 0.63 | 0.014 | 140 | 0.79 | 0.018 | 140 | 0.94 | 0.020 | 200 | 1.18 | 0.026 | 200 | 1.42 | 0.029 | 220 | 1.57 | 0.038 | 220 | 1.97 | 0.041 | 240 | 2.36 | 0.053 | 260 | 3.15 | 0.055 | 260 | 4.72 | 0.055 | 260 | 6.29 | 0.055 |
| **328** | **.025** | **.00055** | **459** | **.031** | **.00071** | **459** | **.037** | **.00079** | **656** | **.046** | **.00102** | **656** | **.056** | **.00114** | **722** | **.062** | **.00150** | **722** | **.077** | **.00161** | **787** | **.093** | **.00209** | **853** | **.124** | **.00217** | **853** | **.186** | **.00217** | **853** | **.248** | **.00217** |
| 100 | 0.63 | 0.014 | 140 | 0.79 | 0.018 | 140 | 0.94 | 0.020 | 200 | 1.18 | 0.026 | 200 | 1.42 | 0.029 | 220 | 1.57 | 0.038 | 220 | 1.97 | 0.041 | 240 | 2.36 | 0.053 | 260 | 3.15 | 0.055 | 260 | 4.72 | 0.055 | 260 | 6.29 | 0.055 |
| **328** | **.025** | **.00055** | **459** | **.031** | **.00071** | **459** | **.037** | **.00079** | **656** | **.046** | **.00102** | **656** | **.056** | **.00114** | **722** | **.062** | **.00150** | **722** | **.077** | **.00161** | **787** | **.093** | **.00209** | **853** | **.124** | **.00217** | **853** | **.186** | **.00217** | **853** | **.248** | **.00217** |
| 100 | 0.63 | 0.013 | 140 | 0.79 | 0.014 | 140 | 0.94 | 0.017 | 200 | 1.18 | 0.019 | 200 | 1.42 | 0.022 | 220 | 1.57 | 0.036 | 220 | 1.97 | 0.038 | 240 | 2.36 | 0.048 | 260 | 3.15 | 0.053 | 260 | 4.72 | 0.053 | 260 | 6.29 | 0.053 |
| **328** | **.025** | **.00051** | **459** | **.031** | **.00055** | **459** | **.037** | **.00067** | **656** | **.046** | **.00075** | **656** | **.056** | **.00087** | **722** | **.062** | **.00142** | **722** | **.077** | **.00150** | **787** | **.093** | **.00189** | **853** | **.124** | **.00209** | **853** | **.186** | **.00209** | **853** | **.248** | **.00209** |
| 100 | 0.63 | 0.011 | 120 | 0.79 | 0.013 | 120 | 0.94 | 0.026 | 140 | 1.18 | 0.029 | 140 | 1.42 | 0.031 | 160 | 1.57 | 0.034 | 160 | 1.97 | 0.043 | 180 | 2.36 | 0.052 | 200 | 3.15 | 0.060 | 200 | 4.72 | 0.060 | 200 | 6.29 | 0.060 |
| **328** | **.025** | **.00043** | **394** | **.031** | **.00051** | **394** | **.037** | **.00102** | **459** | **.046** | **.00114** | **459** | **.056** | **.00122** | **525** | **.062** | **.00134** | **525** | **.077** | **.00169** | **591** | **.093** | **.00205** | **656** | **.124** | **.00236** | **656** | **.186** | **.00236** | **656** | **.248** | **.00236** |
| 100 | 0.63 | 0.019 | 140 | 0.79 | 0.022 | 140 | 0.94 | 0.024 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00075** | **459** | **.031** | **.00087** | **459** | **.037** | **.00094** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.019 | 140 | 0.79 | 0.022 | 140 | 0.94 | 0.024 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00075** | **459** | **.031** | **.00087** | **459** | **.037** | **.00094** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.019 | 140 | 0.79 | 0.022 | 140 | 0.94 | 0.024 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.072 | 260 | 4.72 | 0.072 | 260 | 6.29 | 0.072 |
| **328** | **.025** | **.00075** | **459** | **.031** | **.00087** | **459** | **.037** | **.00094** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00283** | **853** | **.186** | **.00283** | **853** | **.248** | **.00283** |
| 100 | 0.63 | 0.007 | 120 | 0.79 | 0.008 | 120 | 0.94 | 0.010 | 130 | 1.18 | 0.011 | 130 | 1.42 | 0.012 | 140 | 1.57 | 0.012 | 140 | 1.97 | 0.014 | 150 | 2.36 | 0.018 | 170 | 3.15 | 0.024 | 170 | 4.72 | 0.024 | 170 | 6.29 | 0.024 |
| **328** | **.025** | **.00028** | **394** | **.031** | **.00031** | **394** | **.037** | **.00039** | **427** | **.046** | **.00043** | **427** | **.056** | **.00047** | **459** | **.062** | **.00047** | **459** | **.077** | **.00055** | **492** | **.093** | **.00071** | **558** | **.124** | **.00094** | **558** | **.186** | **.00094** | **558** | **.248** | **.00094** |
| 100 | 0.63 | 0.013 | 120 | 0.79 | 0.019 | 120 | 0.94 | 0.022 | 130 | 1.18 | 0.024 | 130 | 1.42 | 0.026 | 140 | 1.57 | 0.034 | 140 | 1.97 | 0.036 | 150 | 2.36 | 0.048 | 170 | 3.15 | 0.053 | 170 | 4.72 | 0.053 | 170 | 6.29 | 0.053 |
| **328** | **.025** | **.00051** | **394** | **.031** | **.00075** | **394** | **.037** | **.00087** | **427** | **.046** | **.00094** | **427** | **.056** | **.00102** | **459** | **.062** | **.00134** | **459** | **.077** | **.00142** | **492** | **.093** | **.00189** | **558** | **.124** | **.00209** | **558** | **.186** | **.00209** | **558** | **.248** | **.00209** |
| 100 | 0.63 | 0.013 | 120 | 0.79 | 0.019 | 120 | 0.94 | 0.022 | 130 | 1.18 | 0.024 | 130 | 1.42 | 0.026 | 140 | 1.57 | 0.034 | 140 | 1.97 | 0.036 | 150 | 2.36 | 0.048 | 170 | 3.15 | 0.053 | 170 | 4.72 | 0.053 | 170 | 6.29 | 0.053 |
| **328** | **.025** | **.00051** | **394** | **.031** | **.00075** | **394** | **.037** | **.00087** | **427** | **.046** | **.00094** | **427** | **.056** | **.00102** | **459** | **.062** | **.00134** | **459** | **.077** | **.00142** | **492** | **.093** | **.00189** | **558** | **.124** | **.00209** | **558** | **.186** | **.00209** | **558** | **.248** | **.00209** |
| 100 | 0.63 | 0.007 | 140 | 0.79 | 0.008 | 140 | 0.94 | 0.010 | 180 | 1.18 | 0.011 | 180 | 1.42 | 0.012 | 200 | 1.57 | 0.012 | 200 | 1.97 | 0.014 | 220 | 2.36 | 0.018 | 240 | 3.15 | 0.024 | 240 | 4.72 | 0.024 | 240 | 6.29 | 0.024 |
| **328** | **.025** | **.00028** | **459** | **.031** | **.00031** | **459** | **.037** | **.00039** | **591** | **.046** | **.00043** | **591** | **.056** | **.00047** | **656** | **.062** | **.00047** | **656** | **.077** | **.00055** | **722** | **.093** | **.00071** | **787** | **.124** | **.00094** | **787** | **.186** | **.00094** | **787** | **.248** | **.00094** |
| 80 | 0.63 | 0.011 | 100 | 0.79 | 0.012 | 100 | 0.94 | 0.014 | 140 | 1.18 | 0.017 | 140 | 1.42 | 0.022 | 180 | 1.57 | 0.024 | 180 | 1.97 | 0.031 | 200 | 2.36 | 0.040 | 240 | 3.15 | 0.048 | 240 | 4.72 | 0.048 | 240 | 6.29 | 0.048 |
| **262** | **.025** | **.00043** | **328** | **.031** | **.00047** | **328** | **.037** | **.00055** | **459** | **.046** | **.00067** | **459** | **.056** | **.00087** | **591** | **.062** | **.00094** | **591** | **.077** | **.00122** | **656** | **.093** | **.00157** | **787** | **.124** | **.00189** | **787** | **.186** | **.00189** | **787** | **.248** | **.00189** |

CRAZYMILL by Mikron Tool Cool

# Type C - Roughing

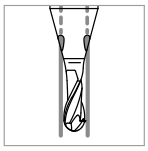
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

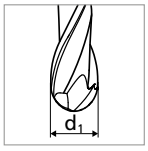
**Roughing**




- $a_p = 0.5 \times d_1$ ($Ød_1 \leq 0.5$ mm | **.020"**)
- $a_p = 1 \times d_1$ ($Ød_1 > 0.5$ mm | **.020"**)
- $a_e = 0.3 \times d_1$

**Machining angle = 0°**

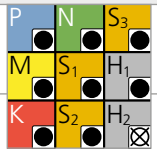





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3–0.4 mm \| .012"–.016" $v_c$ | $f_z$ |
|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 60 \| **197** | 0.005–0.007 **.00020–.00028** |
| | | 1.0401 | C15 | AISI 1015 | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | |
| | | 1.0044 | S275JR | AISI 1020 | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 60 \| **197** | 0.005–0.007 **.00020–.00028** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| **197** | 0.003–0.005 **.00012–.00020** |
| | | 0.6030 | GG30 | ASTM 40B | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.102 | CuSn6 | UNS C51900 | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 60 \| **197** | 0.006–0.008 **.00024–.00031** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 60 \| **197** | 0.003–0.004 **.00012–.00016** |
| | | 2.4668 | | Inconel 718 | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 60 \| **197** | 0.003–0.004 **.00012–.00016** |
| | | | CrCoMo28 | ASTM F1537 | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| **197** | 0.004–0.006 **.00016–.00024** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





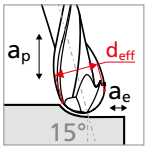

| Ød1 | 1/32" 0.5–0.8 mm \| .020"–.032" | | 1.0–1.2 mm \| .039"–.047" | | 1/16" 1.5–1.8 mm \| .059"–.071" | | 3/32" 2.0–2.5 mm \| .079"–.098" | | 1/8" 3.0 mm \| .118" | | 5/32–3/16–7/32–1/4" 4.0–6 mm \| .158"–.236" | | 8.0 mm \| .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 100 \| **328** | 0.010–0.014 **.00039–.00055** | 140 \| **459** | 0.015–0.017 **.00059–.00067** | 200 \| **656** | 0.024–0.026 **.00094–.00102** | 220 \| **722** | 0.034–0.036 **.00134–.00142** | 240 \| **787** | 0.040 **.00157** | 280 \| **919** | 0.050 **.00197** | 280 \| **919** | 0.050 **.00197** |
| | 100 \| **328** | 0.009–0.012 **.00035–.00047** | 140 \| **459** | 0.014–0.016 **.00055–.00063** | 200 \| **656** | 0.022–0.024 **.00087–.00094** | 220 \| **722** | 0.032–0.034 **.00126–.00134** | 240 \| **787** | 0.038 **.00150** | 280 \| **919** | 0.048 **.00189** | 280 \| **919** | 0.048 **.00189** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 140 \| **459** | 0.011–0.013 **.00043–.00051** | 200 \| **656** | 0.020–0.022 **.00079–.00087** | 220 \| **722** | 0.030–0.032 **.00118–.00126** | 240 \| **787** | 0.035 **.00138** | 280 \| **919** | 0.044 **.00173** | 280 \| **919** | 0.044 **.00173** |
| | 100 \| **328** | 0.010–0.014 **.00039–.00055** | 140 \| **459** | 0.016–0.018 **.00063–.00071** | 200 \| **656** | 0.024–0.026 **.00094–.00102** | 220 \| **722** | 0.034–0.036 **.00134–.00142** | 240 \| **787** | 0.040 **.00157** | 280 \| **919** | 0.048 **.00189** | 280 \| **919** | 0.048 **.00189** |
| | 100 \| **328** | 0.009–0.012 **.00035–.00047** | 140 \| **459** | 0.015–0.017 **.00059–.00067** | 200 \| **656** | 0.022–0.024 **.00087–.00094** | 220 \| **722** | 0.032–0.034 **.00126–.00134** | 240 \| **787** | 0.036 **.00142** | 280 \| **919** | 0.046 **.00181** | 280 \| **919** | 0.046 **.00181** |
| | 100 \| **328** | 0.009–0.012 **.00035–.00047** | 140 \| **459** | 0.015–0.017 **.00059–.00067** | 200 \| **656** | 0.022–0.024 **.00087–.00094** | 220 \| **722** | 0.032–0.034 **.00126–.00134** | 240 \| **787** | 0.046 **.00142** | 280 \| **919** | 0.046 **.00181** | 280 \| **919** | 0.046 **.00181** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 140 \| **459** | 0.012–0.014 **.00047–.00055** | 200 \| **656** | 0.016–0.018 **.00063–.00071** | 220 \| **722** | 0.030–0.032 **.00118–.00126** | 240 \| **787** | 0.034 **.00134** | 280 \| **919** | 0.044 **.00173** | 280 \| **919** | 0.044 **.00173** |
| | 100 \| **328** | 0.006–0.009 **.00024–.00035** | 120 \| **394** | 0.011–0.022 **.00043–.00087** | 140 \| **459** | 0.024–0.026 **.00094–.00102** | 160 \| **525** | 0.028–0.036 **.00110–.00142** | 180 \| **591** | 0.042 **.00165** | 200 \| **656** | 0.052 **.00205** | 200 \| **656** | 0.052 **.00205** |
| | 100 \| **328** | 0.012–0.016 **.00047–.00063** | 140 \| **459** | 0.018–0.020 **.00071–.00079** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.055 **.00217** | 280 \| **919** | 0.055 **.00217** |
| | 100 \| **328** | 0.012–0.016 **.00047–.00063** | 140 \| **459** | 0.018–0.020 **.00071–.00079** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.055 **.00217** | 280 \| **919** | 0.055 **.00217** |
| | 100 \| **328** | 0.014–0.018 **.00055–.00071** | 140 \| **459** | 0.020–0.022 **.00079–.00087** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.055 **.00217** | 280 \| **919** | 0.055 **.00217** |
| | 100 \| **328** | 0.014–0.018 **.00055–.00071** | 140 \| **459** | 0.020–0.022 **.00079–.00087** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.055 **.00217** | 280 \| **919** | 0.055 **.00217** |
| | 100 \| **328** | 0.014–0.018 **.00055–.00071** | 140 \| **459** | 0.020–0.022 **.00079–.00087** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.055 **.00217** | 280 \| **919** | 0.055 **.00217** |
| | 100 \| **328** | 0.012–0.016 **.00047–.00063** | 140 \| **459** | 0.018–0.020 **.00071–.00079** | 200 \| **656** | 0.026–0.028 **.00102–.00110** | 220 \| **722** | 0.036–0.040 **.00142–.00157** | 240 \| **787** | 0.058 **.00228** | 280 \| **919** | 0.055 **.00217** | 280 \| **919** | 0.055 **.00217** |
| | 100 \| **328** | 0.004–0.006 **.00016–.00024** | 120 \| **394** | 0.007–0.008 **.00028–.00031** | 130 \| **427** | 0.009–0.010 **.00035–.00039** | 140 \| **459** | 0.010–0.012 **.00039–.00047** | 150 \| **492** | 0.015 **.00059** | 170 \| **558** | 0.020 **.00079** | 170 \| **558** | 0.020 **.00079** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 120 \| **394** | 0.016–0.018 **.00063–.00071** | 130 \| **427** | 0.020–0.022 **.00079–.00087** | 140 \| **459** | 0.028–0.030 **.00110–.00118** | 150 \| **492** | 0.034 **.00134** | 170 \| **558** | 0.042 **.00165** | 170 \| **558** | 0.042 **.00165** |
| | 100 \| **328** | 0.008–0.011 **.00031–.00043** | 120 \| **394** | 0.016–0.018 **.00063–.00071** | 130 \| **427** | 0.020–0.022 **.00079–.00087** | 140 \| **459** | 0.028–0.030 **.00110–.00118** | 150 \| **492** | 0.034 **.00134** | 170 \| **558** | 0.042 **.00165** | 170 \| **558** | 0.042 **.00165** |
| | 100 \| **328** | 0.004–0.006 **.00016–.00024** | 140 \| **459** | 0.007–0.008 **.00028–.00031** | 180 \| **591** | 0.009–0.010 **.00035–.00039** | 200 \| **656** | 0.010–0.012 **.00039–.00047** | 220 \| **722** | 0.015 **.00059** | 240 \| **787** | 0.020 **.00079** | 240 \| **787** | 0.020 **.00079** |
| | 80 \| **262** | 0.007–0.009 **.00028–.00035** | 100 \| **328** | 0.010–0.012 **.00039–.00047** | 140 \| **459** | 0.014–0.018 **.00055–.00071** | 180 \| **591** | 0.020–0.026 **.00079–.00102** | 200 \| **656** | 0.030 **.00118** | 240 \| **787** | 0.032 **.00126** | 240 \| **787** | 0.032 **.00126** |

CRAZYMILL by Mikron Tool Cool

# Type C - Semi-finishing

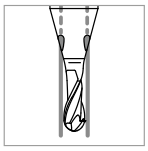
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

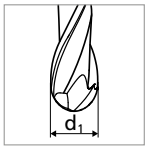
**Semi-finishing**




- $a_p = 0.25 \times d_1$ ($Ød_1 \leq 0.5$ mm **| .020"**)
- $a_p = 0.5 \times d_1$ ($Ød_1 > 0.5$ mm **| .020"**)
- $a_e = 0.1 \times d_1$

**Machining angle = 15°**

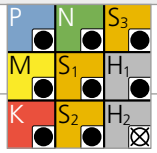





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3 mm \| .012" $v_c$ | $d_{eff}$ | $f_z$ | 0.4 mm \| .016" $v_c$ | $d_{eff}$ | $f_z$ | 0.5 mm \| .020" $v_c$ | $d_{eff}$ | $f_z$ | 0.6 mm \| .024" $v_c$ | $d_{eff}$ | $f_z$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 55 | 0.29 | 0.005 | 73 | 0.39 | 0.007 | 92 | 0.48 | 0.010 | 100 | 0.60 | 0.012 |
| | | 1.0401 | C15 | AISI 1015 | **180** | **.011** | **.00020** | **240** | **.015** | **.00028** | **302** | **.019** | **.00039** | **328** | **.024** | **.00047** |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.009 | 100 | 0.60 | 0.011 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00035** | **328** | **.024** | **.00043** |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | | | | | | | |
| | High alloyed tool steel Rm<1200N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 55 | 0.29 | **0.004** | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.009 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00031** | **328** | **.024** | **.00035** |
| | | 1.3343 | HS6-5-2C | AISI M2 | | | | | | | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 | | | | | | | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 | 55 | 0.29 | 0.005 | 73 | 0.39 | 0.007 | 92 | 0.48 | 0.010 | 100 | 0.60 | 0.012 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | **180** | **.011** | **.00020** | **240** | **.015** | **.00028** | **302** | **.019** | **.00039** | **328** | **.024** | **.00047** |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.009 | 100 | 0.60 | 0.010 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00035** | **328** | **.024** | **.00039** |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.009 | 100 | 0.60 | 0.010 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00035** | **328** | **.024** | **.00039** |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.010 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00031** | **328** | **.024** | **.00039** |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | | | | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 55 | 0.29 | 0.003 | 73 | 0.39 | 0.005 | 92 | 0.48 | 0.006 | 100 | 0.60 | 0.008 |
| | | 0.6030 | GG30 | ASTM 40B | **180** | **.011** | **.00012** | **240** | **.015** | **.00020** | **302** | **.019** | **.00024** | **328** | **.024** | **.00030** |
| | | 0.7040 | GGG40 | ASTM60-40-18 | | | | | | | | | | | | |
| | | 0.7060 | GGG60 | ASTM80-60-03 | | | | | | | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.012 | 100 | 0.60 | 0.014 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00047** | **328** | **.024** | **.00055** |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.012 | 100 | 0.60 | 0.014 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00047** | **328** | **.024** | **.00055** |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.014 | 100 | 0.60 | 0.016 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00055** | **328** | **.024** | **.00063** |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.014 | 100 | 0.60 | 0.016 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00055** | **328** | **.024** | **.00063** |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 | UNS C38500 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.014 | 100 | 0.60 | 0.016 |
| | | 2.102 | CuSn6 | UNS C51900 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00055** | **328** | **.024** | **.00063** |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 55 | 0.29 | 0.006 | 73 | 0.39 | 0.008 | 92 | 0.48 | 0.012 | 100 | 0.60 | 0.014 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | **180** | **.011** | **.00024** | **240** | **.015** | **.00031** | **302** | **.019** | **.00047** | **328** | **.024** | **.00055** |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 55 | 0.29 | 0.003 | 73 | 0.39 | 0.004 | 92 | 0.48 | 0.004 | 100 | 0.60 | 0.005 |
| | | 2.4668 | | Inconel 718 | **180** | **.011** | **.00012** | **240** | **.015** | **.00016** | **302** | **.019** | **.00016** | **328** | **.024** | **.00020** |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.004 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.009 |
| | | 3.7065 | Gr.4 | ASTM B348 | **180** | **.011** | **.00016** | **240** | **.015** | **.00016** | **302** | **.019** | **.00031** | **328** | **.024** | **.00035** |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.004 | 92 | 0.48 | 0.008 | 100 | 0.60 | 0.009 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | **180** | **.011** | **.00016** | **240** | **.015** | **.00016** | **302** | **.019** | **.00031** | **328** | **.024** | **.00035** |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 55 | 0.29 | 0.003 | 73 | 0.39 | 0.003 | 92 | 0.48 | 0.005 | 100 | 0.60 | 0.005 |
| | | | CrCoMo28 | ASTM F1537 | **180** | **.011** | **.00012** | **240** | **.015** | **.00012** | **302** | **.019** | **.00020** | **328** | **.024** | **.00020** |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 55 | 0.29 | 0.004 | 73 | 0.39 | 0.006 | 92 | 0.48 | 0.007 | 80 | 0.60 | 0.008 |
| | | | | | **180** | **.011** | **.00016** | **240** | **.015** | **.00024** | **302** | **.019** | **.00028** | **262** | **.024** | **.00031** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**
$d_{eff}$ [mm] | **[inch]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




Ød1

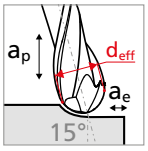
| 1/32" 0.8mm \| .032" | | | 1.0mm \| .039" | | | 1.2mm \| .047" | | | 1/16" 1.5 \| .059" | | | 1.8mm \| .071" | | | 2.0mm \| .079" | | | 3/32" 2.5mm \| .098" | | | 1/8" 3.0mm \| .118" | | | 5/32" 4.0mm \| .158" | | | 3/16–7/32–1/4" 6.0mm \| .236" | | | 8.0mm \| .315" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ |
| 100 | 0.80 | 0.014 | 140 | 1.00 | 0.015 | 140 | 1.20 | 0.017 | 200 | 1.50 | 0.024 | 200 | 1.80 | 0.026 | 220 | 2.00 | 0.034 | 220 | 2.50 | 0.036 | 240 | 3.00 | 0.040 | 260 | 4.00 | 0.050 | 260 | 6.00 | 0.050 | 260 | 8.00 | 0.050 |
| **328** | **.032** | **.00055** | **459** | **.039** | **.00059** | **459** | **.047** | **.00067** | **656** | **.059** | **.00094** | **656** | **.071** | **.00102** | **722** | **.079** | **.00134** | **722** | **.098** | **.00142** | **787** | **.118** | **.00157** | **853** | **.158** | **.00197** | **853** | **.236** | **.00197** | **853** | **.315** | **.00197** |
| 100 | 0.80 | 0.012 | 140 | 1.00 | 0.014 | 140 | 1.20 | 0.016 | 200 | 1.50 | 0.022 | 200 | 1.80 | 0.024 | 220 | 2.00 | 0.032 | 220 | 2.50 | 0.034 | 240 | 3.00 | 0.038 | 260 | 4.00 | 0.044 | 260 | 6.00 | 0.048 | 260 | 8.00 | 0.048 |
| **328** | **.032** | **.00047** | **459** | **.039** | **.00055** | **459** | **.047** | **.00063** | **656** | **.059** | **.00087** | **656** | **.071** | **.00094** | **722** | **.079** | **.00126** | **722** | **.098** | **.00134** | **787** | **.118** | **.00150** | **853** | **.158** | **.00173** | **853** | **.236** | **.00189** | **853** | **.315** | **.00189** |
| 100 | 0.80 | 0.011 | 140 | 1.00 | 0.011 | 140 | 1.20 | 0.013 | 200 | 1.50 | 0.020 | 200 | 1.80 | 0.022 | 220 | 2.00 | 0.030 | 220 | 2.50 | 0.032 | 240 | 3.00 | 0.035 | 260 | 4.00 | 0.044 | 260 | 6.00 | 0.044 | 260 | 8.00 | 0.044 |
| **328** | **.032** | **.00043** | **459** | **.039** | **.00043** | **459** | **.047** | **.00051** | **656** | **.059** | **.00079** | **656** | **.071** | **.00087** | **722** | **.079** | **.00118** | **722** | **.098** | **.00126** | **787** | **.118** | **.00138** | **853** | **.158** | **.00173** | **853** | **.236** | **.00173** | **853** | **.315** | **.00173** |
| 100 | 0.80 | 0.014 | 140 | 1.00 | 0.016 | 140 | 1.20 | 0.018 | 200 | 1.50 | 0.024 | 200 | 1.80 | 0.026 | 220 | 2.00 | 0.034 | 220 | 2.50 | 0.036 | 240 | 3.00 | 0.040 | 260 | 4.00 | 0.048 | 260 | 6.00 | 0.048 | 260 | 8.00 | 0.048 |
| **328** | **.032** | **.00055** | **459** | **.039** | **.00063** | **459** | **.047** | **.00071** | **656** | **.059** | **.00094** | **656** | **.071** | **.00102** | **722** | **.079** | **.00134** | **722** | **.098** | **.00142** | **787** | **.118** | **.00157** | **853** | **.158** | **.00189** | **853** | **.236** | **.00189** | **853** | **.315** | **.00189** |
| 100 | 0.80 | 0.012 | 140 | 1.00 | 0.015 | 140 | 1.20 | 0.017 | 200 | 1.50 | 0.022 | 200 | 1.80 | 0.024 | 220 | 2.00 | 0.032 | 220 | 2.50 | 0.034 | 240 | 3.00 | 0.036 | 260 | 4.00 | 0.046 | 260 | 6.00 | 0.046 | 260 | 8.00 | 0.046 |
| **328** | **.032** | **.00047** | **459** | **.039** | **.00059** | **459** | **.047** | **.00067** | **656** | **.059** | **.00087** | **656** | **.071** | **.00094** | **722** | **.079** | **.00126** | **722** | **.098** | **.00134** | **787** | **.118** | **.00142** | **853** | **.158** | **.00181** | **853** | **.236** | **.00181** | **853** | **.315** | **.00181** |
| 100 | 0.80 | 0.012 | 140 | 1.00 | 0.015 | 140 | 1.20 | 0.017 | 200 | 1.50 | 0.022 | 200 | 1.80 | 0.024 | 220 | 2.00 | 0.032 | 220 | 2.50 | 0.034 | 240 | 3.00 | 0.036 | 260 | 4.00 | 0.046 | 260 | 6.00 | 0.046 | 260 | 8.00 | 0.046 |
| **328** | **.032** | **.00047** | **459** | **.039** | **.00059** | **459** | **.047** | **.00067** | **656** | **.059** | **.00087** | **656** | **.071** | **.00094** | **722** | **.079** | **.00126** | **722** | **.098** | **.00134** | **787** | **.118** | **.00142** | **853** | **.158** | **.00181** | **853** | **.236** | **.00181** | **853** | **.315** | **.00181** |
| 100 | 0.80 | 0.011 | 140 | 1.00 | 0.012 | 140 | 1.20 | 0.014 | 200 | 1.50 | 0.016 | 200 | 1.80 | 0.018 | 220 | 2.00 | 0.030 | 220 | 2.50 | 0.032 | 240 | 3.00 | 0.034 | 260 | 4.00 | 0.044 | 260 | 6.00 | 0.044 | 260 | 8.00 | 0.044 |
| **328** | **.032** | **.00043** | **459** | **.039** | **.00047** | **459** | **.047** | **.00055** | **656** | **.059** | **.00063** | **656** | **.071** | **.00071** | **722** | **.079** | **.00118** | **722** | **.098** | **.00126** | **787** | **.118** | **.00134** | **853** | **.158** | **.00173** | **853** | **.236** | **.00173** | **853** | **.315** | **.00173** |
| 100 | 0.80 | 0.009 | 120 | 1.00 | 0.011 | 120 | 1.20 | 0.022 | 140 | 1.50 | 0.024 | 140 | 1.80 | 0.026 | 160 | 2.00 | 0.028 | 160 | 2.50 | 0.036 | 180 | 3.00 | 0.042 | 200 | 4.00 | 0.052 | 200 | 6.00 | 0.052 | 200 | 8.00 | 0.052 |
| **328** | **.032** | **.00035** | **394** | **.039** | **.00043** | **394** | **.047** | **.00087** | **459** | **.059** | **.00094** | **459** | **.071** | **.00102** | **525** | **.079** | **.00110** | **525** | **.098** | **.00142** | **591** | **.118** | **.00165** | **656** | **.158** | **.00205** | **656** | **.236** | **.00205** | **656** | **.315** | **.00205** |
| 100 | 0.80 | 0.016 | 140 | 1.00 | 0.018 | 140 | 1.20 | 0.020 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.055 | 260 | 6.00 | 0.055 | 260 | 8.00 | 0.055 |
| **328** | **.032** | **.00063** | **459** | **.039** | **.00071** | **459** | **.047** | **.00079** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00217** | **853** | **.236** | **.00217** | **853** | **.315** | **.00217** |
| 100 | 0.80 | 0.016 | 140 | 1.00 | 0.018 | 140 | 1.20 | 0.020 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.055 | 260 | 6.00 | 0.055 | 260 | 8.00 | 0.055 |
| **328** | **.032** | **.00063** | **459** | **.039** | **.00071** | **459** | **.047** | **.00079** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00217** | **853** | **.236** | **.00217** | **853** | **.315** | **.00217** |
| 100 | 0.80 | 0.018 | 140 | 1.00 | 0.020 | 140 | 1.20 | 0.022 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.055 | 260 | 6.00 | 0.055 | 260 | 8.00 | 0.055 |
| **328** | **.032** | **.00071** | **459** | **.039** | **.00079** | **459** | **.047** | **.00087** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00217** | **853** | **.236** | **.00217** | **853** | **.315** | **.00217** |
| 100 | 0.80 | 0.018 | 140 | 1.00 | 0.020 | 140 | 1.20 | 0.022 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.055 | 260 | 6.00 | 0.055 | 260 | 8.00 | 0.055 |
| **328** | **.032** | **.00071** | **459** | **.039** | **.00079** | **459** | **.047** | **.00087** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00217** | **853** | **.236** | **.00217** | **853** | **.315** | **.00217** |
| 100 | 0.80 | 0.018 | 140 | 1.00 | 0.020 | 140 | 1.20 | 0.022 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.055 | 260 | 6.00 | 0.055 | 260 | 8.00 | 0.055 |
| **328** | **.032** | **.00071** | **459** | **.039** | **.00079** | **459** | **.047** | **.00087** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00217** | **853** | **.236** | **.00217** | **853** | **.315** | **.00217** |
| 100 | 0.80 | 0.016 | 140 | 1.00 | 0.018 | 140 | 1.20 | 0.020 | 200 | 1.50 | 0.026 | 200 | 1.80 | 0.028 | 220 | 2.00 | 0.036 | 220 | 2.50 | 0.040 | 240 | 3.00 | 0.058 | 260 | 4.00 | 0.055 | 260 | 6.00 | 0.055 | 260 | 8.00 | 0.055 |
| **328** | **.032** | **.00063** | **459** | **.039** | **.00071** | **459** | **.047** | **.00079** | **656** | **.059** | **.00102** | **656** | **.071** | **.00110** | **722** | **.079** | **.00142** | **722** | **.098** | **.00157** | **787** | **.118** | **.00228** | **853** | **.158** | **.00217** | **853** | **.236** | **.00217** | **853** | **.315** | **.00217** |
| 100 | 0.80 | 0.006 | 120 | 1.00 | 0.007 | 120 | 1.20 | 0.008 | 130 | 1.50 | 0.009 | 130 | 1.80 | 0.010 | 140 | 2.00 | 0.010 | 140 | 2.50 | 0.012 | 150 | 3.00 | 0.015 | 170 | 4.00 | 0.020 | 170 | 6.00 | 0.020 | 170 | 8.00 | 0.020 |
| **328** | **.032** | **.00024** | **394** | **.039** | **.00028** | **394** | **.047** | **.00031** | **427** | **.059** | **.00035** | **427** | **.071** | **.00039** | **459** | **.079** | **.00039** | **459** | **.098** | **.00047** | **492** | **.118** | **.00059** | **558** | **.158** | **.00079** | **558** | **.236** | **.00079** | **558** | **.315** | **.00079** |
| 100 | 0.80 | 0.011 | 120 | 1.00 | 0.016 | 120 | 1.20 | 0.018 | 130 | 1.50 | 0.020 | 130 | 1.80 | 0.022 | 140 | 2.00 | 0.028 | 140 | 2.50 | 0.030 | 150 | 3.00 | 0.034 | 170 | 4.00 | 0.042 | 170 | 6.00 | 0.042 | 170 | 8.00 | 0.042 |
| **328** | **.032** | **.00043** | **394** | **.039** | **.00063** | **394** | **.047** | **.00071** | **427** | **.059** | **.00079** | **427** | **.071** | **.00087** | **459** | **.079** | **.00110** | **459** | **.098** | **.00118** | **492** | **.118** | **.00134** | **558** | **.158** | **.00165** | **558** | **.236** | **.00165** | **558** | **.315** | **.00165** |
| 100 | 0.80 | 0.011 | 120 | 1.00 | 0.016 | 120 | 1.20 | 0.018 | 130 | 1.50 | 0.020 | 130 | 1.80 | 0.022 | 140 | 2.00 | 0.028 | 140 | 2.50 | 0.030 | 150 | 3.00 | 0.034 | 170 | 4.00 | 0.042 | 170 | 6.00 | 0.042 | 170 | 8.00 | 0.042 |
| **328** | **.032** | **.00043** | **394** | **.039** | **.00063** | **394** | **.047** | **.00071** | **427** | **.059** | **.00079** | **427** | **.071** | **.00087** | **459** | **.079** | **.00110** | **459** | **.098** | **.00118** | **492** | **.118** | **.00134** | **558** | **.158** | **.00165** | **558** | **.236** | **.00165** | **558** | **.315** | **.00165** |
| 100 | 0.80 | 0.006 | 140 | 1.00 | 0.007 | 140 | 1.20 | 0.008 | 180 | 1.50 | 0.009 | 180 | 1.80 | 0.010 | 200 | 2.00 | 0.010 | 200 | 2.50 | 0.012 | 220 | 3.00 | 0.015 | 240 | 4.00 | 0.020 | 240 | 6.00 | 0.020 | 240 | 8.00 | 0.020 |
| **328** | **.032** | **.00024** | **459** | **.039** | **.00028** | **459** | **.047** | **.00031** | **591** | **.059** | **.00035** | **591** | **.071** | **.00039** | **656** | **.079** | **.00039** | **656** | **.098** | **.00047** | **722** | **.118** | **.00059** | **787** | **.158** | **.00079** | **787** | **.236** | **.00079** | **787** | **.315** | **.00079** |
| 80 | 0.80 | 0.009 | 100 | 1.00 | 0.010 | 100 | 1.20 | 0.012 | 140 | 1.50 | 0.014 | 140 | 1.80 | 0.018 | 180 | 2.00 | 0.020 | 180 | 2.50 | 0.026 | 200 | 3.00 | 0.030 | 240 | 4.00 | 0.032 | 240 | 6.00 | 0.032 | 240 | 8.00 | 0.032 |
| **262** | **.032** | **.00035** | **328** | **.039** | **.00039** | **328** | **.047** | **.00047** | **459** | **.059** | **.00055** | **459** | **.071** | **.00071** | **591** | **.079** | **.00079** | **591** | **.098** | **.00102** | **656** | **.118** | **.00118** | **787** | **.158** | **.00126** | **787** | **.236** | **.00126** | **787** | **.315** | **.00126** |

CRAZYMILL by Mikron Tool Cool

# Type C - Finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

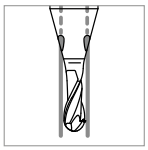
**Finishing**

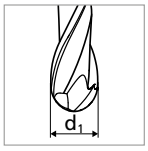



- $a_p = 0.1 \times d_1$
- $a_e = 0.05 \times d_1$

**Machining angle = 15°**

**$n_{max}$ = 60'000 rpm**

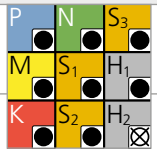





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1/64" 0.3 mm \| .012" $v_c$ | $d_{eff}$ | $f_z$ | 0.4 mm \| .016" $v_c$ | $d_{eff}$ | $f_z$ | 0.5 mm \| .020" $v_c$ | $d_{eff}$ | $f_z$ | 0.6 mm \| .024" $v_c$ | $d_{eff}$ | $f_z$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 45 | 0.24 | 0.006 | 59 | 0.31 | 0.008 | 74 | 0.39 | 0.012 | 89 | 0.47 | 0.014 |
| | | 1.0401 | C15 | AISI 1015 | **148** | **.009** | **.00024** | **194** | **.012** | **.00031** | **243** | **.015** | **.00047** | **292** | **.019** | **.00055** |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.011 | 89 | 0.47 | 0.013 |
| | | 1.7131 | 16MnCr5 | AISI 5115 | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00043** | **292** | **.019** | **.00051** |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | | | | | | | | | |
| | High alloyed tool steel Rm<1200N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.010 | 89 | 0.47 | 0.011 |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00039** | **292** | **.019** | **.00043** |
| | | 1.3343 | HS6-5-2C | AISI M2 | | | | | | | | | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 | | | | | | | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 | 45 | 0.24 | 0.006 | 59 | 0.31 | 0.008 | 74 | 0.39 | 0.012 | 89 | 0.47 | 0.014 |
| | | 1.4105 | X6CrMoS17 | AISI 430F | **148** | **.009** | **.00024** | **194** | **.012** | **.00031** | **243** | **.015** | **.00047** | **292** | **.019** | **.00055** |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.011 | 89 | 0.47 | 0.012 |
| | | 1.4112 | X90CrMoV18 | AISI 440B | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00043** | **292** | **.019** | **.00047** |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.011 | 89 | 0.47 | 0.012 |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00043** | **292** | **.019** | **.00047** |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.010 | 89 | 0.47 | 0.012 |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00039** | **292** | **.019** | **.00047** |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | | | | | | | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 45 | 0.24 | 0.004 | 59 | 0.31 | 0.006 | 74 | 0.39 | 0.007 | 89 | 0.47 | 0.009 |
| | | 0.6030 | GG30 | ASTM 40B | **148** | **.009** | **.00016** | **194** | **.012** | **.00024** | **243** | **.015** | **.00028** | **292** | **.019** | **.00035** |
| | | 0.7040 | GGG40 | ASTM60-40-18 | | | | | | | | | | | | |
| | | 0.7060 | GGG60 | ASTM80-60-03 | | | | | | | | | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.014 | 89 | 0.47 | 0.017 |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00055** | **292** | **.019** | **.00067** |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.014 | 89 | 0.47 | 0.017 |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00055** | **292** | **.019** | **.00067** |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.017 | 89 | 0.47 | 0.019 |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00067** | **292** | **.019** | **.00075** |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.017 | 89 | 0.47 | 0.019 |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00067** | **292** | **.019** | **.00075** |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 | UNS C38500 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.017 | 89 | 0.47 | 0.019 |
| | | 2.102 | CuSn6 | UNS C51900 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00067** | **292** | **.019** | **.00075** |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 45 | 0.24 | 0.007 | 59 | 0.31 | 0.010 | 74 | 0.39 | 0.014 | 89 | 0.47 | 0.017 |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | **148** | **.009** | **.00028** | **194** | **.012** | **.00039** | **243** | **.015** | **.00055** | **292** | **.019** | **.00067** |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 45 | 0.24 | 0.004 | 59 | 0.31 | 0.005 | 74 | 0.39 | 0.005 | 89 | 0.47 | 0.006 |
| | | 2.4668 | | Inconel 718 | **148** | **.009** | **.00016** | **194** | **.012** | **.00020** | **243** | **.015** | **.00020** | **292** | **.019** | **.00024** |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | | | | | | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | | | | | | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.005 | 74 | 0.39 | 0.010 | 100 | 0.47 | 0.011 |
| | | 3.7065 | Gr.4 | ASTM B348 | **148** | **.009** | **.00020** | **194** | **.012** | **.00020** | **243** | **.015** | **.00039** | **328** | **.019** | **.00043** |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.005 | 74 | 0.39 | 0.010 | 89 | 0.47 | 0.011 |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | **148** | **.009** | **.00020** | **194** | **.012** | **.00020** | **243** | **.015** | **.00039** | **292** | **.019** | **.00043** |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 45 | 0.24 | 0.004 | 59 | 0.31 | 0.004 | 74 | 0.39 | 0.006 | 89 | 0.47 | 0.006 |
| | | | CrCoMo28 | ASTM F1537 | **148** | **.009** | **.00016** | **194** | **.012** | **.00016** | **243** | **.015** | **.00024** | **292** | **.019** | **.00024** |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 45 | 0.24 | 0.005 | 59 | 0.31 | 0.007 | 74 | 0.39 | 0.008 | 80 | 0.47 | 0.010 |
| | | | | | **148** | **.009** | **.00020** | **194** | **.012** | **.00028** | **243** | **.015** | **.00031** | **262** | **.019** | **.00039** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**
$d_{eff}$ [mm] | **[inch]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




Ød1

| 1/32" | | | 1/16" | | | | | | | | | 3/32" | | | 1/8" | | | 5/32" | | | 3/16–7/32–1/4" | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.8mm\|.032" | | | 1.0mm\|.039" | | | 1.2mm\|.047" | | | 1.5\|.059" | | | 1.8mm\|.071" | | | 2.0mm\|.079" | | | 2.5mm\|.098" | | | 3.0mm\|.118" | | | 4.0mm\|.158" | | | 6.0mm\|.236" | | | 8.0mm\|.315" | | |
| $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ | $v_c$ | $d_{eff}$ | $f_z$ |
| 100 | 0.63 | 0.017 | 140 | 0.79 | 0.018 | 140 | 0.94 | 0.020 | 200 | 1.18 | 0.029 | 200 | 1.42 | 0.031 | 220 | 1.57 | 0.041 | 220 | 1.97 | 0.043 | 240 | 2.36 | 0.048 | 260 | 3.15 | 0.060 | 260 | 4.72 | 0.060 | 260 | 6.29 | 0.060 |
| **328** | **.025** | **.00067** | **459** | **.031** | **.00071** | **459** | **.037** | **.00079** | **656** | **.046** | **.00114** | **656** | **.056** | **.00122** | **722** | **.062** | **.00161** | **722** | **.077** | **.00169** | **787** | **.093** | **.00189** | **853** | **.124** | **.00236** | **853** | **.186** | **.00236** | **853** | **.248** | **.00236** |
| 100 | 0.63 | 0.014 | 140 | 0.79 | 0.017 | 140 | 0.94 | 0.019 | 200 | 1.18 | 0.026 | 200 | 1.42 | 0.029 | 220 | 1.57 | 0.038 | 220 | 1.97 | 0.041 | 240 | 2.36 | 0.046 | 260 | 3.15 | 0.058 | 260 | 4.72 | 0.058 | 260 | 6.29 | 0.058 |
| **328** | **.025** | **.00055** | **459** | **.031** | **.00067** | **459** | **.037** | **.00075** | **656** | **.046** | **.00102** | **656** | **.056** | **.00114** | **722** | **.062** | **.00150** | **722** | **.077** | **.00161** | **787** | **.093** | **.00181** | **853** | **.124** | **.00228** | **853** | **.186** | **.00228** | **853** | **.248** | **.00228** |
| 100 | 0.63 | 0.013 | 140 | 0.79 | 0.013 | 140 | 0.94 | 0.016 | 200 | 1.18 | 0.024 | 200 | 1.42 | 0.026 | 220 | 1.57 | 0.036 | 220 | 1.97 | 0.038 | 240 | 2.36 | 0.042 | 260 | 3.15 | 0.053 | 260 | 4.72 | 0.053 | 260 | 6.29 | 0.053 |
| **328** | **.025** | **.00051** | **459** | **.031** | **.00051** | **459** | **.037** | **.00063** | **656** | **.046** | **.00094** | **656** | **.056** | **.00102** | **722** | **.062** | **.00142** | **722** | **.077** | **.00150** | **787** | **.093** | **.00165** | **853** | **.124** | **.00209** | **853** | **.186** | **.00209** | **853** | **.248** | **.00209** |
| 100 | 0.63 | 0.017 | 140 | 0.79 | 0.019 | 140 | 0.94 | 0.022 | 200 | 1.18 | 0.029 | 200 | 1.42 | 0.031 | 220 | 1.57 | 0.041 | 220 | 1.97 | 0.043 | 240 | 2.36 | 0.048 | 260 | 3.15 | 0.058 | 260 | 4.72 | 0.058 | 260 | 6.29 | 0.058 |
| **328** | **.025** | **.00067** | **459** | **.031** | **.00075** | **459** | **.037** | **.00087** | **656** | **.046** | **.00114** | **656** | **.056** | **.00122** | **722** | **.062** | **.00161** | **722** | **.077** | **.00169** | **787** | **.093** | **.00189** | **853** | **.124** | **.00228** | **853** | **.186** | **.00228** | **853** | **.248** | **.00228** |
| 100 | 0.63 | 0.014 | 140 | 0.79 | 0.018 | 140 | 0.94 | 0.020 | 200 | 1.18 | 0.026 | 200 | 1.42 | 0.029 | 220 | 1.57 | 0.038 | 220 | 1.97 | 0.041 | 240 | 2.36 | 0.043 | 260 | 3.15 | 0.055 | 260 | 4.72 | 0.055 | 260 | 6.29 | 0.055 |
| **328** | **.025** | **.00055** | **459** | **.031** | **.00071** | **459** | **.037** | **.00079** | **656** | **.046** | **.00102** | **656** | **.056** | **.00114** | **722** | **.062** | **.00150** | **722** | **.077** | **.00161** | **787** | **.093** | **.00169** | **853** | **.124** | **.00217** | **853** | **.186** | **.00217** | **853** | **.248** | **.00217** |
| 100 | 0.63 | 0.014 | 140 | 0.79 | 0.018 | 140 | 0.94 | 0.020 | 200 | 1.18 | 0.026 | 200 | 1.42 | 0.029 | 220 | 1.57 | 0.038 | 220 | 1.97 | 0.041 | 240 | 2.36 | 0.043 | 260 | 3.15 | 0.055 | 260 | 4.72 | 0.055 | 260 | 6.29 | 0.055 |
| **328** | **.025** | **.00055** | **459** | **.031** | **.00071** | **459** | **.037** | **.00079** | **656** | **.046** | **.00102** | **656** | **.056** | **.00114** | **722** | **.062** | **.00150** | **722** | **.077** | **.00161** | **787** | **.093** | **.00169** | **853** | **.124** | **.00217** | **853** | **.186** | **.00217** | **853** | **.248** | **.00217** |
| 100 | 0.63 | 0.013 | 140 | 0.79 | 0.014 | 140 | 0.94 | 0.017 | 200 | 1.18 | 0.019 | 200 | 1.42 | 0.022 | 220 | 1.57 | 0.036 | 220 | 1.97 | 0.038 | 240 | 2.36 | 0.041 | 260 | 3.15 | 0.053 | 260 | 4.72 | 0.053 | 260 | 6.29 | 0.053 |
| **328** | **.025** | **.00051** | **459** | **.031** | **.00055** | **459** | **.037** | **.00067** | **656** | **.046** | **.00075** | **656** | **.056** | **.00087** | **722** | **.062** | **.00142** | **722** | **.077** | **.00150** | **787** | **.093** | **.00161** | **853** | **.124** | **.00209** | **853** | **.186** | **.00209** | **853** | **.248** | **.00209** |
| 100 | 0.63 | 0.011 | 120 | 0.79 | 0.013 | 120 | 0.94 | 0.026 | 140 | 1.18 | 0.029 | 140 | 1.42 | 0.031 | 160 | 1.57 | 0.034 | 160 | 1.97 | 0.043 | 180 | 2.36 | 0.050 | 200 | 3.15 | 0.062 | 200 | 4.72 | 0.062 | 200 | 6.29 | 0.062 |
| **328** | **.025** | **.00043** | **394** | **.031** | **.00051** | **394** | **.037** | **.00102** | **459** | **.046** | **.00114** | **459** | **.056** | **.00122** | **525** | **.062** | **.00134** | **525** | **.077** | **.00169** | **591** | **.093** | **.00197** | **656** | **.124** | **.00244** | **656** | **.186** | **.00244** | **656** | **.248** | **.00244** |
| 100 | 0.63 | 0.019 | 140 | 0.79 | 0.022 | 140 | 0.94 | 0.024 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.066 | 260 | 4.72 | 0.066 | 260 | 6.29 | 0.066 |
| **328** | **.025** | **.00075** | **459** | **.031** | **.00087** | **459** | **.037** | **.00094** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00260** | **853** | **.186** | **.00260** | **853** | **.248** | **.00260** |
| 100 | 0.63 | 0.019 | 140 | 0.79 | 0.022 | 140 | 0.94 | 0.024 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.066 | 260 | 4.72 | 0.066 | 260 | 6.29 | 0.066 |
| **328** | **.025** | **.00075** | **459** | **.031** | **.00087** | **459** | **.037** | **.00094** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00260** | **853** | **.186** | **.00260** | **853** | **.248** | **.00260** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.066 | 260 | 4.72 | 0.066 | 260 | 6.29 | 0.066 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00260** | **853** | **.186** | **.00260** | **853** | **.248** | **.00260** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.066 | 260 | 4.72 | 0.066 | 260 | 6.29 | 0.066 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00260** | **853** | **.186** | **.00260** | **853** | **.248** | **.00260** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.066 | 260 | 4.72 | 0.066 | 260 | 6.29 | 0.066 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00260** | **853** | **.186** | **.00260** | **853** | **.248** | **.00260** |
| 100 | 0.63 | 0.022 | 140 | 0.79 | 0.024 | 140 | 0.94 | 0.026 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.066 | 260 | 4.72 | 0.066 | 260 | 6.29 | 0.066 |
| **328** | **.025** | **.00087** | **459** | **.031** | **.00094** | **459** | **.037** | **.00102** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00260** | **853** | **.186** | **.00260** | **853** | **.248** | **.00260** |
| 100 | 0.63 | 0.019 | 140 | 0.79 | 0.022 | 140 | 0.94 | 0.024 | 200 | 1.18 | 0.031 | 200 | 1.42 | 0.034 | 220 | 1.57 | 0.043 | 220 | 1.97 | 0.048 | 240 | 2.36 | 0.070 | 260 | 3.15 | 0.066 | 260 | 4.72 | 0.066 | 260 | 6.29 | 0.066 |
| **328** | **.025** | **.00075** | **459** | **.031** | **.00087** | **459** | **.037** | **.00094** | **656** | **.046** | **.00122** | **656** | **.056** | **.00134** | **722** | **.062** | **.00169** | **722** | **.077** | **.00189** | **787** | **.093** | **.00276** | **853** | **.124** | **.00260** | **853** | **.186** | **.00260** | **853** | **.248** | **.00260** |
| 100 | 0.63 | 0.007 | 120 | 0.79 | 0.008 | 120 | 0.94 | 0.010 | 130 | 1.18 | 0.011 | 130 | 1.42 | 0.012 | 140 | 1.57 | 0.012 | 140 | 1.97 | 0.014 | 150 | 2.36 | 0.018 | 170 | 3.15 | 0.024 | 170 | 4.72 | 0.024 | 170 | 6.29 | 0.024 |
| **328** | **.025** | **.00028** | **394** | **.031** | **.00031** | **394** | **.037** | **.00039** | **427** | **.046** | **.00043** | **427** | **.056** | **.00047** | **459** | **.062** | **.00047** | **459** | **.077** | **.00055** | **492** | **.093** | **.00071** | **558** | **.124** | **.00094** | **558** | **.186** | **.00094** | **558** | **.248** | **.00094** |
| 100 | 0.63 | 0.013 | 120 | 0.79 | 0.019 | 120 | 0.94 | 0.022 | 130 | 1.18 | 0.024 | 130 | 1.42 | 0.026 | 140 | 1.57 | 0.034 | 140 | 1.97 | 0.036 | 150 | 2.36 | 0.041 | 170 | 3.15 | 0.050 | 170 | 4.72 | 0.050 | 170 | 6.29 | 0.050 |
| **328** | **.025** | **.00051** | **394** | **.031** | **.00075** | **394** | **.037** | **.00087** | **427** | **.046** | **.00094** | **427** | **.056** | **.00102** | **459** | **.062** | **.00134** | **459** | **.077** | **.00142** | **492** | **.093** | **.00161** | **558** | **.124** | **.00197** | **558** | **.186** | **.00197** | **558** | **.248** | **.00197** |
| 100 | 0.63 | 0.013 | 120 | 0.79 | 0.019 | 120 | 0.94 | 0.022 | 130 | 1.18 | 0.024 | 130 | 1.42 | 0.026 | 140 | 1.57 | 0.034 | 140 | 1.97 | 0.036 | 150 | 2.36 | 0.041 | 170 | 3.15 | 0.050 | 170 | 4.72 | 0.050 | 170 | 6.29 | 0.050 |
| **328** | **.025** | **.00051** | **394** | **.031** | **.00075** | **394** | **.037** | **.00087** | **427** | **.046** | **.00094** | **427** | **.056** | **.00102** | **459** | **.062** | **.00134** | **459** | **.077** | **.00142** | **492** | **.093** | **.00161** | **558** | **.124** | **.00197** | **558** | **.186** | **.00197** | **558** | **.248** | **.00197** |
| 100 | 0.63 | 0.007 | 140 | 0.79 | 0.008 | 140 | 0.94 | 0.010 | 180 | 1.18 | 0.011 | 180 | 1.42 | 0.012 | 200 | 1.57 | 0.012 | 200 | 1.97 | 0.014 | 220 | 2.36 | 0.018 | 240 | 3.15 | 0.024 | 240 | 4.72 | 0.024 | 240 | 6.29 | 0.024 |
| **328** | **.025** | **.00028** | **459** | **.031** | **.00031** | **459** | **.037** | **.00039** | **591** | **.046** | **.00043** | **591** | **.056** | **.00047** | **656** | **.062** | **.00047** | **656** | **.077** | **.00055** | **722** | **.093** | **.00071** | **787** | **.124** | **.00094** | **787** | **.186** | **.00094** | **787** | **.248** | **.00094** |
| 80 | 0.63 | 0.011 | 100 | 0.79 | 0.012 | 100 | 0.94 | 0.014 | 140 | 1.18 | 0.017 | 140 | 1.42 | 0.022 | 180 | 1.57 | 0.024 | 180 | 1.97 | 0.031 | 200 | 2.36 | 0.036 | 240 | 3.15 | 0.038 | 240 | 4.72 | 0.038 | 240 | 6.29 | 0.038 |
| **262** | **.025** | **.00043** | **328** | **.031** | **.00047** | **328** | **.037** | **.00055** | **459** | **.046** | **.00067** | **459** | **.056** | **.00087** | **591** | **.062** | **.00094** | **591** | **.077** | **.00122** | **656** | **.093** | **.00142** | **787** | **.124** | **.00150** | **787** | **.186** | **.00150** | **787** | **.248** | **.00150** |



# Process CrazyMill Cool Ball - Z2

## ACCURATE AND EFFICIENT MILLING

### Coolant type, pressure and filtration

**Coolant:** for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

**Filter:** the large cooling channels permit the use of a standard filter with filter quality of ≤ .002" (0.05 mm).

**Coolant pressure:** at least 218 psi (15 bar) coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

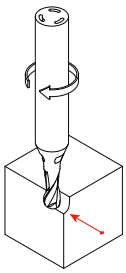
| | | | |
|---|---|---|---|
| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
| **Minimal pressure** | [bar] | 15 | 30 |
| | **[psi]** | **218** | **435** |

### Tool holders

For detailed indications for tool holders see chapter "Technical information".

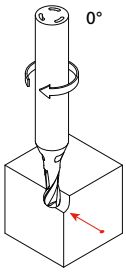
## MILLING PROCESS

### Climb milling and conventional milling



Mikron tool recommends climb milling for the machining of surfaces or edges. The chip thickness here is greater at the beginning and decreases continuously; the cutting forces remain low. With conventional milling, however, high cutting forces would push the milling tool away from the part.Thus surface quality decreases.

### Roughing

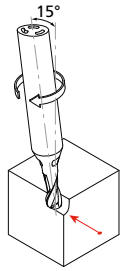



Mikron Tool recommends vertical machining with respect to the workpiece for roughing with CrazyMill Cool Ball (machining angle 0°). This allows the maximum recommended cutting depth $a_p$ to be fully utilized. The result is an extremely high removal rate (Q [cm³/min]).

**Recommended cutting parameters**

$v_c$ and $f_z$ = as specified in the cutting data table
$a_p$ = max. 1 x d
$a_e$ = 0.3 x d

### Finishing




Mikron Tool recommends machining at a machining angle of 15° or 75° with respect to the workpiece surface for finishing with CrazyMill Cool Ball. This shifts the milling contact away from the tool's axis center towards its external diameter, where the ideal cutting geometry takes effect and also the cutting speed increases (the cutting speed is zero at the tool's center).

An angle of 15° of the milling body with respect to the workpiece brings certain advantages:

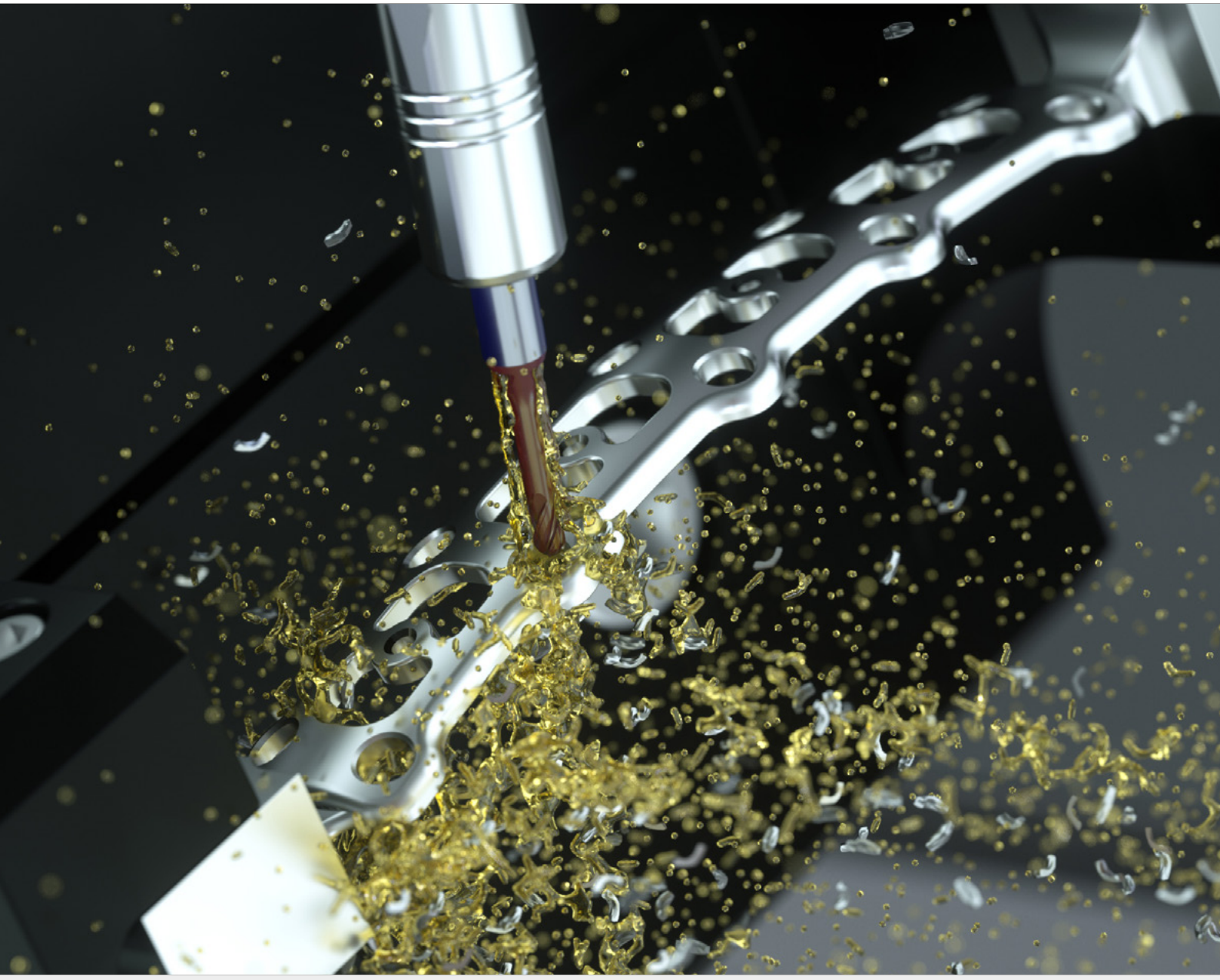
- Shorter cycle time
- Better surface quality
- Longer service life

**Recommended cutting parameters**

$v_c$ and $f_z$ = as specified in the cutting data table
$a_p$ = 0.05 – 0.5 x d
$a_e$ = 0.05 – 0.15 x d depending on the required surface quality
$a_e$ = $f_z$ for maximum surface quality

PATENTED

# CrazyMill Cool Ball - Z4



CRAZYMILL Cool

## HSPC MILLING TOOL FOR DIFFICULT TO MACHINE MATERIALS



CrazyMill Cool Ball end-mill is especially developed with four flutes for finishing operations in stainless steels, titanium, super alloys and CrCo alloys in diameters from .039" to .315" (1 mm to 8 mm) and for a maximum milling depth of 5 x d. Its strengths include high cutting speeds, high removal rate, long tool life and excellent surface quality.

With progressive flutes in the versions M (3.5 x d) and N (4.5 x d) these characteristics are once more significantly increased. The cutting length of these two versions is extended in order to allow machining on the radius as well as the cylindrical section of the tool. The outcome is a very versatile milling cutter.

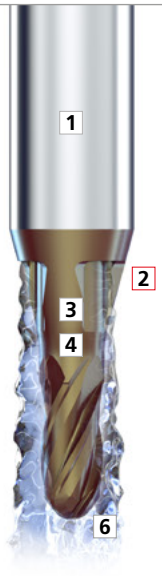
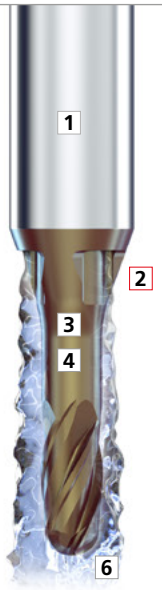
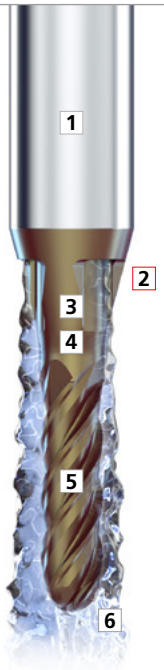
High performance is possible due to the new cutting edge geometry specially designed to reduce vibrations and improve process time and due to the integrated cooling channels that guarantee substantial cooling of the cutting edges.

The new high performance coating, which is specially suitable for finishing operations, improves tool life and milling performance.

**Regrinding:** This product is not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the CrazyMill Cool Ball - Z4 (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYMILL™ by Mikron Tool Cool

| PATENTED | 2 x d | 3 x d | 5 x d | 3.5 x d | 4.5 x d |
|---|---|---|---|---|---|
| | Type A | Type B | Type C | Type M | Type N |
| $l_1$ = Effective length<br>$l_2$ = Cutting length | ■ Coated<br>■ Integ. cooling<br>■ $l_1$: 2xd, $l_2$: 2xd | ■ Coated<br>■ Integ. cooling<br>■ $l_1$: 3xd, $l_2$: 2xd | ■ Coated<br>■ Integ. cooling<br>■ $l_1$: 5xd, $l_2$: 2xd | ■ Coated<br>■ Integ. cooling<br>■ $l_1$: 3.5xd, $l_2$: 3.5xd | ■ Coated<br>■ Integ. cooling<br>■ $l_1$: 4.5xd, $l_2$: 4.5xd |
| |  |  |  |  |  |
| |  |  |  |  |  |
| | page 599 | page 600 | page 601 | page 602 | page 603 |

**1 | SHANK**
The robust solid carbide shank guarantees stable and vibration less milling. High precision and extraordinary surface quality are reached.

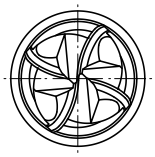
**2 | INTEGRATED COOLING - PATENTED**
The integrated cooling channels guarantee constant and maximal cooling of the cutting edges and optimal chip removal. The results are higher cutting speed and depth $a_p$ as well as an excellent surface quality.

**3 | CARBIDE**
The specially developed micro-grain carbide meets all requirements in terms of mechanical properties.

**4 | COATING**
The high-performance SNP coating is heat-resistant and wear-resistant, prevents build up edges and guarantees optimum chip flushing. The result is long tool life.

**5 | PROGRESSIVE FLUTE**
The new technology with progressive flute allows to machining with a soft cutting and without vibrations. The result is a maximal surface quality.

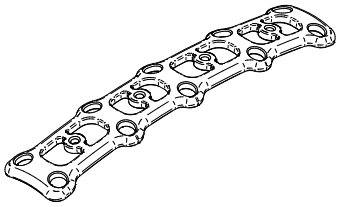
**6 | CUTTING GEOMETRY ON RADIUS**
Developed for difficult-to-machine materials such as stainless steels, titanium and super alloys. Allows finishing with high surface quality due to vibration less machining.

Mill tip  4 - Teeth

# Benefits

## SEMI-FINISHING AND FINISHING CUTTER WITH INTEGRATED COOLING, FROM .039" (1 MM)

- **SHORT MACHINING TIME** | up to 5 times faster
- **LONG TOOL LIFE** | due to efficient cooling
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to through shank coolant
- **HIGH SURFACE QUALITY** | due to anti-vibration geometry
- **LOW PRODUCTION COSTS** | roughing and finishing with one tool



**COMPONENT**
Bone plate

**MATERIAL**
TiAl6V4 / 3.7165 / B348 (Grade 5)

**MACHINING**
- Semi-finishing and finishing
- d = 6 mm | **.236"**

**MILLING TOOL**
Mikron Tool - CrazyMill Cool Ball - Z4 - Type C

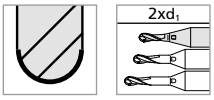
| DATA | MIKRON TOOL |
|---|---|
| Tool type | CrazyMill Cool Ball - Z4<br>- Carbide<br>- Coated<br>- Integrated cooling |
| Item number | 2.CMC30.C5Z4.600.1 |
| Cutting data | Semi-finishing<br>$v_c$ = 170 m/min \| **558 SFM**<br>$f_z$ = 0.036 mm \| **.00142 IPT**<br>$a_{p,\,max}$ = 0.5 x d<br>$a_e$ = 1 mm \| **.039"**<br>Z = 4<br><br>Finishing<br>$v_c$ = 170 m/min \| **558 SFM**<br>$f_z$ = 0.039 mm \| **.00154 IPT**<br>$a_{p,\,max}$ = 0.1 x d<br>$a_e$ = 0.3 mm \| **.012"**<br>Z = 4 |

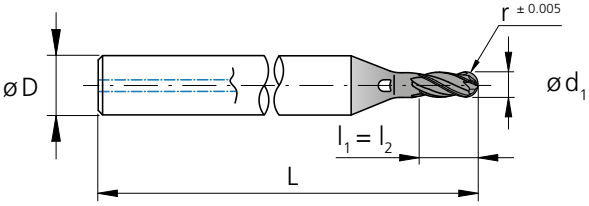
# Type A - 2 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

| | | |
|---|---|---|
| Ø$d_1$ | **.039" - .315"** (1.0 - 8.0 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Ball




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | r [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [teeth] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | 0.50 | **.079** | 2.00 | 2.00 | 4 | **1.57** | 40 | 4 | 2.CMC30.A5Z4.100.1 | ■ |
| | **.047** | 1.2 | 0.60 | **.094** | 2.40 | 2.40 | 4 | **1.57** | 40 | 4 | 2.CMC30.A5Z4.120.1 | ■ |
| | **.059** | 1.5 | 0.75 | **.118** | 3.00 | 3.00 | 4 | **1.57** | 40 | 4 | 2.CMC30.A5Z4.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | 0.794 | **.125** | 3.17 | 3.17 | 4 | **1.57** | 40 | 4 | 2.CMC.BAZ4.F116 | ■ |
| | **.071** | 1.8 | 0.90 | **.142** | 3.60 | 3.60 | 4 | **1.57** | 40 | 4 | 2.CMC30.A5Z4.180.1 | ■ |
| | **.079** | 2.0 | 1.00 | **.157** | 4.00 | 4.00 | 4 | **1.57** | 40 | 4 | 2.CMC30.A5Z4.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | 1.191 | **.187** | 4.76 | 4.76 | 4 | **1.97** | 40 | 4 | 2.CMC.BAZ4.F332 | ■ |
| | **.098** | 2.5 | 1.25 | **.197** | 5.00 | 5.00 | 6 | **1.97** | 50 | 4 | 2.CMC30.A5Z4.250.1 | ■ |
| | **.118** | 3.0 | 1.50 | **.236** | 6.00 | 6.00 | 6 | **1.97** | 50 | 4 | 2.CMC30.A5Z4.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | 1.588 | **.250** | 6.35 | 6.35 | 6 | **1.97** | 50 | 4 | 2.CMC.BAZ4.F18 | ■ |
| **5/32** | **.1562** | 3.968 | 1.984 | **.313** | 7.94 | 7.94 | 6 | **1.97** | 50 | 4 | 2.CMC.BAZ4.F532 | ■ |
| | **.157** | 4.0 | 2.00 | **.315** | 8.00 | 8.00 | 6 | **1.97** | 50 | 4 | 2.CMC30.A5Z4.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | 2.381 | **.375** | 9.52 | 9.52 | 8 | **2.36** | 60 | 4 | 2.CMC.BAZ4.F316 | ■ |
| | **.197** | 5.0 | 2.50 | **.394** | 10.00 | 10.00 | 8 | **2.36** | 60 | 4 | 2.CMC30.A5Z4.500.1 | ■ |
| **7/32** | **.2189** | 5.560 | 2.780 | **.438** | 11.12 | 11.12 | 10 | **2.36** | 60 | 4 | 2.CMC.BAZ4.F732 | ■ |
| | **.236** | 6.0 | 3.00 | **.472** | 12.00 | 12.00 | 10 | **2.36** | 60 | 4 | 2.CMC30.A5Z4.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | 3.175 | **.500** | 12.70 | 12.70 | 10 | **2.36** | 60 | 4 | 2.CMC.BAZ4.F14 | ■ |
| | **.315** | 8.0 | 4.00 | **.630** | 16.00 | 16.00 | 12 | **2.76** | 70 | 4 | 2.CMC30.A5Z4.800.1 | ■ |

■ Stock item

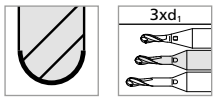
CRAZYMILL by Mikron Tool Cool

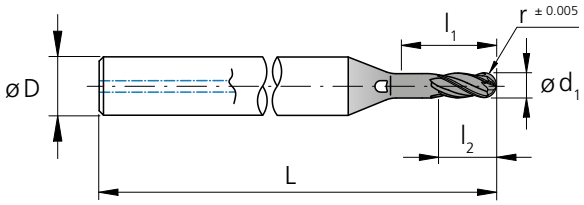
# Type B - 3 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

| | | |
|---|---|---|
| Ø $d_1$ | **.039" - .315"** (1.0 - 8.0 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Ball




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | r [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [teeth] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | 0.50 | **.118** | 3.00 | 2.00 | 4 | **1.57** | 40 | 4 | 2.CMC30.B5Z4.100.1 | ■ |
| | **.047** | 1.2 | 0.60 | **.142** | 3.60 | 2.40 | 4 | **1.57** | 40 | 4 | 2.CMC30.B5Z4.120.1 | ■ |
| | **.059** | 1.5 | 0.75 | **.177** | 4.50 | 3.00 | 4 | **1.57** | 40 | 4 | 2.CMC30.B5Z4.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | 0.794 | **.187** | 4.76 | 3.17 | 4 | **1.57** | 40 | 4 | 2.CMC.BBZ4.F116 | ■ |
| | **.071** | 1.8 | 0.90 | **.213** | 5.40 | 3.60 | 4 | **1.57** | 40 | 4 | 2.CMC30.B5Z4.180.1 | ■ |
| | **.079** | 2.0 | 1.00 | **.236** | 6.00 | 4.00 | 4 | **1.57** | 40 | 4 | 2.CMC30.B5Z4.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | 1.191 | **.281** | 7.14 | 4.76 | 4 | **1.97** | 40 | 4 | 2.CMC.BBZ4.F332 | ■ |
| | **.098** | 2.5 | 1.25 | **.295** | 7.50 | 5.00 | 6 | **1.97** | 50 | 4 | 2.CMC30.B5Z4.250.1 | ■ |
| | **.118** | 3.0 | 1.50 | **.354** | 9.00 | 6.00 | 6 | **1.97** | 50 | 4 | 2.CMC30.B5Z4.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | 1.588 | **.375** | 9.53 | 6.35 | 6 | **2.17** | 55 | 4 | 2.CMC.BBZ4.F18 | ■ |
| **5/32** | **.1562** | 3.968 | 1.984 | **.469** | 11.90 | 7.94 | 6 | **2.17** | 55 | 4 | 2.CMC.BBZ4.F532 | ■ |
| | **.157** | 4.0 | 2.00 | **.472** | 12.00 | 8.00 | 6 | **2.17** | 55 | 4 | 2.CMC30.B5Z4.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | 2.381 | **.563** | 14.29 | 9.52 | 8 | **2.56** | 65 | 4 | 2.CMC.BBZ4.F316 | ■ |
| | **.197** | 5.0 | 2.50 | **.591** | 15.00 | 10.00 | 8 | **2.56** | 65 | 4 | 2.CMC30.B5Z4.500.1 | ■ |
| **7/32** | **.2189** | 5.560 | 2.780 | **.657** | 16.68 | 11.12 | 8 | **2.56** | 65 | 4 | 2.CMC.BBZ4.F732 | ■ |
| | **.236** | 6.0 | 3.00 | **.709** | 18.00 | 12.00 | 10 | **2.56** | 65 | 4 | 2.CMC30.B5Z4.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | 3.175 | **.750** | 19.05 | 12.70 | 10 | **2.56** | 65 | 4 | 2.CMC.BBZ4.F14 | ■ |
| | **.315** | 8.0 | 4.00 | **.945** | 24.00 | 16.00 | 12 | **3.15** | 80 | 4 | 2.CMC30.B5Z4.800.1 | ■ |

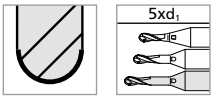
■ Stock item

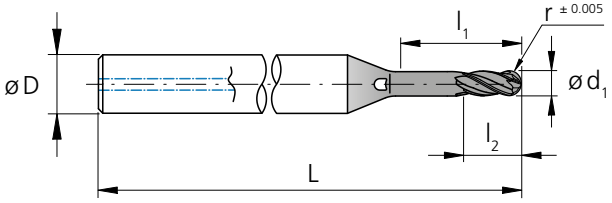
# Type C - 5 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

| Ød$_1$ | .039" - .315" (1.0 - 8.0 mm) | |
|---|---|---|
| Tolerance | + .0004"<br>- .0004" | + 0.01 mm<br>- 0.01 mm |

## Ball




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | r [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [teeth] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .039 | 1.0 | 0.50 | .197 | 5.00 | 2.00 | 4 | 1.57 | 40 | 4 | 2.CMC30.C5Z4.100.1 | ■ |
| | .047 | 1.2 | 0.60 | .236 | 6.00 | 2.40 | 4 | 1.57 | 40 | 4 | 2.CMC30.C5Z4.120.1 | ■ |
| | .059 | 1.5 | 0.75 | .295 | 7.50 | 3.00 | 4 | 1.57 | 40 | 4 | 2.CMC30.C5Z4.150.1 | ■ |
| 1/16 | .0625 | 1.587 | 0.794 | .313 | 7.94 | 3.17 | 4 | 1.77 | 45 | 4 | 2.CMC.BCZ4.F116 | ■ |
| | .071 | 1.8 | 0.90 | .354 | 9.00 | 3.60 | 4 | 1.77 | 45 | 4 | 2.CMC30.C5Z4.180.1 | ■ |
| | .079 | 2.0 | 1.00 | .394 | 10.00 | 4.00 | 4 | 1.73 | 44 | 4 | 2.CMC30.C5Z4.200.1 | ■ |
| 3/32 | .0937 | 2.381 | 1.191 | .469 | 11.91 | 4.76 | 4 | 2.17 | 44 | 4 | 2.CMC.BCZ4.F332 | ■ |
| | .098 | 2.5 | 1.25 | .492 | 12.50 | 5.00 | 6 | 2.17 | 55 | 4 | 2.CMC30.C5Z4.250.1 | ■ |
| | .118 | 3.0 | 1.50 | .591 | 15.00 | 6.00 | 6 | 2.17 | 55 | 4 | 2.CMC30.C5Z4.300.1 | ■ |
| 1/8 | .1250 | 3.175 | 1.588 | .625 | 15.88 | 6.35 | 6 | 2.36 | 60 | 4 | 2.CMC.BCZ4.F18 | ■ |
| 5/32 | .1562 | 3.968 | 1.984 | .781 | 19.84 | 7.94 | 6 | 2.36 | 60 | 4 | 2.CMC.BCZ4.F532 | ■ |
| | .157 | 4.0 | 2.00 | .787 | 20.00 | 8.00 | 6 | 2.36 | 60 | 4 | 2.CMC30.C5Z4.400.1 | ■ |
| 3/16 | .1875 | 4.762 | 2.381 | .937 | 23.81 | 9.52 | 8 | 2.76 | 70 | 4 | 2.CMC.BCZ4.F316 | ■ |
| | .197 | 5.0 | 2.50 | .984 | 25.00 | 10.00 | 8 | 2.76 | 70 | 4 | 2.CMC30.C5Z4.500.1 | ■ |
| 7/32 | .2189 | 5.560 | 2.780 | 1.09 | 27.80 | 11.12 | 10 | 2.76 | 70 | 4 | 2.CMC.BCZ4.F732 | ■ |
| | .236 | 6.0 | 3.00 | 1.18 | 30.00 | 12.00 | 10 | 2.76 | 70 | 4 | 2.CMC30.C5Z4.600.1 | ■ |
| 1/4 | .2500 | 6.350 | 3.175 | 1.25 | 31.75 | 12.70 | 10 | 2.76 | 70 | 4 | 2.CMC.BCZ4.F14 | ■ |
| | .315 | 8.0 | 4.00 | 1.57 | 40.00 | 16.00 | 12 | 3.54 | 90 | 4 | 2.CMC30.C5Z4.800.1 | ■ |

■ Stock item

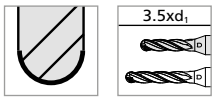
CRAZYMILL by Mikron Tool Cool

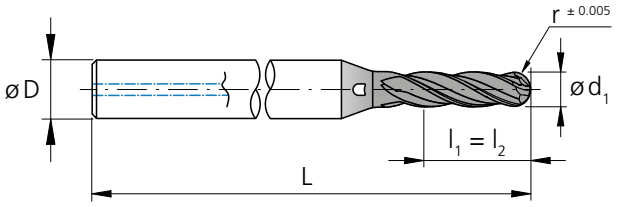
# Type M - 3.5 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

| | | |
|---|---|---|
| Ø $d_1$ | **.039" - .315"** (1.0 - 8.0 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Ball




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | r [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [teeth] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | 0.50 | **.138** | 3.50 | 3.50 | 4 | **1.57** | 40 | 4 | 2.CMC30.M5Z4.100.1 | ■ |
| | **.047** | 1.2 | 0.60 | **.165** | 4.20 | 4.20 | 4 | **1.57** | 40 | 4 | 2.CMC30.M5Z4.120.1 | ■ |
| | **.059** | 1.5 | 0.75 | **.207** | 5.25 | 5.25 | 4 | **1.57** | 40 | 4 | 2.CMC30.M5Z4.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | 0.794 | **.219** | 5.55 | 5.55 | 4 | **1.57** | 40 | 4 | 2.CMC.BMZ4.F116 | ■ |
| | **.071** | 1.8 | 0.90 | **.248** | 6.30 | 6.30 | 4 | **1.57** | 40 | 4 | 2.CMC30.M5Z4.180.1 | ■ |
| | **.079** | 2.0 | 1.00 | **.276** | 7.00 | 7.00 | 4 | **1.57** | 40 | 4 | 2.CMC30.M5Z4.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | 1.191 | **.328** | 8.33 | 8.33 | 4 | **1.97** | 40 | 4 | 2.CMC.BMZ4.F332 | ■ |
| | **.098** | 2.5 | 1.25 | **.344** | 8.75 | 8.75 | 6 | **1.97** | 50 | 4 | 2.CMC30.M5Z4.250.1 | ■ |
| | **.118** | 3.0 | 1.50 | **.413** | 10.50 | 10.50 | 6 | **1.97** | 50 | 4 | 2.CMC30.M5Z4.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | 1.588 | **.437** | 11.11 | 11.11 | 6 | **2.17** | 55 | 4 | 2.CMC.BMZ4.F18 | ■ |
| **5/32** | **.1562** | 3.968 | 1.984 | **.547** | 13.89 | 13.89 | 6 | **2.17** | 55 | 4 | 2.CMC.BMZ4.F532 | ■ |
| | **.157** | 4.0 | 2.00 | **.551** | 14.00 | 14.00 | 6 | **2.17** | 55 | 4 | 2.CMC30.M5Z4.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | 2.381 | **.656** | 16.67 | 16.67 | 8 | **2.56** | 65 | 4 | 2.CMC.BMZ4.F316 | ■ |
| | **.197** | 5.0 | 2.50 | **.689** | 17.50 | 17.50 | 8 | **2.56** | 65 | 4 | 2.CMC30.M5Z4.500.1 | ■ |
| **7/32** | **.2189** | 5.560 | 2.780 | **.766** | 19.46 | 19.46 | 10 | **2.56** | 65 | 4 | 2.CMC.BMZ4.F732 | ■ |
| | **.236** | 6.0 | 3.00 | **.827** | 21.00 | 21.00 | 10 | **2.56** | 65 | 4 | 2.CMC30.M5Z4.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | 3.175 | **.875** | 22.23 | 22.23 | 10 | **2.56** | 65 | 4 | 2.CMC.BMZ4.F14 | ■ |
| | **.315** | 8.0 | 4.00 | **1.10** | 28.00 | 28.00 | 12 | **3.15** | 80 | 4 | 2.CMC30.M5Z4.800.1 | ■ |

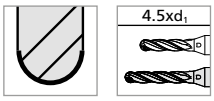
■ Stock item

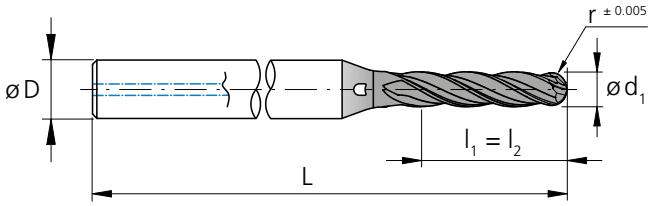
# Type N - 4.5 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

| | | |
|---|---|---|
| Ø$d_1$ | **.039" - .315"** (1.0 - 8.0 mm) | |
| Tolerance | **+ .0004"**<br>**- .0004"** | + 0.01 mm<br>- 0.01 mm |

## Ball




$l_1$ = Effective length
$l_2$ = Cutting length

| $d_1$ [inch] | $d_1$ [inch] | $d_1$ [mm] | r [mm] | $l_1$ [inch] | $l_1$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Z [teeth] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **.039** | 1.0 | 0.50 | **.177** | 4.50 | 4.50 | 4 | **1.57** | 40 | 4 | 2.CMC30.N5Z4.100.1 | ■ |
| | **.047** | 1.2 | 0.60 | **.213** | 5.40 | 5.40 | 4 | **1.57** | 40 | 4 | 2.CMC30.N5Z4.120.1 | ■ |
| | **.059** | 1.5 | 0.75 | **.266** | 6.75 | 6.75 | 4 | **1.57** | 40 | 4 | 2.CMC30.N5Z4.150.1 | ■ |
| **1/16** | **.0625** | 1.587 | 0.794 | **.281** | 7.14 | 7.14 | 4 | **1.77** | 45 | 4 | 2.CMC.BNZ4.F116 | ■ |
| | **.071** | 1.8 | 0.90 | **.319** | 8.10 | 8.10 | 4 | **1.77** | 45 | 4 | 2.CMC30.N5Z4.180.1 | ■ |
| | **.079** | 2.0 | 1.00 | **.354** | 9.00 | 9.00 | 4 | **1.73** | 44 | 4 | 2.CMC30.N5Z4.200.1 | ■ |
| **3/32** | **.0937** | 2.381 | 1.191 | **.422** | 10.71 | 10.71 | 4 | **2.17** | 44 | 4 | 2.CMC.BNZ4.F332 | ■ |
| | **.098** | 2.5 | 1.25 | **.443** | 11.25 | 11.25 | 6 | **2.17** | 55 | 4 | 2.CMC30.N5Z4.250.1 | ■ |
| | **.118** | 3.0 | 1.50 | **.531** | 13.50 | 13.50 | 6 | **2.17** | 55 | 4 | 2.CMC30.N5Z4.300.1 | ■ |
| **1/8** | **.1250** | 3.175 | 1.588 | **.563** | 14.29 | 14.29 | 6 | **2.36** | 60 | 4 | 2.CMC.BNZ4.F18 | ■ |
| **5/32** | **.1562** | 3.968 | 1.984 | **.703** | 17.86 | 17.86 | 6 | **2.36** | 60 | 4 | 2.CMC.BNZ4.F532 | ■ |
| | **.157** | 4.0 | 2.00 | **.709** | 18.00 | 18.00 | 6 | **2.36** | 60 | 4 | 2.CMC30.N5Z4.400.1 | ■ |
| **3/16** | **.1875** | 4.762 | 2.381 | **.844** | 21.43 | 21.43 | 8 | **2.76** | 70 | 4 | 2.CMC.BNZ4.F316 | ■ |
| | **.197** | 5.0 | 2.50 | **.886** | 22.50 | 22.50 | 8 | **2.76** | 70 | 4 | 2.CMC30.N5Z4.500.1 | ■ |
| **7/32** | **.2189** | 5.560 | 2.780 | **.985** | 25.02 | 25.02 | 10 | **2.76** | 70 | 4 | 2.CMC.BNZ4.F732 | ■ |
| | **.236** | 6.0 | 3.00 | **1.06** | 27.00 | 27.00 | 10 | **2.76** | 70 | 4 | 2.CMC30.N5Z4.600.1 | ■ |
| **1/4** | **.2500** | 6.350 | 3.175 | **1.13** | 28.58 | 28.58 | 10 | **2.76** | 70 | 4 | 2.CMC.BNZ4.F14 | ■ |
| | **.315** | 8.0 | 4.00 | **1.42** | 36.00 | 36.00 | 12 | **3.54** | 90 | 4 | 2.CMC30.N5Z4.800.1 | ■ |

■ Stock item

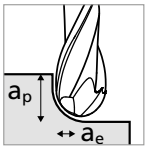
CRAZYMILL by Mikron Tool Cool

# Type A - Semi-finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Possibility 1**

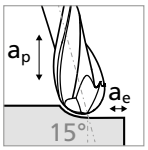
**Inclination 0°**



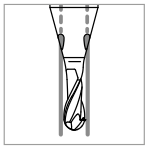

- $a_p = 1 \times d_1$
- $a_e = 0.2 \times d_1$

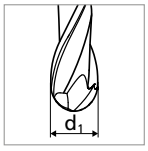
**Possibility 2**

**Inclination 15°**




- $a_p = 0.5 \times d_1$
- $a_e = 0.2 \times d_1$

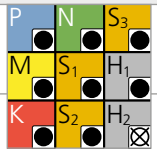





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00054** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.009 **.00037** | 140 **459** | 0.011 **.00044** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.014 **.00054** | 140 **459** | 0.015 **.00060** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.010 **.00040** | 140 **459** | 0.012 **.00047** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.009 **.00037** | 120 **394** | 0.019 **.00074** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.006 **.00023** | 120 **394** | 0.007 **.00027** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.006 **.00023** | 140 **459** | 0.007 **.00027** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.009 **.00033** | 100 **328** | 0.010 **.00040** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



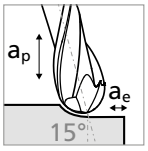

| Ød1 | 1/16" 1.5 mm \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.038<br>**.00151** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.043<br>**.00167** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.037<br>**.00145** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.017<br>**.00067** | 200<br>**656** | 0.019<br>**.00074** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.034<br>**.00132** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00147** |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.037<br>**.00145** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.014<br>**.00054** | 200<br>**656** | 0.015<br>**.00060** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.034<br>**.00132** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00147** |
| | 140<br>**459** | 0.020<br>**.00080** | 140<br>**459** | 0.022<br>**.00087** | 160<br>**525** | 0.024<br>**.00094** | 160<br>**525** | 0.031<br>**.00120** | 180<br>**591** | 0.035<br>**.00139** | 200<br>**656** | 0.044<br>**.00173** | 200<br>**656** | 0.044<br>**.00173** | 200<br>**656** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 130<br>**427** | 0.008<br>**.00030** | 130<br>**427** | 0.009<br>**.00033** | 140<br>**459** | 0.009<br>**.00033** | 140<br>**459** | 0.010<br>**.00040** | 150<br>**492** | 0.012<br>**.00047** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.017<br>**.00067** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.034<br>**.00132** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.037<br>**.00147** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.034<br>**.00132** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.037<br>**.00147** |
| | 180<br>**591** | 0.008<br>**.00030** | 180<br>**591** | 0.009<br>**.00033** | 200<br>**656** | 0.009<br>**.00033** | 200<br>**656** | 0.010<br>**.00040** | 220<br>**722** | 0.012<br>**.00047** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.017<br>**.00067** |
| | 140<br>**459** | 0.012<br>**.00047** | 140<br>**459** | 0.015<br>**.00060** | 180<br>**591** | 0.017<br>**.00067** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.028<br>**.00110** | 240<br>**787** | 0.032<br>**.00126** | 240<br>**787** | 0.032<br>**.00126** | 240<br>**787** | 0.034<br>**.00134** |

CRAZYMILL by Mikron Tool Cool

# Type A - Finishing

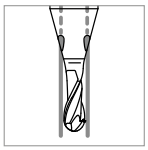
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

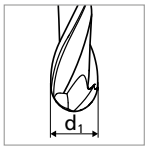
**Inclination 15°**




- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm

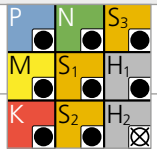





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.014 **.00055** | 140 **459** | 0.016 **.00063** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.011 **.00043** | 140 **459** | 0.013 **.00051** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.016 **.00063** | 140 **459** | 0.018 **.00071** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00055** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.011 **.00043** | 120 **394** | 0.022 **.00087** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.007 **.00028** | 120 **394** | 0.008 **.00031** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.007 **.00028** | 140 **459** | 0.008 **.00031** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.010 **.00039** | 100 **328** | 0.012 **.00047** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 2.5 mm \| .098" | | 3.0 mm \| .118" | | 4.0 mm \| .158" | | 5.0 mm \| .197" | | 6.0–8.0 mm \| .236"–.315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.042<br>**.00166** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.040<br>**.00159** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.020<br>**.00079** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.037<br>**.00146** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.041<br>**.00162** |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.040<br>**.00159** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.016<br>**.00063** | 200<br>**656** | 0.018<br>**.00071** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.037<br>**.00146** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.041<br>**.00162** |
| | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00102** | 160<br>**525** | 0.028<br>**.00110** | 160<br>**525** | 0.036<br>**.00142** | 180<br>**591** | 0.039<br>**.00152** | 200<br>**656** | 0.048<br>**.00191** | 200<br>**656** | 0.048<br>**.00191** | 200<br>**656** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 130<br>**427** | 0.009<br>**.00035** | 130<br>**427** | 0.010<br>**.00039** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.012<br>**.00047** | 150<br>**492** | 0.013<br>**.00052** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.019<br>**.00074** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.037<br>**.00146** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.041<br>**.00162** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.037<br>**.00146** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.041<br>**.00162** |
| | 180<br>**591** | 0.009<br>**.00035** | 180<br>**591** | 0.010<br>**.00039** | 200<br>**656** | 0.010<br>**.00039** | 200<br>**656** | 0.012<br>**.00047** | 220<br>**722** | 0.013<br>**.00052** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.019<br>**.00074** |
| | 140<br>**459** | 0.014<br>**.00055** | 140<br>**459** | 0.018<br>**.00071** | 180<br>**591** | 0.020<br>**.00079** | 180<br>**591** | 0.026<br>**.00102** | 200<br>**656** | 0.031<br>**.00121** | 240<br>**787** | 0.035<br>**.00139** | 240<br>**787** | 0.035<br>**.00139** | 240<br>**787** | 0.037<br>**.00147** |
| | | | | | | | | | | | | | | | | |

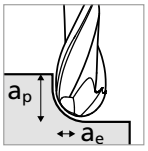
CRAZYMILL by Mikron Tool Cool

# Type B - Semi-finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Possibility 1**

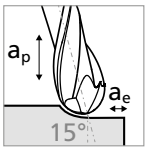
**Inclination 0°**



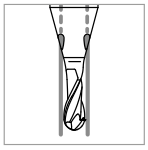

- $a_p = 1 \times d_1$
- $a_e = 0.2 \times d_1$

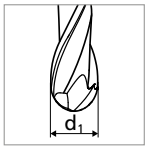
**Possibility 2**

**Inclination 15°**




- $a_p = 0.5 \times d_1$
- $a_e = 0.2 \times d_1$

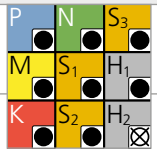





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00054** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.009 **.00037** | 140 **459** | 0.011 **.00044** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.014 **.00054** | 140 **459** | 0.015 **.00060** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.010 **.00040** | 140 **459** | 0.012 **.00047** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.009 **.00037** | 120 **394** | 0.019 **.00074** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.006 **.00023** | 120 **394** | 0.007 **.00027** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.006 **.00023** | 140 **459** | 0.007 **.00027** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.009 **.00033** | 100 **328** | 0.010 **.00040** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





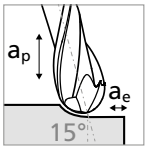

| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.037<br>**.00145** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.043<br>**.00167** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.017<br>**.00067** | 200<br>**656** | 0.019<br>**.00074** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.032<br>**.00126** | 260<br>**853** | 0.034<br>**.00132** | 260<br>**853** | 0.034<br>**.00132** | 260<br>**853** | 0.036<br>**.00141** |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.014<br>**.00054** | 200<br>**656** | 0.015<br>**.00060** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.032<br>**.00126** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00147** |
| | 140<br>**459** | 0.020<br>**.00080** | 140<br>**459** | 0.022<br>**.00087** | 160<br>**525** | 0.024<br>**.00094** | 160<br>**525** | 0.031<br>**.00120** | 180<br>**591** | 0.034<br>**.00135** | 200<br>**656** | 0.040<br>**.00157** | 200<br>**656** | 0.042<br>**.00164** | 200<br>**656** | 0.044<br>**.00174** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 130<br>**427** | 0.008<br>**.00030** | 130<br>**427** | 0.009<br>**.00033** | 140<br>**459** | 0.009<br>**.00033** | 140<br>**459** | 0.010<br>**.00040** | 150<br>**492** | 0.012<br>**.00047** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.017<br>**.00067** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.032<br>**.00126** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.037<br>**.00147** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.032<br>**.00126** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.037<br>**.00147** |
| | 180<br>**591** | 0.008<br>**.00030** | 180<br>**591** | 0.009<br>**.00033** | 200<br>**656** | 0.009<br>**.00033** | 200<br>**656** | 0.010<br>**.00040** | 220<br>**722** | 0.012<br>**.00047** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.017<br>**.00067** |
| | 140<br>**459** | 0.012<br>**.00047** | 140<br>**459** | 0.015<br>**.00060** | 180<br>**591** | 0.017<br>**.00067** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.026<br>**.00104** | 240<br>**787** | 0.032<br>**.00126** | 240<br>**787** | 0.032<br>**.00126** | 240<br>**787** | 0.034<br>**.00134** |

CRAZYMILL by Mikron Tool Cool

# Type B - Finishing

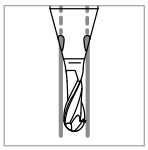
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

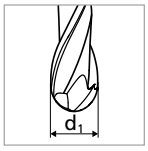
**Inclination 15°**




- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm

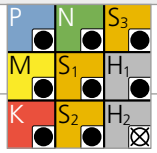





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.014 **.00055** | 140 **459** | 0.016 **.00063** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.011 **.00043** | 140 **459** | 0.013 **.00051** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.016 **.00063** | 140 **459** | 0.018 **.00071** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00055** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.011 **.00043** | 120 **394** | 0.022 **.00087** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.007 **.00028** | 120 **394** | 0.008 **.00031** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.007 **.00028** | 140 **459** | 0.008 **.00031** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.010 **.00039** | 100 **328** | 0.012 **.00047** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.040<br>**.00159** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.020<br>**.00079** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00146** | 260<br>**853** | 0.037<br>**.00146** | 260<br>**853** | 0.039<br>**.00155** |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.016<br>**.00063** | 200<br>**656** | 0.018<br>**.00071** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.041<br>**.00162** |
| | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00102** | 160<br>**525** | 0.028<br>**.00110** | 160<br>**525** | 0.036<br>**.00142** | 180<br>**591** | 0.038<br>**.00149** | 200<br>**656** | 0.044<br>**.00173** | 200<br>**656** | 0.046<br>**.00180** | 200<br>**656** | 0.049<br>**.00191** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 130<br>**427** | 0.009<br>**.00035** | 130<br>**427** | 0.010<br>**.00039** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.012<br>**.00047** | 150<br>**492** | 0.013<br>**.00052** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.019<br>**.00074** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.035<br>**.00139** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.041<br>**.00162** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.035<br>**.00139** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.041<br>**.00162** |
| | 180<br>**591** | 0.009<br>**.00035** | 180<br>**591** | 0.010<br>**.00039** | 200<br>**656** | 0.010<br>**.00039** | 200<br>**656** | 0.012<br>**.00047** | 220<br>**722** | 0.013<br>**.00052** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.019<br>**.00074** |
| | 140<br>**459** | 0.014<br>**.00055** | 140<br>**459** | 0.018<br>**.00071** | 180<br>**591** | 0.020<br>**.00079** | 180<br>**591** | 0.026<br>**.00102** | 200<br>**656** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 240<br>**787** | 0.035<br>**.00139** | 240<br>**787** | 0.037<br>**.00147** |

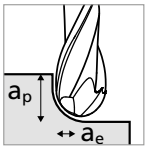
CRAZYMILL by Mikron Tool Cool

# Type C - Semi-finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Possibility 1**

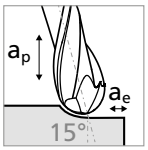
**Inclination 0°**



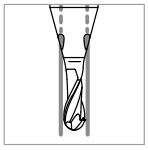

- $a_p = 0.5 \times d_1$
- $a_e = 0.2 \times d_1$

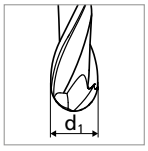
**Possibility 2**

**Inclination 15°**




- $a_p = 0.5 \times d_1$
- $a_e = 0.2 \times d_1$

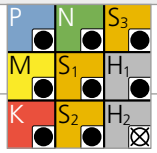





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00054** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.009 **.00037** | 140 **459** | 0.011 **.00044** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.014 **.00054** | 140 **459** | 0.015 **.00060** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.010 **.00040** | 140 **459** | 0.012 **.00047** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.009 **.00037** | 120 **394** | 0.019 **.00074** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.006 **.00023** | 120 **394** | 0.007 **.00027** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.006 **.00023** | 140 **459** | 0.007 **.00027** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.009 **.00033** | 100 **328** | 0.010 **.00040** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




07

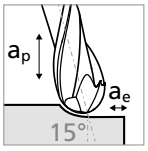
| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.032<br>**.00126** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.043<br>**.00167** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.030<br>**.00120** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.017<br>**.00067** | 200<br>**656** | 0.019<br>**.00074** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.028<br>**.00110** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.034<br>**.00132** | 260<br>**853** | 0.037<br>**.00147** |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.032<br>**.00126** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.029<br>**.00113** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.029<br>**.00113** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.014<br>**.00054** | 200<br>**656** | 0.015<br>**.00060** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.027<br>**.00107** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00147** |
| | 140<br>**459** | 0.020<br>**.00080** | 140<br>**459** | 0.022<br>**.00087** | 160<br>**525** | 0.024<br>**.00094** | 160<br>**525** | 0.031<br>**.00120** | 180<br>**591** | 0.034<br>**.00132** | 200<br>**656** | 0.042<br>**.00164** | 200<br>**656** | 0.042<br>**.00164** | 200<br>**656** | 0.044<br>**.00174** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 130<br>**427** | 0.008<br>**.00030** | 130<br>**427** | 0.009<br>**.00033** | 140<br>**459** | 0.009<br>**.00033** | 140<br>**459** | 0.010<br>**.00040** | 150<br>**492** | 0.012<br>**.00047** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.017<br>**.00067** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.027<br>**.00107** | 170<br>**558** | 0.034<br>**.00132** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.036<br>**.00141** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.027<br>**.00107** | 170<br>**558** | 0.034<br>**.00132** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.036<br>**.00141** |
| | 180<br>**591** | 0.008<br>**.00030** | 180<br>**591** | 0.009<br>**.00033** | 200<br>**656** | 0.009<br>**.00033** | 200<br>**656** | 0.010<br>**.00040** | 220<br>**722** | 0.012<br>**.00047** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.017<br>**.00067** |
| | 140<br>**459** | 0.012<br>**.00047** | 140<br>**459** | 0.015<br>**.00060** | 180<br>**591** | 0.017<br>**.00067** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 240<br>**787** | 0.026<br>**.00101** | 240<br>**787** | 0.032<br>**.00126** | 240<br>**787** | 0.027<br>**.00107** |

CRAZYMILL by Mikron Tool Cool

# Type C - Finishing

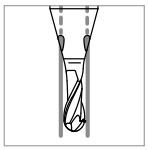
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

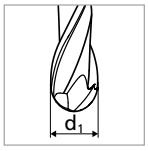
**Inclination 15°**




- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm

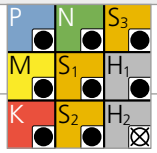





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.014 **.00055** | 140 **459** | 0.016 **.00063** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.011 **.00043** | 140 **459** | 0.013 **.00051** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.016 **.00063** | 140 **459** | 0.018 **.00071** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00055** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.011 **.00043** | 120 **394** | 0.022 **.00087** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.007 **.00028** | 120 **394** | 0.008 **.00031** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.007 **.00028** | 140 **459** | 0.008 **.00031** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.010 **.00039** | 100 **328** | 0.012 **.00047** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.033<br>**.00132** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.020<br>**.00079** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.031<br>**.00121** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.037<br>**.00146** | 260<br>**853** | 0.041<br>**.00162** |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.032<br>**.00125** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.032<br>**.00125** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.016<br>**.00063** | 200<br>**656** | 0.018<br>**.00071** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.030<br>**.00118** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.041<br>**.00162** |
| | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00102** | 160<br>**525** | 0.028<br>**.00110** | 160<br>**525** | 0.036<br>**.00142** | 180<br>**591** | 0.037<br>**.00146** | 200<br>**656** | 0.046<br>**.00180** | 200<br>**656** | 0.046<br>**.00180** | 200<br>**656** | 0.049<br>**.00191** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 130<br>**427** | 0.009<br>**.00035** | 130<br>**427** | 0.010<br>**.00039** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.012<br>**.00047** | 150<br>**492** | 0.013<br>**.00052** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.019<br>**.00074** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.030<br>**.00118** | 170<br>**558** | 0.037<br>**.00146** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00155** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.030<br>**.00118** | 170<br>**558** | 0.037<br>**.00146** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00155** |
| | 180<br>**591** | 0.009<br>**.00035** | 180<br>**591** | 0.010<br>**.00039** | 200<br>**656** | 0.010<br>**.00039** | 200<br>**656** | 0.012<br>**.00047** | 220<br>**722** | 0.013<br>**.00052** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.019<br>**.00074** |
| | 140<br>**459** | 0.014<br>**.00055** | 140<br>**459** | 0.018<br>**.00071** | 180<br>**591** | 0.020<br>**.00079** | 180<br>**591** | 0.026<br>**.00102** | 200<br>**656** | 0.026<br>**.00104** | 240<br>**787** | 0.028<br>**.00111** | 240<br>**787** | 0.035<br>**.00139** | 240<br>**787** | 0.030<br>**.00118** |

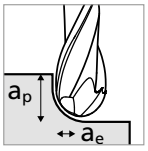
CRAZYMILL by Mikron Tool Cool

# Type M - Semi-finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Possibility 1**

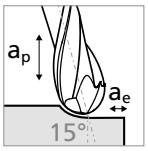
**Inclination 0°**



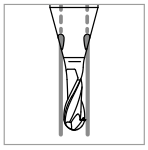

- $a_p = 1 \times d_1$
- $a_e = 0.2 \times d_1$

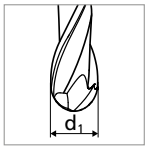
**Possibility 2**

**Inclination 15°**




- $a_p = 0.5 \times d_1$
- $a_e = 0.2 \times d_1$

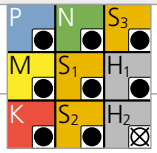





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00054** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.009 **.00037** | 140 **459** | 0.011 **.00044** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.014 **.00054** | 140 **459** | 0.015 **.00060** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.010 **.00040** | 140 **459** | 0.012 **.00047** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.009 **.00037** | 120 **394** | 0.019 **.00074** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.006 **.00023** | 120 **394** | 0.007 **.00027** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.006 **.00023** | 140 **459** | 0.007 **.00027** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.009 **.00033** | 100 **328** | 0.010 **.00040** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





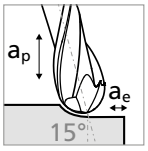

| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.037<br>**.00145** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.043<br>**.00167** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.017<br>**.00067** | 200<br>**656** | 0.019<br>**.00074** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.032<br>**.00126** | 260<br>**853** | 0.034<br>**.00132** | 260<br>**853** | 0.034<br>**.00132** | 260<br>**853** | 0.036<br>**.00141** |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.014<br>**.00054** | 200<br>**656** | 0.015<br>**.00060** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.032<br>**.00126** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00147** |
| | 140<br>**459** | 0.020<br>**.00080** | 140<br>**459** | 0.022<br>**.00087** | 160<br>**525** | 0.024<br>**.00094** | 160<br>**525** | 0.031<br>**.00120** | 180<br>**591** | 0.034<br>**.00135** | 200<br>**656** | 0.040<br>**.00157** | 200<br>**656** | 0.042<br>**.00164** | 200<br>**656** | 0.044<br>**.00174** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.051<br>**.00201** |
| | 130<br>**427** | 0.008<br>**.00030** | 130<br>**427** | 0.009<br>**.00033** | 140<br>**459** | 0.009<br>**.00033** | 140<br>**459** | 0.010<br>**.00040** | 150<br>**492** | 0.012<br>**.00047** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.017<br>**.00067** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.032<br>**.00126** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.037<br>**.00147** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.032<br>**.00126** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.037<br>**.00147** |
| | 180<br>**591** | 0.008<br>**.00030** | 180<br>**591** | 0.009<br>**.00033** | 200<br>**656** | 0.009<br>**.00033** | 200<br>**656** | 0.010<br>**.00040** | 220<br>**722** | 0.012<br>**.00047** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.017<br>**.00067** |
| | 140<br>**459** | 0.012<br>**.00047** | 140<br>**459** | 0.015<br>**.00060** | 180<br>**591** | 0.017<br>**.00067** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.026<br>**.00104** | 240<br>**787** | 0.032<br>**.00126** | 240<br>**787** | 0.032<br>**.00126** | 240<br>**787** | 0.034<br>**.00134** |

CRAZYMILL by Mikron Tool Cool

# Type M - Finishing

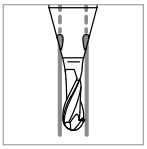
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

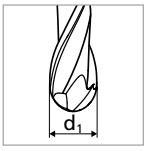
**Inclination 15°**




- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm

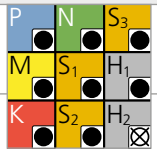





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.014 **.00055** | 140 **459** | 0.016 **.00063** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.011 **.00043** | 140 **459** | 0.013 **.00051** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.016 **.00063** | 140 **459** | 0.018 **.00071** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00055** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.011 **.00043** | 120 **394** | 0.022 **.00087** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.007 **.00028** | 120 **394** | 0.008 **.00031** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.007 **.00028** | 140 **459** | 0.008 **.00031** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.010 **.00039** | 100 **328** | 0.012 **.00047** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





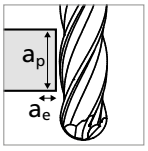

| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.040<br>**.00159** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.020<br>**.00079** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00146** | 260<br>**853** | 0.037<br>**.00146** | 260<br>**853** | 0.039<br>**.00155** |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.039<br>**.00152** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.016<br>**.00063** | 200<br>**656** | 0.018<br>**.00071** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.041<br>**.00162** |
| | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00102** | 160<br>**525** | 0.028<br>**.00110** | 160<br>**525** | 0.036<br>**.00142** | 180<br>**591** | 0.038<br>**.00149** | 200<br>**656** | 0.044<br>**.00173** | 200<br>**656** | 0.046<br>**.00180** | 200<br>**656** | 0.049<br>**.00191** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.056<br>**.00221** |
| | 130<br>**427** | 0.009<br>**.00035** | 130<br>**427** | 0.010<br>**.00039** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.012<br>**.00047** | 150<br>**492** | 0.013<br>**.00052** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.019<br>**.00074** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.035<br>**.00139** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.041<br>**.00162** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.035<br>**.00139** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.041<br>**.00162** |
| | 180<br>**591** | 0.009<br>**.00035** | 180<br>**591** | 0.010<br>**.00039** | 200<br>**656** | 0.010<br>**.00039** | 200<br>**656** | 0.012<br>**.00047** | 220<br>**722** | 0.013<br>**.00052** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.019<br>**.00074** |
| | 140<br>**459** | 0.014<br>**.00055** | 140<br>**459** | 0.018<br>**.00071** | 180<br>**591** | 0.020<br>**.00079** | 180<br>**591** | 0.026<br>**.00102** | 200<br>**656** | 0.029<br>**.00114** | 240<br>**787** | 0.035<br>**.00139** | 240<br>**787** | 0.035<br>**.00139** | 240<br>**787** | 0.037<br>**.00147** |

CRAZYMILL by Mikron Tool Cool

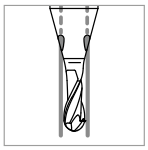
# Type M - Side-finishing

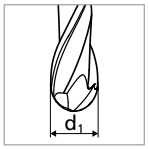
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Inclination 0°**




- $a_p = 3 \times d_1$
- $a_e = 0.02 - 0.1 \times d_1$

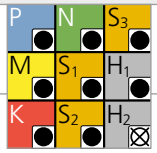





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 130 **425** | 0.008 **.00031** | 130 **425** | 0.009 **.00035** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 130 **425** | 0.007 **.00028** | 130 **425** | 0.008 **.00031** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 130 **425** | 0.006 **.00024** | 130 **425** | 0.007 **.00028** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 130 **425** | 0.008 **.00031** | 130 **425** | 0.009 **.00035** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 130 **425** | 0.008 **.00031** | 130 **425** | 0.009 **.00035** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 130 **425** | 0.008 **.00031** | 130 **425** | 0.009 **.00035** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 130 **425** | 0.006 **.00024** | 130 **425** | 0.007 **.00028** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 111 **365** | 0.006 **.00024** | 111 **365** | 0.011 **.00043** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 130 **425** | 0.009 **.00035** | 130 **425** | 0.010 **.00039** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 130 **425** | 0.009 **.00035** | 130 **425** | 0.010 **.00039** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 130 **425** | 0.010 **.00039** | 130 **425** | 0.011 **.00043** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 130 **425** | 0.010 **.00039** | 130 **425** | 0.011 **.00043** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 130 **425** | 0.010 **.00039** | 130 **425** | 0.011 **.00043** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 130 **425** | 0.009 **.00035** | 130 **425** | 0.010 **.00039** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 111 **365** | 0.004 **.00016** | 111 **365** | 0.004 **.00016** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 111 **365** | 0.008 **.00031** | 111 **365** | 0.009 **.00035** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 111 **365** | 0.008 **.00031** | 111 **365** | 0.009 **.00035** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 130 **425** | 0.004 **.00016** | 130 **425** | 0.004 **.00016** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 93 **304** | 0.005 **.00020** | 93 **304** | 0.006 **.00024** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 180<br>**591** | 0.012<br>**.00047** | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.017<br>**.00067** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** | 220<br>**722** | 0.033<br>**.00130** |
| | 180<br>**591** | 0.011<br>**.00043** | 180<br>**591** | 0.012<br>**.00047** | 200<br>**656** | 0.016<br>**.00063** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**722** | 0.024<br>**.00094** | 220<br>**722** | 0.026<br>**.00102** | 220<br>**722** | 0.029<br>**.00114** |
| | 180<br>**591** | 0.010<br>**.00039** | 180<br>**591** | 0.011<br>**.00043** | 200<br>**656** | 0.015<br>**.00059** | 200<br>**656** | 0.016<br>**.00063** | 210<br>**688** | 0.020<br>**.00079** | 220<br>**722** | 0.021<br>**.00083** | 220<br>**722** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** |
| | 180<br>**591** | 0.012<br>**.00047** | 180<br>**591** | 0.013<br>**.00051** | 200<br>**656** | 0.017<br>**.00067** | 200<br>**656** | 0.018<br>**.00071** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**722** | 0.024<br>**.00094** | 220<br>**722** | 0.026<br>**.00102** | 220<br>**722** | 0.029<br>**.00114** |
| | 180<br>**591** | 0.011<br>**.00043** | 180<br>**591** | 0.012<br>**.00047** | 200<br>**656** | 0.016<br>**.00063** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**722** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** |
| | 180<br>**591** | 0.011<br>**.00043** | 180<br>**591** | 0.012<br>**.00047** | 200<br>**656** | 0.016<br>**.00063** | 200<br>**656** | 0.017<br>**.00067** | 210<br>**688** | 0.022<br>**.00087** | 220<br>**722** | 0.023<br>**.00091** | 220<br>**722** | 0.025<br>**.00098** | 220<br>**722** | 0.028<br>**.00110** |
| | 180<br>**591** | 0.008<br>**.00031** | 180<br>**591** | 0.009<br>**.00035** | 200<br>**656** | 0.015<br>**.00059** | 200<br>**656** | 0.016<br>**.00063** | 210<br>**688** | 0.020<br>**.00079** | 220<br>**722** | 0.022<br>**.00087** | 220<br>**722** | 0.024<br>**.00094** | 220<br>**722** | 0.026<br>**.00102** |
| | 126<br>**414** | 0.012<br>**.00047** | 126<br>**414** | 0.013<br>**.00051** | 145<br>**477** | 0.014<br>**.00055** | 145<br>**477** | 0.018<br>**.00071** | 157<br>**516** | 0.022<br>**.00087** | 169<br>**556** | 0.025<br>**.00098** | 169<br>**556** | 0.029<br>**.00114** | 169<br>**556** | 0.031<br>**.00122** |
| | 180<br>**591** | 0.013<br>**.00051** | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.018<br>**.00071** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** |
| | 180<br>**591** | 0.013<br>**.00051** | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.018<br>**.00071** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** |
| | 180<br>**591** | 0.013<br>**.00051** | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.018<br>**.00071** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** |
| | 180<br>**591** | 0.013<br>**.00051** | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.018<br>**.00071** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** |
| | 180<br>**591** | 0.013<br>**.00051** | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.018<br>**.00071** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** |
| | 180<br>**591** | 0.013<br>**.00051** | 180<br>**591** | 0.014<br>**.00055** | 200<br>**656** | 0.018<br>**.00071** | 200<br>**656** | 0.020<br>**.00079** | 210<br>**688** | 0.029<br>**.00114** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.033<br>**.00130** | 220<br>**722** | 0.036<br>**.00142** |
| | 117<br>**384** | 0.005<br>**.00020** | 117<br>**384** | 0.005<br>**.00020** | 127<br>**418** | 0.005<br>**.00020** | 127<br>**418** | 0.006<br>**.00024** | 131<br>**430** | 0.008<br>**.00031** | 144<br>**473** | 0.010<br>**.00039** | 144<br>**473** | 0.011<br>**.00043** | 144<br>**473** | 0.012<br>**.00047** |
| | 117<br>**384** | 0.010<br>**.00039** | 117<br>**384** | 0.011<br>**.00043** | 127<br>**418** | 0.014<br>**.00055** | 127<br>**418** | 0.015<br>**.00059** | 131<br>**430** | 0.020<br>**.00079** | 144<br>**473** | 0.022<br>**.00087** | 144<br>**473** | 0.024<br>**.00094** | 144<br>**473** | 0.026<br>**.00102** |
| | 117<br>**384** | 0.010<br>**.00039** | 117<br>**384** | 0.011<br>**.00043** | 127<br>**418** | 0.014<br>**.00055** | 127<br>**418** | 0.015<br>**.00059** | 131<br>**430** | 0.020<br>**.00079** | 144<br>**473** | 0.022<br>**.00087** | 144<br>**473** | 0.024<br>**.00094** | 144<br>**473** | 0.026<br>**.00102** |
| | 162<br>**532** | 0.005<br>**.00020** | 162<br>**532** | 0.005<br>**.00020** | 182<br>**597** | 0.005<br>**.00020** | 182<br>**597** | 0.006<br>**.00024** | 192<br>**630** | 0.008<br>**.00031** | 203<br>**667** | 0.010<br>**.00039** | 203<br>**667** | 0.011<br>**.00043** | 203<br>**667** | 0.012<br>**.00047** |
| | 126<br>**414** | 0.007<br>**.00028** | 126<br>**414** | 0.009<br>**.00035** | 164<br>**537** | 0.010<br>**.00039** | 164<br>**537** | 0.013<br>**.00051** | 175<br>**573** | 0.017<br>**.00067** | 203<br>**667** | 0.020<br>**.00079** | 203<br>**667** | 0.022<br>**.00087** | 203<br>**667** | 0.024<br>**.00094** |

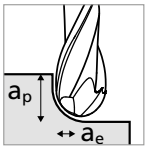
CRAZYMILL by Mikron Tool Cool

# Type N - Semi-finishing

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Possibility 1**

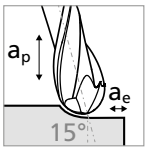
**Inclination 0°**



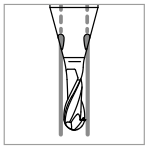

- $a_p = 0.5 \times d_1$
- $a_e = 0.2 \times d_1$

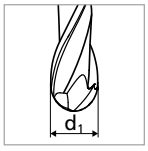
**Possibility 2**

**Inclination 15°**




- $a_p = 0.5 \times d_1$
- $a_e = 0.2 \times d_1$

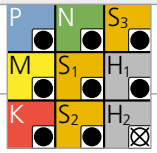





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00054** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.009 **.00037** | 140 **459** | 0.011 **.00044** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.014 **.00054** | 140 **459** | 0.015 **.00060** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.013 **.00050** | 140 **459** | 0.014 **.00057** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.010 **.00040** | 140 **459** | 0.012 **.00047** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.009 **.00037** | 120 **394** | 0.019 **.00074** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.017 **.00067** | 140 **459** | 0.019 **.00074** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.015 **.00060** | 140 **459** | 0.017 **.00067** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.006 **.00023** | 120 **394** | 0.007 **.00027** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.014 **.00054** | 120 **394** | 0.015 **.00060** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.006 **.00023** | 140 **459** | 0.007 **.00027** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.009 **.00033** | 100 **328** | 0.010 **.00040** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





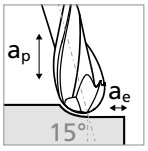

| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.032<br>**.00126** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.040<br>**.00157** | 260<br>**853** | 0.043<br>**.00167** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.030<br>**.00120** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.017<br>**.00067** | 200<br>**656** | 0.019<br>**.00074** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.028<br>**.00110** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.034<br>**.00132** | 260<br>**853** | 0.037<br>**.00147** |
| | 200<br>**656** | 0.020<br>**.00080** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.029<br>**.00114** | 220<br>**722** | 0.031<br>**.00120** | 240<br>**787** | 0.032<br>**.00126** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.038<br>**.00151** | 260<br>**853** | 0.041<br>**.00161** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.029<br>**.00113** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.019<br>**.00074** | 200<br>**656** | 0.020<br>**.00080** | 220<br>**722** | 0.027<br>**.00107** | 220<br>**722** | 0.029<br>**.00114** | 240<br>**787** | 0.029<br>**.00113** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.037<br>**.00145** | 260<br>**853** | 0.039<br>**.00154** |
| | 200<br>**656** | 0.014<br>**.00054** | 200<br>**656** | 0.015<br>**.00060** | 220<br>**722** | 0.026<br>**.00100** | 220<br>**722** | 0.027<br>**.00107** | 240<br>**787** | 0.027<br>**.00107** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.035<br>**.00139** | 260<br>**853** | 0.037<br>**.00147** |
| | 140<br>**459** | 0.020<br>**.00080** | 140<br>**459** | 0.022<br>**.00087** | 160<br>**525** | 0.024<br>**.00094** | 160<br>**525** | 0.031<br>**.00120** | 180<br>**591** | 0.034<br>**.00132** | 200<br>**656** | 0.042<br>**.00164** | 200<br>**656** | 0.042<br>**.00164** | 200<br>**656** | 0.044<br>**.00174** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.031<br>**.00120** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.046<br>**.00183** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.048<br>**.00189** | 260<br>**853** | 0.047<br>**.00184** |
| | 130<br>**427** | 0.008<br>**.00030** | 130<br>**427** | 0.009<br>**.00033** | 140<br>**459** | 0.009<br>**.00033** | 140<br>**459** | 0.010<br>**.00040** | 150<br>**492** | 0.012<br>**.00047** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.016<br>**.00063** | 170<br>**558** | 0.017<br>**.00067** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.027<br>**.00107** | 170<br>**558** | 0.034<br>**.00132** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.036<br>**.00141** |
| | 130<br>**427** | 0.017<br>**.00067** | 130<br>**427** | 0.019<br>**.00074** | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00100** | 150<br>**492** | 0.027<br>**.00107** | 170<br>**558** | 0.034<br>**.00132** | 170<br>**558** | 0.035<br>**.00139** | 170<br>**558** | 0.036<br>**.00141** |
| | 180<br>**591** | 0.008<br>**.00030** | 180<br>**591** | 0.009<br>**.00033** | 200<br>**656** | 0.009<br>**.00033** | 200<br>**656** | 0.010<br>**.00040** | 220<br>**722** | 0.012<br>**.00047** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.016<br>**.00063** | 240<br>**787** | 0.017<br>**.00067** |
| | 140<br>**459** | 0.012<br>**.00047** | 140<br>**459** | 0.015<br>**.00060** | 180<br>**591** | 0.017<br>**.00067** | 180<br>**591** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 240<br>**787** | 0.026<br>**.00101** | 240<br>**787** | 0.032<br>**.00126** | 240<br>**787** | 0.027<br>**.00107** |

CRAZYMILL by Mikron Tool Cool

# Type N - Finishing

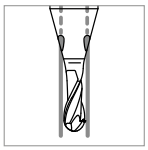
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

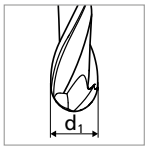
**Inclination 15°**




- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm

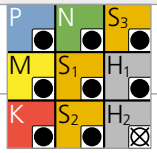





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 140 **459** | 0.014 **.00055** | 140 **459** | 0.016 **.00063** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 140 **459** | 0.011 **.00043** | 140 **459** | 0.013 **.00051** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 **459** | 0.016 **.00063** | 140 **459** | 0.018 **.00071** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 140 **459** | 0.015 **.00059** | 140 **459** | 0.017 **.00067** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 140 **459** | 0.012 **.00047** | 140 **459** | 0.014 **.00055** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 120 **394** | 0.011 **.00043** | 120 **394** | 0.022 **.00087** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 140 **459** | 0.020 **.00079** | 140 **459** | 0.022 **.00087** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 140 **459** | 0.018 **.00071** | 140 **459** | 0.020 **.00079** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 120 **394** | 0.007 **.00028** | 120 **394** | 0.008 **.00031** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 **394** | 0.016 **.00063** | 120 **394** | 0.018 **.00071** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 140 **459** | 0.007 **.00028** | 140 **459** | 0.008 **.00031** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 100 **328** | 0.010 **.00039** | 100 **328** | 0.012 **.00047** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended





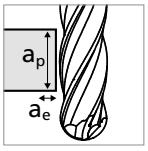

| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.044<br>**.00173** | 260<br>**853** | 0.047<br>**.00184** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.033<br>**.00132** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.020<br>**.00079** | 200<br>**656** | 0.022<br>**.00087** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.031<br>**.00121** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.037<br>**.00146** | 260<br>**853** | 0.041<br>**.00162** |
| | 200<br>**656** | 0.024<br>**.00094** | 200<br>**656** | 0.026<br>**.00102** | 220<br>**722** | 0.034<br>**.00134** | 220<br>**722** | 0.036<br>**.00142** | 240<br>**787** | 0.035<br>**.00139** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.042<br>**.00166** | 260<br>**853** | 0.045<br>**.00177** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.032<br>**.00125** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.022<br>**.00087** | 200<br>**656** | 0.024<br>**.00094** | 220<br>**722** | 0.032<br>**.00126** | 220<br>**722** | 0.034<br>**.00134** | 240<br>**787** | 0.032<br>**.00125** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.040<br>**.00159** | 260<br>**853** | 0.043<br>**.00169** |
| | 200<br>**656** | 0.016<br>**.00063** | 200<br>**656** | 0.018<br>**.00071** | 220<br>**722** | 0.030<br>**.00118** | 220<br>**722** | 0.032<br>**.00126** | 240<br>**787** | 0.030<br>**.00118** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.039<br>**.00152** | 260<br>**853** | 0.041<br>**.00162** |
| | 140<br>**459** | 0.024<br>**.00094** | 140<br>**459** | 0.026<br>**.00102** | 160<br>**525** | 0.028<br>**.00110** | 160<br>**525** | 0.036<br>**.00142** | 180<br>**591** | 0.037<br>**.00146** | 200<br>**656** | 0.046<br>**.00180** | 200<br>**656** | 0.046<br>**.00180** | 200<br>**656** | 0.049<br>**.00191** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 200<br>**656** | 0.026<br>**.00102** | 200<br>**656** | 0.028<br>**.00110** | 220<br>**722** | 0.036<br>**.00142** | 220<br>**722** | 0.040<br>**.00157** | 240<br>**787** | 0.051<br>**.00201** | 260<br>**853** | 0.048<br>**.00191** | 260<br>**853** | 0.053<br>**.00208** | 260<br>**853** | 0.051<br>**.00202** |
| | 130<br>**427** | 0.009<br>**.00035** | 130<br>**427** | 0.010<br>**.00039** | 140<br>**459** | 0.010<br>**.00039** | 140<br>**459** | 0.012<br>**.00047** | 150<br>**492** | 0.013<br>**.00052** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.018<br>**.00069** | 170<br>**558** | 0.019<br>**.00074** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.030<br>**.00118** | 170<br>**558** | 0.037<br>**.00146** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00155** |
| | 130<br>**427** | 0.020<br>**.00079** | 130<br>**427** | 0.022<br>**.00087** | 140<br>**459** | 0.028<br>**.00110** | 140<br>**459** | 0.030<br>**.00118** | 150<br>**492** | 0.030<br>**.00118** | 170<br>**558** | 0.037<br>**.00146** | 170<br>**558** | 0.039<br>**.00152** | 170<br>**558** | 0.039<br>**.00155** |
| | 180<br>**591** | 0.009<br>**.00035** | 180<br>**591** | 0.010<br>**.00039** | 200<br>**656** | 0.010<br>**.00039** | 200<br>**656** | 0.012<br>**.00047** | 220<br>**722** | 0.013<br>**.00052** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.018<br>**.00069** | 240<br>**787** | 0.019<br>**.00074** |
| | 140<br>**459** | 0.014<br>**.00055** | 140<br>**459** | 0.018<br>**.00071** | 180<br>**591** | 0.020<br>**.00079** | 180<br>**591** | 0.026<br>**.00102** | 200<br>**656** | 0.026<br>**.00104** | 240<br>**787** | 0.028<br>**.00111** | 240<br>**787** | 0.035<br>**.00139** | 240<br>**787** | 0.030<br>**.00118** |

CRAZYMILL by Mikron Tool Cool

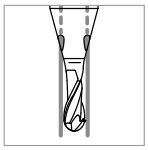
# Type N - Side-finishing

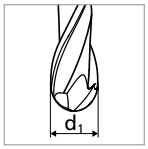
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

**Inclination 0°**




- $a_p = 4 \times d_1$
- $a_e = 0.02 - 0.1 \times d_1$

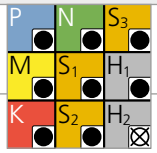





| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm \| .039" $v_c$ | 1.0 mm \| .039" $f_z$ | 1.2 mm \| .047" $v_c$ | 1.2 mm \| .047" $f_z$ |
|---|---|---|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 130 **425** | 0.008 **.00031** | 130 **425** | 0.009 **.00035** |
| | | 1.0401 | C15 | AISI 1015 | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 130 **425** | 0.007 **.00028** | 130 **425** | 0.008 **.00031** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | | | | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 130 **425** | 0.006 **.00024** | 130 **425** | 0.007 **.00028** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | | | | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 130 **425** | 0.008 **.00031** | 130 **425** | 0.009 **.00035** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 130 **425** | 0.008 **.00031** | 130 **425** | 0.009 **.00035** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | | | | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | 130 **425** | 0.008 **.00031** | 130 **425** | 0.009 **.00035** |
| | | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | AISI 304 | 130 **425** | 0.006 **.00024** | 130 **425** | 0.007 **.00028** |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 111 **365** | 0.006 **.00024** | 111 **365** | 0.011 **.00043** |
| | | 0.6030 | GG30 | ASTM 40B | | | | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | | | | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | | | | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 130 **425** | 0.009 **.00035** | 130 **425** | 0.010 **.00039** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | | | | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 130 **425** | 0.009 **.00035** | 130 **425** | 0.010 **.00039** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | | | | |
| | Copper | 2.0040 | Cu-OF / CW008A | UNS C10100 | 130 **425** | 0.010 **.00039** | 130 **425** | 0.011 **.00043** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | | | | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 130 **425** | 0.010 **.00039** | 130 **425** | 0.011 **.00043** |
| | | 2.0360 | CuZn40 CW509L | UNS C28000 | | | | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 130 **425** | 0.010 **.00039** | 130 **425** | 0.011 **.00043** |
| | | 2.1020 | CuSn6 | UNS C51900 | | | | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 130 **425** | 0.009 **.00035** | 130 **425** | 0.010 **.00039** |
| | | 2.0960 | CuAl9Mn2 | UNS C63200 | | | | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 111 **365** | 0.004 **.00016** | 111 **365** | 0.004 **.00016** |
| | | 2.4668 | | Inconel 718 | | | | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | | | | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | | | | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 111 **365** | 0.008 **.00031** | 111 **365** | 0.009 **.00035** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | | | | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 111 **365** | 0.008 **.00031** | 111 **365** | 0.009 **.00035** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 130 **425** | 0.004 **.00016** | 130 **425** | 0.004 **.00016** |
| | | | CrCoMo28 | ASTM F1537 | | | | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 93 **304** | 0.005 **.00020** | 93 **304** | 0.006 **.00024** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | | | | |

$v_c$ [m/min] | **[SFM]**
$f_z$ [mm] | **[IPT]**

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended






| Ød1 | 1/16" 1.5 \| .059" | | 1.8 mm \| .071" | | 2.0 mm \| .079" | | 3/32" 2.5 mm \| .098" | | 1/8" 3.0 mm \| .118" | | 5/32" 4.0 mm \| .158" | | 3/16" 5.0 mm \| .197" | | 7/32 – 1/4" 6.0 – 8.0 mm \| .236" – .315" | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ | $v_c$ | $f_z$ |
| | 185<br>**608** | 0.012<br>**.00047** | 185<br>**608** | 0.013<br>**.00051** | 204<br>**668** | 0.017<br>**.00067** | 204<br>**668** | 0.018<br>**.00071** | 222<br>**729** | 0.020<br>**.00079** | 241<br>**790** | 0.025<br>**.00098** | 241<br>**790** | 0.028<br>**.00110** | 241<br>**790** | 0.033<br>**.00130** |
| | 185<br>**608** | 0.011<br>**.00043** | 185<br>**608** | 0.012<br>**.00047** | 204<br>**668** | 0.016<br>**.00063** | 204<br>**668** | 0.017<br>**.00067** | 222<br>**729** | 0.019<br>**.00075** | 241<br>**790** | 0.024<br>**.00094** | 241<br>**790** | 0.026<br>**.00102** | 241<br>**790** | 0.031<br>**.00122** |
| | 185<br>**608** | 0.010<br>**.00039** | 185<br>**608** | 0.011<br>**.00043** | 204<br>**668** | 0.015<br>**.00059** | 204<br>**668** | 0.016<br>**.00063** | 222<br>**729** | 0.018<br>**.00071** | 241<br>**790** | 0.022<br>**.00087** | 241<br>**790** | 0.024<br>**.00094** | 241<br>**790** | 0.029<br>**.00114** |
| | 185<br>**608** | 0.012<br>**.00047** | 185<br>**608** | 0.013<br>**.00051** | 204<br>**668** | 0.017<br>**.00067** | 204<br>**668** | 0.018<br>**.00071** | 222<br>**729** | 0.020<br>**.00079** | 241<br>**790** | 0.024<br>**.00094** | 241<br>**790** | 0.026<br>**.00102** | 241<br>**790** | 0.031<br>**.00122** |
| | 185<br>**608** | 0.011<br>**.00043** | 185<br>**608** | 0.012<br>**.00047** | 204<br>**668** | 0.016<br>**.00063** | 204<br>**668** | 0.017<br>**.00067** | 222<br>**729** | 0.018<br>**.00071** | 241<br>**790** | 0.023<br>**.00091** | 241<br>**790** | 0.025<br>**.00098** | 241<br>**790** | 0.030<br>**.00118** |
| | 185<br>**608** | 0.011<br>**.00043** | 185<br>**608** | 0.012<br>**.00047** | 204<br>**668** | 0.016<br>**.00063** | 204<br>**668** | 0.017<br>**.00067** | 222<br>**729** | 0.018<br>**.00071** | 241<br>**790** | 0.023<br>**.00091** | 241<br>**790** | 0.025<br>**.00098** | 241<br>**790** | 0.030<br>**.00118** |
| | 185<br>**608** | 0.008<br>**.00031** | 185<br>**608** | 0.009<br>**.00035** | 204<br>**668** | 0.015<br>**.00059** | 204<br>**668** | 0.016<br>**.00063** | 222<br>**729** | 0.017<br>**.00067** | 241<br>**790** | 0.022<br>**.00087** | 241<br>**790** | 0.024<br>**.00094** | 241<br>**790** | 0.029<br>**.00114** |
| | 130<br>**425** | 0.012<br>**.00047** | 130<br>**425** | 0.013<br>**.00051** | 148<br>**486** | 0.014<br>**.00055** | 148<br>**486** | 0.018<br>**.00071** | 167<br>**547** | 0.021<br>**.00083** | 185<br>**608** | 0.026<br>**.00102** | 185<br>**608** | 0.029<br>**.00114** | 185<br>**608** | 0.034<br>**.00134** |
| | 185<br>**608** | 0.013<br>**.00051** | 185<br>**608** | 0.014<br>**.00055** | 204<br>**668** | 0.018<br>**.00071** | 204<br>**668** | 0.020<br>**.00079** | 222<br>**729** | 0.029<br>**.00114** | 241<br>**790** | 0.028<br>**.00110** | 241<br>**790** | 0.030<br>**.00118** | 241<br>**790** | 0.036<br>**.00142** |
| | 185<br>**608** | 0.013<br>**.00051** | 185<br>**608** | 0.014<br>**.00055** | 204<br>**668** | 0.018<br>**.00071** | 204<br>**668** | 0.020<br>**.00079** | 222<br>**729** | 0.029<br>**.00114** | 241<br>**790** | 0.028<br>**.00110** | 241<br>**790** | 0.030<br>**.00118** | 241<br>**790** | 0.036<br>**.00142** |
| | 185<br>**608** | 0.013<br>**.00051** | 185<br>**608** | 0.014<br>**.00055** | 204<br>**668** | 0.018<br>**.00071** | 204<br>**668** | 0.020<br>**.00079** | 222<br>**729** | 0.029<br>**.00114** | 241<br>**790** | 0.028<br>**.00110** | 241<br>**790** | 0.030<br>**.00118** | 241<br>**790** | 0.036<br>**.00142** |
| | 185<br>**608** | 0.013<br>**.00051** | 185<br>**608** | 0.014<br>**.00055** | 204<br>**668** | 0.018<br>**.00071** | 204<br>**668** | 0.020<br>**.00079** | 222<br>**729** | 0.029<br>**.00114** | 241<br>**790** | 0.028<br>**.00110** | 241<br>**790** | 0.030<br>**.00118** | 241<br>**790** | 0.036<br>**.00142** |
| | 185<br>**608** | 0.013<br>**.00051** | 185<br>**608** | 0.014<br>**.00055** | 204<br>**668** | 0.018<br>**.00071** | 204<br>**668** | 0.020<br>**.00079** | 222<br>**729** | 0.029<br>**.00114** | 241<br>**790** | 0.028<br>**.00110** | 241<br>**790** | 0.030<br>**.00118** | 241<br>**790** | 0.036<br>**.00142** |
| | 185<br>**608** | 0.013<br>**.00051** | 185<br>**608** | 0.014<br>**.00055** | 204<br>**668** | 0.018<br>**.00071** | 204<br>**668** | 0.020<br>**.00079** | 222<br>**729** | 0.029<br>**.00114** | 241<br>**790** | 0.028<br>**.00110** | 241<br>**790** | 0.030<br>**.00118** | 241<br>**790** | 0.036<br>**.00142** |
| | 120<br>**395** | 0.005<br>**.00020** | 120<br>**395** | 0.005<br>**.00020** | 130<br>**425** | 0.005<br>**.00020** | 130<br>**425** | 0.006<br>**.00024** | 139<br>**456** | 0.008<br>**.00031** | 157<br>**516** | 0.010<br>**.00039** | 157<br>**516** | 0.011<br>**.00043** | 157<br>**516** | 0.013<br>**.00051** |
| | 120<br>**395** | 0.010<br>**.00039** | 120<br>**395** | 0.011<br>**.00043** | 130<br>**425** | 0.014<br>**.00055** | 130<br>**425** | 0.015<br>**.00059** | 139<br>**456** | 0.017<br>**.00067** | 157<br>**516** | 0.021<br>**.00083** | 157<br>**516** | 0.023<br>**.00091** | 157<br>**516** | 0.027<br>**.00106** |
| | 120<br>**395** | 0.010<br>**.00039** | 120<br>**395** | 0.011<br>**.00043** | 130<br>**425** | 0.014<br>**.00055** | 130<br>**425** | 0.015<br>**.00059** | 139<br>**456** | 0.017<br>**.00067** | 157<br>**516** | 0.021<br>**.00083** | 157<br>**516** | 0.023<br>**.00091** | 157<br>**516** | 0.027<br>**.00106** |
| | 167<br>**547** | 0.005<br>**.00020** | 167<br>**547** | 0.005<br>**.00020** | 185<br>**608** | 0.005<br>**.00020** | 185<br>**608** | 0.006<br>**.00024** | 204<br>**668** | 0.008<br>**.00031** | 222<br>**729** | 0.010<br>**.00039** | 222<br>**729** | 0.011<br>**.00043** | 222<br>**729** | 0.013<br>**.00051** |
| | 130<br>**425** | 0.007<br>**.00028** | 130<br>**425** | 0.009<br>**.00035** | 167<br>**547** | 0.010<br>**.00039** | 167<br>**547** | 0.013<br>**.00051** | 185<br>**608** | 0.015<br>**.00059** | 222<br>**729** | 0.016<br>**.00063** | 222<br>**729** | 0.018<br>**.00071** | 222<br>**729** | 0.021<br>**.00083** |

# Process CrazyMill Cool Ball - Z4

## ACCURATE AND EFFICIENT MILLING

### Coolant type, pressure and filtration

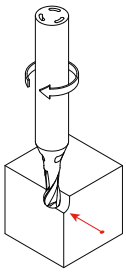
**Coolant:** for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

**Filter:** the large cooling channels permit the use of a standard filter with filter quality of ≤ .002" (0.05 mm).

**Coolant pressure:** at least 218 psi (15 bar) coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

| | | | |
|---|---|---|---|
| **Revolution** | [rpm] | ≤ 10'000 | > 10'000 |
| **Minimal pressure** | [bar] | 15 | 30 |
| | **[psi]** | **218** | **435** |

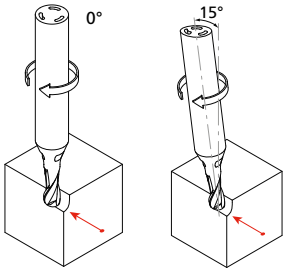
### Climb milling and conventional milling



Mikron tool recommends climb milling for the machining of surfaces or edges. The chip thickness here is greater at the beginning and decreases continuously; the cutting forces remain low. With conventional milling, however, high cutting forces would push the milling tool away from the part.Thus surface quality decreases.

## MILLING PROCESS

### Semi-finishing

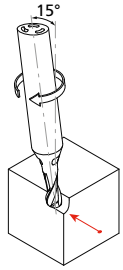



Mikron Tool recommends vertical machining with respect to the workpiece for semi-finishing with CrazyMill Cool Ball (machining angle 0°) or a machining angle of 15° or 75° with respect to the workpiece surface.

**Recommended cutting parameters**

$v_c$ and $f_z$ = as specified in the cutting data table
End mill Type A, B and M: $a_p$ = max. 1 x d, $a_e$ = 0.2 x d
End mill Type C and N: $a_p$ = max. 0.5 x d, $a_e$ = 0.2 x d

### Finishing




Mikron Tool recommends machining at a machining angle of 15° or 75° with respect to the workpiece surface for finishing with CrazyMill Cool Ball. This shifts the milling contact away from the tool's axis center towards its external diameter, where the ideal cutting geometry takes effect and also the cutting speed increases (the cutting speed is zero at the tool's center).

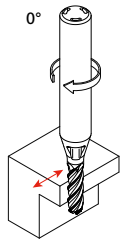
An angle of 15° of the milling body with respect to the workpiece brings certain advantages:

- Shorter cycle time
- Better surface quality
- Longer tool life

**Recommended cutting parameters**

$v_c$ and $f_z$ = as specified in the cutting data table
$a_p$ = 0.1 x d
$a_e$ = 0.05 – 0.1 x d depending on the required surface quality
$a_e$ = $f_z$ for maximum surface quality

### Side-finishing

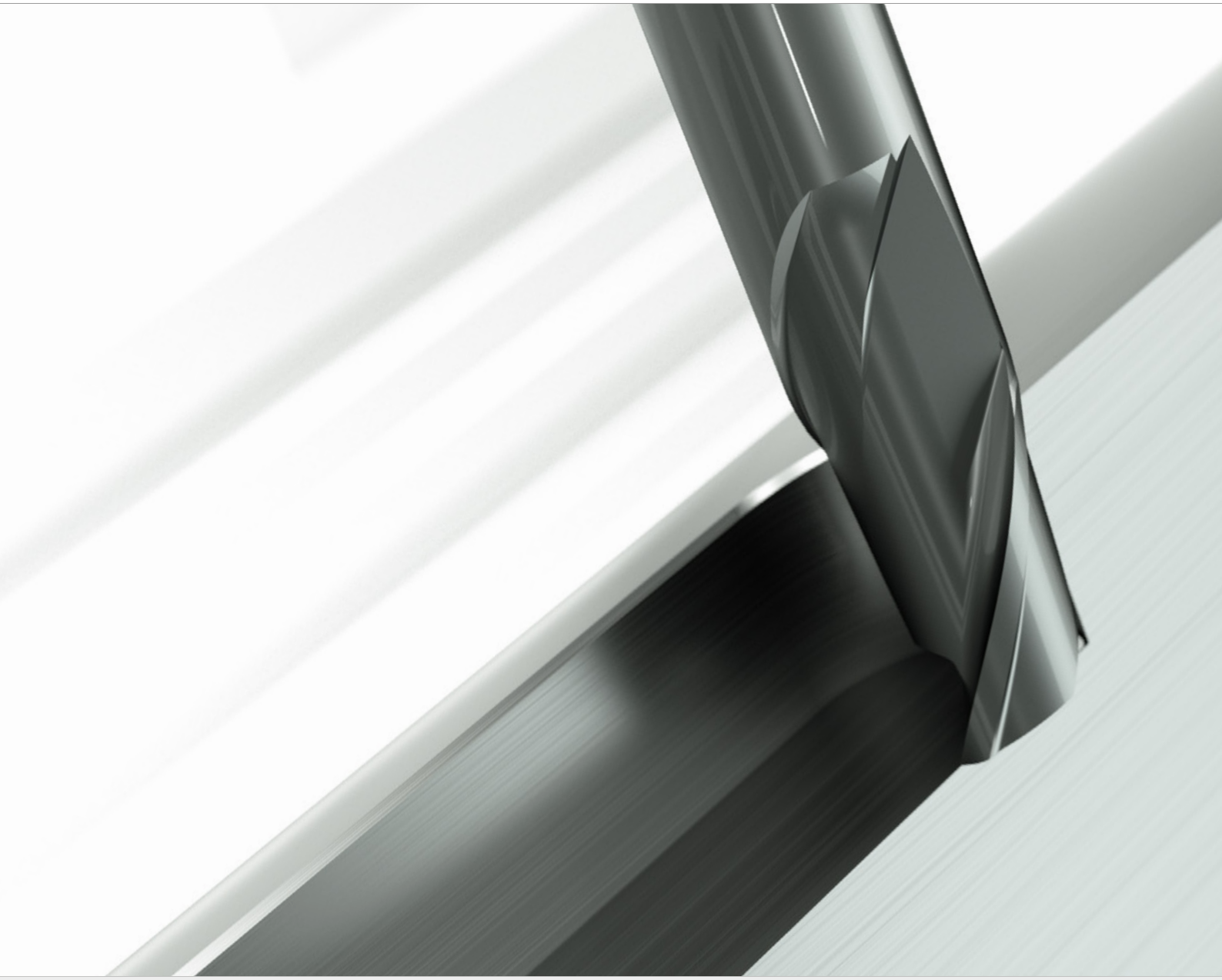



For side-finishing with CrazyMill Cool Ball, the machining must be executed vertically with respect to the workpiece (machining angle 0°).

**Recommended cutting parameters**

$v_c$ and $f_z$ = as specified in the cutting data table
End mill Type M: $a_p$ = 3 x d, $a_e$ = 0.02 – 0.1 x d
End mill Type N: $a_p$ = 4 x d, $a_e$ = 0.02 – 0.1 x d

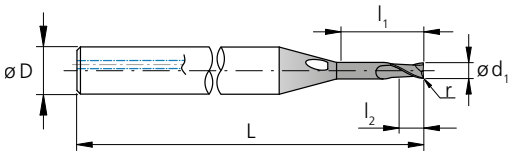
# Customized milling cutters



**Mikron Tool produces solid carbide milling cutters according to your needs and requirements and within the following range:**

### CHARACTERISTICS

- Diameter min.: .008" (0.2 mm)
- Diameter max.: 1.26" (32.0 mm), please contact us for larger diameters
- Maximum tool length: 13" (330 mm)
- Tool diameter tolerance max.: ± 197µin (5 µm)
- Concentricity between shank and tool diameters max.: ≤ 79 µin (2 µm)
- Types of milling cutters: conical milling cutters, cylindrical milling tools, spherical milling tools, solid carbide circular saws (see chapter on circular saws), milling tools with chamfer, milling tools with corner radius, form milling tools, angle milling tools, solid carbide recess milling tools, rough and finish milling tools, etc.
- Number of teeth: 1 up to 16
- Cutting direction: right-hand cutting or left-hand cutting
- Material for milling cutters: tungsten carbide, grade selection according to application




### COATINGS

Various choices according to application

### COOLING

- Milling cutters with straight internal cooling ducts in the shaft
- Milling cutters with internal cooling channels and special exit, for example in the flutes
- Milling cutters to be used with external coolant supply

### TYPE OF SHAFT

- Cylindrical as per DIN 6535 HA
- Cylindrical as per DIN 6535 HB (Weldon)
- Others upon request

### MATERIAL TO BE MACHINED

Drills for steel, corrosion-resistant steels, i.e. stainless steels, titanium / titanium alloys, super alloys or heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, drills for hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

### TREATMENTS

Cutting edge preparation, polishing of flutes

# Customized profile milling cutters



**Mikron Tool produces solid carbide profile milling cutters according to your needs and requirements and within the following range:**

### CHARACTERISTICS

- External diameter min.: .197" - 7.87" (5 mm – 200 mm)
- Thickness: .004" – 1.18" (0.1 mm – 30.0 mm)
- Bore diameter (diameter of profile milling cutter holder): .079" – 1.58" (2.0 mm – 40.0 mm)
- Tolerance tool diameter max.: ± .0004" (0.01 mm)
- Concentricity internal to external diameter: .0004" (0.01 mm)
- Number of teeth: 10 up to 160
- Cutting edge geometry: with or without logarithmic relief
- Direction of cut: right- or left-hand cutting
- Material of profile milling cutter: tungsten carbide, grade selection according to application left-hand cutting

### COATINGS

Various possibilities, selection according to application

### COOLING

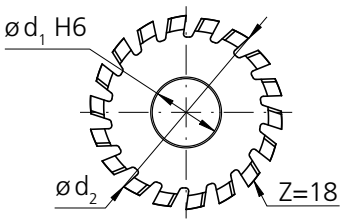
- Tools to be used with external coolant supply

### MATERIAL TO BE MACHINED

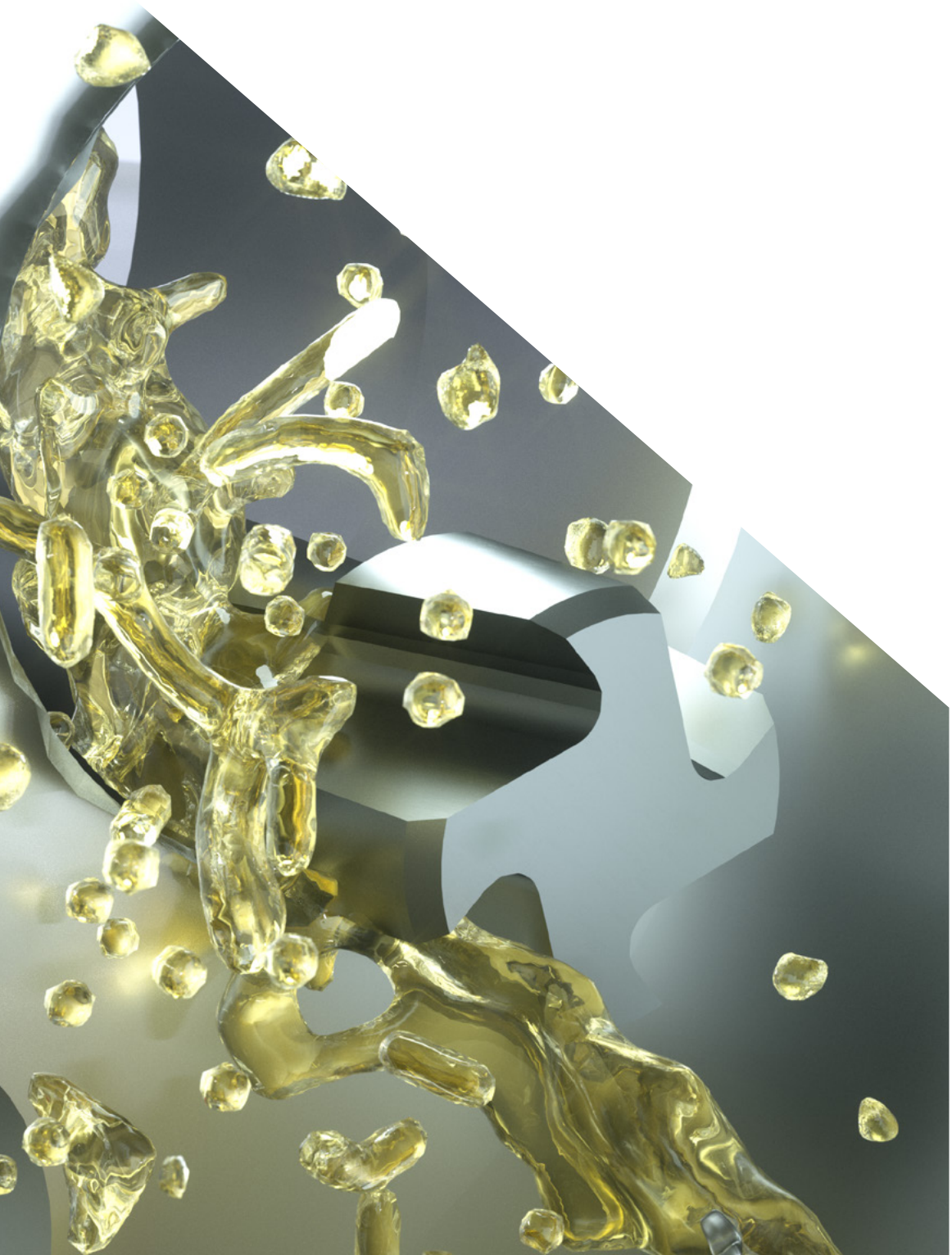
For steel, corrosion-resistant steel i.e. stainless steel, titanium / titanium alloys, super alloys i.e. heat-resistant steel such as Inconel or Hastelloy, CrCo alloys, hardened steel up to 55 HRC, aluminum / aluminum alloys, brass, copper, cast metals, etc.

### TREATMENTS

Cutting edge preparation



# crazy about deburring



# DEBURRING TOOLS

# 08


**OVERVIEW** **636**

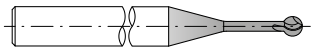
CODIFICATION KEY 638

CRAZYMILL CHAMFER 640
Chamfering and deburring, Ø 0.36 mm - 6 mm | **.014" – .236"**

CUSTOMIZED CHAMFER AND DEBURRING TOOLS 660

# Overview

## CUTTING TOOL SOLUTIONS

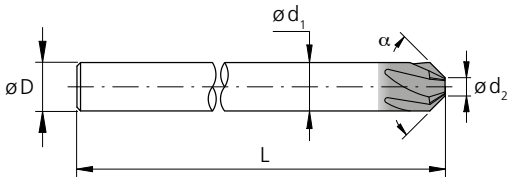
| | | |
|---|---|---|
| CRAZYMILL Chamfer |  Frontchamfer |  |
| CRAZYMILL Chamfer |  Backchamfer |  |
| CRAZYMILL Chamfer |  Doublechamfer |  |
| CRAZYMILL Chamfer |  Radiuschamfer |  |
| **Customized Chamfer and Deburring Tools** | |  |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended

| ø - range [mm] \| [inch] | max. depth | Cooling | | P | M | K | N | $S_1$ | $S_2$ | $S_3$ | $H_1$ | $H_2$ | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Int. | Ext. | Unalloyed and alloyed steel | Stainless steel | Cast iron | Non ferrous metals | Super alloys | Titanium (pure and alloyed) | CrCo alloys | Hardened steel <55 HRC | Hardened steel ≥55 HRC | |
| 1.0 – 6.0<br>**.039" – .236"** | – | – | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **646** |
| 0.36 – 5.70<br>**.014" – .224"** | 3 x d<br>5 x d | – | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **647** |
| 0.9 – 5.7<br>**.035" – .224"** | 3 x d<br>6 x d | – | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **648** |
| 1.0 – 6.0<br>**.039" – .236"** | 4 x d | – | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **649** |
| 0.1 – 32.0<br>**.004" – 1.26"** | as required | ✔ | ✔ | ● | ● | ● | ● | ● | ● | ● | ● | ⊠ | **660** |

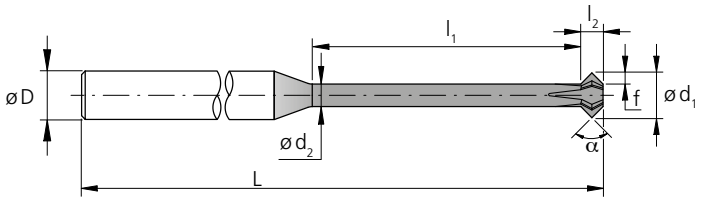
# Codification key

## ITEM NUMBER EASY TO UNDERSTAND



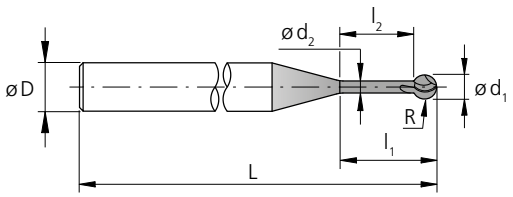

**2.FC.100 300 90.1**

- **2** — Division number: 2 = Mikron Tool SA Agno
- **FC** — CrazyMill Chamfer family: FC = CrazyMill Frontchamfer
- **100** — Second diameter $d_2$: 100 = Ø 1 mm (.039")
- **300** — Cutting diameter $d_1$: 300 = Ø 3 mm (.118")
- **90** — Chamfer angle: 90 = 90°
- **1** — Coating: ■ 1 = Coated




**2.DC.06 140 090.1**

- **2** — Division number: 2 = Mikron Tool SA Agno
- **DC** — CrazyMill Chamfer family: ■ BC = CrazyMill Backchamfer; ■ DC = CrazyMill Doublechamfer
- **06** — Effective length $l_1$: 06 = 6 x $d_1$
- **140** — Cutting diameter $d_1$: 140 = Ø 1.4 mm (.055")
- **090** — Chamfer angle: ■ 090 = 90°
- **1** — Coating: ■ 1 = Coated




# 2.RC.040 100.1

**Division number**
- 2 = Mikron Tool SA Agno

**CrazyMill Chamfer family**
RC = CrazyMill Radiuschamfer

**Effective length $l_1$**
- 040 = 4 x $d_1$

**Cutting diameter $d_1$**
100 = Ø 1 mm (.039")

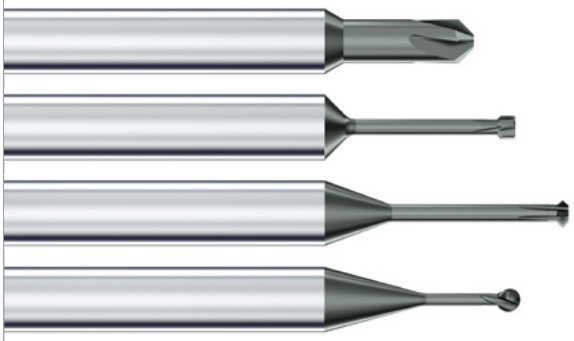
**Coating**
- 1 = Coated

# CrazyMill Chamfer



CRAZYMILL Chamfer

## CHAMFER TOOLS FOR EACH APPLICATION



Mikron Tool's CrazyMill Chamfer provides a full program of solid carbide deburring and milling cutters. Every single model specializes in chamfering and deburring in the diameter range of 014" to .236" (0.36 to 6.0 mm).

The deburring tools complement each other and offer users the ideal tool for every deburring situation:

- **CrazyMill Frontchamfer:** For front deburring and chamfering
- **CrazyMill Backchamfer:** For rear deburring, the part no longer needs to be re-clamped on the machine
- **CrazyMill Doublechamfer:** Doublechamfer for front and rear deburring in a single clamping
- **CrazyMill Radiuschamfer:** For universal usage thanks to its extra-large 300° cutting zone. It is suitable for front and rear chamfering, for all possible internal and external contours as well as for intersections of holes and milling procedures or oblique hole exits.

Whether steel, stainless steel, cast iron, non-ferrous metal, or titanium – the milling tools can be universally used in many different materials.

All four models have the same quality features: They are suitable for small-scale machining with a wide variety of materials, can be utilized at high feed rates, cut sharply, and offer first-class surface quality. The long service life can be attributed to the special solid carbide with high fracture toughness on the one hand, and to the high-performance coating used for all models on the other hand.

**Regrinding:** This product is not suitable for regrinding.

**Please note:** You couldn't find your suitable version of the CrazyMill Chamfer (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYMILL by Mikron Tool Chamfer

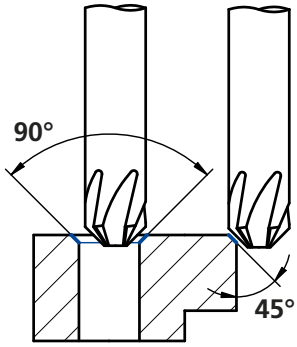
# Perfect finished parts

## CHAMFERING AND DEBURRING IN SMALL DIMENSIONS

**All options with 4 versions**

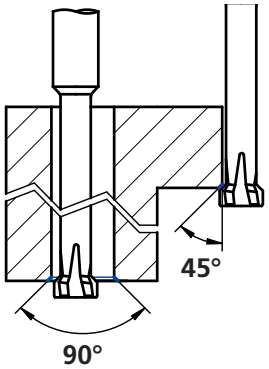
### CrazyMill Frontchamfer

For front deburring and chamfering



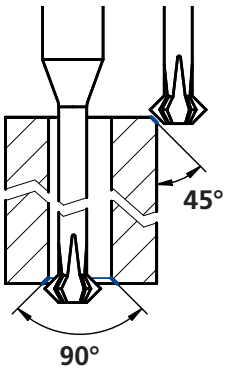

### CrazyMill Backchamfer

For rear deburring



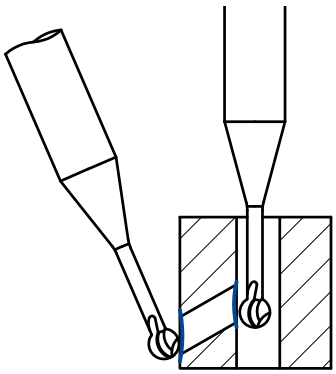
**CrazyMill Doublechamfer**

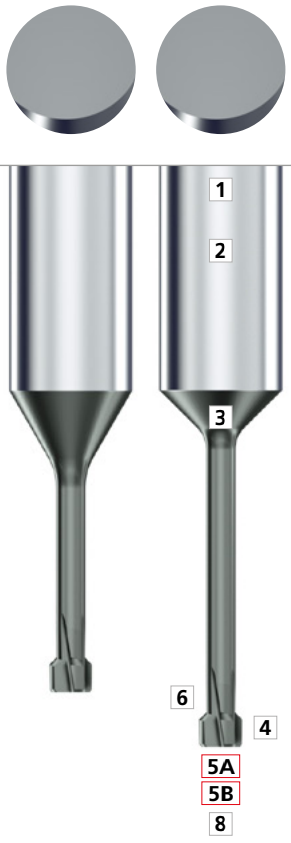
For front and rear deburring




**CrazyMill Radiuschamfer**

For universal usage



| Front | Back | Double | Radius |
|---|---|---|---|
| | 3 x d / 5 x d | 3 x d / 6 x d | 4 x d |
| ■ External cooling<br>■ Coated<br>■ Ø .039" - .236"<br>(1.0 - 6.0 mm) | ■ External cooling<br>■ Coated<br>■ Ø .014" - .224"<br>(0.36 - 5.70 mm) | ■ External cooling<br>■ Coated<br>■ Ø .035" - .224"<br>(0.9 - 5.7 mm) | ■ External cooling<br>■ Coated<br>■ Ø .039" - .236"<br>(1.0 - 6.0 mm) |
|  |  |  |  |
| page 646 | page 647 | page 648 | page 649 |

**1 | SHAFT / USABLE LENGTH**
The sturdy solid carbide shaft combined with a short usable length supports stable vibration-free machining.

**2 | SOLID CARBIDE**
A long tool life, even with materials which are difficult to machine, thanks to solid carbide with high fracture toughness and resistance to heat shock.

**3 | COATING**
High-performance coating for a long tool life and perfect surface quality.

**4 | TOOL SHAPE**
Different types of geometries result in a complete range of deburring tools for all possible deburring situations.

**5A | TIP GEOMETRY**
The tip geometry is designed to prevent secondary burrs.
■ Positively cut, sharply ground.

**5B | HIGH NUMBER OF TEETH**
Three to six teeth depending on the diameter enable a high feed speed and result in outstanding surface quality.

**6 | CHAMFER 90°**
A 90° chamfer can be applied simultaneously during front and rear deburring.

**7 | CRAZYMILL FRONTCHAMFER**
Recommended for front deburring and chamfering.

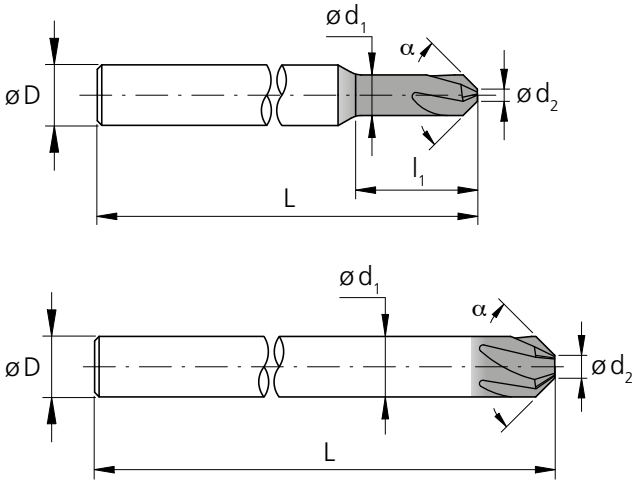
**8 | CRAZYMILL BACKCHAMFER**
Recommended for backside deburring of edges, holes, and threads.

**9 | CRAZYMILL DOUBLECHAMFER**
Can deburr front and rear in a single clamping.

**10 | CRAZYMILL RADIUSCHAMFER: 300° CUTTING ZONE**
Suited for hard-to-reach spots, for inner and outer contours, drilling / milling intersections and inclined hole exits.

# CrazyMill Frontchamfer

Carbide | 45° | Z 4-6 | eXedur RI

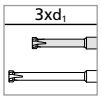


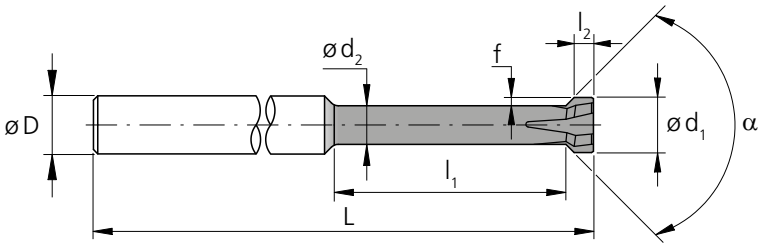

| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer α | Z [Teeth] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **.039** | 1.0 | **.118** | 3 | 0.3 | 3 | **1.57** | 40 | 90° | 4 | 2.FC.03010090.1 | ■ |
| **.079** | 2.0 | **.236** | 6 | 0.6 | 3 | **1.57** | 40 | 90° | 4 | 2.FC.06020090.1 | ■ |
| **.118** | 3.0 | **-** | - | 1.0 | 3 | **1.97** | 50 | 90° | 5 | 2.FC.10030090.1 | ■ |
| **.157** | 4.0 | **-** | - | 1.5 | 4 | **1.97** | 50 | 90° | 6 | 2.FC.15040090.1 | ■ |
| **.236** | 6.0 | **-** | - | 2.0 | 6 | **1.97** | 50 | 90° | 6 | 2.FC.20060090.1 | ■ |

■ Stock item

# CrazyMill Backchamfer 3 x d / 5 x d

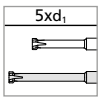
Carbide | 45° | Z 3-6 | eXedur RI

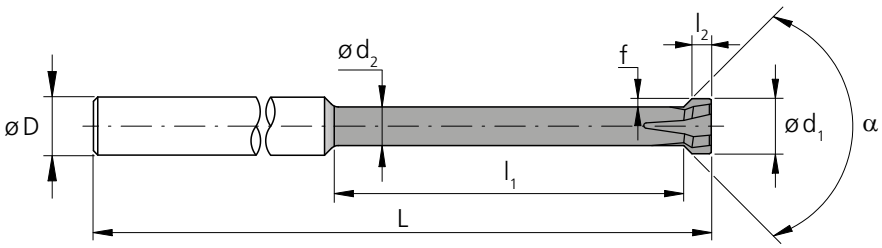



| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer α | Z [Teeth] | f [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **.014** | 0.36 | **.063** | 1.6 | 0.22 | 0.20 | 3 | **1.97** | 50 | 90° | 3 | 0.07 | 2.BC.03036090.1 | ■ |
| **.018** | 0.46 | **.079** | 2.0 | 0.30 | 0.25 | 3 | **1.97** | 50 | 90° | 3 | 0.08 | 2.BC.03046090.1 | ■ |
| **.026** | 0.65 | **.110** | 2.8 | 0.40 | 0.35 | 3 | **1.97** | 50 | 90° | 3 | 0.125 | 2.BC.03065090.1 | ■ |
| **.035** | 0.90 | **.158** | 4.0 | 0.60 | 0.50 | 4 | **1.97** | 50 | 90° | 4 | 0.30 | 2.BC.03090090.1 | ■ |
| **.055** | 1.40 | **.236** | 6.0 | 0.95 | 0.90 | 4 | **1.97** | 50 | 90° | 4 | 0.45 | 2.BC.03140090.1 | ■ |
| **.075** | 1.90 | **.315** | 8.0 | 1.40 | 1.00 | 4 | **1.97** | 50 | 90° | 5 | 0.25 | 2.BC.03190090.1 | ■ |
| **.114** | 2.90 | **.472** | 12.0 | 2.10 | 1.50 | 4 | **2.36** | 60 | 90° | 5 | 0.40 | 2.BC.03290090.1 | ■ |
| **.146** | 3.70 | **.630** | 16.0 | 2.70 | 2.00 | 4 | **2.36** | 60 | 90° | 5 | 0.50 | 2.BC.03370090.1 | ■ |
| **.185** | 4.70 | **.787** | 20.0 | 3.30 | 2.00 | 6 | **2.76** | 70 | 90° | 6 | 0.70 | 2.BC.03470090.1 | ■ |
| **.224** | 5.70 | **.945** | 24.0 | 4.00 | 2.00 | 6 | **2.76** | 70 | 90° | 6 | 0.85 | 2.BC.03570090.1 | ■ |

■ Stock item



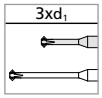



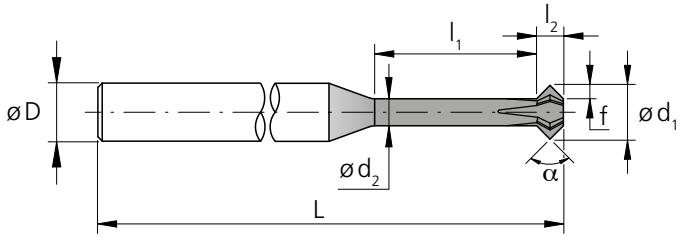

| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer α | Z [Teeth] | f [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **.014** | 0.36 | **.094** | 2.4 | 0.22 | 0.20 | 3 | **1.97** | 50 | 90° | 3 | 0.07 | 2.BC.05036090.1 | ■ |
| **.018** | 0.46 | **.118** | 3.0 | 0.30 | 0.25 | 3 | **1.97** | 50 | 90° | 3 | 0.08 | 2.BC.05046090.1 | ■ |
| **.026** | 0.65 | **.165** | 4.2 | 0.40 | 0.35 | 3 | **1.97** | 50 | 90° | 3 | 0.125 | 2.BC.05065090.1 | ■ |
| **.035** | 0.90 | **.236** | 6.0 | 0.60 | 0.50 | 4 | **2.36** | 60 | 90° | 4 | 0.30 | 2.BC.05090090.1 | ■ |
| **.055** | 1.40 | **.354** | 9.0 | 0.95 | 0.90 | 4 | **2.36** | 60 | 90° | 4 | 0.45 | 2.BC.05140090.1 | ■ |
| **.075** | 1.90 | **.472** | 12.0 | 1.40 | 1.00 | 4 | **2.36** | 60 | 90° | 5 | 0.25 | 2.BC.05190090.1 | ■ |
| **.114** | 2.90 | **.709** | 18.0 | 2.10 | 1.50 | 4 | **2.76** | 70 | 90° | 5 | 0.40 | 2.BC.05290090.1 | ■ |
| **.146** | 3.70 | **.945** | 24.0 | 2.70 | 2.00 | 4 | **2.76** | 70 | 90° | 5 | 0.50 | 2.BC.05370090.1 | ■ |
| **.185** | 4.70 | **1.18** | 30.0 | 3.30 | 2.00 | 6 | **3.15** | 80 | 90° | 6 | 0.70 | 2.BC.05470090.1 | ■ |
| **.224** | 5.70 | **1.42** | 36.0 | 4.00 | 2.00 | 6 | **3.15** | 80 | 90° | 6 | 0.85 | 2.BC.05570090.1 | ■ |

■ Stock item

# CrazyMill Doublechamfer 3 x d / 6 x d

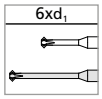
Carbide | 45° 45° | Z 4-6 | eXedur RI

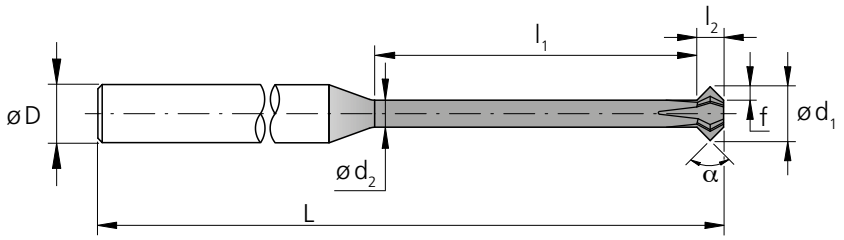



| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer α | Z [Teeth] | f [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **.035** | 0.9 | **.106** | 2.7 | 0.45 | 0.45 | 3 | **2.11** | 53.5 | 90° | 4 | 0.23 | 2.DC.03090090.1 | ■ |
| **.055** | 1.4 | **.165** | 4.2 | 0.70 | 0.70 | 3 | **2.11** | 53.5 | 90° | 5 | 0.35 | 2.DC.03140090.1 | ■ |
| **.071** | 1.8 | **.213** | 5.4 | 0.90 | 0.90 | 4 | **2.17** | 55.0 | 90° | 5 | 0.45 | 2.DC.03180090.1 | ■ |
| **.110** | 2.8 | **.331** | 8.4 | 1.40 | 1.40 | 4 | **2.36** | 60.0 | 90° | 5 | 0.70 | 2.DC.03280090.1 | ■ |
| **.146** | 3.7 | **.437** | 11.1 | 1.85 | 1.85 | 4 | **2.36** | 60.0 | 90° | 5 | 0.93 | 2.DC.03370090.1 | ■ |
| **.185** | 4.7 | **.555** | 14.1 | 2.35 | 2.35 | 6 | **2.76** | 70.0 | 90° | 5 | 1.18 | 2.DC.03470090.1 | ■ |
| **.224** | 5.7 | **.673** | 17.1 | 2.85 | 2.85 | 6 | **2.76** | 70.0 | 90° | 6 | 1.43 | 2.DC.03570090.1 | ■ |

■ Stock item



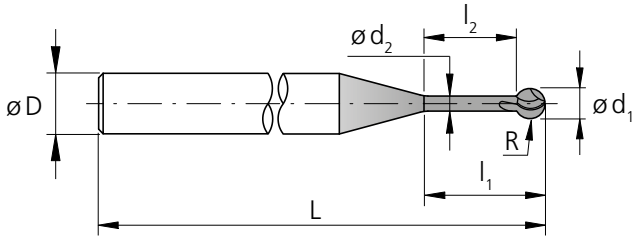

| $d_1$ [inch] | $d_1$ [mm] | $l_1$ [inch] | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L [inch] | L [mm] | Chamfer α | Z [Teeth] | f [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **.035** | 0.9 | **.213** | 5.4 | 0.54 | 0.36 | 3 | **2.36** | 60.0 | 90° | 4 | 0.18 | 2.DC.06090090.1 | ■ |
| **.055** | 1.4 | **.331** | 8.4 | 0.84 | 0.56 | 3 | **2.36** | 60.0 | 90° | 5 | 0.28 | 2.DC.06140090.1 | ■ |
| **.071** | 1.8 | **.425** | 10.8 | 1.08 | 0.72 | 4 | **2.36** | 60.0 | 90° | 5 | 0.36 | 2.DC.06180090.1 | ■ |
| **.110** | 2.8 | **.661** | 16.8 | 1.68 | 1.12 | 4 | **2.36** | 60.0 | 90° | 5 | 0.56 | 2.DC.06280090.1 | ■ |
| **.146** | 3.7 | **.874** | 22.2 | 2.22 | 1.48 | 4 | **2.36** | 60.0 | 90° | 5 | 0.74 | 2.DC.06370090.1 | ■ |
| **.185** | 4.7 | **1.11** | 28.2 | 2.82 | 1.88 | 6 | **3.15** | 80.0 | 90° | 5 | 0.94 | 2.DC.06470090.1 | ■ |
| **.224** | 5.7 | **1.35** | 34.2 | 3.42 | 2.28 | 6 | **3.15** | 80.0 | 90° | 6 | 1.14 | 2.DC.06570090.1 | ■ |

■ Stock item

# CrazyMill Radiuschamfer

| Carbide | 300° | Z3 | | eXedur RI |
|---|---|---|---|---|

| | | |
|---|---|---|
| Ø$d_1$ | **.039" - .236"** (1 - 6 mm) | |
| Tolerance | **0 - .0016"** | 0 - 0.04 mm |



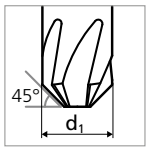

| $d_1$ **[inch]** | $d_1$ [mm] | $l_1$ **[inch]** | $l_1$ [mm] | $d_2$ [mm] | $l_2$ [mm] | D (h6) [mm] | L **[inch]** | L [mm] | Z [Teeth] | R (0/- 0.02) [mm] | Item number | Availability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **.039** | 1.0 | **.157** | 4 | 0.50 | 3.0 | 4 | **1.97** | 50 | 3 | 0.50 | 2.RC.040100.1 | ■ |
| **.059** | 1.5 | **.236** | 6 | 0.75 | 4.5 | 4 | **1.97** | 50 | 3 | 0.75 | 2.RC.040150.1 | ■ |
| **.079** | 2.0 | **.315** | 8 | 1.00 | 6.0 | 4 | **2.36** | 60 | 3 | 1.00 | 2.RC.040200.1 | ■ |
| **.098** | 2.5 | **.394** | 10 | 1.25 | 7.5 | 4 | **2.36** | 60 | 3 | 1.25 | 2.RC.040250.1 | ■ |
| **.118** | 3.0 | **.472** | 12 | 1.50 | 9.0 | 4 | **2.36** | 60 | 3 | 1.50 | 2.RC.040300.1 | ■ |
| **.157** | 4.0 | **.630** | 16 | 2.00 | 12.0 | 6 | **2.76** | 70 | 3 | 2.00 | 2.RC.040400.1 | ■ |
| **.236** | 6.0 | **.945** | 24 | 3.00 | 18.0 | 6 | **2.76** | 70 | 3 | 3.00 | 2.RC.040600.1 | ■ |

■ Stock item

# CrazyMill Frontchamfer

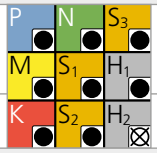
## DEBURRING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW






| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 120 \| **394** |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 100 \| **328** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 80 \| **262** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 50 \| **164** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 80 \| **262** |
| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 50 \| **164** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| **197** |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 200 \| **656** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 200 \| **656** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 \| **131** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 \| **131** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 200 \| **656** |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 200 \| **656** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 40 \| **131** |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 40 \| **131** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 40 \| **131** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 50 \| **164** |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| **197** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



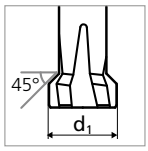

$f_z$ [mm] | **[IPT]**

| | **Ød1** 1.0 – 2.0 mm \| **.039" – .079"** **f** | **Ød1** 3.0 – 6.0 mm \| **.118" – .236"** **f** |
|---|---|---|
| | 0.01 – 0.04 \| **.0004 – .0016** | 0.03 – 0.05 \| **.0012 – .0020** |
| | 0.01 – 0.03 \| **.0004 – .0012** | 0.02 – 0.04 \| **.0008 – .0016** |
| | 0.01 – 0.02 \| **.0004 – .0008** | 0.01 – 0.03 \| **.0004 – .0012** |
| | 0.01 – 0.02 \| **.0004 – .0008** | 0.02 – 0.03 \| **.0008 – .0012** |
| | 0.01 – 0.02 \| **.0004 – .0008** | 0.01 – 0.03 \| **.0004 – .0012** |
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| | 0.01 – 0.02 \| **.0004 – .0008** | 0.02 – 0.03 \| **.0008 – .0012** |
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| | 0.01 – 0.02 \| **.0004 – .0008** | 0.01 – 0.03 \| **.0004 – .0012** |
| | 0.02 – 0.05 \| **.0008 – .0020** | 0.03 – 0.07 \| **.0012 – .0028** |
| | 0.02 – 0.05 \| **.0008 – .0020** | 0.03 – 0.07 \| **.0012 – .0028** |
| | 0.01 – 0.02 \| **.0004 – .0008** | 0.02 – 0.03 \| **.0008 – .0012** |
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| | 0.02 – 0.05 \| **.0008 – .0020** | 0.03 – 0.07 \| **.0012 – .0028** |
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| | 0.01 – 0.02 \| **.0004 – .0008** | 0.02 – 0.03 \| **.0008 – .0012** |
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| | | |

# CrazyMill Backchamfer 3 x d / 5 x d

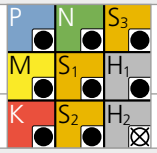
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| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] |
|---|---|---|---|---|---|
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | 120 \| **394** |
| | | 1.0401 | C15 | AISI 1015 | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | |
| | | 1.0044 | S275JR | AISI 1020 | |
| | | 1.0715 | 11SMn30 | AISI 1215 | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | ASTM 3415 / AISI 3310 | 100 \| **328** |
| | | 1.7131 | 16MnCr5 | AISI 5115 | |
| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | AISI D2 | 80 \| **262** |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | |
| | | 1.3343 | HS6-5-2C | AISI M2 / UNS T11302 | |
| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 50 \| **164** |
| | | 1.4105 | X6CrMoS17 | AISI 430F | |
| | Stainless steel martensitic | 1.4034 | X46Cr13 | AISI 420C | 80 \| **262** |
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| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 50 \| **164** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| **197** |
| | | 0.6030 | GG30 | ASTM 40B | |
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| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 200 \| **656** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 200 \| **656** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 \| **131** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 \| **131** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 200 \| **656** |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 200 \| **656** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 40 \| **131** |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 40 \| **131** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 40 \| **131** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 50 \| **164** |
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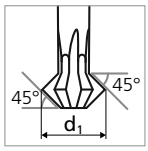

$f_z$ [mm] | **[IPT]**

| | **Ød1** 0.36 - 1.90 mm **| .014" - .075"** **f** | 2.90 - 5.70 mm **| .114" - .224"** **f** |
|---|---|---|
| | 0.030 **| .0012** | 0.040 **| .0016** |
| | 0.020 **| .0008** | 0.030 **| .0012** |
| | 0.015 **| .0006** | 0.030 **| .0012** |
| | 0.010 **| .0004** | 0.030 **| .0012** |
| | 0.015 **| .0006** | 0.030 **| .0012** |
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| | 0.030 **| .0012** | 0.040 **| .0016** |
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| | 0.020 **| .0008** | 0.030 **| .0012** |
| | 0.030 **| .0012** | 0.040 **| .0016** |
| | 0.030 **| .0012** | 0.040 **| .0016** |
| | 0.020 **| .0008** | 0.030 **| .0012** |
| | 0.020 **| .0008** | 0.030 **| .0012** |
| | 0.020 **| .0008** | 0.030 **| .0012** |
| | 0.020 **| .0008** | 0.030 **| .0012** |
| | 0.015 **| .0006** | 0.020 **| .0008** |
| | | |

# CrazyMill Doublechamfer 3 x d / 6 x d

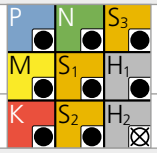
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| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | $v_c$ [m/min] \| [SFM] |
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| | | 1.3505 | 100Cr6 | AISI 52100 | |
| | | 1.7225 | 42CrMo4 | AISI 4140 | |
| | | 1.2842 | 90MnCrV8 | AISI O2 | |
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| | | 1.3355 | HS18-0-1 | AISI T1 / UNS T12001 | |
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| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
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| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 200 \| **656** |
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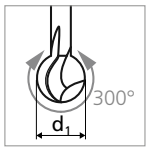

$f_z$ [mm] | **[IPT]**

| | **Ød1** 0.90 - 1.80 mm | **.035" - .071"** **f** | 2.80 - 5.70 mm | **.110" - .224"** **f** |
|---|---|---|---|
| | 0.030 | **.0012** | 0.040 | **.0016** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.015 | **.0006** | 0.030 | **.0012** |
| | 0.010 | **.0004** | 0.030 | **.0012** |
| | 0.015 | **.0006** | 0.030 | **.0012** |
| | | | | |
| | 0.015 | **.0006** | 0.030 | **.0012** |
| | | | | |
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| | | | | |
| | 0.015 | **.0006** | 0.030 | **.0012** |
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| | 0.030 | **.0012** | 0.040 | **.0016** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.030 | **.0012** | 0.040 | **.0016** |
| | 0.030 | **.0012** | 0.040 | **.0016** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.015 | **.0006** | 0.030 | **.0012** |
| | 0.015 | **.0006** | 0.020 | **.0008** |
| | | | | |

# CrazyMill Radiuschamfer

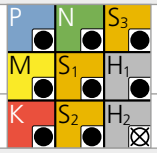
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| | | 1.4112 | X90CrMoV18 | AISI 440B | |
| | Stainless steel martensitic – PH | 1.4542 | X5CrNiCuNb 16-4 | AISI 630 / ASTM 17-4 PH | |
| | | 1.4545 | X5CrNiCuNb 15-5 | ASTM 15-5 PH | |
| | Stainless steel austenitic | 1.4301 | X5CrNi 18-10 | AISI 304 | 50 \| **164** |
| | | 1.4435 | X2CrNiMo 18-14-3 | AISI 316L | |
| | | 1.4441 | X2CrNiMo 18-15-3 | AISI 316LM | |
| | | 1.4539 | X1NiCrMoCu 25-20-5 | AISI 904L | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | 60 \| **197** |
| | | 0.6030 | GG30 | ASTM 40B | |
| | | 0.7040 | GGG40 | ASTM 60-40-18 | |
| | | 0.7060 | GGG60 | ASTM 80-60-03 | |
| N | Aluminium alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | 200 \| **656** |
| | | 3.4365 | AlZnMgCu1.5 | ASTM 7075 | |
| | Aluminium alloy cast | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 200 \| **656** |
| | | 3.2381 | GD-AlSi10Mg | UNS A03590 | |
| | Copper | 2.004 | Cu-OF / CW008A | UNS C10100 | 40 \| **131** |
| | | 2.0065 | Cu-ETP / CW004A | UNS C11000 | |
| | Brass lead free | 2.0321 | CuZn37 CW508L | UNS C27400 | 40 \| **131** |
| | | 2.036 | CuZn40 CW509L | UNS C28000 | |
| | Brass, Bronze Rm < 400 N/mm² | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | 200 \| **656** |
| | | 2.102 | CuSn6 | UNS C51900 | |
| | Bronze Rm < 600 N/mm² | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | 200 \| **656** |
| | | 2.096 | CuAl9Mn2 | UNS C63200 | |
| $S_1$ | Super alloys | 2.4856 | | Inconel 625 | 40 \| **131** |
| | | 2.4668 | | Inconel 718 | |
| | | 2.4617 | NiMo28 | Hastelloy B-2 | |
| | | 2.4665 | NiCr22Fe18Mo | Hastelloy X | |
| $S_2$ | Titanium pure | 3.7035 | Gr.2 | ASTM B348 / F67 | 40 \| **131** |
| | | 3.7065 | Gr.4 | ASTM B348 / F68 | |
| | Titanium alloys | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 40 \| **131** |
| | | 9.9367 | TiAl6Nb7 | ASTM F1295 | |
| $S_3$ | CrCo alloys | 2.4964 | CoCr20W15Ni | Haynes 25 | 50 \| **164** |
| | | | CrCoMo28 | ASTM F1537 | |
| $H_1$ | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | 60 \| **197** |
| $H_2$ | Hardened steel ≥ 55 HRC | 1.2379 | X153CrMoV12 | AISI D2 | |

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended




$f_z$ [mm] | **[IPT]**

| | **Ød1** 1.0 - 2.0 mm | **.039" - .079"** **f** | **Ød1** 3.0 - 6.0 mm | **.118" - .236"** **f** |
|---|---|---|---|---|
| | 0.030 | **.0012** | 0.040 | **.0016** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.015 | **.0006** | 0.030 | **.0012** |
| | 0.010 | **.0004** | 0.030 | **.0012** |
| | 0.015 | **.0006** | 0.030 | **.0012** |
| | | | | |
| | 0.015 | **.0006** | 0.030 | **.0012** |
| | | | | |
| | | | | |
| | | | | |
| | 0.015 | **.0006** | 0.030 | **.0012** |
| | 0.030 | **.0012** | 0.040 | **.0016** |
| | 0.030 | **.0012** | 0.040 | **.0016** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.030 | **.0012** | 0.040 | **.0016** |
| | 0.030 | **.0012** | 0.040 | **.0016** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.020 | **.0008** | 0.030 | **.0012** |
| | 0.015 | **.0006** | 0.030 | **.0012** |
| | 0.015 | **.0006** | 0.020 | **.0008** |
| | | | | |



# Deburring process CrazyMill Chamfer

## PRECISE AND EFFICIENT CHAMFERING AND DEBURRING

### Coolant type, pressure and filtration

For best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling fluid is aimed directly to the deburring cutter tip, thus cooling and lubricating the tool perfectly and flushing away the chips.

### Tool holders

For detailed indications for tool holders see chapter "Technical information".

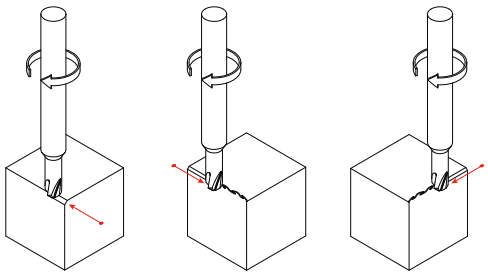
### CrazyMill Chamfer

The chamfering and deburring tool of the CrazyMill Chamfer product line supplements the CrazyDrill / MiquDrill drill line and the CrazyMill Cool line. Holes, edges, grooves, and corners can be quickly and easily deburred front or rear. The result is a burr-free part with a defined chamfer.

- **CrazyMill Frontchamfer** for front deburring and chamfering
- **CrazyMill Backchamfer** for rear deburring and chamfering without reclamping the workpiece
- **CrazyMill Doublechamfer** for front and rear deburring and chamfering
- **CrazyMill Radiuschamfer** for front and rear deburring, for inner and outer contours and for complex profiles such as intersections of holes and milling processes

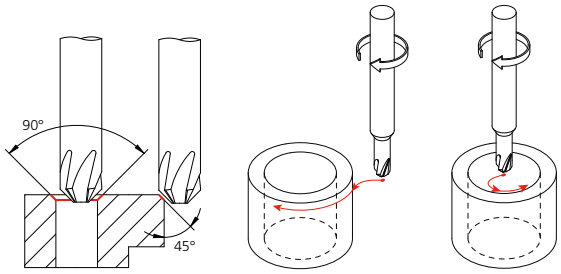
## CHAMFERING AND DEBURRING PROCESS

### 1. Upcut milling and downcut milling



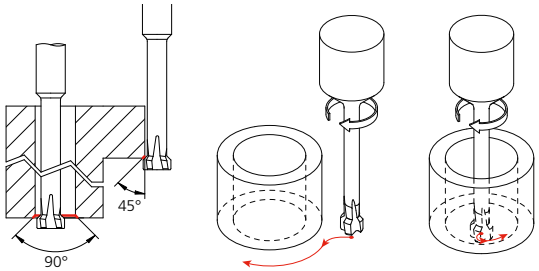
- Upcut milling is recommended for chamfering
- The machining direction for deburring depends on the direction of burr formation. Mikron Tool recommends using the milling tool in the opposite direction of the burr

### 2. Front deburring / chamfering of holes, pockets, and edges



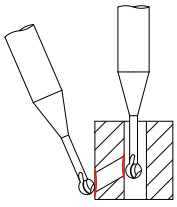

- Approach via spiral interpolation, rolling entry, or tangential entry

### 3. Back deburring / chamfering of holes, pockets, and edges



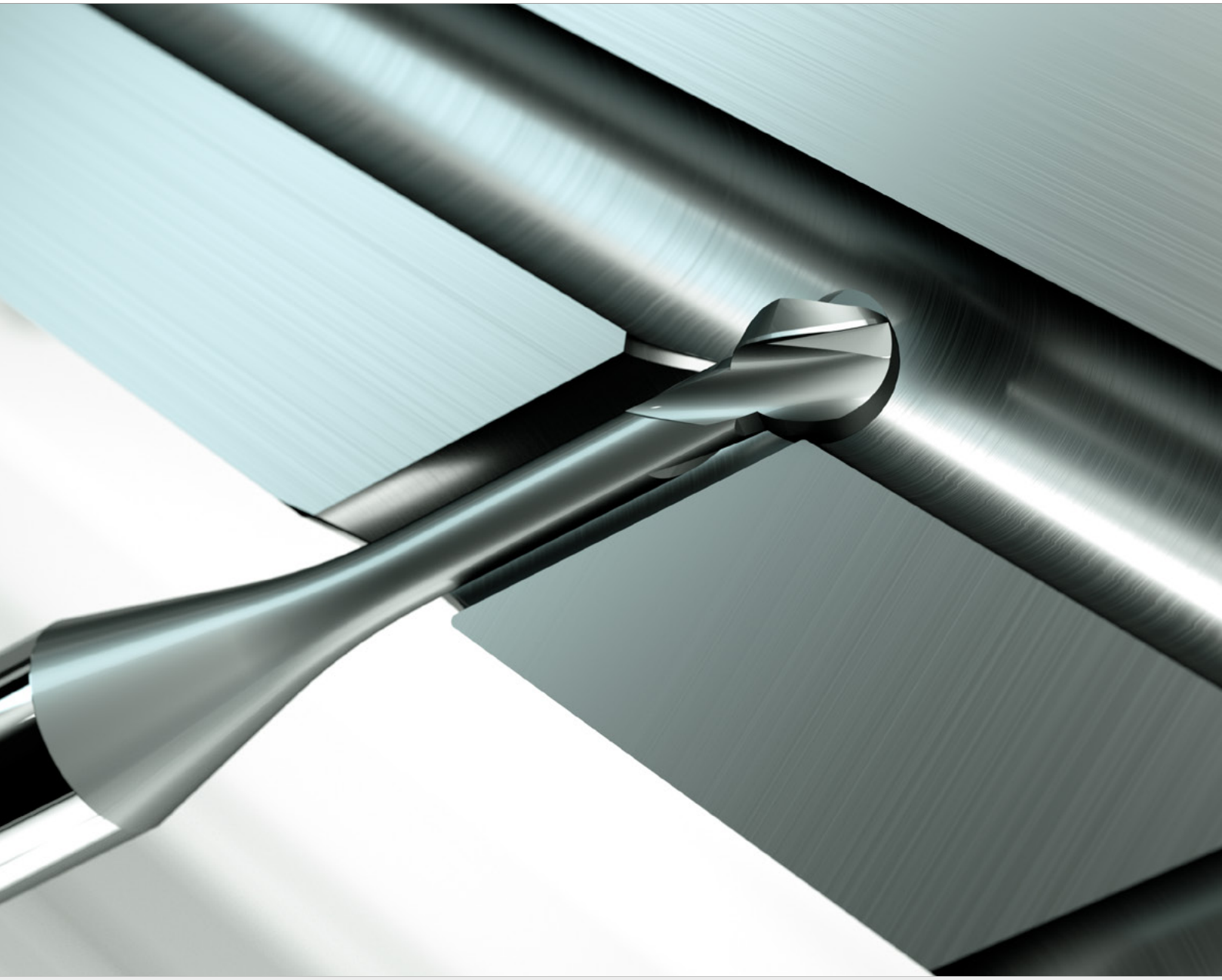

- Approach via spiral interpolation, rolling entry, or tangential entry

### 4. Deburring of complex edges such as hole intersections



- Depending on the workpiece geometry, approach using spiral interpolation, rolling entry, tangential entry, side delivery, or CNC special functions for tubular openings

# Customized Chamfer and Deburring Tools



**Mikron Tool produces solid carbide chamfer and deburring tools according to your needs and requirements and within the following range:**

### MILLING TOOLS FOR DEBURRING FRONT AND BACKSIDE AS WELL AS MULTI CHAMFER MILLING

- Diameter standard milling sizes min: .014" (0.36 mm)
- Number of cutting edges: 1 up to 16

### DRILLS FOR DEBURRING

- Diameter min: .004" (0.1 mm)
- Number of cutting edges 1 up to 4

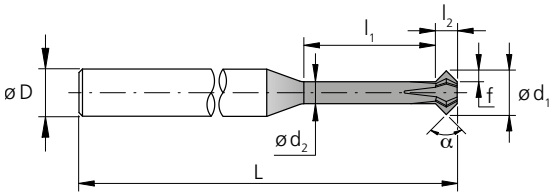
### REAMERS FOR DEBURRING

- Diameter min: .016" (0.4 mm)
- Number of cutting edges 2 up to 8

### DEBURRING TOOLS

### GENERAL CHARACTERISTICS

- Maximum tool diameter: 1.26" (32.0 mm), bigger as per specific request
- Maximum tool length: 13" (330 mm)
- Tool diameter tolerance max.: ± 20 µin (0.5 µm)
- Concentricity between shaft and tool diameters max.: ≤ 79 µin (2 µm)




- Direction of cut: right- hand cutting or left-hand cutting
- Material for deburring and chamfering tools: tungsten carbide, grade selection depending on application

### COATINGS

Various, choice according to application

### COOLING

- Cooling via straight internal coolant channels in the shaft
- Cooling via cooling channels in the shaft, but with special exits, (for ex. in the flutes)
- Deburring tools to be used with external coolant supply

### TYPE OF SHAFT

- Cylindrical as per DIN 6535 HA
- Cylindrical as per DIN 6535 HB (Weldon)
- Clamping face for turning tools
- Others upon request

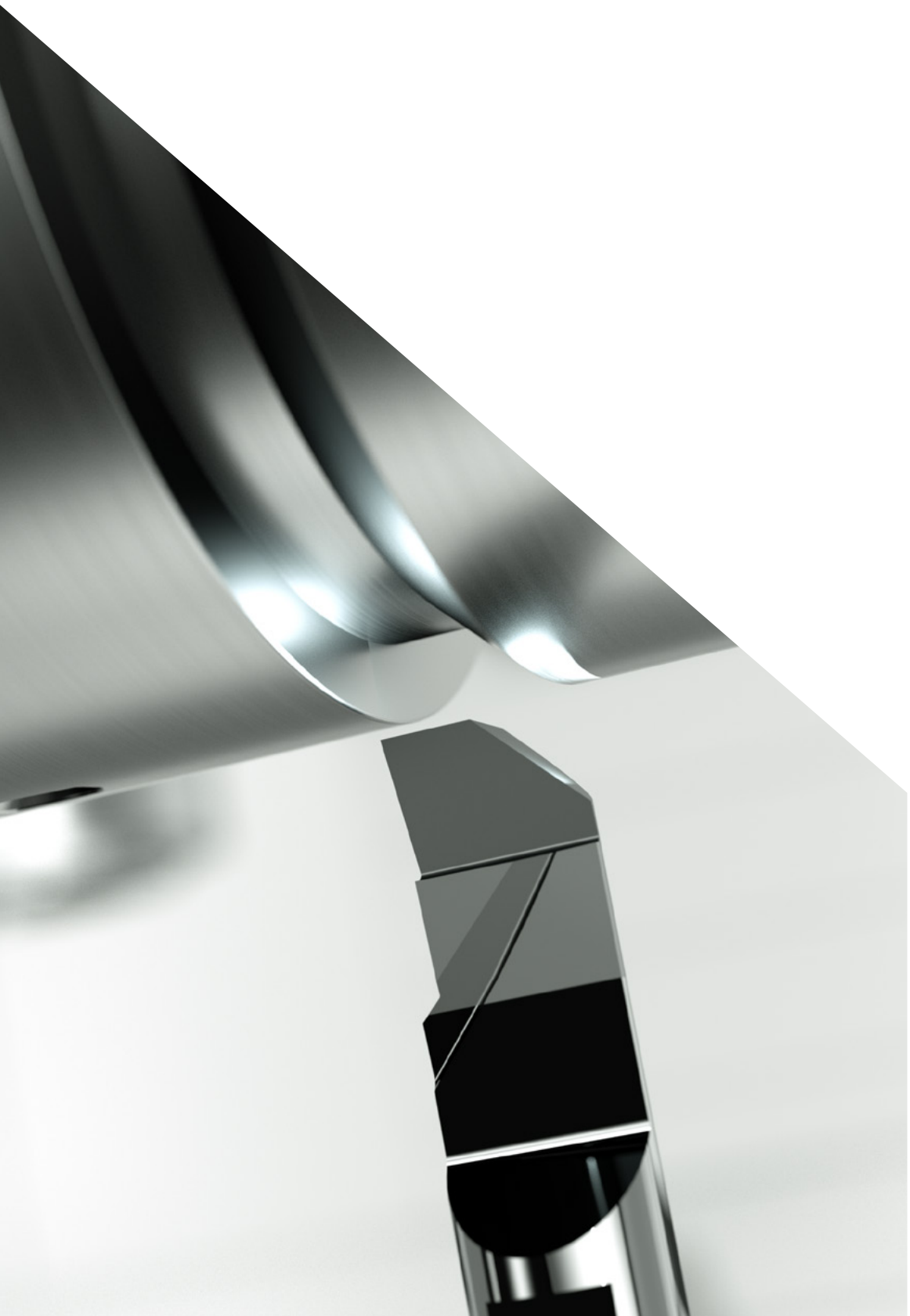
### MATERIAL TO BE MACHINED

For steel, corrosion-resistant steels, i.e. stainless steels, titanium pure / titanium alloys, super alloys, i.e. heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

### CONDITIONING

Cutting edge preparation, polishing of flutes

# crazy about turning



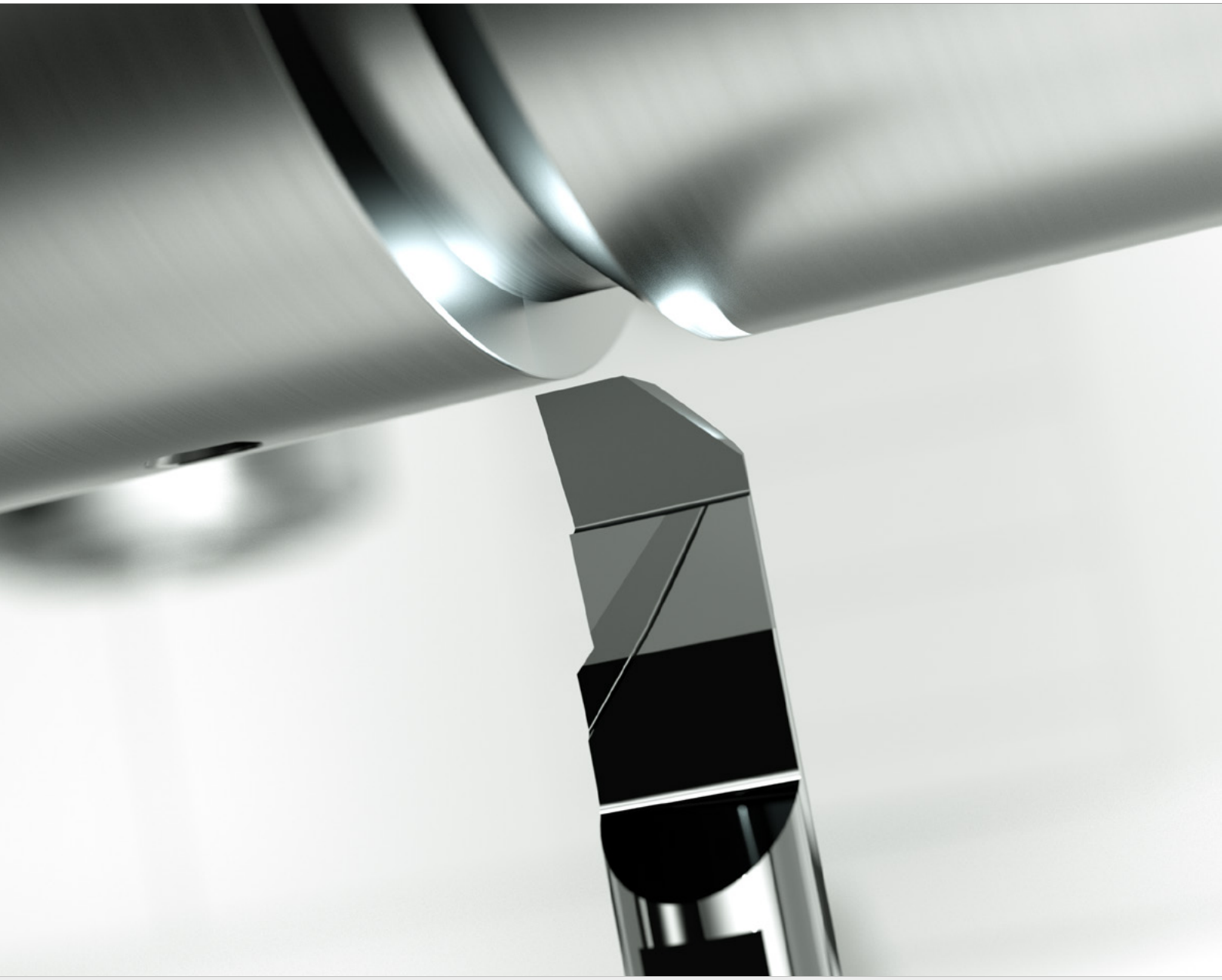
# TURNING TOOLS

# 09


CUSTOMIZED FORM TURNING TOOLS 664

CUSTOMIZED GROOVING TOOLS 666

# Customized form turning tools



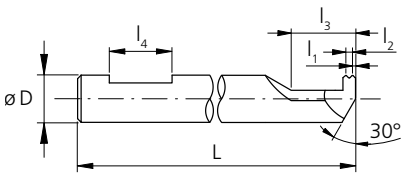
**Mikron Tool produces solid carbide form turning tools according to your needs and requirements:**

## CHARACTERISTICS

- For internal or external machining
- Form tolerance max.: ± 39 µin (1 µm)
- Number of cutting edges: 1 or more
- Cutting direction: right-hand cutting or left-hand cutting
- Material for form turning tool: tungsten carbide, grade selection depending on application

## COATINGS

Various choice according to application




## COOLING

- Form turning tools for external or integrated coolant supply

## TOOL HOLDING

- Clamping face for turning tools
- Others upon request

## MATERIAL TO BE MACHINED

Steel, corrosion-resistant steels, i.e. stainless steels, pure titanium / titanium alloys, super alloys or heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, drills for hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

## TREATMENTS

Cutting edge preparation

# Customized grooving tools



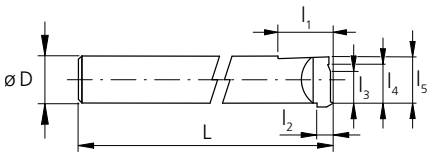
**Mikron Tool produces solid carbide grooving tools according to your needs and requirements:**

## CHARACTERISTICS

- For internal or external machining
- Form tolerance max.: ± 39 µin (1 µm)
- Number of cutting edges: 1 or more
- Cutting direction: right-hand cutting or left-hand cutting
- Material for grooving tool: tungsten carbide, grade selection depending on application

## COATINGS

Various choice according to application




## COOLING

- Grooving tools for external or integrated coolant supply

## TOOL HOLDING

- By means of clamping face for turning tools
- Others upon request

## MATERIAL TO BE MACHINED

Steel, corrosion-resistant steels, i.e. stainless steels, pure titanium / titanium alloys, super alloys or heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, drills for hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

## TREATMENTS

Cutting edge preparation

# crazy about reaming



# 10

CUSTOMIZED REAMING TOOLS 670

# Customized reaming tools

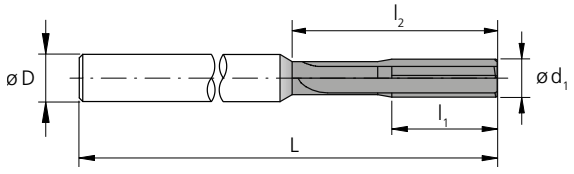


**Mikron Tool produces solid carbide reamers according to your needs and requirements and within the following range:**

- Reamer with 1-diameter
- Step reamer with different diameters
- Surface quality n5 can be obtained depending on cutting / coolant medium, machine tool equipment, spindle, tool holder (concentricity), material to be removed

## CHARACTERISTICS

- Diameter min: .016" (0.4 mm)
- Diameter max: 1.26" (32.0 mm), bigger following specific request
- Maximum tool length: 13" (330 mm)
- Tool diameter tolerance max.: ± 20 µin (0.5 µm)
- Concentricity with shaft max.: 79 µin (2 µm)
- Number of cutting edges: 1 up to 16
- Cutting direction: right-hand cutting or left-hand cutting
- Form of flutes: straight flutes left-hand helix, right-hand helix
- Division of teeth: regular or irregular
- Shape of cutting edges: various
- Reamer material: tungsten carbide, grade selection depending on application




## COATINGS

Various, choice according to application

## COOLING

- Reaming tools with straight internal cooling channels in the shaft
- Reaming tools with internal cooling channels, special exits, for example in the flutes
- Reaming tool for external coolant supply

## TYPE OF SHAFT

- Cylindrical as per DIN 6535 HA
- Cylindrical as per DIN 6535 HB (Weldon)
- Others upon request

## MATERIAL TO BE MACHINED

Reamer for steel, corrosion-resistant steels, i.e. stainless steels, pure titanium / titanium alloys, super alloys, i.e. heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

## TREATMENTS

Cutting edge preparation, polishing of flutes

# crazy about multifuncional



# MULTIFUNCIONAL TOOLS

# 11

CUSTOMIZED MULTIFUNCIONAL TOOLS 674

# Customized multifuncinal tools

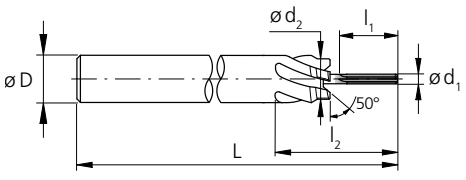


**Mikron Tool produces solid carbide multifunctional tools according to your needs and requirements and within the following range:**

- Various operations can be combined in one tool for example:
  1. Tool for centering + drilling
  2. Tool for centering + drilling + reaming
  3. Tool for drilling + reaming
  4. Drill + form drill
  5. Tool for milling + deburring

## CHARACTERISTICS

- Diameter min: .039" (1.0 mm)
- Diameter max: 1.26" (32.0 mm), bigger following specific requests
- Maximum tool length: 13" (330 mm)
- Tolerance of tool diameters max.: ± 20 µin (0.5 µm)
- Concentricity between shaft and cutting diameters.: 79 µin (2 µm)
- Number of cutting edges: 2 - 8
- Cutting direction: right-hand cutting or left-hand cutting
- Tool material: tungsten carbide, grade selection depending on application




## COATINGS

Various, choice according to application

## COOLING

- Tools with internal helix shaped cooling channels up to the tip of the tool
- Tools with straight internal cooling channels in the shaft
- Tools to be used with external coolant supply

## TYPE OF SHAFT

- Cylindrical as per DIN 6535 HA
- Cylindrical as per DIN 6535 HE (Whistle Notch)
- Cylindrical as per DIN 6535 HB (Weldon)
- Others upon request

## MATERIAL TO BE MACHINED

Tool for steel, corrosion-resistant steels, i.e. stainless steels, pure titanium / titanium alloys, super alloys, i.e. heat-resistant alloys such as Inconel or Hastelloy, CrCo alloys, hardened steel up to 55HRC, aluminum / aluminum alloys, brass, copper, cast materials, etc.

## TREATMENTS

Cutting edge preparation, polishing of flutes

# crazy about regrinding



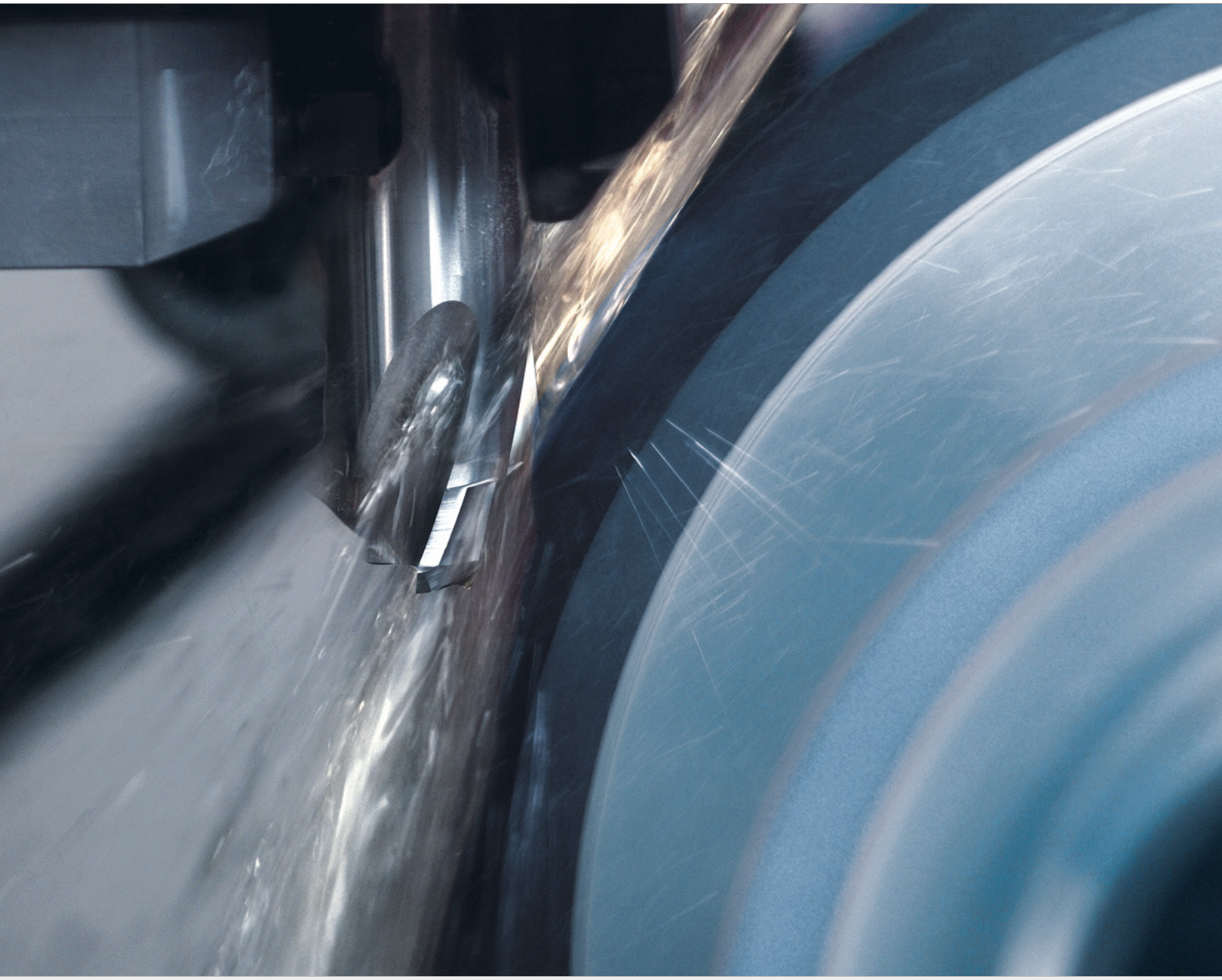
# REGRINDING

# 12


SAVE RESOURCES – REDUCE COSTS 678
Regrinding of tools increases savings significantly

TOP QUALITY ALSO WITH THE SECOND REGRIND 680
Tools reground by Mikron Tool have the same performance as new tools

# Save resources – reduce costs



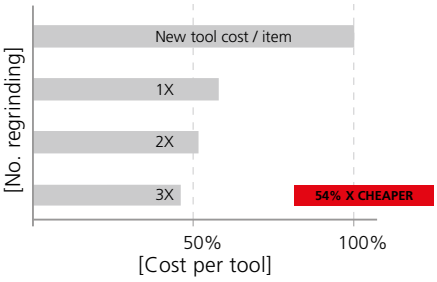
## REGRINDING INCREASES SAVINGS

Worldwide reserves of raw materials for carbide tools (cobalt and tungsten) are limited and expensive. This is also a reason to treat these resources with respect and to obtain a maximum of efficiency. If only for environmental reasons.

### Regrinding pays off

Economics is the most used argument justifying reprocessing of worn tools. Where a regrinding is possible, the price is reduced clearly for the second and third use. No new raw material is necessary, the tool geometry is already there, only the cutting edges are reground.

The example of a CrazyDrill Cool XL shows: With multiple regrinding the tool costs can be lowered by more than half.




54% = cost reduction per tool with regrinding for 25 pcs.
CrazyDrill Cool XL Ø.079" (2 mm), length 30 x d.

Multiple regrinding is worthwhile!

### Catalog tools

You find information regarding the feasibility to regrind a tool in this catalogue in form of a note for each tool under product description. The quantity graduations for the price of regrinding are in the pricelist.

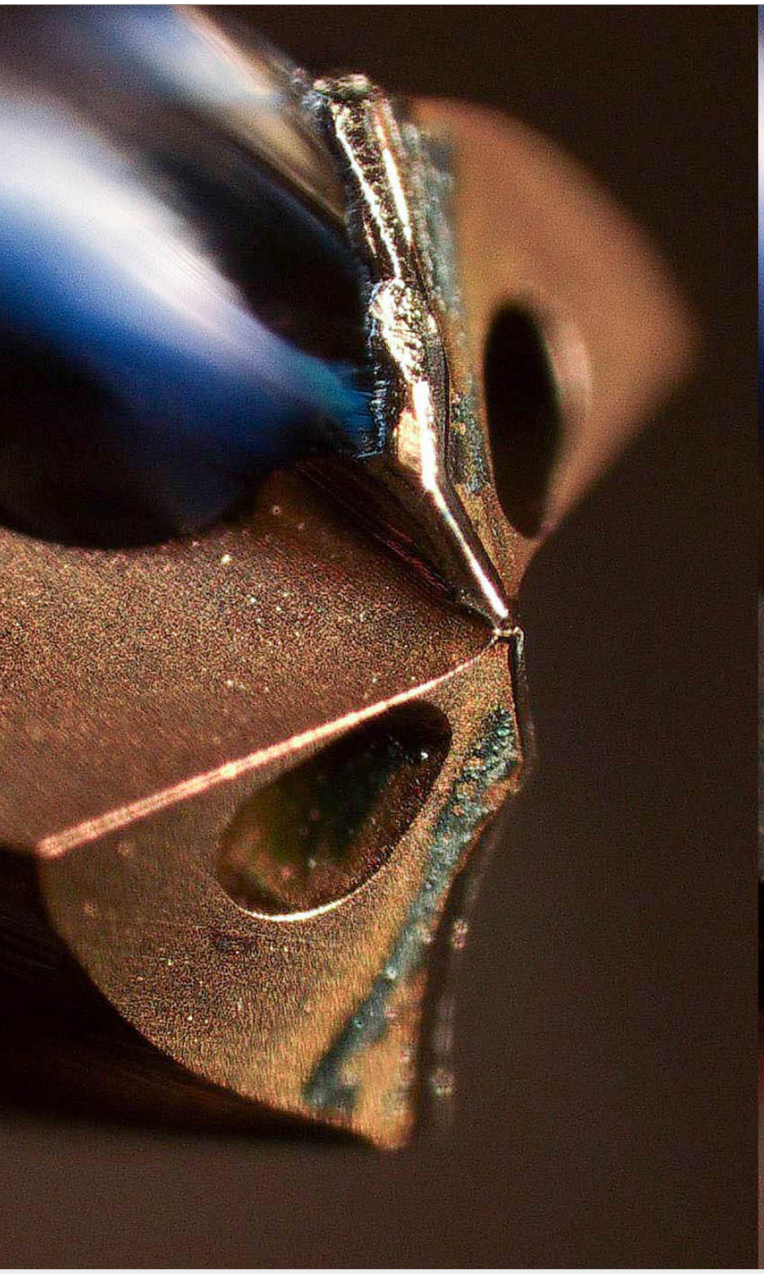
### Customer specific tools

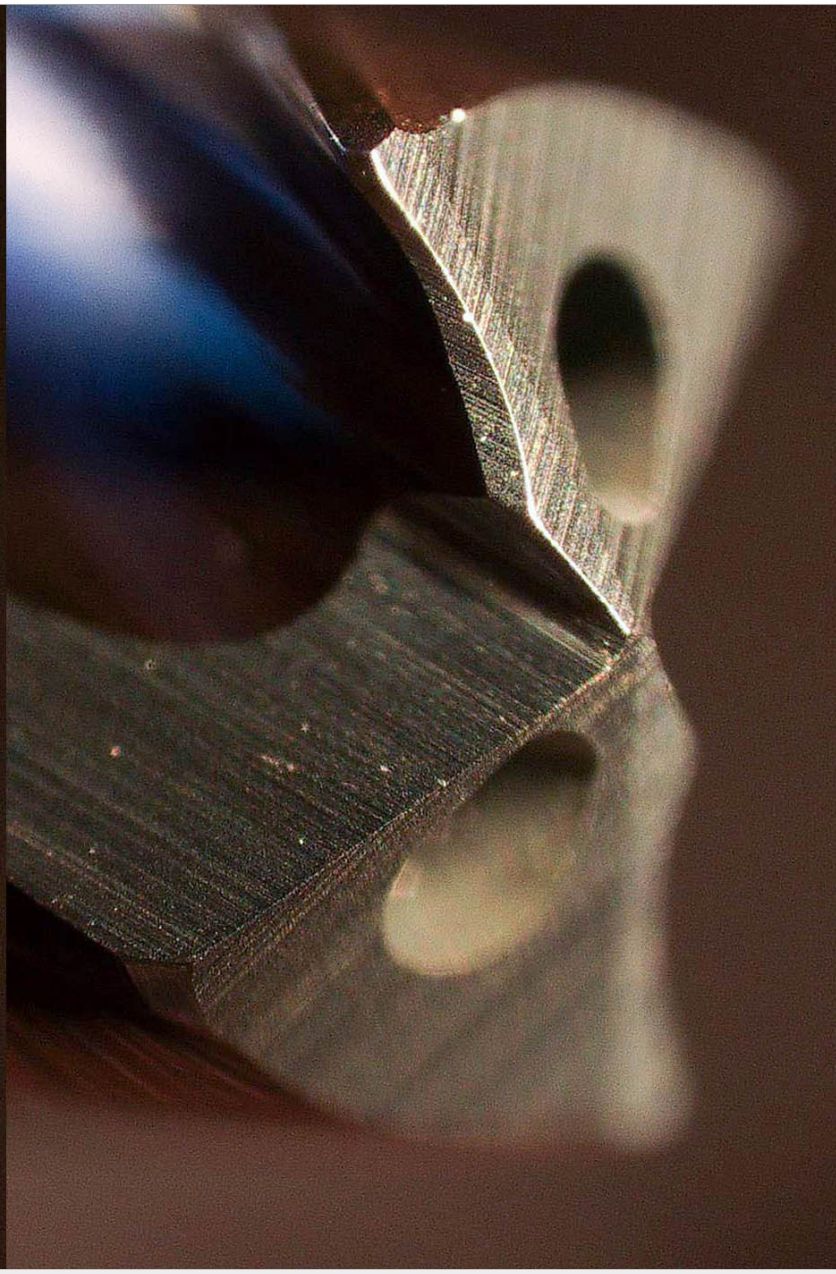
Check already in the planning of the purchase whether regrinding of a tool is possible. If yes, this allows the calculation of the tool price, which is significantly more economical than using always new tools.

### Conclusion

It's worthwhile to obtain information regarding the possibility of reprocessing tools already when buying new tools.

# Top quality also with the second regrind





## TOP PERFORMANCE ALSO WITH REGROUND TOOLS

**Highest quality also with the second regrind**

At Mikron Tool, when it comes to the quality of the final product, there is no difference between new and reground tools. This is valid for standard as well as customer specific tools.

**Selection for regrinding**

Regrinding starts with a detailed control and selection of the incoming, used tools. Whether a tool can be reground depends mainly on its condition. Significant breakout of the cutting edge angles, severely worn edges or tools which have already been reground several times are eliminated.

**Regrinding by the original manufacturer**

Why should the customer have regrinding be done by the original manufacturer?
Only the manufacturer knows his tools in detail. He guarantees that nothing is left up to chance when regrinding or even coating. All parameters are taken from the manufacturing process of new tools:

- same grinding machine
- same grinding wheels
- same grinding programs
- same edge preparation

After grinding, the tools receive an original coating and honing. A rigorous quality control completes the process.

The end-user has the guarantee that the quality of reground tools is identical to the one of new tools and that they can be used with the same cutting parameters.

# crazy about technical perfection



# 13


| | |
|---|---|
| **INTRODUCTION** | **684** |
| MACHINES | 686 |
| TOOL HOLDERS | 688 |
| COOLANT TYPE, PRESSURE AND FILTRATION | 692 |
| FORMULAS AND CONVERSIONS | 694 |

# Introduction



## TECHNICAL INFORMATION ON THE PROPER USE OF MIKRON TOOL CUTTING TOOLS

To fulfill current requirements for manufacturing precision and process reliability, the "machine tool – spindle – tool – tool holder" system must be perfectly matched.

**The machine tool:** High level of stiffness, vibration isolation of the foundations, lightweight design of the moving parts, high concentricity of the spindle, pull-in forces of the machine spindle, intelligent and fast machine controls
**The tool holder:** High concentricity and balance quality, friction-locked tightening of the tool
**The tool:** High concentricity, excellent balance quality (geometry, shaft design), long tool life (tool material, geometry, coating)

# Machines



## FROM THE MACHINE TO THE TOOL: THE PERFORMANCE MUST CONVINCE

Mikron Tool cutting tools can be used on CNC machining centers, lathes or transfer machines.

Minimum speeds and minimum concentricity of the spindle must be considered as well as whether or not the tools are used with through-tool coolant.

Details on the requirements for the various tool groups can be found in the individual product descriptions.

# Tool holders

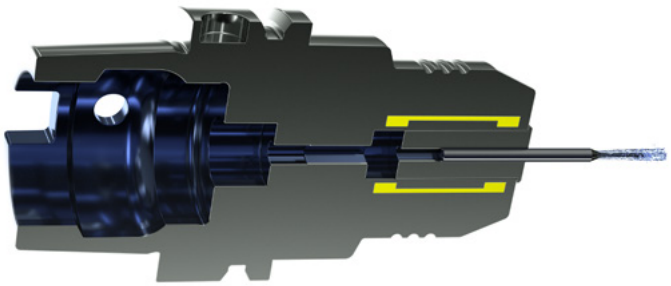


## THE RIGHT CLAMPING FOR EACH TOOL (APPLICATION)

### The clamping equipment

Mikron Tool recommends using a high-precision tool holder which, depending on the tool, is equipped with through-tool coolant supply.

### Hydraulic expansion tool holder



These ensure the high concentricity during drilling.

**Features**

Concentricity: .00012" (0.003 mm)
Max. speed: 50'000 rpm, balance rate (G 2.5 / 25000 $min^{-1}$)
Precise concentric clamping
High torque transmission
Maintenance-free (closed system)
No wear in the clamping diameter
Longer (up to 4 times) tool life
Adjustable clamping force
Short tool change time (without additional devices such as shrink fit device)

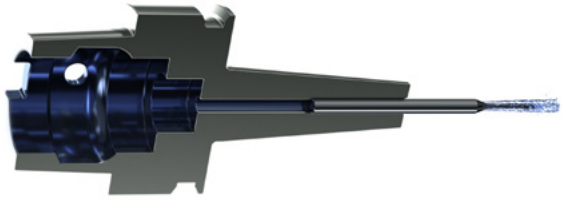
**Application**

High-precision clamping of tools with cylindrical shaft
Universal tool holder for milling (roughing and finishing) and drilling
Advantageous in the case of HSC processing (milling, e.g. on a small CNC milling machine) due to its shock-absorbing

# Tool holders

## THE RIGHT CLAMPING FOR EACH TOOL (APPLICATION)

### Shrink fit tool holder – shrink fit tool holder according to DIN 69871



These guarantee highest concentricity with secure friction-fit connection and form an optimal connection between the tool and the holder.

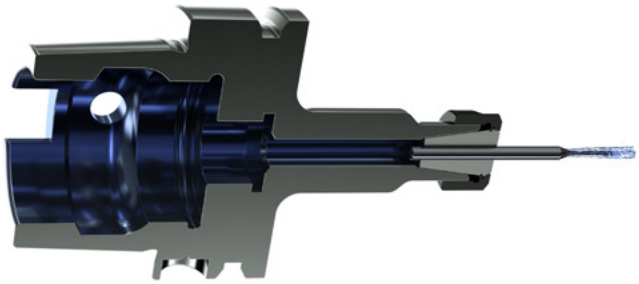
**Features**

- Concentricity: ≤ .00012" (0.003 mm)
- Max. speed: 40'000 rpm
- Absolutely secure friction-fit force transmission
- Adequate for shaft diameter of .158" (4 mm) (.118"(3 mm) are conditionally possible)
- Transmittable torque 2 to 4 times higher compared to the hydraulic-tool holder and the high precision collet tool holder
- Average tool change time (shrink fit device is necessary)
- Suitable for machining in narrow spaces and interfacing edges due to the small overall construction size and longer versions

**Application**

- Optimal for HSC machining, in particular also for smallest drills
- For milling and drilling tools with cylindrical shaft

**Collet tool holder systems (ER collet chucks) according to DIN 6499-A / optimized precision collets**



These guarantee highest concentricity.

**Features**

Concentricity: .00012" (0.003 mm) possible

Max. speed: 40'000 rpm

Average tool change time (a torque wrench is necessary)

**Application**

Clamping of tools with a cylindrical shaft in high precision collet according to DIN 6499

Universal tool holder for milling (roughing and finishing) and drilling

**Balance quality**

The balance quality of the collet tool holder is specially critical in high speed machining processes. The best possible balance quality guarantees not only reduced vibrations of the tool but increases tool life, improves surface quality and above all, protects the spindle bearings.

# Coolant type, pressure and filtration

## BEST CONDITIONS RESULT IN HIGHEST PERFORMANCE

### Coolant

For best results, Mikron Tool recommends using cutting oil as a cooling lubricant. Emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can also be used as an alternative.

### Coolant pressure and filters

The minimum required pressure and the filter quality depend on the coolant system.

#### External coolant supply



No particular requirements exist for coolant pressure and filters. It must be ensured, however, that the coolant is routed directly to the drill tip for effective cooling, lubrication, and chip removal.

#### Integrated coolant delivery through the shaft



The large cooling channels generally permit a standard filter with a filter quality of ≤ .0020" (0.050 mm). Tools with integrated cooling channels in the shaft require a minimum coolant pressure of at least 218 psi (15 bar) to ensure a reliable drilling or milling process. High pressure is generally better for the cooling and flushing effect.

#### Linear through tool coolant channels



The large cooling channels generally permit a standard filter with a filter quality of ≤ 0020" (0.050 mm). Tools with linear cooling channels require a minimum coolant pressure of at least 218 psi (15 bar) to ensure a reliable drilling process. High pressure is generally better for the cooling and flushing effect.

**Twisted coolant delivery up to the tip (round cross-section)**





Good filter quality is important in drilling tools with through-tool cooling, so that no dirt particles or chips reach the tool through the coolant supply and jeopardize coolant flow in the tool. The following filter qualities must be complied for small diameters:

Spiral drill types with diameter < .079" (2 mm) Filter quality ≤ .0004" (0.010 mm)
Spiral drill types with diameter < .118" (3 mm) Filter quality ≤ .0008" (0.020 mm)
Spiral drill types with diameter < .236" (6 mm) Filter quality ≤ .0020" (0.050 mm)

At least 435 psi (30 bar) coolant pressure is requested for drilling diameter .158" – .236"(4.0 – 6.0 mm) for a reliable drilling process. Higher pressures are needed for smaller drill diameters. High pressure is generally better for the cooling and flushing effect.

**Twisted coolant delivery up to the tip (drop shape)**





Good filter quality is important in drilling tools with through-tool cooling, so that no dirt particles or chips reach the tool through the coolant supply and jeopardize coolant flow in the tool. The following filter qualities must be complied for small diameters:

- Spiral drill types with diameter < 079" (2 mm) Filter quality ≤ .0004" (0.010 mm)
- Spiral drill types with diameter < .118" (3 mm) Filter quality ≤ .0008" (0.020 mm)
- Spiral drill types with diameter < 1/4" (6.35 mm) Filter quality ≤ .0020" (0.050 mm)

Tools with linear cooling channels require, at least, 435 psi (30 bar) coolant pressure for drilling diameter .158" – 1/4" (4.0 – 6.35 mm) for a reliable drilling process. Higher pressures are needed for smaller drill diameters. High pressure is generally better for the cooling and flushing effect.

Note:
Detailed data on the specific requirements can be found directly in the individual product descriptions.

# Formulas and conversions

## FORMULAS AND DIMENSIONS AT A GLANCE

### Formulas for drilling and milling

**Designation of parameters**

| | | | | | |
|---|---|---|---|---|---|
| **n** : | Spindle speed | [rpm] | **z** : | Number of teeth | [teeth] |
| **$v_c$** : | Cutting speed | [SFM] ⋮ $\left[\frac{m}{min}\right]$ | **$f_z$** : | Feed per tooth and revolution | [inch] ⋮ [mm] |
| **$d_1$** : | Diameter of the cutting edge | [inch] ⋮ [mm] | **$a_p$** : | Axial depth of cut | [inch] ⋮ [mm] |
| **$v_f$** : | Feed rate | $\left[\frac{inch}{min}\right]$ ⋮ $\left[\frac{mm}{min}\right]$ | **$a_e$** : | Radial depth of cut | [inch] ⋮ [mm] |
| **f** : | Feed per revolution | $\left[\frac{inch}{rev}\right]$ ⋮ $\left[\frac{mm}{rev}\right]$ | **Q** : | Material removal rate | $\left[\frac{inch^3}{min}\right]$ ⋮ $\left[\frac{mm}{min}\right]$ |
| **$Q_1$** : | Depth of first peck | [inch] ⋮ [mm] | **$d_{eff}$** : | Effective engagement diameter | [inch] ⋮ [mm] |
| **$Q_x$** : | Depth of further pecks | [inch] ⋮ [mm] | **β** : | Setting angle | [°] |

**Cutting speed**

$$v_c = \frac{\pi \cdot d_1 \cdot n}{1000} \cdot 3.28 \quad [SFM]$$

**Spindle speed**

$$n = \frac{1000 \cdot v_c}{\pi \cdot d_1} \quad [rpm]$$

**Feed per rotation**

$$f = f_z \cdot z \quad \left[\frac{inch}{rev}\right]$$

**Feed rate**

$$v_f = f \cdot n = f_z \cdot z \cdot n \quad \left[\frac{inch}{min}\right]$$

**Feed per tooth**

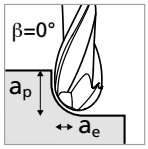
$$f_z = \frac{v_f}{z \cdot n} \quad [inch]$$

### Material removal rate

$$Q = \frac{a_p \cdot a_e \cdot v_f}{1000} \quad \left[\frac{\text{inch}^3}{\text{min}}\right]$$

### Effective engagement diameter

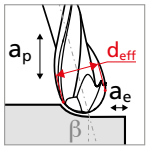
For ball end mills at a set angle β = 0°




$$d_{eff} = 2 \cdot \sqrt{d_1 \cdot a_p - a_p^2} \quad [\text{inch}]$$

### Effective engagement diameter

For ball end mills at a set angle 0°< β > 15°




$$d_{eff} = d_1 \cdot \sin\left[\beta + \cos^{-1}\left(\frac{(d_1 - 2 \cdot a_p)}{d_1}\right)\right] \quad [\text{inch}]$$

### Conversions between systems

1 [mm] = .0394 [inch]

$1\left[\frac{\text{m}}{\text{min}}\right]$ = 3.28 [SFM]

1 [bar] = 14.5 [psi]

# crazy about first quality worldwide



# GENERAL INFORMATION & ITEM INDEX

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# Global presence

## CLOSE TO THE CUSTOMER

Worldwide we are present in four different locations with our own subsidiaries:

**Agno – Switzerland**




Our main office with 160 employees ist the center of our activities: production, research & development, administration, sales and technical support, stock.

**Rottweil – Germany**




The second most important pillar is located in South Germany: production, re-sharpening, sales and technical support, project management, stock. In addition, the European customers are supplied from this location quickly and efficiently with standardized Mikron Tool products by means of the "Euro-Stock".

**Monroe – USA**




For the American continents (North and South America), a sales team is available: sales and technical support, stock.
Moreover, Mikron Tool represents an additional product lines in USA:

■ Milling cutters from Japan NS TOOL

**Shanghai – China**



In Shanghai, a sales team is available to the customers in Asia: sales and technical support.

**Representatives network**

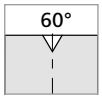
Mikron Tool is working worldwide with various partner companies. This way, we guarantee, along with the company-own locations, an efficient and competent technical support to our customers in the entire world.

# Icons

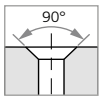
## ICONS AT A GLANCE



Tool material



Chamfer 60°



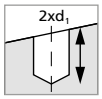
Pilot drilling with chamfer 90°



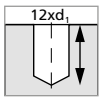
Tool without coating



Coating eXedur RIP



Max. drilling depth 2 x d
inclined surface

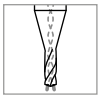


Max. drilling depth 12 x d


Flood coolant


Linear through tool coolant


Integrated shaft coolant

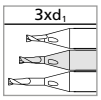

Twisted through tool coolant



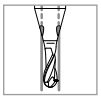
Tip angle 140°

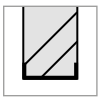


Teeth number



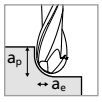
Max. machining depth 3 x d


Mill with integrated
shaft coolant

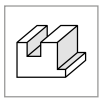

Square mill


Corner radius mill

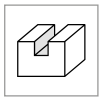

Ball mill



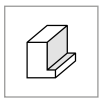

$a_p$ = depth feed,
$a_e$ = lateral feed



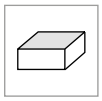
Slot and side milling



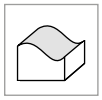
Slot milling



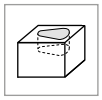
Side milling



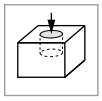
Face milling



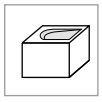
Copy milling



Pocket milling



Plunge milling



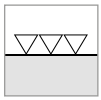
Linear ramp milling




Helix angle 30°



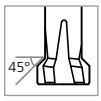
Machining direction



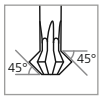
Perfect surface quality
similar to grinding quality




CrazyMill Frontchamfer




CrazyMill Backchamfer




CrazyMill Doublechamfer




CrazyMill Radiuschamfer

# Sales conditions and certificates

## SALES AND QUALITY

### Sales conditions

You find the detailed sales terms for Mikron Tool products under:

www.mikrontool.com/en/Download/Sales conditions

### Certificates


Certificate

Mikron Switzerland AG, Agno
Division Tool
Via Campagna 1
6982 Agno
Switzerland

Further sites according to appendix

Engineering and production of cutting tools

ISO 9001:2015 Quality Management System
ISO 14001:2015 Environmental Management System
ISO 45001:2018 Occupational Health and Safety Management System

The certification according to the ISO standards is self-evident for Mikron Tool. We have been working continuously on the quality of our processes, their reliability and environmental compatibility. We are now in possession of all important certificates in our industry: ISO 9001, ISO 14001 und OHS 18001.

Would you like to download a copy of our certificate?
You find it under: www.mikrontool.com/en/Download/Certificates

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# Notes

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