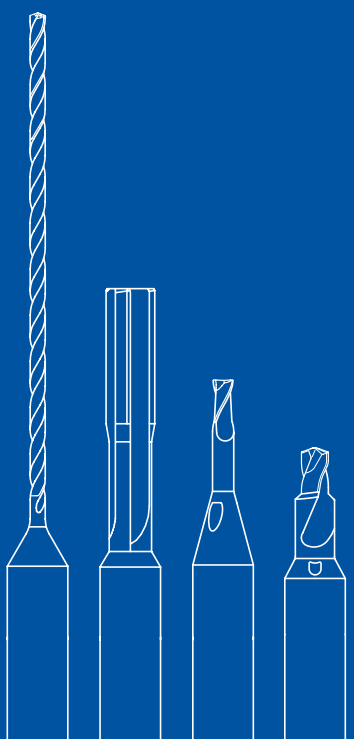
MIKRON TOOL

More than tools

crazy about cool tools

CUTTING SOLUTIONS

2024 – 2027



English

crazy about cool tools

MIKRON TOOL

WHY MIKRON TOOL

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 0.1 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 0.1 mm to 32.0 mm.

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 +/- 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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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

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	

RECOMMENDATION FOR USE

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

ø - range [mm]	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	Alloyed titanium	Pure titanium	CrCo alloys	Hardened steel <55 HRC	Hardened steel ≥55 HRC	
1.0 – 6.35	3 x d + Chamfer 90°	✔	–	⊠	⊠	⊠	⊠	⊠	●	⊠	⊠	⊠	⊠	**16**
1.0 – 6.35	6 x d 10 x d	✔	–	⊠	⊠	⊠	⊠	⊠	●	⊠	⊠	⊠	⊠	**18**
1.0 – 6.35	3 x d 6 x d	✔	–	⊠	⊠	⊠	⊠	⊠	⊠	●	⊠	⊠	⊠	**18**
0.9 – 3.8 (T4 – T30)	variable + Chamfer 120°	–	✔	⊠	●	⊠	⊠	⊠	●	●	●	⊠	⊠	**20**
0.2 – 1.0 (T4 – T30)	3.5 x d 5 x d	–	✔	⊠	⊠	⊠	⊠	⊠	⊠	⊠	●	⊠	⊠	**20**
0.2 – 1.0	3 x d 5 x d	✔	–	●	●	●	●	●	●	●	●	●	⊠	**22**
1.0 – 8.0	2.5 x d 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: 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 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.

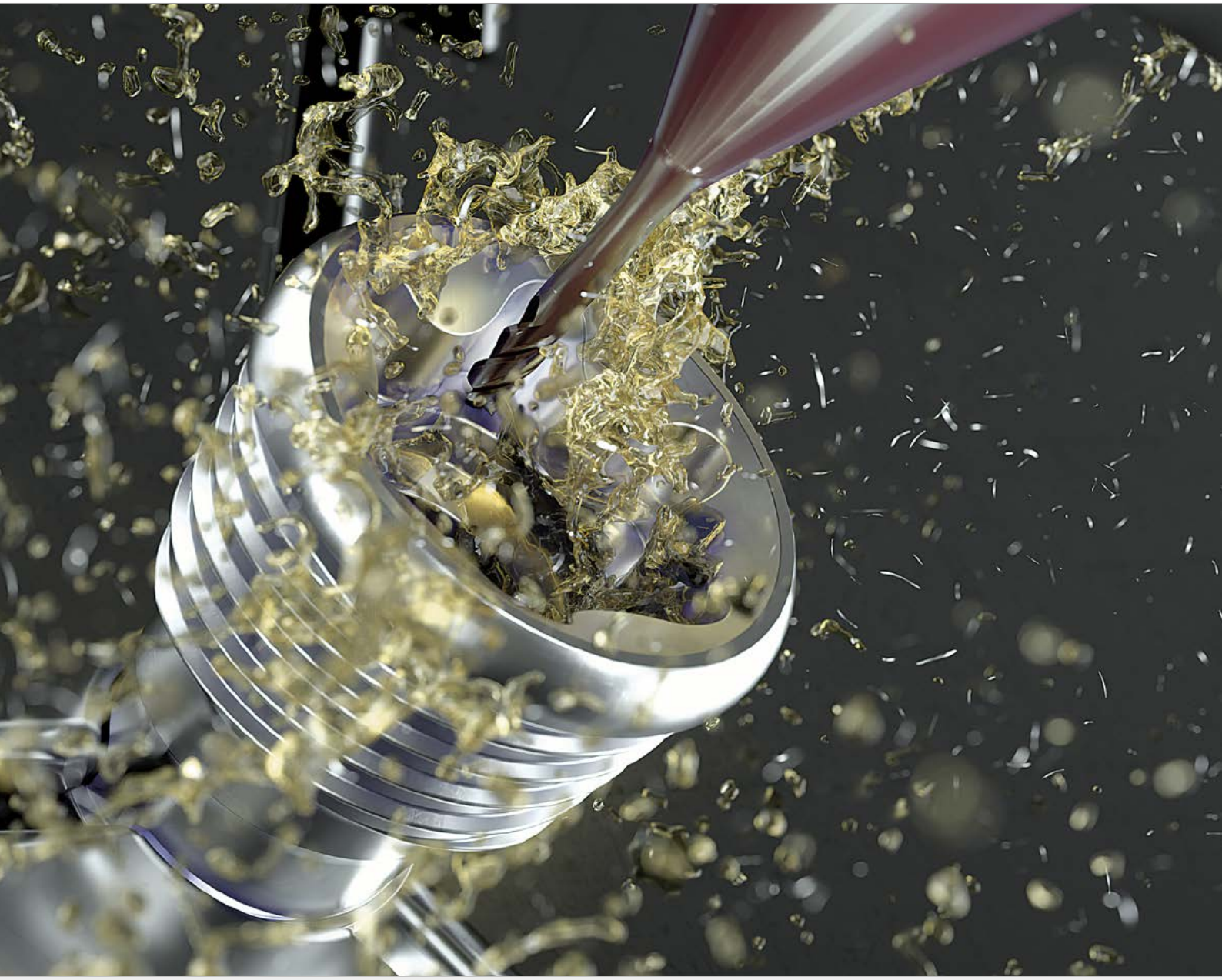
The features: These drills, which are perfectly matched to the respective titanium grades, achieve maximum drilling performance combined with high process reliability. It is now even possible to drill titanium alloys up to 10 x d in a single step without multiple pecking for chip removal. Thanks to the 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

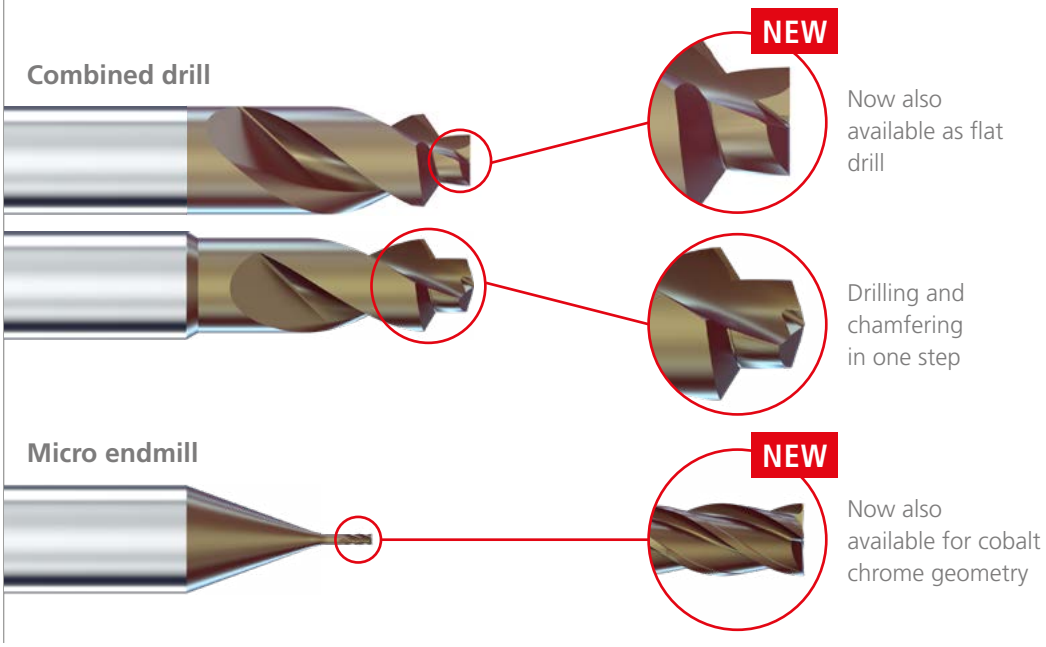
New concept

- 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

01

CRAZYMILL Cool Micro

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

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 0.2 mm to 1.0 mm with a milling depth of up to 5 x d:

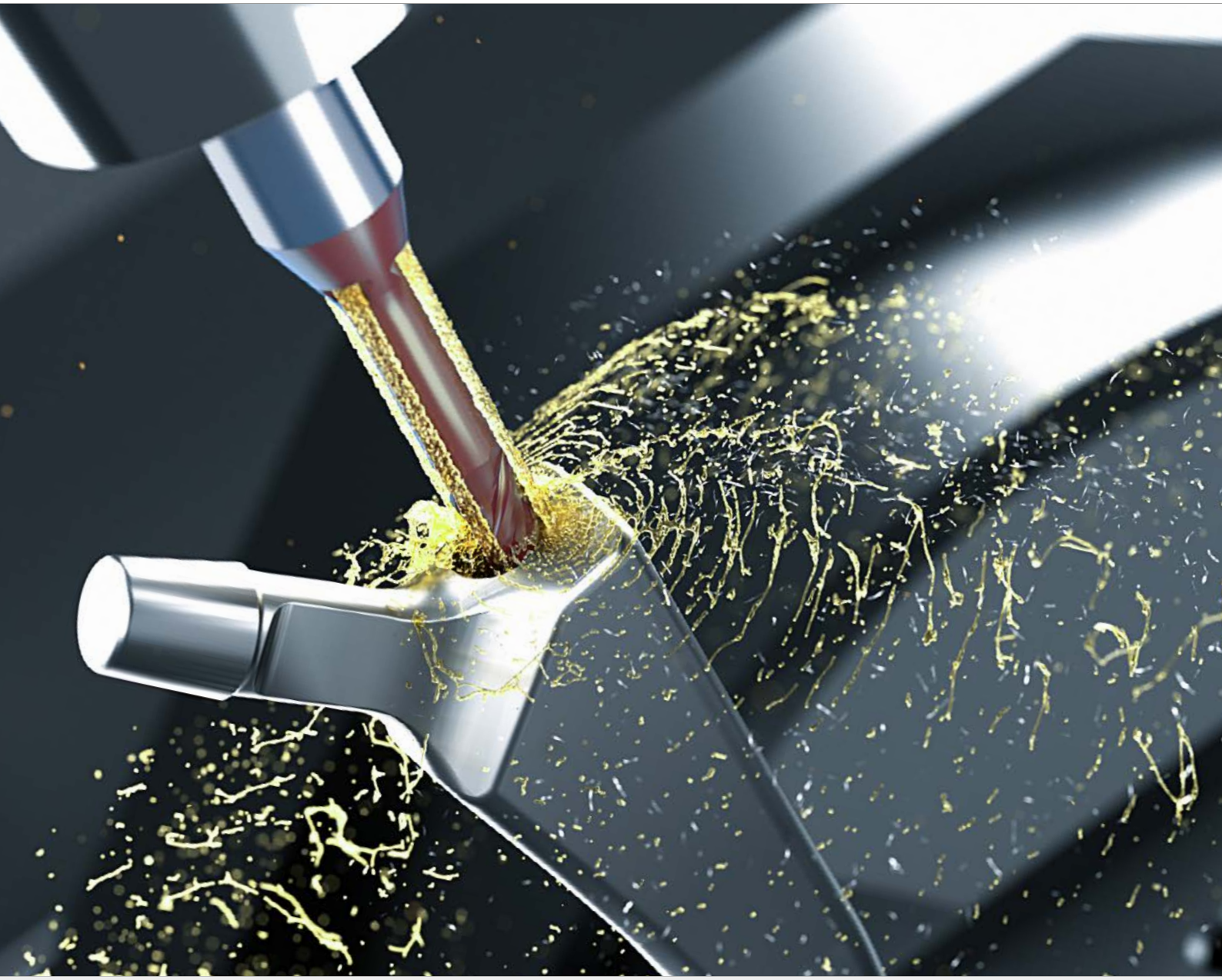
- **Geometry S** - specially developed for stainless steels, structural steels, non-ferrous metals and titanium alloys. It is characterized by a higher cutting capacity for materials with a specific cutting force of less than 2250 N/mm^2.
- **Geometry SX** - featuring a special cutting edge protection,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

TECHNICAL SUPPORT & TECHNOLOGY CENTER

crazy about competence

TECHNICAL SUPPORT & TECHNOLOGY CENTER

02

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:

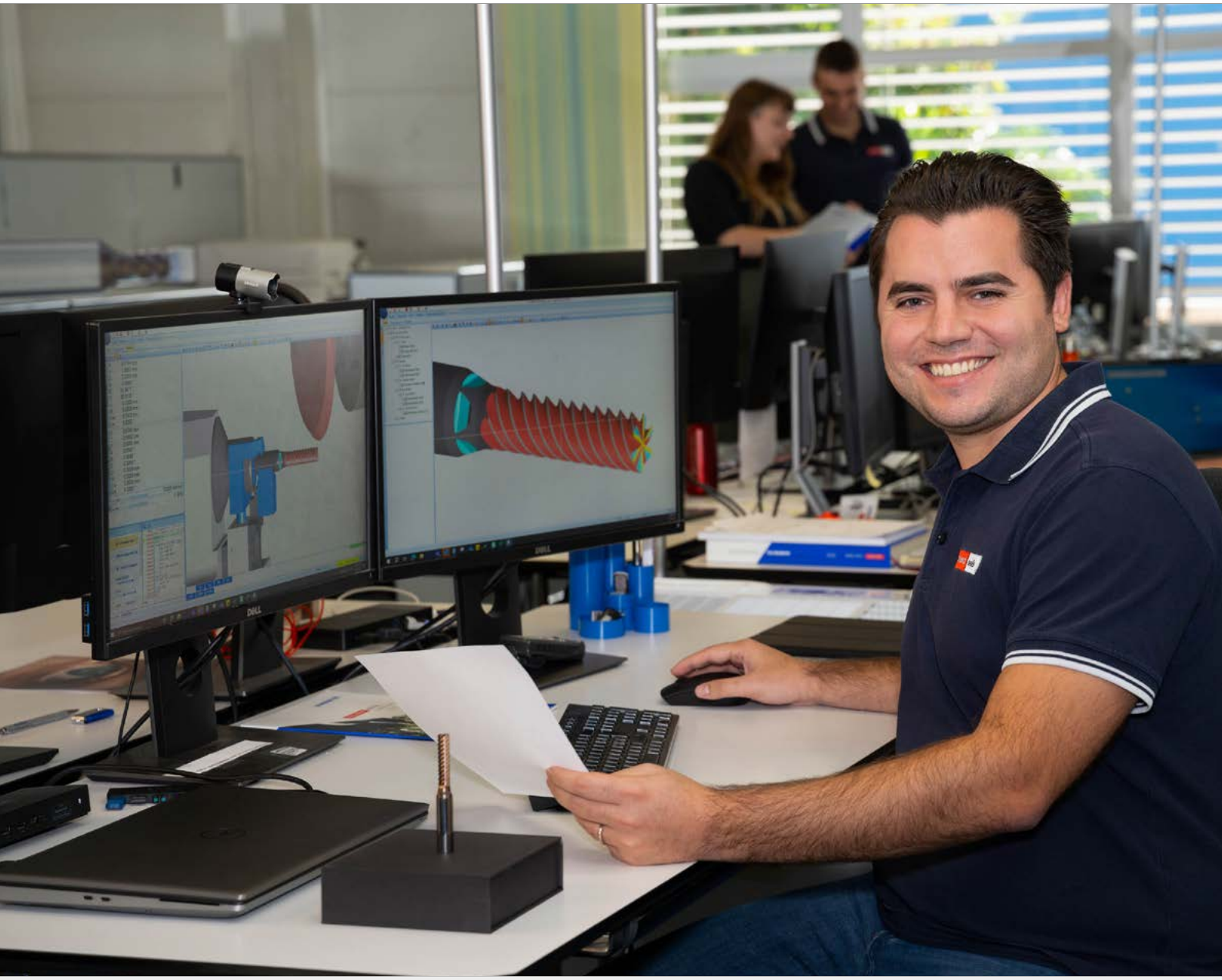
- Which kind of material are you machining?
- Which coolant are you using?
- Which is the maximum spindle speed on your machine?

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

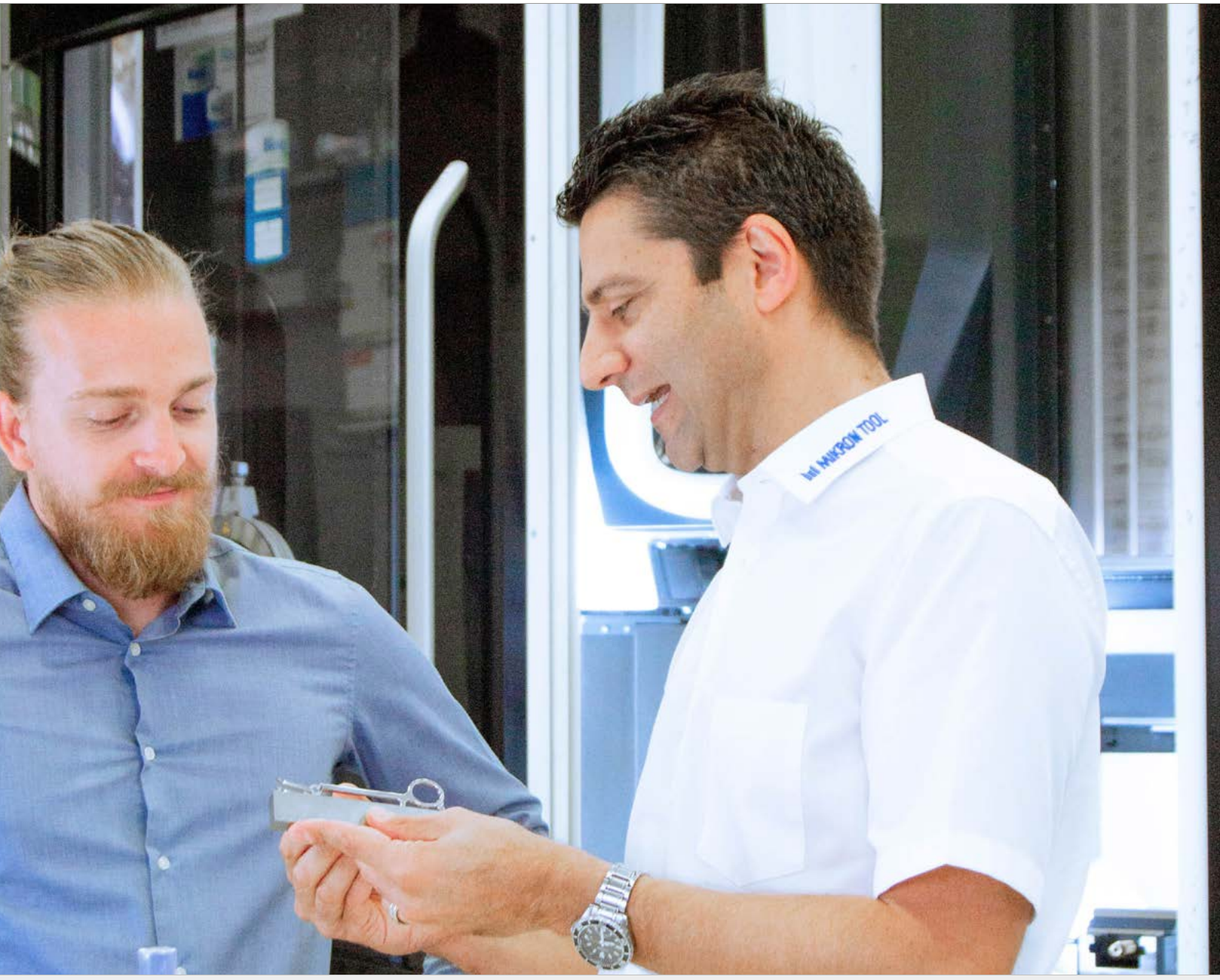
All of the new Mikron Tool products are developed at the Technology Center in Agno / Switzerland. It goes without saying that even crazy ideas are sometimes presented to us here.

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

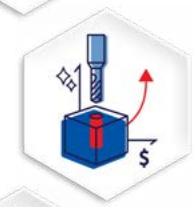


MORE THAN JUST A TOOL FOR THE CUSTOMER

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

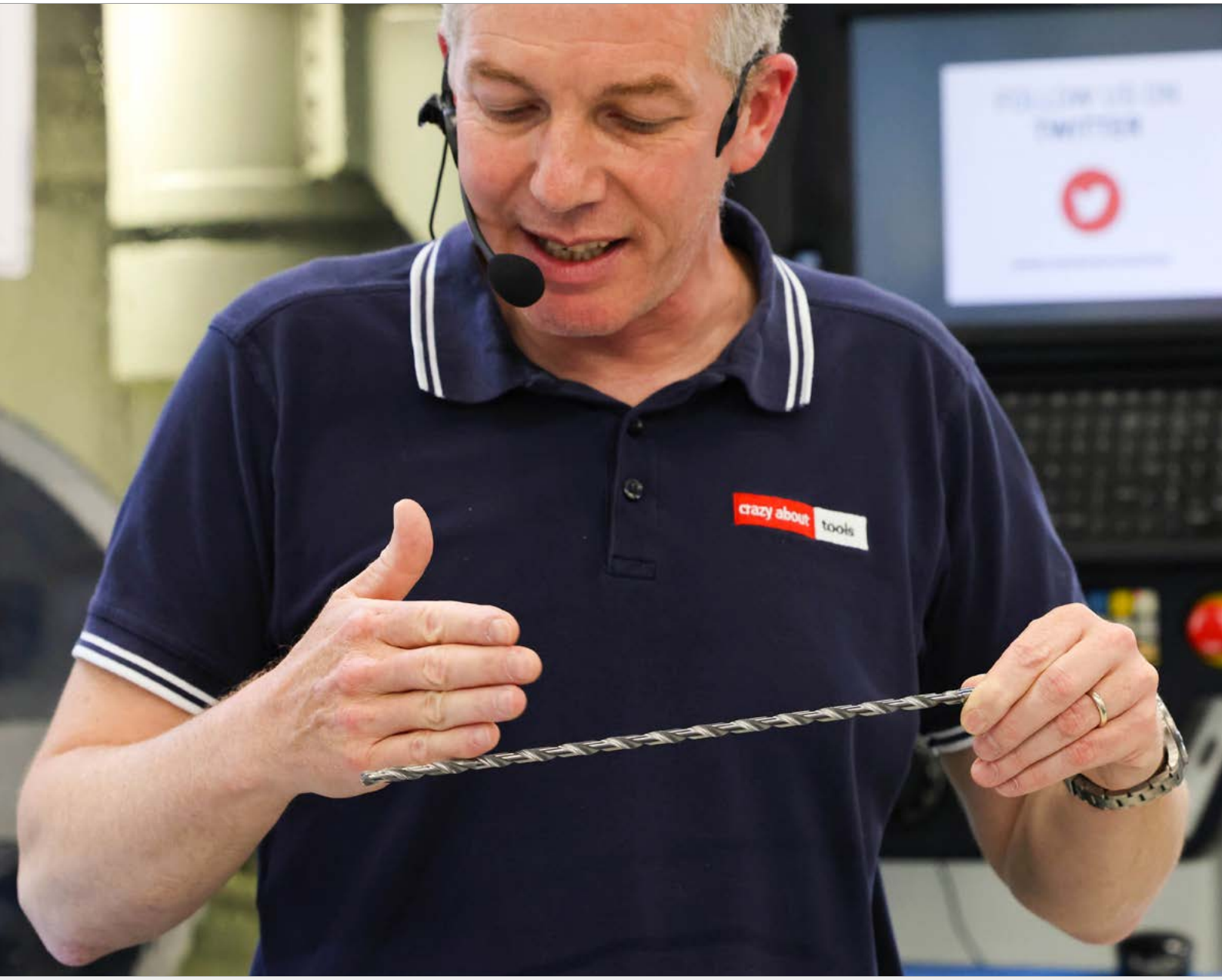
Customer-specific tools are used to optimize critical features or processes.
Validation through machining testing on the machine.
Reduce process and tooling costs.

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

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 conditions as well as the high requirements for a certification in medical field, the production of 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

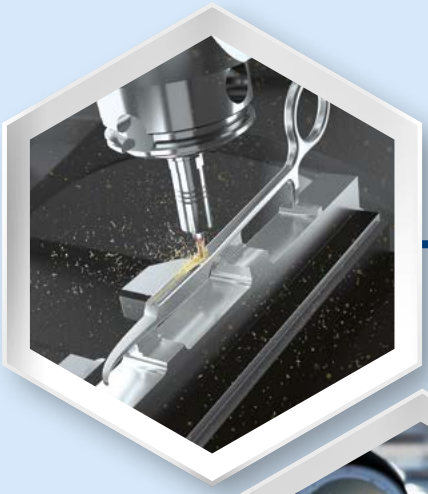
Where are tools of Mikron Tool used? More or less everywhere where machining takes place, be it from a machine center, an automatic lathe or based on 3D printing; be it for a single part, for small or large series or for mass production.

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.

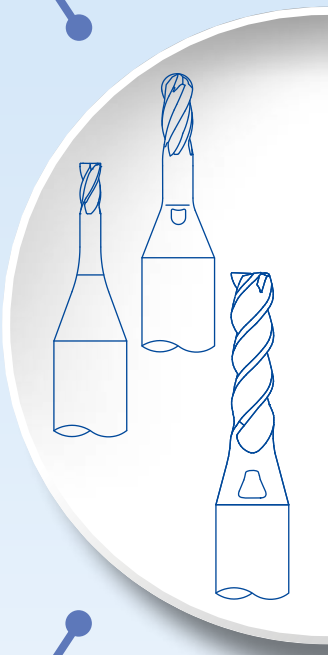
Technology Solutions

- Machining process reliability
- Cycle time reduction
- Excellent surface quality Ra < 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

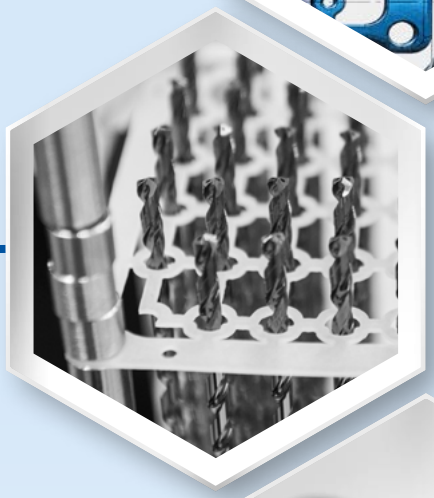
- **MSDS:** Tools and coating material safety data sheets
- **Quality management system:** ISO 9001:2015
- **Environmental management system:** ISO 14001:2015
- **OHS management system:** ISO 45001:2018

Technology Center

- Technical support
- Developments
- CrazyService Products
- Training

Challenges

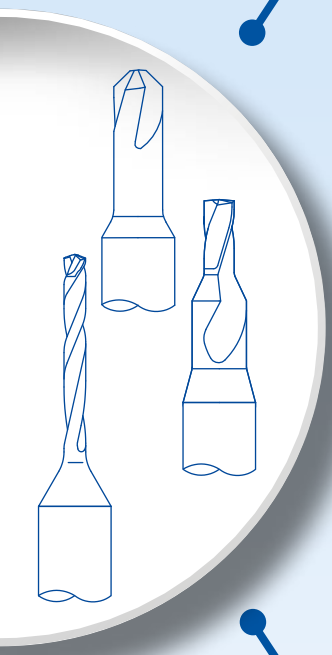
- Nearly burr free
- High surface quality
- Optimised productivity
- Improved process reliability



Cutting tool technology

CRAZYTOOL by Mikron Tool

- **Repeatability:** Guaranteed technical features for each produced batch
- **Dimension:** Micro dimensions from diameter 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

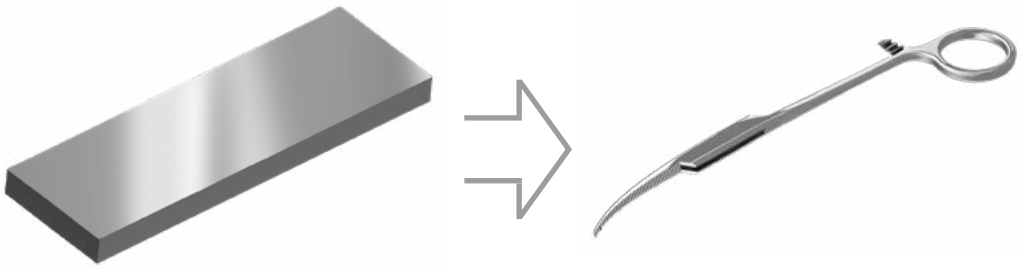
- High-Speed cutting 5-axis machining centers
- CNC swiss type automatic lathe
- Turn-mill machining center

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: 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: 80 bar internal coolant with cutting oil (viscosity: 10 mm^2/s)

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

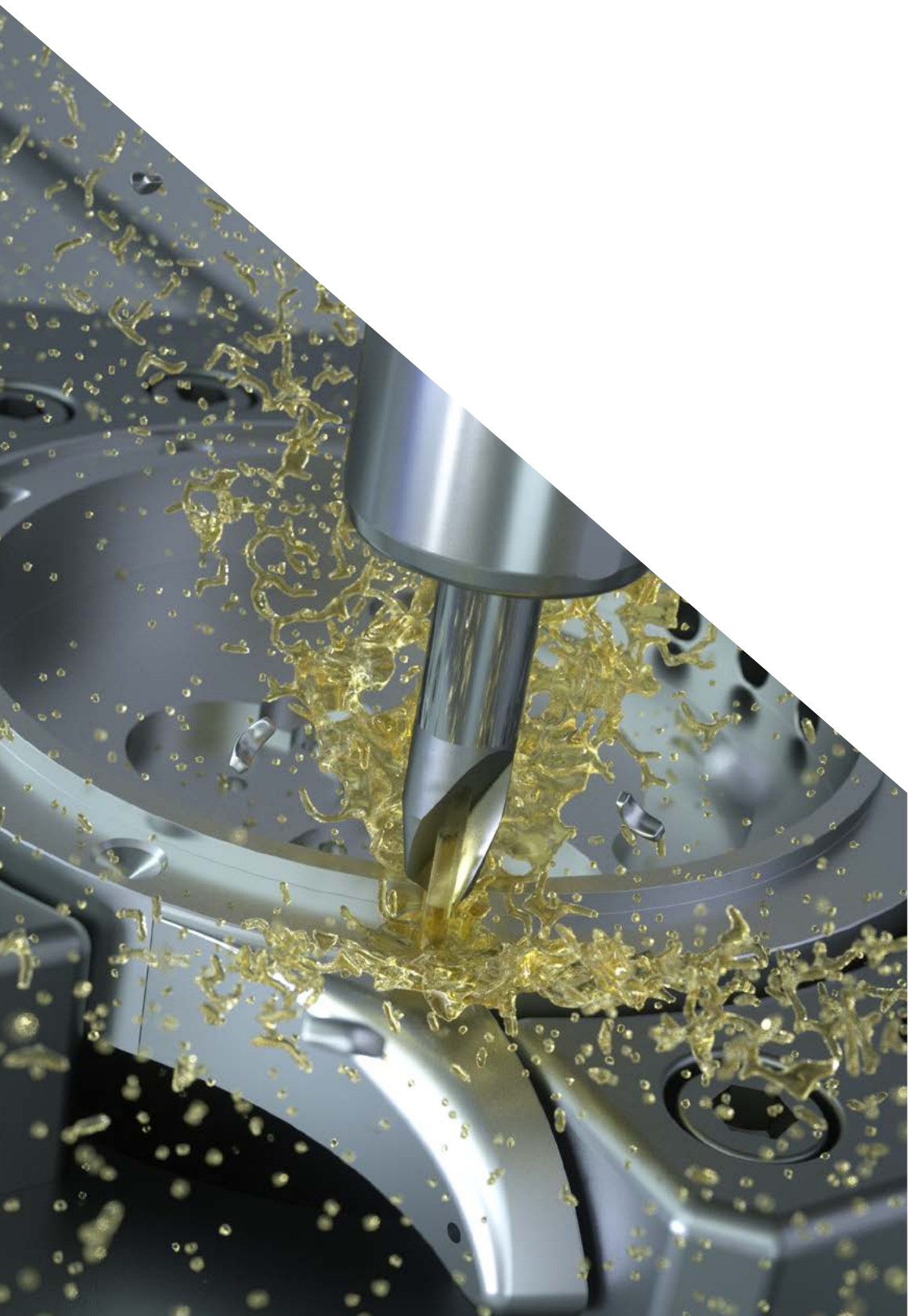
- Nearly burr free - no post finishing
- Surface quality: Ra = 0.2 µm / Rz = 0.6 µm

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

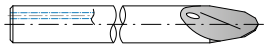


CENTERING TOOLS

04

Overview

CUTTING TOOL SOLUTIONS

MIQUDRILL™ by Mikron Tool Centro	
CRAZYDRILL™ by Mikron Tool Twicenter	
Customized center drills	

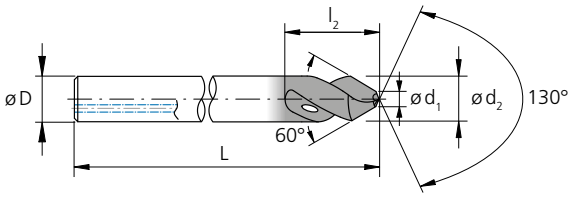
RECOMMENDATION FOR USE

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

ø - range [mm]	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	–	–	✔	◐	○	◐	◐	⊠	◐	⊠	◐	⊠	**54**
0.3 – 10.0	–	✔	✔	●	●	●	●	●	●	●	●	⊠	**66**
0.1 – 32.0	–	✔	✔	●	●	●	●	●	●	●	●	●	**82**

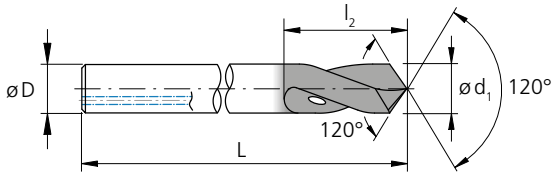
Codification key

ITEM NUMBER EASY TO UNDERSTAND



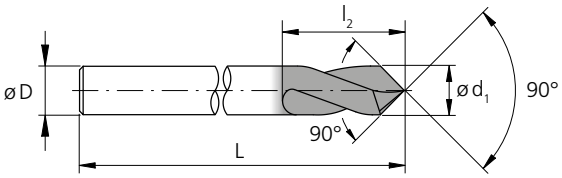
2.CC.60100.60

- **Division number**
  - 2 = Mikron Tool SA Agno
- **Family**
  - CrazyDrill Twicenter
- **Cutting diameter d_1**
  - 60 = Ø 6 mm
- **Second diameter d_2**
  - 100 = Ø 10 mm
- **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
- **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

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 0.5 mm to 6.0 mm - coated version (eXedur RIP)
- from 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 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.

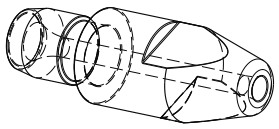
Please note: You couldn't find your suitable version of the MiquDrill Centro (diameter, length, cutting direction…)? Ask us about our customized versions!

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

DRILLING TOOL
Mikron Tool - MiquDrill Centro - coated

DATA	MIKRON TOOL
Tool type	MiquDrill Centro - Carbide - Coated - External cooling
Item number	2.MC.120300.1
Cutting data	v_c = 50 m/min f = 0.08 mm/rev

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.

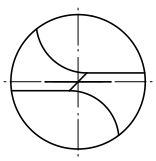
2 | SHAFT
The accurately ground shaft guarantees high concentricity and therefore highest position accuracy.

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 0.1 mm).

Tip drill

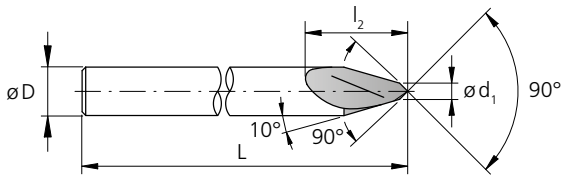


MIQUDRILL by Mikron Tool Centro

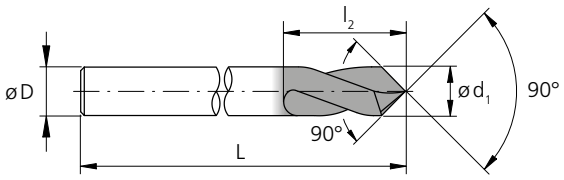
MiquDrill Centro 90° / 120° - coated

Carbide | Z2 | eXedur RIP

90°



Execution: d_1 = 0.5 and 1.0 mm

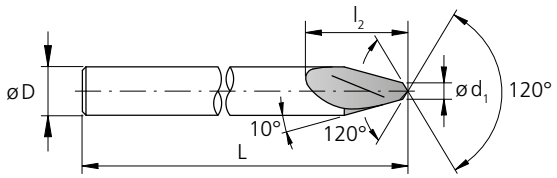


Execution: d_1 = 2.0 to 6.0 mm

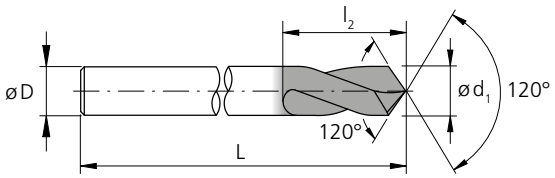
d_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer	Item number	Availability
0.5	4.5	2	30	90°	2.MC.090050.1	■
1.0	4.5	2	30	90°	2.MC.090100.1	■
2.0	6.0	2	30	90°	2.MC.090200.1	■
3.0	8.0	3	40	90°	2.MC.090300.1	■
4.0	10.0	4	45	90°	2.MC.090400.1	■
5.0	12.0	5	50	90°	2.MC.090500.1	■
6.0	15.0	6	60	90°	2.MC.090600.1	■

■ Stock item, packing unit of 3 pcs.

120°



Execution: d_1 = 0.5 and 1.0 mm

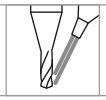


Execution: d_1 = 2.0 to 6.0 mm

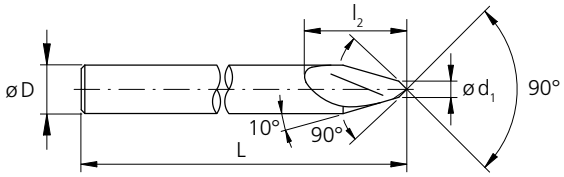
d_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer	Item number	Availability
0.5	4.5	2	30	120°	2.MC.120050.1	■
1.0	4.5	2	30	120°	2.MC.120100.1	■
2.0	6.0	2	30	120°	2.MC.120200.1	■
3.0	8.0	3	40	120°	2.MC.120300.1	■
4.0	10.0	4	45	120°	2.MC.120400.1	■
5.0	12.0	5	50	120°	2.MC.120500.1	■
6.0	15.0	6	60	120°	2.MC.120600.1	■

■ Stock item, packing unit of 3 pcs.

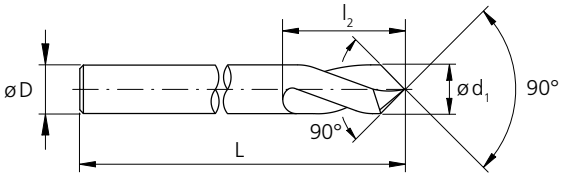
MiquDrill Centro 90° / 120° - uncoated

Carbide | Z2 |  | Uncoated

90°



Execution: d_1 = 0.5 and 1.0 mm

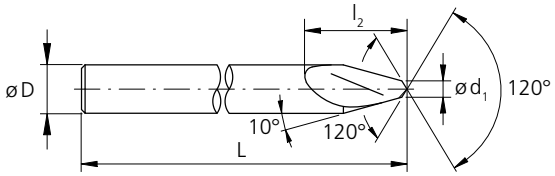


Execution: d_1 = 2.0 to 6.0 mm

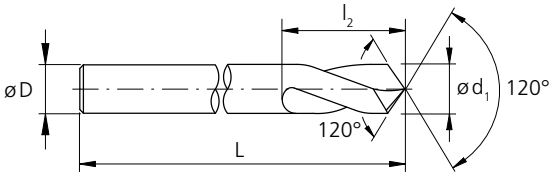
d_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer	Item number	Availability
0.5	4.5	2	30	90°	2.MC.090050.0	■
1.0	4.5	2	30	90°	2.MC.090100.0	■
2.0	6.0	2	30	90°	2.MC.090200.0	■
3.0	8.0	3	40	90°	2.MC.090300.0	■
4.0	10.0	4	45	90°	2.MC.090400.0	■
5.0	12.0	5	50	90°	2.MC.090500.0	■
6.0	15.0	6	60	90°	2.MC.090600.0	■

■ Stock item, packing unit of 3 pcs.

120°



Execution: d_1 = 0.5 and 1.0 mm



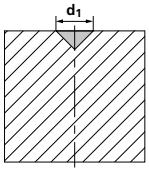
Execution: d_1 = 2.0 to 6.0 mm

d_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer	Item number	Availability
0.5	4.5	2	30	120°	2.MC.120050.0	■
1.0	4.5	2	30	120°	2.MC.120100.0	■
2.0	6.0	2	30	120°	2.MC.120200.0	■
3.0	8.0	3	40	120°	2.MC.120300.0	■
4.0	10.0	4	45	120°	2.MC.120400.0	■
5.0	12.0	5	50	120°	2.MC.120500.0	■
6.0	15.0	6	60	120°	2.MC.120600.0	■

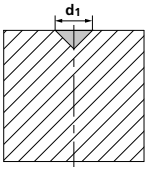
■ Stock item, packing unit of 3 pcs.

MiquDrill Centro 90° / 120° - coated

CENTERING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



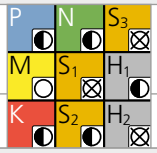
90°



120°

Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	20 – 80
		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
		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
		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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	20 – 60
		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
		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
		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
		3.4365	AlZnMgCu1.5	ASTM 7075	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	50 – 100
		3.2381	GD-AlSi10Mg	UNS A03590	
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	50 – 100
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	50 – 100
		2.0360	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	50 – 100
		2.1020	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	50 – 100
		2.0960	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
		3.7065	Gr.4	ASTM B348 / F68	
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20 – 50
		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
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2	

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



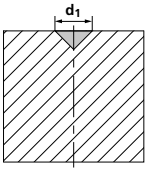
f [mm/rev]

	Ød1						
	0.5 mm	1.0 mm	2.0 mm	3.0 mm	4.0 mm	5.0 mm	6.0 mm
	f	**f**	**f**	**f**	**f**	**f**	**f**
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.020	0.030	0.040	0.060	0.080	0.120	0.130
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.020	0.030	0.040	0.060	0.080	0.120	0.130
	0.020	0.030	0.030	0.040	0.060	0.080	0.080
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.020	0.030	0.030	0.040	0.060	0.080	0.080
	0.020	0.030	0.030	0.040	0.060	0.080	0.080
	0.020	0.030	0.040	0.060	0.080	0.100	0.120

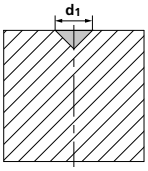
MIQUDRILL by Mikron Tool Centro

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]
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	20 – 50
		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
		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
		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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	20 – 40
		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
		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
		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
		3.4365	AlZnMgCu1.5	ASTM 7075	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	40 – 80
		3.2381	GD-AlSi10Mg	UNS A03590	
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	40 – 80
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40 – 80
		2.0360	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	40 – 80
		2.1020	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	40 – 80
		2.0960	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
		3.7065	Gr.4	ASTM B348 / F68	
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	15 – 25
		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

P ◐	N ◐	S_3 ⊠
M ○	S_1 ⊠	H_1 ⊠
K ◐	S_2 ◐	H_2 ⊠

	f [mm/rev]						
	Ød1						
	0.5 mm	1.0 mm	2.0 mm	3.0 mm	4.0 mm	5.0 mm	6.0 mm
	f	f	f	f	f	f	f
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.020	0.030	0.040	0.060	0.080	0.120	0.130
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.020	0.030	0.040	0.060	0.080	0.120	0.130
	0.020	0.030	0.030	0.040	0.060	0.080	0.080
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.030	0.050	0.060	0.080	0.100	0.150	0.150
	0.020	0.030	0.030	0.040	0.060	0.080	0.080
	0.020	0.030	0.030	0.040	0.060	0.080	0.080
	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.

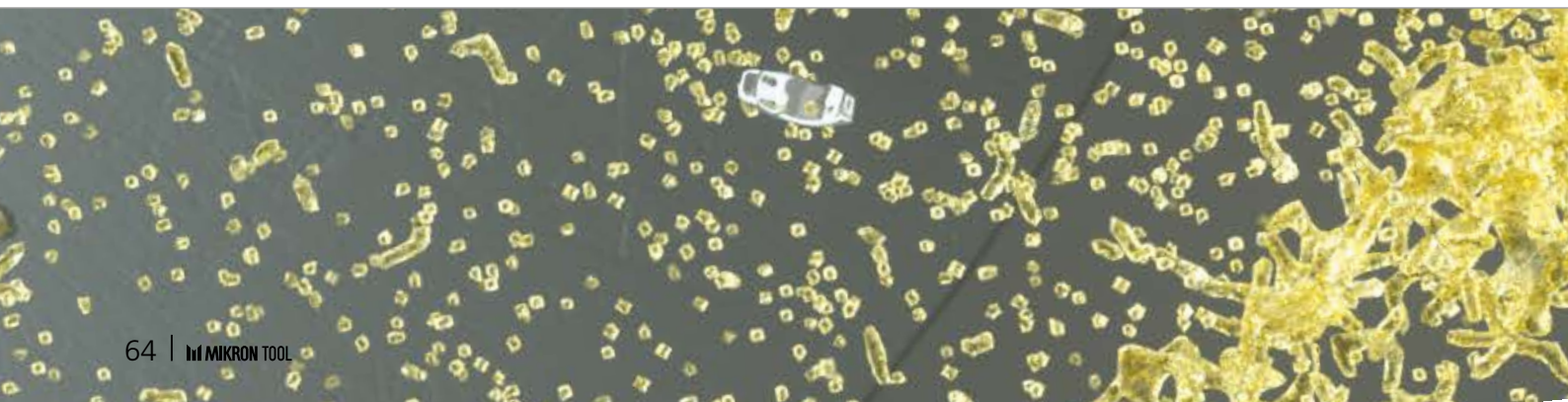
For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the coolant fluid is directed to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

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.

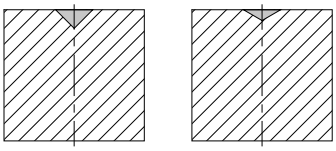


CENTERING PROCESS

Centering and chamfering in one step

1 | CENTER DRILLING

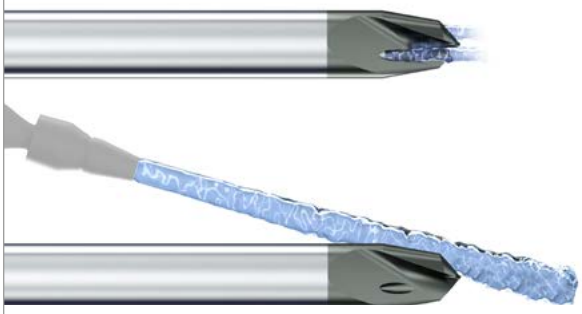
- With MiquDrill Centro in one step.



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 0.3 up to 6.0 mm for centering and 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 position accuracy.

This center drill has two unique features:

- Two straight cooling channels orienting the coolant to the tip and guaranteeing 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 1 mm for 60°/90° and from Ø 2 mm for 120°.

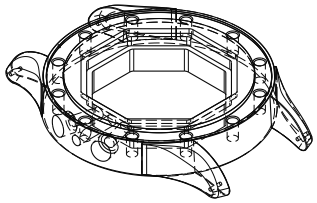
Please note: You couldn't find your suitable version of the CrazyDrill Twicenter (diameter, length, cutting direction…)? Ask us about our customized versions!

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

DRILLING TOOL
Mikron Tool - CrazyDrill Twicenter 90°

DATA	MIKRON TOOL
Tool type	CrazyDrill Twicenter - Carbide - Coated - Internal cooling
Item number	2.CC.05014.90
Cutting data	v_c = 50 m/min f = 0.09 mm/rev
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.

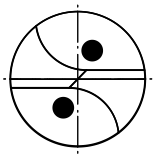
3 | COATING
High-performance coating guarantees a long tool life.

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

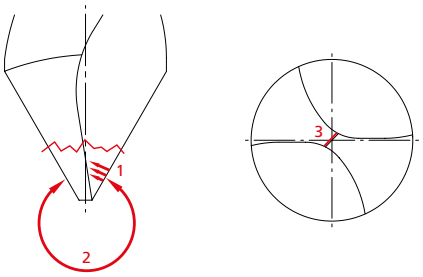


Important features

THE CENTER DRILL WITH TWICE THE ADVANTAGE

The comparison:

■ Traditional Centering

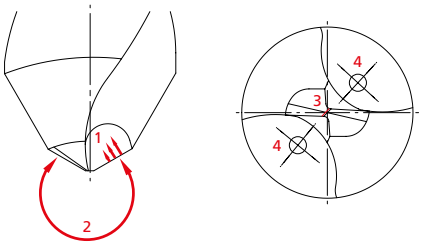


1 | Poor chip evacuation equals jamming risk.

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



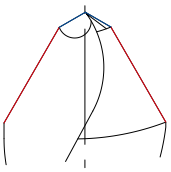
1 | 130° tip angle favors chip evacuation.

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

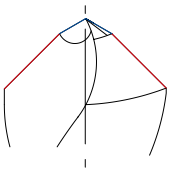
3 | Short web reduces penetration force on the tip.

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

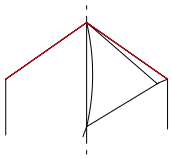
Integrated cooling channels in the shaft and a double angle on the tip make the CrazyDrill Twicenter unique. The optimal cooling orientation makes it perfect for mass production and materials which are difficult to be machined, such as stainless steels or titanium. The through coolant features remarcable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

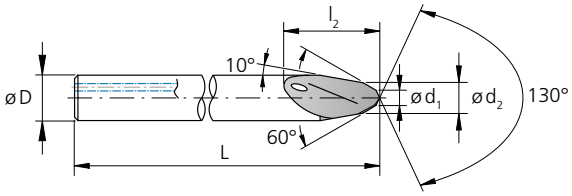
It is the perfect solution for the centering and chamfering of deep holes, e.g. with CrazyDrill SST-Inox.

CRAZYDRILL by Mikron Tool Twicenter

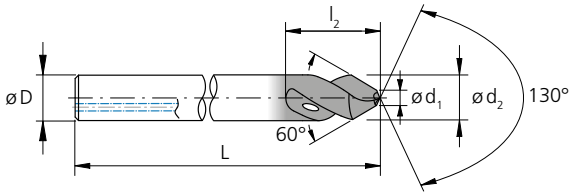
CrazyDrill Twicenter 60° / 90°

Carbide | 130° | Z2 | eXedur RIP

60°



Execution: d_1 = 0.3 to 1.0 mm

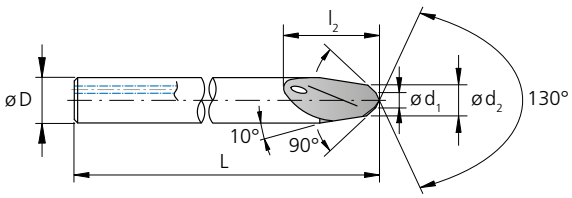


Execution: d_1 = 1.5 to 6.0 mm

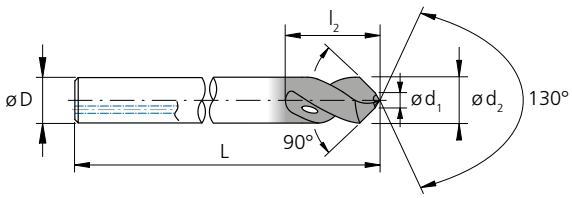
d_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer	Item number	Availability
0.3	1.0	6.4	3	40	60°	2.CC.03010.60	■
0.5	1.4	6.3	3	40	60°	2.CC.05014.60	■
1.0	2.0	6.3	3	40	60°	2.CC.10020.60	■
1.5	3.0	6.3	3	40	60°	2.CC.15030.60	■
2.0	4.0	8.0	4	50	60°	2.CC.20040.60	■
3.0	6.0	12.0	6	60	60°	2.CC.30060.60	■
4.0	8.0	16.0	8	70	60°	2.CC.40080.60	■
6.0	10.0	20.0	10	80	60°	2.CC.60100.60	■

■ Stock item

90°



Execution: d_1 = 0.3 to 1.0 mm



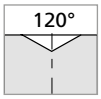
Execution: d_1 = 1.5 to 6.0 mm

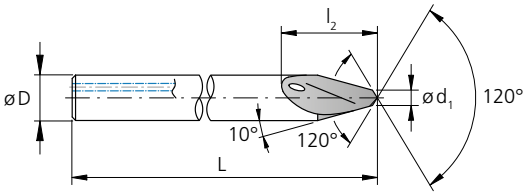
d_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer	Item number	Availability
0.3	1.0	6.4	3	40	90°	2.CC.03010.90	■
0.5	1.4	6.0	3	40	90°	2.CC.05014.90	■
1.0	2.0	6.2	3	40	90°	2.CC.10020.90	■
1.5	3.0	6.3	3	40	90°	2.CC.15030.90	■
2.0	4.0	8.0	4	50	90°	2.CC.20040.90	■
3.0	6.0	12.0	6	60	90°	2.CC.30060.90	■
4.0	8.0	16.0	8	70	90°	2.CC.40080.90	■
6.0	10.0	20.0	10	80	90°	2.CC.60100.90	■

■ Stock item

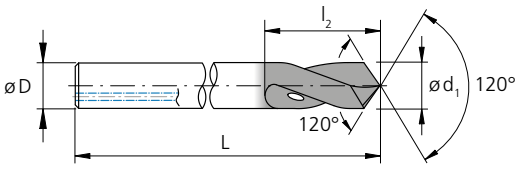
CrazyDrill Twicenter 120°

Carbide | 120° | Z2 | eXedur RIP





Execution: d_1 = 0.5 to 2.0 mm



Execution: d_1 = 3.0 to 10.0 mm

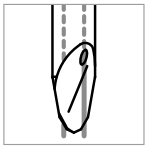
d_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer	Item number	Availability
0.5	7.0	3	40	120°	2.CC.00050.120	■
1.0	6.15	3	40	120°	2.CC.00100.120	■
2.0	6.0	3	40	120°	2.CC.00200.120	■
3.0	8.0	3	40	120°	2.CC.00300.120	■
4.0	10.0	4	50	120°	2.CC.00400.120	■
6.0	15.0	6	60	120°	2.CC.00600.120	■
8.0	17.0	8	70	120°	2.CC.00800.120	■
10.0	21.0	10	80	120°	2.CC.01000.120	■

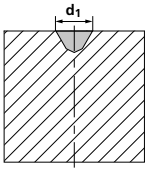
■ Stock item

CRAZYDRILL by Mikron Tool Twicenter

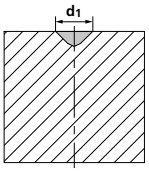
CrazyDrill Twicenter 60° / 90°

CENTERING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW





60°

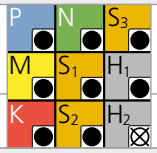


90°

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]
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	120
		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
		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
		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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60
		1.4112	X90CrMoV18	AISI 440B	
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	50
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH	
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	50
		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
		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
		3.4365	AlZnMgCu1.5	ASTM 7075	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100
		3.2381	GD-AlSi10Mg	UNS A03590	
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	100
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	80
		2.0360	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	100
		2.1020	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80
		2.0960	CuAl9Mn2	UNS C63200	
S_1	Super alloys	2.4856		Inconel 625	10 – 30
		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
		3.7065	Gr.4	ASTM B348 / F68	
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	25
		9.9367	TiAl6Nb7	ASTM F1295	
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	40 – 50
			CrCoMo28	ASTM F1537	
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	40
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2	

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

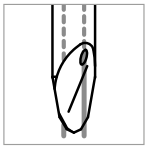


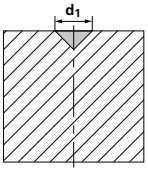
	f [mm/rev]							
	Ød1							
	0.3 mm	0.5 mm	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.0 mm	6.0 mm
	f	f	f	f	f	f	f	f
	0.012	0.020	0.040	0.060	0.080	0.120	0.160	0.240
	0.012	0.020	0.040	0.060	0.080	0.120	0.160	0.240
	0.009	0.015	0.030	0.045	0.060	0.090	0.120	0.180
	0.007	0.012	0.025	0.040	0.050	0.075	0.100	0.150
	0.009	0.015	0.030	0.045	0.060	0.090	0.120	0.180
	0.020	0.030	0.040	0.060	0.070	0.090	0.110	0.130
	0.007	0.012	0.025	0.040	0.050	0.075	0.100	0.150
	0.009	0.015	0.030	0.045	0.060	0.090	0.120	0.180
	0.015	0.025	0.050	0.075	0.100	0.150	0.200	0.300
	0.015	0.025	0.050	0.075	0.100	0.150	0.200	0.300
	0.015	0.025	0.050	0.075	0.100	0.150	0.200	0.300
	0.009	0.015	0.030	0.045	0.060	0.090	0.120	0.180
	0.009	0.015	0.030	0.045	0.060	0.090	0.120	0.180
	0.009	0.015	0.030	0.045	0.060	0.090	0.120	0.180
	0.007	0.012	0.025	0.040	0.050	0.070	0.090	0.110
	0.007	0.012	0.025	0.040	0.050	0.075	0.100	0.150
	0.009	0.015	0.030	0.045	0.060	0.090	0.120	0.180
	0.007	0.012	0.025	0.040	0.050	0.075	0.100	0.150
	0.007	0.012	0.025	0.040	0.050	0.060	0.070	0.080

CRAZYDRILL by Mikron Tool Twicenter

CrazyDrill Twicenter 120°

CENTERING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW



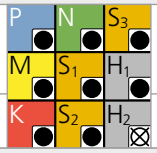


120°

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]
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	120
		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
		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
		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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60
		1.4112	X90CrMoV18	AISI 440B	
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	50
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH	
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	50
		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
		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
		3.4365	AlZnMgCu1.5	ASTM 7075	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100
		3.2381	GD-AlSi10Mg	UNS A03590	
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	100
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	80
		2.0360	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	100
		2.1020	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80
		2.0960	CuAl9Mn2	UNS C63200	
S_1	Super alloys	2.4856		Inconel 625	10 – 30
		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
		3.7065	Gr.4	ASTM B348 / F68	
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	25
		9.9367	TiAl6Nb7	ASTM F1295	
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	40 – 50
			CrCoMo28	ASTM F1537	
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	40
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2	

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



	f [mm/rev]							
	Ød1							
	0.5 mm	1.0 mm	2.0 mm	3.0 mm	4.0 mm	6.0 mm	8.0 mm	10.0 mm
	f	f	f	f	f	f	f	f
	0.020	0.040	0.080	0.100	0.120	0.150	0.180	0.250
	0.020	0.040	0.080	0.100	0.120	0.150	0.180	0.250
	0.015	0.030	0.040	0.060	0.080	0.120	0.160	0.200
	0.012	0.025	0.040	0.060	0.080	0.100	0.120	0.150
	0.015	0.030	0.050	0.075	0.100	0.120	0.160	0.200
	0.015	0.030	0.050	0.075	0.100	0.120	0.160	0.200
	0.012	0.025	0.040	0.060	0.080	0.100	0.120	0.150
	0.015	0.030	0.040	0.060	0.080	0.120	0.160	0.200
	0.020	0.040	0.080	0.100	0.120	0.150	0.200	0.250
	0.020	0.040	0.080	0.100	0.120	0.150	0.200	0.250
	0.020	0.040	0.080	0.100	0.120	0.150	0.200	0.250
	0.015	0.030	0.040	0.060	0.080	0.120	0.160	0.200
	0.015	0.030	0.040	0.060	0.080	0.120	0.160	0.200
	0.015	0.030	0.040	0.060	0.080	0.120	0.160	0.200
	0.015	0.025	0.030	0.040	0.050	0.070	0.090	0.110
	0.020	0.030	0.040	0.060	0.070	0.090	0.110	0.130
	0.030	0.040	0.070	0.090	0.110	0.140	0.180	0.220
	0.020	0.030	0.040	0.060	0.080	0.100	0.110	0.130
	0.010	0.020	0.030	0.040	0.050	0.060	0.070	0.080

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.

Coolant pressure: At least 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

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.

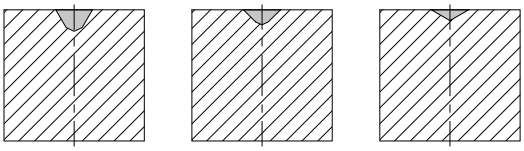
Using the internally cooled center drill with high-performance coating can greatly increase the tool life of the subsequent drill. A chamfer of 60°, 90° or 120° can be generated in the same process.

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).



Centering process CrazyDrill Twicenter

QUICK AND ACCURATE CENTERING AND CHAMFERING

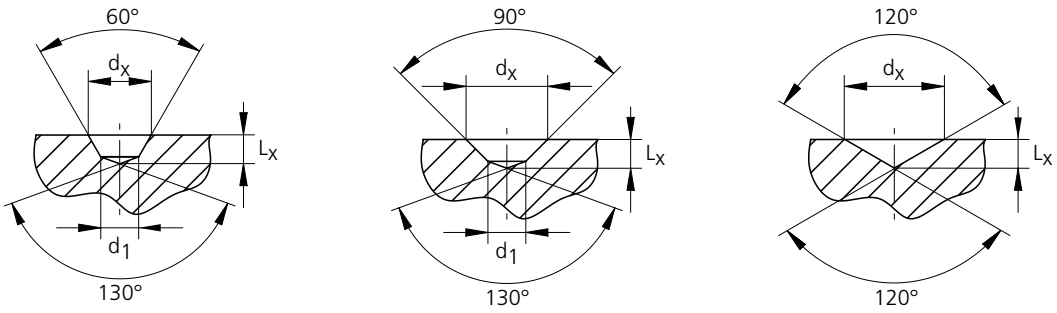


Table for cutting depths

For 60° chamfer angle / 130° tip angle

Ø d_x	L_x							
	2.CC.03010.60 Ød1 0.3 mm	2.CC.05014.60 Ød1 0.5 mm	2.CC.10020.60 Ød1 1.0 mm	2.CC.15030.60 Ød1 1.5 mm	2.CC.20040.60 Ød1 2.0 mm	2.CC.30060.60 Ød1 3.0 mm	2.CC.40080.60 Ød1 4.0 mm	2.CC.60100.60 Ød1 6.0 mm
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
0.4	0.16							
0.8	0.50	0.38						
1.0		0.55						
1.5			0.67					
2.0				0.78				
2.5				1.22	0.90			
3.0					1.33			
3.5					1.77	1.13		
4.0						1.57		
5.0						2.43	1.80	
6.0							2.66	
7.0							3.53	2.26
8.0								3.13
9.0								4.00

For 90° chamfer angle / 130° tip angle

Ø d_x	L_x							
	2.CC.03010.90 Ød1 0.3 mm	2.CC.05014.90 Ød1 0.5 mm	2.CC.10020.90 Ød1 1.0 mm	2.CC.15030.90 Ød1 1.5 mm	2.CC.20040.90 Ød1 2.0 mm	2.CC.30060.90 Ød1 3.0 mm	2.CC.40080.90 Ød1 4.0 mm	2.CC.60100.90 Ød1 6.0 mm
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
0.4	0.12							
0.8	0.32	0.27						
1.0		0.37						
1.5			0.48					
2.0				0.60				
2.5				0.85	0.72			
3.0					0.97			
3.5					1.22	0.95		
4.0						1.20		
5.0						1.70	1.43	
6.0							1.93	
7.0							2.43	1.90
8.0								2.40
9.0								2.90

■ For 120° chamfer angle / 120° tip angle

Ø d_x	L_x							
	2.CC.00050.120 Ød1 0.5 mm	2.CC.00100.120 Ød1 1.0 mm	2.CC.00200.120 Ød1 2.0 mm	2.CC.00300.120 Ød1 3.0 mm	2.CC.00400.120 Ød1 4.0 mm	2.CC.00600.120 Ød1 6.0 mm	2.CC.00800.120 Ød1 8.0 mm	2.CC.01000.120 Ød1 10.0 mm
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
0.4	0.12							
0.5	0.14							
0.8		0.23						
1.0		0.29						
1.5			0.43					
2.0			0.58					
2.5				0.72				
3.0				0.87				
3.5					1.01			
4.0					1.15			
5.0						1.44		
6.0						1.73		
7.0							2.02	
8.0							2.31	
9.0								2.60
10.0								2.89

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

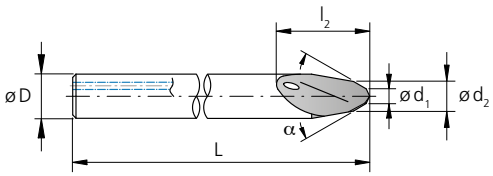
Mikron Tool produces solid carbide center drills according to your needs and requirements and within the following range:

CHARACTERISTICS

- Diameter max: 32.0 mm, larger as per specific request
- Maximum tool length: 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

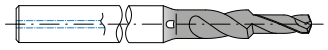
crazy about pilot drilling

PILOT DRILLING AND SHORT DRILLING TOOLS

05

Overview

CUTTING TOOL SOLUTIONS

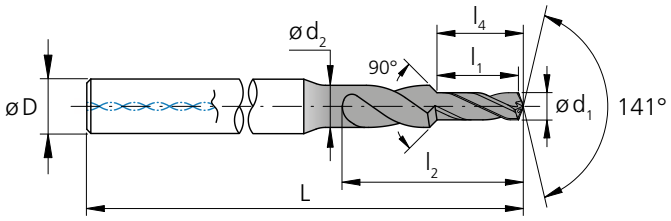
	MIQUDRILL 200	
	CRAZYDRILL Flexpilot	
	CRAZYDRILL Pilot SST-Inox	
	CRAZYDRILL Pilot	
	CRAZYDRILL Crosspilot	
	CRAZYDRILL Coolpilot	
NEW	CRAZYDRILL Coolpilot Titanium ATC	
NEW	CRAZYDRILL Hexalobe	
	Customized short / pilot drills	

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

ø - range [mm]	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	Alloyed titanium	Pure titanium	CrCo alloys	Hardened steel <55 HRC	Hardened steel ≥55 HRC	
0.1 – 1.5	up to 2.4 x d	–	✔	◐	⊠	◐	◐	⊠	⊠	⊠	⊠	◐	⊠	**90**
0.1 – 2.0	3 x d	–	✔	●	⊠	●	●	⊠	●	●	⊠	⊠	⊠	**104**
0.2 – 2.0	3 x d + Chamfer 90°	✔	✔	⊠	●	⊠	◐	●	⊠	⊠	●	⊠	⊠	**118**
0.4 – 6.35	2 x d + Chamfer 90°	–	✔	●	◐	●	●	⊠	●	●	⊠	●	⊠	**128**
0.4 – 6.35	2 x d	–	✔	●	◐	●	●	⊠	●	●	⊠	●	⊠	**140**
1.0 – 6.35	3 x d + Chamfer 90°	✔	–	⊠	●	⊠	⊠	●	⊠	⊠	●	⊠	⊠	**152**
1.0 – 6.35	3 x d + Chamfer 90°	✔	–	⊠	⊠	⊠	⊠	⊠	●	⊠	⊠	⊠	⊠	**162**
0.9 – 3.8	variable + Chamfer 120°	–	✔	⊠	●	⊠	⊠	⊠	●	●	●	⊠	⊠	**172**
0.1 – 32.0	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

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

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

2.PFS.120.0

Division number
- 2 = Mikron Tool SA Agno

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

Cutting diameter d_1
- 120 = Ø 1.2 mm

Coating
- 1 = Coated
- 0 = Uncoated

2.MD.200088.1

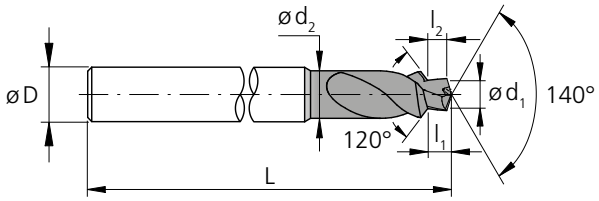
Division number
- 2 = Mikron Tool SA Agno

Family
- MiquDrill

Tool type
- 200 = Short drill

Cutting diameter d_1
- 088 = Ø 0.88 mm

Coating
- 1 = Coated
- 0 = Uncoated



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

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

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 0.3 mm to 3.0 mm - coated version (eXedur RIP)
- from 0.1 mm to 3.0 mm - uncoated version

with the following increment:

- 0.01 mm in the diameter range from 0.1 mm to 2.0 mm
- 0.05 mm from 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.

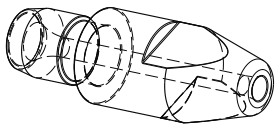
Regrinding: This product is not suitable for regrinding.

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

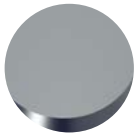
MACHINING
- Short drilling
- d1 = 0.5 mm
- Drilling depth 0.9 mm

DRILLING TOOL
Mikron Tool - MiquDrill 200 - coated

DATA	MIKRON TOOL
Tool type	MiquDrill 200 - Carbide - Coated - External cooling
Item number	2.MD.200050.1
Cutting data	v_c = 45 m/min f = 0.008 mm/rev

Uncoated

Drill with external cooling



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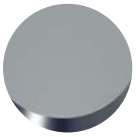
Coated

Drill with external cooling



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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.

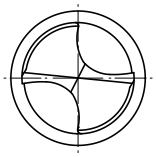
3 | COATING
The coated version of the drill is also adapted for difficult-to-machine materials and hardened steels < 55 HRC and reaches even a better tool life.

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.

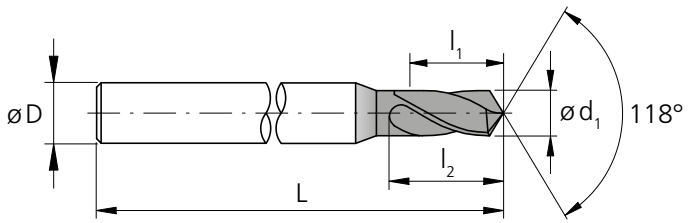
6 | DIAMETER RANGE AND INCREMENTS
Readily available from stock starting of diameters from 0.1 mm with increments of 0.01 mm.

Drill tip



MiquDrill 200 - coated / uncoated

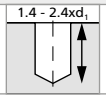
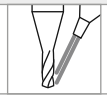
DRILLING WITH EXTERNAL COOLING



d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.10	0.15	0.3	1.0	30	2.MD.200010	-	.0	◪
0.11	0.27	0.4	1.0	30	2.MD.200011	-	.0	◪
0.12	0.26	0.4	1.0	30	2.MD.200012	-	.0	◪
0.13	0.25	0.4	1.0	30	2.MD.200013	-	.0	◪
0.14	0.24	0.4	1.0	30	2.MD.200014	-	.0	◪
0.15	0.23	0.4	1.0	30	2.MD.200015	-	.0	◪
0.16	0.34	0.5	1.0	30	2.MD.200016	-	.0	◪
0.17	0.33	0.5	1.0	30	2.MD.200017	-	.0	◪
0.18	0.32	0.5	1.0	30	2.MD.200018	-	.0	◪
0.19	0.31	0.5	1.0	30	2.MD.200019	-	.0	◪
0.20	0.30	0.5	1.0	30	2.MD.200020	-	.0	◪
0.21	0.44	0.7	1.0	30	2.MD.200021	-	.0	◪
0.22	0.43	0.7	1.0	30	2.MD.200022	-	.0	◪
0.23	0.42	0.7	1.0	30	2.MD.200023	-	.0	◪
0.24	0.41	0.7	1.0	30	2.MD.200024	-	.0	◪
0.25	0.40	0.7	1.0	30	2.MD.200025	-	.0	◪
0.26	0.49	0.8	1.0	30	2.MD.200026	-	.0	◪
0.27	0.48	0.8	1.0	30	2.MD.200027	-	.0	◪
0.28	0.47	0.8	1.0	30	2.MD.200028	-	.0	◪
0.29	0.46	0.8	1.0	30	2.MD.200029	-	.0	◪
0.30	0.45	0.8	1.0	30	2.MD.200030	.1	.0	■
0.31	0.59	0.9	1.0	30	2.MD.200031	.1	.0	■
0.32	0.58	0.9	1.0	30	2.MD.200032	.1	.0	■
0.33	0.57	0.9	1.0	30	2.MD.200033	.1	.0	■
0.34	0.56	0.9	1.0	30	2.MD.200034	.1	.0	■
0.35	0.55	0.9	1.0	30	2.MD.200035	.1	.0	■
0.36	0.64	1.0	1.0	30	2.MD.200036	.1	.0	■
0.37	0.63	1.0	1.0	30	2.MD.200037	.1	.0	■
0.38	0.62	1.0	1.0	30	2.MD.200038	.1	.0	■
0.39	0.61	1.0	1.0	30	2.MD.200039	.1	.0	■
0.40	0.60	1.0	1.0	30	2.MD.200040	.1	.0	■
0.41	0.74	1.2	1.0	30	2.MD.200041	.1	.0	■
0.42	0.73	1.2	1.0	30	2.MD.200042	.1	.0	■
0.43	0.72	1.2	1.0	30	2.MD.200043	.1	.0	■
0.44	0.71	1.2	1.0	30	2.MD.200044	.1	.0	■
0.45	0.70	1.2	1.0	30	2.MD.200045	.1	.0	■

d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.46	0.84	1.3	1.0	30	2.MD.200046	.1	.0	■
0.47	0.83	1.3	1.0	30	2.MD.200047	.1	.0	■
0.48	0.82	1.3	1.0	30	2.MD.200048	.1	.0	■
0.49	0.81	1.3	1.0	30	2.MD.200049	.1	.0	■
0.50	0.90	1.4	1.0	30	2.MD.200050	.1	.0	■
0.51	0.89	1.4	1.0	30	2.MD.200051	.1	.0	■
0.52	0.88	1.4	1.0	30	2.MD.200052	.1	.0	■
0.53	0.87	1.4	1.0	30	2.MD.200053	.1	.0	■
0.54	0.86	1.4	1.0	30	2.MD.200054	.1	.0	■
0.55	0.85	1.4	1.0	30	2.MD.200055	.1	.0	■
0.56	0.94	1.5	1.0	30	2.MD.200056	.1	.0	■
0.57	0.93	1.5	1.0	30	2.MD.200057	.1	.0	■
0.58	0.92	1.5	1.0	30	2.MD.200058	.1	.0	■
0.59	0.91	1.5	1.0	30	2.MD.200059	.1	.0	■
0.60	0.90	1.5	1.0	30	2.MD.200060	.1	.0	■
0.61	0.99	1.6	1.0	30	2.MD.200061	.1	.0	■
0.62	0.98	1.6	1.0	30	2.MD.200062	.1	.0	■
0.63	0.97	1.6	1.0	30	2.MD.200063	.1	.0	■
0.64	0.96	1.6	1.0	30	2.MD.200064	.1	.0	■
0.65	0.95	1.6	1.0	30	2.MD.200065	.1	.0	■
0.66	1.14	1.8	1.0	30	2.MD.200066	.1	.0	■
0.67	1.13	1.8	1.0	30	2.MD.200067	.1	.0	■
0.68	1.12	1.8	1.0	30	2.MD.200068	.1	.0	■
0.69	1.11	1.8	1.0	30	2.MD.200069	.1	.0	■
0.70	1.10	1.8	1.0	30	2.MD.200070	.1	.0	■
0.71	1.19	1.9	1.0	30	2.MD.200071	.1	.0	■
0.72	1.18	1.9	1.0	30	2.MD.200072	.1	.0	■
0.73	1.17	1.9	1.0	30	2.MD.200073	.1	.0	■
0.74	1.16	1.9	1.0	30	2.MD.200074	.1	.0	■
0.75	1.15	1.9	1.0	30	2.MD.200075	.1	.0	■
0.76	1.24	2.0	1.0	30	2.MD.200076	.1	.0	■
0.77	1.23	2.0	1.0	30	2.MD.200077	.1	.0	■
0.78	1.22	2.0	1.0	30	2.MD.200078	.1	.0	■
0.79	1.21	2.0	1.0	30	2.MD.200079	.1	.0	■
0.80	1.20	2.0	1.5	30	2.MD.200080	.1	.0	■
0.81	1.29	2.1	1.5	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	0.1 - 3.0 mm
Tolerance	0 - 0.004 mm

d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated .1	Uncoated .0	Availability
0.82	1.28	2.1	1.5	30	2.MD.200082	.1	.0	■
0.83	1.27	2.1	1.5	30	2.MD.200083	.1	.0	■
0.84	1.26	2.1	1.5	30	2.MD.200084	.1	.0	■
0.85	1.25	2.1	1.5	30	2.MD.200085	.1	.0	■
0.86	1.44	2.3	1.5	30	2.MD.200086	.1	.0	■
0.87	1.43	2.3	1.5	30	2.MD.200087	.1	.0	■
0.88	1.42	2.3	1.5	30	2.MD.200088	.1	.0	■
0.89	1.41	2.3	1.5	30	2.MD.200089	.1	.0	■
0.90	1.40	2.3	1.5	30	2.MD.200090	.1	.0	■
0.91	1.39	2.3	1.5	30	2.MD.200091	.1	.0	■
0.92	1.38	2.3	1.5	30	2.MD.200092	.1	.0	■
0.93	1.37	2.3	1.5	30	2.MD.200093	.1	.0	■
0.94	1.36	2.3	1.5	30	2.MD.200094	.1	.0	■
0.95	1.35	2.3	1.5	30	2.MD.200095	.1	.0	■
0.96	1.54	2.5	1.5	30	2.MD.200096	.1	.0	■
0.97	1.53	2.5	1.5	30	2.MD.200097	.1	.0	■
0.98	1.52	2.5	1.5	30	2.MD.200098	.1	.0	■
0.99	1.51	2.5	1.5	30	2.MD.200099	.1	.0	■
1.00	1.50	2.5	1.5	30	2.MD.200100	.1	.0	■
1.01	1.59	2.6	1.5	30	2.MD.200101	.1	.0	■
1.02	1.58	2.6	1.5	30	2.MD.200102	.1	.0	■
1.03	1.57	2.6	1.5	30	2.MD.200103	.1	.0	■
1.04	1.56	2.6	1.5	30	2.MD.200104	.1	.0	■
1.05	1.55	2.6	1.5	30	2.MD.200105	.1	.0	■
1.06	1.74	2.8	1.5	30	2.MD.200106	.1	.0	■
1.07	1.73	2.8	1.5	30	2.MD.200107	.1	.0	■
1.08	1.72	2.8	1.5	30	2.MD.200108	.1	.0	■
1.09	1.71	2.8	1.5	30	2.MD.200109	.1	.0	■
1.10	1.70	2.8	1.5	30	2.MD.200110	.1	.0	■
1.11	1.89	3.0	1.5	30	2.MD.200111	.1	.0	■
1.12	1.88	3.0	1.5	30	2.MD.200112	.1	.0	■
1.13	1.87	3.0	1.5	30	2.MD.200113	.1	.0	■
1.14	1.86	3.0	1.5	30	2.MD.200114	.1	.0	■
1.15	1.85	3.0	1.5	30	2.MD.200115	.1	.0	■
1.16	1.84	3.0	1.5	30	2.MD.200116	.1	.0	■
1.17	1.83	3.0	1.5	30	2.MD.200117	.1	.0	■

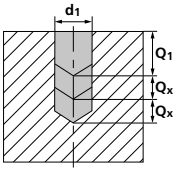
d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated .1	Uncoated .0	Availability
1.18	1.82	3.0	1.5	30	2.MD.200118	.1	.0	■
1.19	1.81	3.0	1.5	30	2.MD.200119	.1	.0	■
1.20	1.80	3.0	1.5	30	2.MD.200120	.1	.0	■
1.21	1.79	3.0	1.5	30	2.MD.200121	.1	.0	■
1.22	1.78	3.0	1.5	30	2.MD.200122	.1	.0	■
1.23	1.77	3.0	1.5	30	2.MD.200123	.1	.0	■
1.24	1.76	3.0	1.5	30	2.MD.200124	.1	.0	■
1.25	1.75	3.0	1.5	30	2.MD.200125	.1	.0	■
1.26	2.04	3.3	1.5	30	2.MD.200126	.1	.0	■
1.27	2.03	3.3	1.5	30	2.MD.200127	.1	.0	■
1.28	2.02	3.3	1.5	30	2.MD.200128	.1	.0	■
1.29	2.01	3.3	1.5	30	2.MD.200129	.1	.0	■
1.30	2.00	3.3	1.5	30	2.MD.200130	.1	.0	■
1.31	1.99	3.3	1.5	30	2.MD.200131	.1	.0	■
1.32	1.98	3.3	1.5	30	2.MD.200132	.1	.0	■
1.33	1.97	3.3	1.5	30	2.MD.200133	.1	.0	■
1.34	1.96	3.3	1.5	30	2.MD.200134	.1	.0	■
1.35	1.95	3.3	1.5	30	2.MD.200135	.1	.0	■
1.36	2.14	3.5	1.5	30	2.MD.200136	.1	.0	■
1.37	2.13	3.5	1.5	30	2.MD.200137	.1	.0	■
1.38	2.12	3.5	1.5	30	2.MD.200138	.1	.0	■
1.39	2.11	3.5	1.5	30	2.MD.200139	.1	.0	■
1.40	2.10	3.5	1.5	30	2.MD.200140	.1	.0	■
1.41	2.09	3.5	1.5	30	2.MD.200141	.1	.0	■
1.42	2.08	3.5	1.5	30	2.MD.200142	.1	.0	■
1.43	2.07	3.5	1.5	30	2.MD.200143	.1	.0	■
1.44	2.06	3.5	1.5	30	2.MD.200144	.1	.0	■
1.45	2.05	3.5	1.5	30	2.MD.200145	.1	.0	■
1.46	2.34	3.8	1.5	30	2.MD.200146	.1	.0	■
1.47	2.33	3.8	1.5	30	2.MD.200147	.1	.0	■
1.48	2.32	3.8	1.5	30	2.MD.200148	.1	.0	■
1.49	2.31	3.8	1.5	30	2.MD.200149	.1	.0	■
1.50	2.30	3.8	2.0	38	2.MD.200150	.1	.0	■

Complementary products

MiquDrill 210 p.200

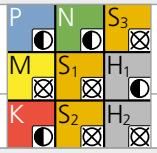
MiquDrill 200 - coated

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	40–70	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	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	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	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	see l_1	-
		3.4365	AlZnMgCu1.5	ASTM 7075			
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60–100	see l_1	-
		3.2381	GD-AlSi10Mg	UNS A03590			
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	40–70	see l_1	-
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40–70	see l_1	-
		2.0360	CuZn40 CW509L	UNS C28000			
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	40–150	see l_1	-
		2.1020	CuSn6	UNS C51900			
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	30–40	see l_1	-
		2.0960	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	0.5xd1	0.5xd1
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2			

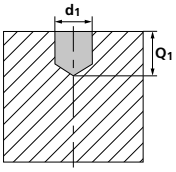
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



	f [mm/rev]		
	Ød1		
	0.3–0.6 mm	0.6–1.0 mm	1.0–1.5 mm
	f	**f**	**f**
	0.009	0.016	0.023
	0.007	0.011	0.015
	0.004	0.009	0.014
	0.007	0.013	0.023
	0.010	0.023	0.038
	0.008	0.019	0.030
	0.008	0.014	0.023
	0.008	0.014	0.023
	0.008	0.017	0.030
	0.007	0.011	0.015
	0.003	0.004	0.007

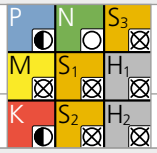
MiquDrill 200 - uncoated

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW

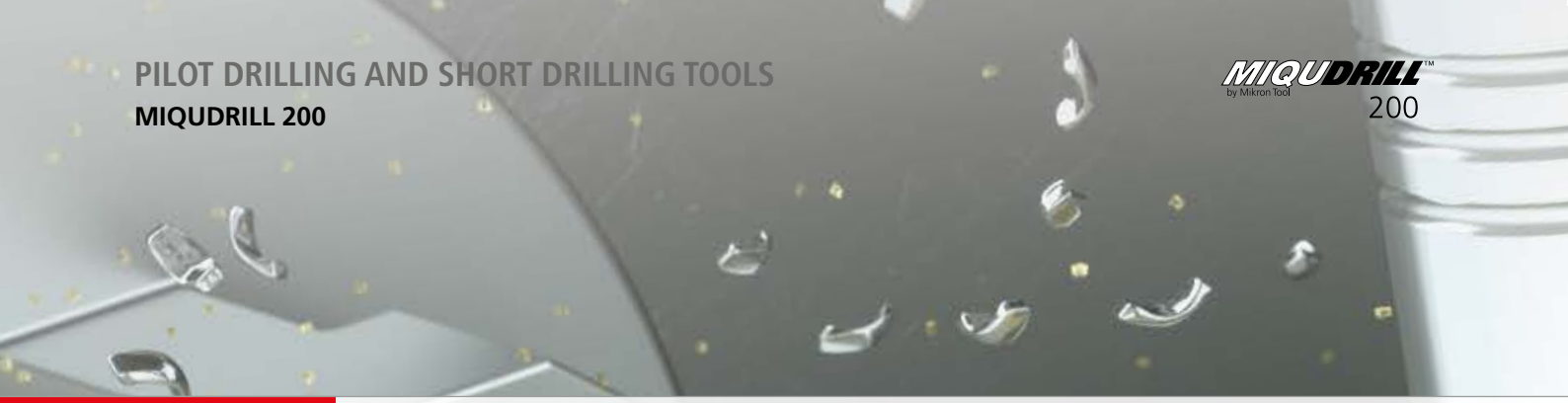


Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]	Q_1
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	30–60	see l_1
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	25–40	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	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	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	see l_1
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	40–80	see l_1
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	30–50	see l_1
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	30–50	see l_1
		2.0360	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	30–80	see l_1
		2.1020	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	25–40	see l_1
		2.0960	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]			
	Ød1			
	0.1–0.3 mm f	0.3–0.6 mm f	0.6–1.0 mm f	1.0–1.5 mm f
	0.003	0.009	0.016	0.023
	0.003	0.007	0.011	0.015
	0.002	0.004	0.009	0.014
	0.003	0.007	0.013	0.023
	0.006	0.010	0.023	0.038
	0.005	0.008	0.019	0.030
	0.004	0.008	0.014	0.023
	0.004	0.008	0.014	0.023
	0.005	0.008	0.017	0.030
	0.003	0.007	0.011	0.015
	Recommended: MiquDrill 200 - coated			



Drilling process MiquDrill 200

ACCURATE AND QUICK DRILLING FROM 1.4 TO 2.4 X D

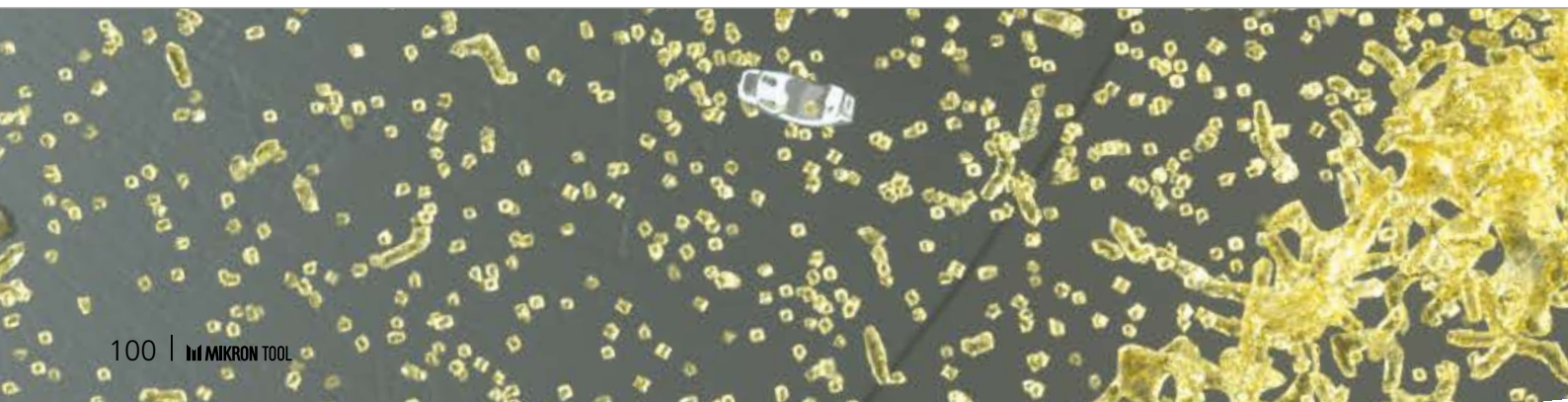
Coolant type, pressure, filtration and flowrate

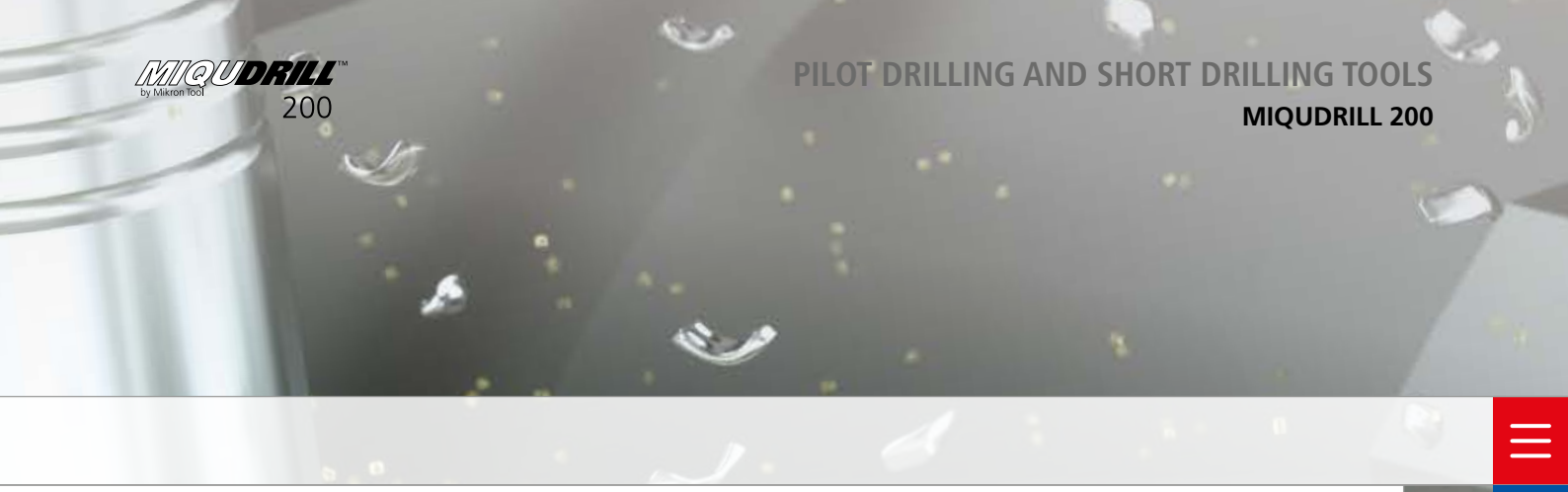
For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

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".



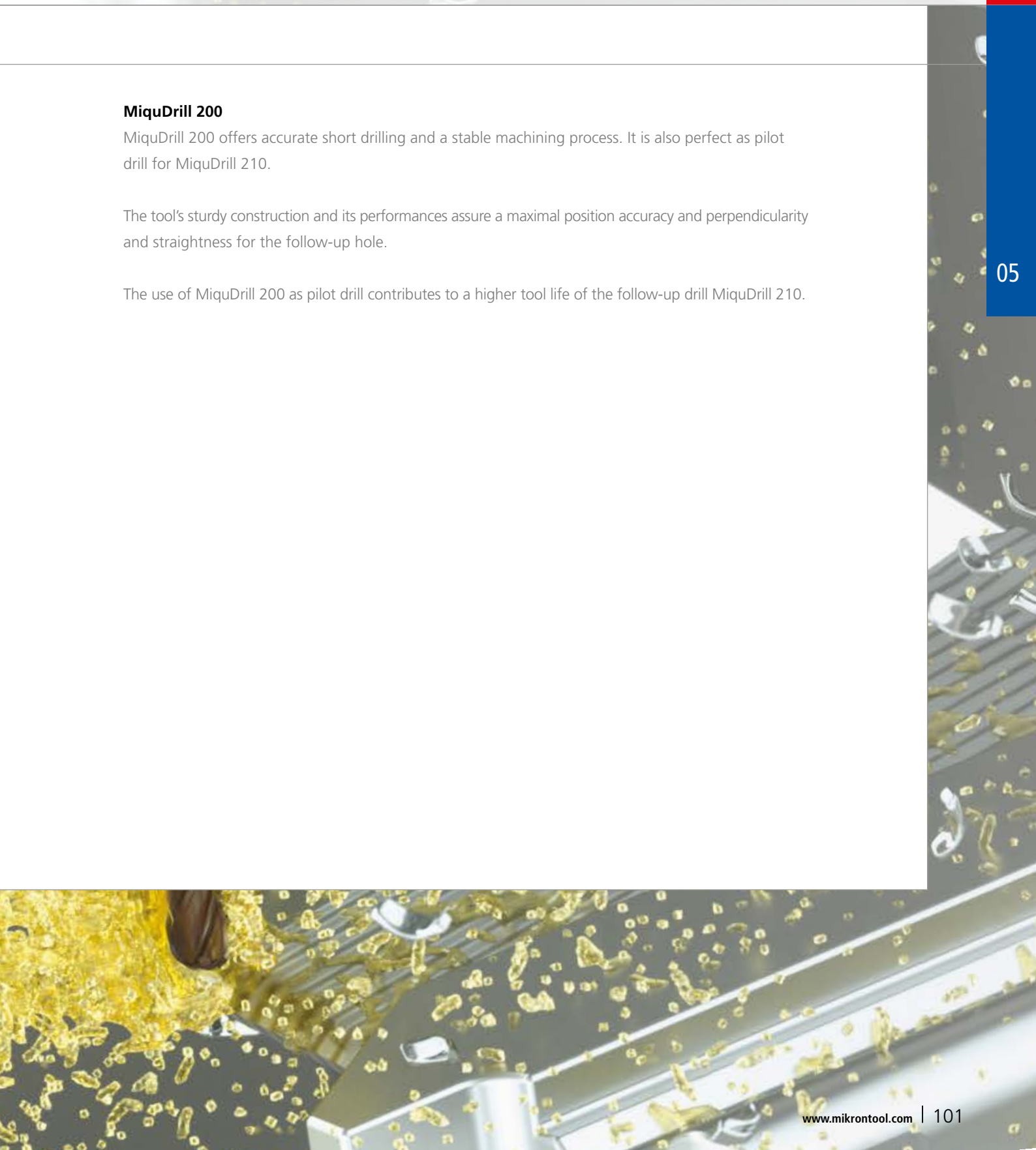


MiquDrill 200

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.

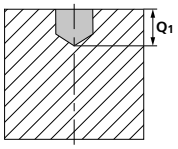


Drilling process MiquDrill 200

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)

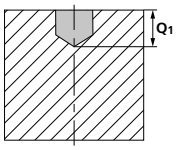
Drilling according DIN 66025 / PAL

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

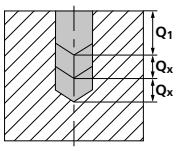
Q = depth of the respective peck

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 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.

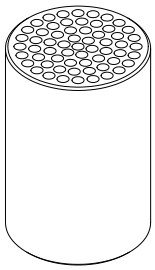
Regrinding: This product is not suitable for regrinding.

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
- Drilling depth 3 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Flexpilot Steel - coated

DATA	MIKRON TOOL
Tool type	CrazyDrill Flexpilot - Carbide - Coated - External cooling
Item number	2.PFS.100.1
Cutting data	v_c = 40 m/min f = 0.042 mm/rev

Steel

- Coated / Uncoated
- External cooling

- Ø0.2 - 2.0 mm - coated
  Ø0.1 - 1.2 mm - uncoated

Page 108

Titanium

- Uncoated
- External cooling

- Ø0.1 - 1.2 mm - uncoated

Page 112

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

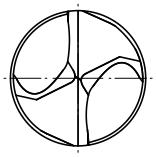
2 | HELICAL FLUTE
The geometry of the flutes is adapted to the materials to be machined (steel or long-chip materials as titanium or copper). Thus guarantees good chip breakage and quick chip evacuation.

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.

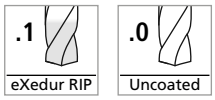
6 | DIAMETER RANGE
Adapted to the diameters of the CrazyDrill Flex family, each deep-hole drill has the proper pilot drill.

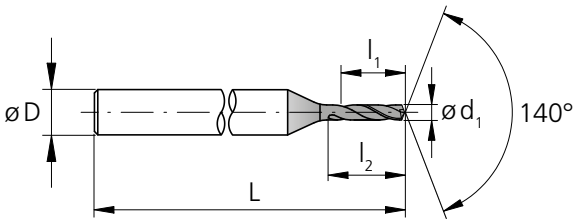
Drill tip 

CRAZYDRILL by Mikron Tool Flexpilot STEEL

Steel - 3 x d - coated / uncoated

DRILLING WITH EXTERNAL COOLING

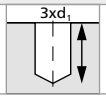
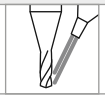




d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.10		0.30	0.5	3	40	2.PFS.010	-	.0	◪
0.11		0.33	0.6	3	40	2.PFS.011	-	.0	Δ
0.12		0.36	0.6	3	40	2.PFS.012	-	.0	Δ
0.13		0.39	0.7	3	40	2.PFS.013	-	.0	Δ
0.14		0.42	0.7	3	40	2.PFS.014	-	.0	Δ
0.15		0.45	0.8	3	40	2.PFS.015	-	.0	◪
0.16		0.48	0.8	3	40	2.PFS.016	-	.0	Δ
0.17		0.51	0.9	3	40	2.PFS.017	-	.0	Δ
0.18		0.54	0.9	3	40	2.PFS.018	-	.0	Δ
0.19		0.57	1.0	3	40	2.PFS.019	-	.0	Δ
0.20		0.60	1.0	3	40	2.PFS.020	.1	.0	■
0.21		0.63	1.1	3	40	2.PFS.021	.1	.0	Δ
0.22		0.66	1.1	3	40	2.PFS.022	.1	.0	Δ
0.23		0.69	1.2	3	40	2.PFS.023	.1	.0	Δ
0.24		0.72	1.2	3	40	2.PFS.024	.1	.0	Δ
0.25		0.75	1.3	3	40	2.PFS.025	.1	.0	■
0.26		0.78	1.3	3	40	2.PFS.026	.1	.0	Δ
0.27		0.81	1.4	3	40	2.PFS.027	.1	.0	Δ
0.28		0.84	1.4	3	40	2.PFS.028	.1	.0	Δ
0.29		0.87	1.5	3	40	2.PFS.029	.1	.0	Δ
0.30		0.90	1.5	3	40	2.PFS.030	.1	.0	■
0.31		0.93	1.6	3	40	2.PFS.031	.1	.0	Δ
0.32		0.96	1.6	3	40	2.PFS.032	.1	.0	Δ
0.33		0.99	1.7	3	40	2.PFS.033	.1	.0	Δ
0.34		1.02	1.7	3	40	2.PFS.034	.1	.0	Δ
0.35		1.05	1.8	3	40	2.PFS.035	.1	.0	■
0.36		1.08	1.8	3	40	2.PFS.036	.1	.0	Δ
0.37		1.11	1.9	3	40	2.PFS.037	.1	.0	Δ
0.38		1.14	1.9	3	40	2.PFS.038	.1	.0	Δ
0.39		1.17	2.0	3	40	2.PFS.039	.1	.0	Δ
0.396	**1/64**	1.20	2.0	3	40	2.PFS.F164	.1	-	◪
0.40		1.20	2.0	3	40	2.PFS.040	.1	.0	■
0.41		1.23	2.1	3	40	2.PFS.041	.1	.0	Δ

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.42		1.26	2.1	3	40	2.PFS.042	.1	.0	Δ
0.43		1.29	2.2	3	40	2.PFS.043	.1	.0	Δ
0.44		1.32	2.2	3	40	2.PFS.044	.1	.0	Δ
0.45		1.35	2.3	3	40	2.PFS.045	.1	.0	■
0.46		1.38	2.3	3	40	2.PFS.046	.1	.0	Δ
0.47		1.41	2.4	3	40	2.PFS.047	.1	.0	Δ
0.48		1.44	2.4	3	40	2.PFS.048	.1	.0	Δ
0.49		1.47	2.5	3	40	2.PFS.049	.1	.0	Δ
0.50		1.50	2.5	3	40	2.PFS.050	.1	.0	■
0.51		1.53	2.6	3	40	2.PFS.051	.1	.0	Δ
0.52		1.56	2.6	3	40	2.PFS.052	.1	.0	Δ
0.53		1.59	2.7	3	40	2.PFS.053	.1	.0	Δ
0.54		1.62	2.7	3	40	2.PFS.054	.1	.0	Δ
0.55		1.65	2.8	3	40	2.PFS.055	.1	.0	■
0.56		1.68	2.8	3	40	2.PFS.056	.1	.0	Δ
0.57		1.71	2.9	3	40	2.PFS.057	.1	.0	Δ
0.58		1.74	2.9	3	40	2.PFS.058	.1	.0	Δ
0.59		1.77	3.0	3	40	2.PFS.059	.1	.0	Δ
0.60		1.80	3.0	3	40	2.PFS.060	.1	.0	■
0.61		1.83	3.1	3	40	2.PFS.061	.1	.0	Δ
0.62		1.86	3.1	3	40	2.PFS.062	.1	.0	Δ
0.63		1.89	3.2	3	40	2.PFS.063	.1	.0	Δ
0.64		1.92	3.2	3	40	2.PFS.064	.1	.0	Δ
0.65		1.95	3.3	3	40	2.PFS.065	.1	.0	■
0.66		1.98	3.3	3	40	2.PFS.066	.1	.0	Δ
0.67		2.01	3.4	3	40	2.PFS.067	.1	.0	Δ
0.68		2.04	3.4	3	40	2.PFS.068	.1	.0	Δ
0.69		2.07	3.5	3	40	2.PFS.069	.1	.0	Δ
0.70		2.10	3.5	3	40	2.PFS.070	.1	.0	■
0.71		2.13	3.6	3	40	2.PFS.071	.1	.0	Δ
0.72		2.16	3.6	3	40	2.PFS.072	.1	.0	Δ
0.73		2.19	3.7	3	40	2.PFS.073	.1	.0	Δ
0.74		2.22	3.7	3	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	0.1 - 3.0 mm
Tolerance	+ 0.003 mm 0

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.75		2.25	3.8	3	40	2.PFS.075	.1	.0	■
0.76		2.28	3.8	3	40	2.PFS.076	.1	.0	Δ
0.77		2.31	3.9	3	40	2.PFS.077	.1	.0	Δ
0.78		2.34	3.9	3	40	2.PFS.078	.1	.0	Δ
0.79		2.37	4.0	3	40	2.PFS.079	.1	.0	Δ
0.793	1/32	2.40	4.0	3	40	2.PFS.F132	.1	-	◪
0.80		2.40	4.0	3	40	2.PFS.080	.1	.0	■
0.81		2.43	4.1	3	40	2.PFS.081	.1	.0	Δ
0.82		2.46	4.1	3	40	2.PFS.082	.1	.0	Δ
0.83		2.49	4.2	3	40	2.PFS.083	.1	.0	Δ
0.84		2.52	4.2	3	40	2.PFS.084	.1	.0	Δ
0.85		2.55	4.3	3	40	2.PFS.085	.1	.0	■
0.86		2.58	4.3	3	40	2.PFS.086	.1	.0	Δ
0.87		2.61	4.4	3	40	2.PFS.087	.1	.0	Δ
0.88		2.64	4.4	3	40	2.PFS.088	.1	.0	Δ
0.89		2.67	4.5	3	40	2.PFS.089	.1	.0	Δ
0.90		2.70	4.5	3	40	2.PFS.090	.1	.0	■
0.91		2.73	4.6	3	40	2.PFS.091	.1	.0	Δ
0.92		2.76	4.6	3	40	2.PFS.092	.1	.0	Δ
0.93		2.79	4.7	3	40	2.PFS.093	.1	.0	Δ
0.94		2.82	4.7	3	40	2.PFS.094	.1	.0	Δ
0.95		2.85	4.8	3	40	2.PFS.095	.1	.0	■
0.96		2.88	4.8	3	40	2.PFS.096	.1	.0	Δ
0.97		2.91	4.9	3	40	2.PFS.097	.1	.0	Δ
0.98		2.94	4.9	3	40	2.PFS.098	.1	.0	Δ
0.99		2.97	5.0	3	40	2.PFS.099	.1	.0	Δ
1.00		3.00	5.0	3	40	2.PFS.100	.1	.0	■
1.01		3.03	5.1	3	40	2.PFS.101	.1	.0	Δ
1.02		3.06	5.1	3	40	2.PFS.102	.1	.0	Δ
1.03		3.09	5.2	3	40	2.PFS.103	.1	.0	Δ
1.04		3.12	5.2	3	40	2.PFS.104	.1	.0	Δ
1.05		3.15	5.3	3	40	2.PFS.105	.1	.0	■
1.06		3.18	5.3	3	40	2.PFS.106	.1	.0	Δ

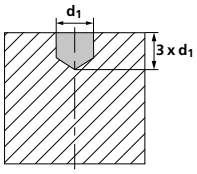
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
1.07		3.21	5.4	3	40	2.PFS.107	.1	.0	Δ
1.08		3.24	5.4	3	40	2.PFS.108	.1	.0	Δ
1.09		3.27	5.5	3	40	2.PFS.109	.1	.0	Δ
1.10		3.30	5.5	3	40	2.PFS.110	.1	.0	■
1.11		3.33	5.6	3	40	2.PFS.111	.1	.0	Δ
1.12		3.36	5.6	3	40	2.PFS.112	.1	.0	Δ
1.13		3.39	5.7	3	40	2.PFS.113	.1	.0	Δ
1.14		3.42	5.7	3	40	2.PFS.114	.1	.0	Δ
1.15		3.45	5.8	3	40	2.PFS.115	.1	.0	■
1.16		3.48	5.8	3	40	2.PFS.116	.1	.0	Δ
1.17		3.51	5.9	3	40	2.PFS.117	.1	.0	Δ
1.18		3.54	5.9	3	40	2.PFS.118	.1	.0	Δ
1.19		3.57	6.0	3	40	2.PFS.119	.1	.0	Δ
1.20		3.60	6.0	3	40	2.PFS.120	.1	.0	■
1.25		3.75	6.3	3	40	2.PFS.125	.1	-	◪
1.30		3.90	6.5	3	40	2.PFS.130	.1	-	◪
1.35		4.05	6.8	3	40	2.PFS.135	.1	-	◪
1.40		4.20	7.0	3	40	2.PFS.140	.1	-	◪
1.45		4.35	7.3	3	40	2.PFS.145	.1	-	◪
1.50		4.50	7.5	3	40	2.PFS.150	.1	-	◪
1.55		4.65	7.8	3	40	2.PFS.155	.1	-	◪
1.587	1/16	4.80	8.0	3	40	2.PFS.F116	.1	-	◪
1.60		4.80	8.0	3	40	2.PFS.160	.1	-	◪
1.65		4.95	8.3	3	40	2.PFS.165	.1	-	◪
1.70		5.10	8.5	3	40	2.PFS.170	.1	-	◪
1.75		5.25	8.8	3	40	2.PFS.175	.1	-	◪
1.80		5.40	9.0	3	40	2.PFS.180	.1	-	◪
1.85		5.55	9.3	3	40	2.PFS.185	.1	-	◪
1.90		5.70	9.5	3	40	2.PFS.190	.1	-	◪
1.95		5.85	9.8	3	40	2.PFS.195	.1	-	◪
2.00		6.00	10.0	3	40	2.PFS.200	.1	-	◪

Complementary products

CrazyDrill Flex Steel p.370

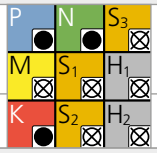
Steel - 3 x d - coated / uncoated

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	5	40	40	60
		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	25	25	50
		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	20	20	35
		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	40	50	100
		0.6030	GG30	ASTM 40B				
		0.7040	GGG40	ASTM 60-40-18			40	80
		0.7060	GGG60	ASTM 80-60-03				
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	5	40	60	120
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	5	40	50	80
		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	5	40	60	100
		2.1020	CuSn6	UNS C51900			40	60
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	5	20	20	40
		2.0960	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

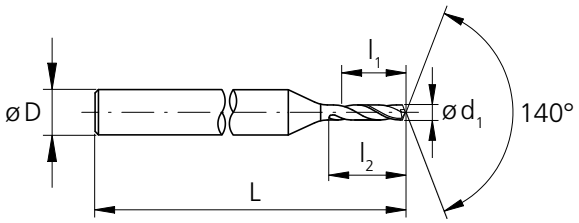


	f [mm/rev]							
	Ød$_1$							
	0.1 mm	0.2 mm	0.3 mm	0.4 mm **1/64"**	0.6 mm	0.8 mm **1/32"**	1.0 mm – 1.2 mm	1.5 mm – 2.0 mm **1/16"**
	f	**f**	**f**	**f**	**f**	**f**	**f**	**f**
	0.002	0.005	0.010	0.015	0.030	0.040	0.060	0.080
	0.002	0.003 – 0.005	0.008 – 0.010	0.012 – 0.015	0.020 – 0.025	0.035	0.050	0.070
	0.0005	0.004	0.008	0.010	0.015	0.025	0.040	0.060
	0.002	0.005	0.010	0.015	0.020	0.035	0.050	0.070
	0.003	0.015	0.040	0.050	0.080	0.100	0.120	0.150
	0.003	0.015	0.040	0.050	0.080	0.100	0.120	0.150
	Recommended: CrazyDrill Flexpilot Titanium							
	0.004	0.010	0.030	0.040	0.060	0.080	0.100	0.120
	0.002	0.004	0.006	0.010	0.015	0.025	0.040	0.060
	Recommended: CrazyDrill Flexpilot Titanium							
	Recommended: CrazyDrill Flexpilot Titanium							

CRAZYDRILL by Mikron Tool Flexpilot TITANIUM

Titanium - 3 x d

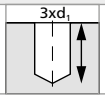
DRILLING WITH EXTERNAL COOLING



d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.10	0.30	0.5	3	40	2.PFT.010.0	■
0.11	0.33	0.6	3	40	2.PFT.011.0	Δ
0.12	0.36	0.6	3	40	2.PFT.012.0	Δ
0.13	0.39	0.7	3	40	2.PFT.013.0	Δ
0.14	0.42	0.7	3	40	2.PFT.014.0	Δ
0.15	0.45	0.8	3	40	2.PFT.015.0	■
0.16	0.48	0.8	3	40	2.PFT.016.0	Δ
0.17	0.51	0.9	3	40	2.PFT.017.0	Δ
0.18	0.54	0.9	3	40	2.PFT.018.0	Δ
0.19	0.57	1.0	3	40	2.PFT.019.0	Δ
0.20	0.60	1.0	3	40	2.PFT.020.0	■
0.21	0.63	1.1	3	40	2.PFT.021.0	Δ
0.22	0.66	1.1	3	40	2.PFT.022.0	Δ
0.23	0.69	1.2	3	40	2.PFT.023.0	Δ
0.24	0.72	1.2	3	40	2.PFT.024.0	Δ
0.25	0.75	1.3	3	40	2.PFT.025.0	■
0.26	0.78	1.3	3	40	2.PFT.026.0	Δ
0.27	0.81	1.4	3	40	2.PFT.027.0	Δ
0.28	0.84	1.4	3	40	2.PFT.028.0	Δ
0.29	0.87	1.5	3	40	2.PFT.029.0	Δ
0.30	0.90	1.5	3	40	2.PFT.030.0	■
0.31	0.93	1.6	3	40	2.PFT.031.0	Δ
0.32	0.96	1.6	3	40	2.PFT.032.0	Δ
0.33	0.99	1.7	3	40	2.PFT.033.0	Δ
0.34	1.02	1.7	3	40	2.PFT.034.0	Δ
0.35	1.05	1.8	3	40	2.PFT.035.0	■
0.36	1.08	1.8	3	40	2.PFT.036.0	Δ
0.37	1.11	1.9	3	40	2.PFT.037.0	Δ
0.38	1.14	1.9	3	40	2.PFT.038.0	Δ
0.39	1.17	2.0	3	40	2.PFT.039.0	Δ
0.40	1.20	2.0	3	40	2.PFT.040.0	■
0.41	1.23	2.1	3	40	2.PFT.041.0	Δ

d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.42	1.26	2.1	3	40	2.PFT.042.0	Δ
0.43	1.29	2.2	3	40	2.PFT.043.0	Δ
0.44	1.32	2.2	3	40	2.PFT.044.0	Δ
0.45	1.35	2.3	3	40	2.PFT.045.0	■
0.46	1.38	2.3	3	40	2.PFT.046.0	Δ
0.47	1.41	2.4	3	40	2.PFT.047.0	Δ
0.48	1.44	2.4	3	40	2.PFT.048.0	Δ
0.49	1.47	2.5	3	40	2.PFT.049.0	Δ
0.50	1.50	2.5	3	40	2.PFT.050.0	■
0.51	1.53	2.6	3	40	2.PFT.051.0	Δ
0.52	1.56	2.6	3	40	2.PFT.052.0	Δ
0.53	1.59	2.7	3	40	2.PFT.053.0	Δ
0.54	1.62	2.7	3	40	2.PFT.054.0	Δ
0.55	1.65	2.8	3	40	2.PFT.055.0	■
0.56	1.68	2.8	3	40	2.PFT.056.0	Δ
0.57	1.71	2.9	3	40	2.PFT.057.0	Δ
0.58	1.74	2.9	3	40	2.PFT.058.0	Δ
0.59	1.77	3.0	3	40	2.PFT.059.0	Δ
0.60	1.80	3.0	3	40	2.PFT.060.0	■
0.61	1.83	3.1	3	40	2.PFT.061.0	Δ
0.62	1.86	3.1	3	40	2.PFT.062.0	Δ
0.63	1.89	3.2	3	40	2.PFT.063.0	Δ
0.64	1.92	3.2	3	40	2.PFT.064.0	Δ
0.65	1.95	3.3	3	40	2.PFT.065.0	■
0.66	1.98	3.3	3	40	2.PFT.066.0	Δ
0.67	2.01	3.4	3	40	2.PFT.067.0	Δ
0.68	2.04	3.4	3	40	2.PFT.068.0	Δ
0.69	2.07	3.5	3	40	2.PFT.069.0	Δ
0.70	2.10	3.5	3	40	2.PFT.070.0	■
0.71	2.13	3.6	3	40	2.PFT.071.0	Δ
0.72	2.16	3.6	3	40	2.PFT.072.0	Δ
0.73	2.19	3.7	3	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	0.1 - 3.0 mm
Tolerance	+ 0.003 mm 0

d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.74	2.22	3.7	3	40	2.PFT.074.0	Δ
0.75	2.25	3.8	3	40	2.PFT.075.0	■
0.76	2.28	3.8	3	40	2.PFT.076.0	Δ
0.77	2.31	3.9	3	40	2.PFT.077.0	Δ
0.78	2.34	3.9	3	40	2.PFT.078.0	Δ
0.79	2.37	4.0	3	40	2.PFT.079.0	Δ
0.80	2.40	4.0	3	40	2.PFT.080.0	■
0.81	2.43	4.1	3	40	2.PFT.081.0	Δ
0.82	2.46	4.1	3	40	2.PFT.082.0	Δ
0.83	2.49	4.2	3	40	2.PFT.083.0	Δ
0.84	2.52	4.2	3	40	2.PFT.084.0	Δ
0.85	2.55	4.3	3	40	2.PFT.085.0	■
0.86	2.58	4.3	3	40	2.PFT.086.0	Δ
0.87	2.61	4.4	3	40	2.PFT.087.0	Δ
0.88	2.64	4.4	3	40	2.PFT.088.0	Δ
0.89	2.67	4.5	3	40	2.PFT.089.0	Δ
0.90	2.70	4.5	3	40	2.PFT.090.0	■
0.91	2.73	4.6	3	40	2.PFT.091.0	Δ
0.92	2.76	4.6	3	40	2.PFT.092.0	Δ
0.93	2.79	4.7	3	40	2.PFT.093.0	Δ
0.94	2.82	4.7	3	40	2.PFT.094.0	Δ
0.95	2.85	4.8	3	40	2.PFT.095.0	■
0.96	2.88	4.8	3	40	2.PFT.096.0	Δ
0.97	2.91	4.9	3	40	2.PFT.097.0	Δ
0.98	2.94	4.9	3	40	2.PFT.098.0	Δ
0.99	2.97	5.0	3	40	2.PFT.099.0	Δ
1.00	3.00	5.0	3	40	2.PFT.100.0	■
1.01	3.03	5.1	3	40	2.PFT.101.0	Δ
1.02	3.06	5.1	3	40	2.PFT.102.0	Δ
1.03	3.09	5.2	3	40	2.PFT.103.0	Δ
1.04	3.12	5.2	3	40	2.PFT.104.0	Δ
1.05	3.15	5.3	3	40	2.PFT.105.0	■

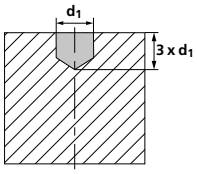
d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.06	3.18	5.3	3	40	2.PFT.106.0	Δ
1.07	3.21	5.4	3	40	2.PFT.107.0	Δ
1.08	3.24	5.4	3	40	2.PFT.108.0	Δ
1.09	3.27	5.5	3	40	2.PFT.109.0	Δ
1.10	3.30	5.5	3	40	2.PFT.110.0	■
1.11	3.33	5.6	3	40	2.PFT.111.0	Δ
1.12	3.36	5.6	3	40	2.PFT.112.0	Δ
1.13	3.39	5.7	3	40	2.PFT.113.0	Δ
1.14	3.42	5.7	3	40	2.PFT.114.0	Δ
1.15	3.45	5.8	3	40	2.PFT.115.0	■
1.16	3.48	5.8	3	40	2.PFT.116.0	Δ
1.17	3.51	5.9	3	40	2.PFT.117.0	Δ
1.18	3.54	5.9	3	40	2.PFT.118.0	Δ
1.19	3.57	6.0	3	40	2.PFT.119.0	Δ
1.20	3.60	6.0	3	40	2.PFT.120.0	■

Complementary products	
CrazyDrill Flex Titanium	p.388

CRAZYDRILL by Mikron Tool Flexpilot TITANIUM

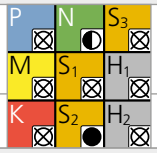
Titanium - 3 x d

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW

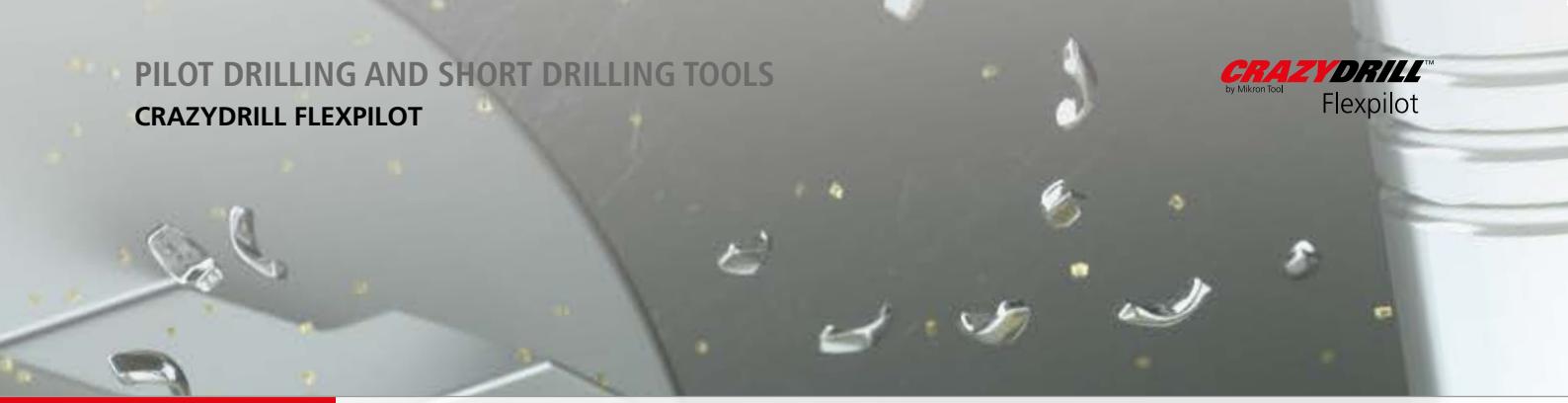


Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010				
		1.0401	C15	AISI 1015				
		1.1191	C45E/CK45	AISI 1045				
		1.0044	S275JR	AISI 1020				
		1.0715	11SMn30	AISI 1215				
	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	2.0040	Cu-OF / CW008A	UNS C10100	5	40	20	40
		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				
		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	20	20	30
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	5	20	20	40
		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]						
	Ød1						
	0.1 mm	0.2 mm	0.3 mm	0.4 mm	0.6 mm	0.8 mm	1.0 mm – 1.2 mm
	f	**f**	**f**	**f**	**f**	**f**	**f**
	Recommended: CrazyDrill Flexpilot Steel						
	Recommended: CrazyDrill Flexpilot Steel						
	Recommended: CrazyDrill Flexpilot Steel						
	0.005	0.010	0.015	0.020	0.030	0.040	0.060
	Recommended: CrazyDrill Flexpilot Steel						
	0.001	0.002	0.003	0.004	0.006	0.008	0.012
	0.002	0.003	0.005	0.006	0.009	0.012	0.018



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

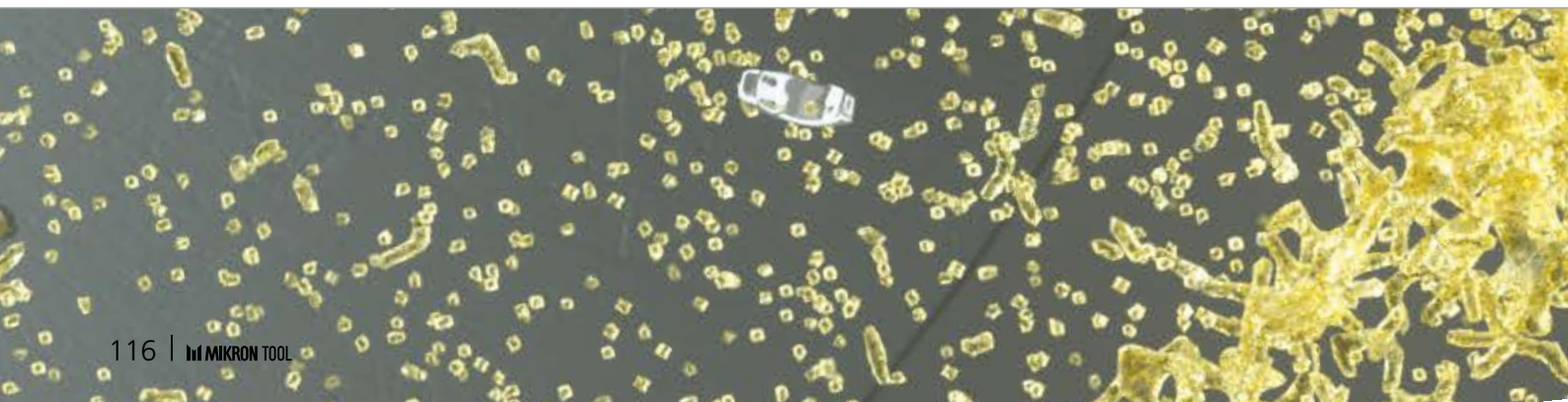
For detailed indications for tool holders see chapter "Technical information".

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.

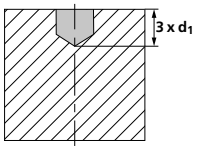
CrazyDrill Flexpilot not only is the perfect preparation of deep follow-up holes with CrazyDrill Flex. Concurrently it is a short drill for highly precise and quick drilling up to 3 x d.



DRILLING PROCESS

1 | PILOT DRILLING OR SHORT DRILLING

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



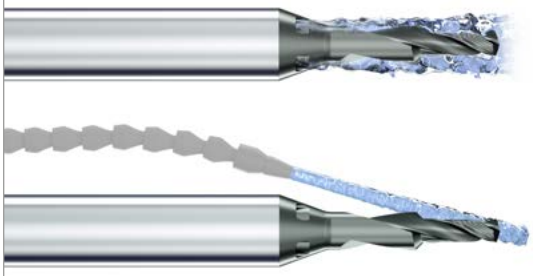
Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

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 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, 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.

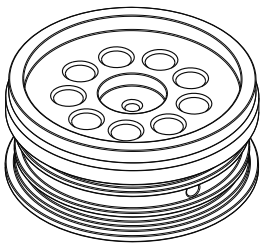
Please note: You couldn't find your suitable version of the CrazyDrill Pilot SST-Inox (diameter, length, cutting direction…)? Ask us about our customized versions!

PATENTED

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
- Drilling depth 2.9 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Pilot SST-Inox

DATA	MIKRON TOOL
Tool type	CrazyDrill Pilot SST-Inox - Carbide - Coated - Integrated cooling
Item number	2.PD.00900.090.IK
Cutting data	v_c = 40 m/min f = 0.030 mm/rev

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. 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.

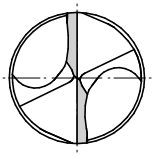
4 | COATING
The high-performance eXedur RIP coating provides thermal and wear protection against heat and abrasion. Extremely smooth and consistent coating exhibits low adhesion to work materials and prevents from cutting edge chipping. The result is a long tool life even in the smallest diameter sizes.

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.

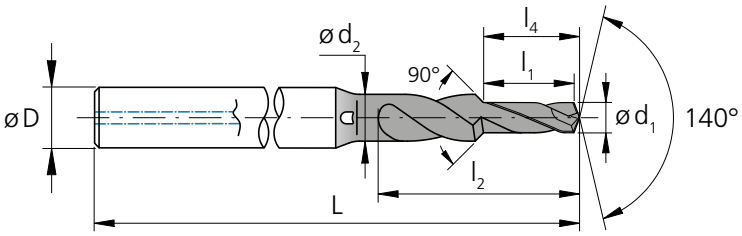
7 | TIP GEOMETRY
The tip geometry is developed for stainless, acid-resistant and heat-resistant steels:
- High degree of cutting edge stability
- Self-centering
- Short chips

Drill tip



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

DRILLING WITH INTEGRATED COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	l_4 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.20		0.60	0.50	1.7	0.63	3	45	2.PD.00200.090.IK	■
0.25		0.75	0.50	2.1	0.79	3	45	2.PD.00250.090.IK	■
0.30		0.90	0.60	2.5	0.95	3	45	2.PD.00300.090.IK	■
0.35		1.05	0.70	2.8	1.11	3	45	2.PD.00350.090.IK	■
0.396	**1/64**	1.20	0.80	3.2	1.26	3	45	2.PD.F164.IK	■
0.40		1.20	0.80	3.2	1.26	3	45	2.PD.00400.090.IK	■
0.45		1.35	0.90	3.6	1.42	3	45	2.PD.00450.090.IK	■
0.50		1.50	1.00	4.0	1.58	3	48	2.PD.00500.090.IK	■
0.55		1.65	1.00	4.4	1.74	3	48	2.PD.00550.090.IK	■
0.60		1.80	1.10	4.7	1.90	3	48	2.PD.00600.090.IK	■
0.65		1.95	1.10	5.1	2.05	3	48	2.PD.00650.090.IK	■
0.70		2.10	1.30	5.5	2.21	4	52	2.PD.00700.090.IK	■
0.75		2.25	1.40	5.8	2.37	4	52	2.PD.00750.090.IK	■
0.793	**1/32**	2.40	1.40	6.2	2.53	4	52	2.PD.F132.IK	■
0.80		2.40	1.40	6.2	2.53	4	52	2.PD.00800.090.IK	■
0.85		2.55	1.50	6.5	2.68	4	52	2.PD.00850.090.IK	■
0.90		2.70	1.50	6.9	2.84	4	52	2.PD.00900.090.IK	■
0.95		2.85	1.50	7.2	3.00	4	52	2.PD.00950.090.IK	■
1.00		3.00	1.70	7.5	3.16	4	55	2.PD.01000.090.IK	■
1.05		3.15	1.70	7.9	3.32	4	55	2.PD.01050.090.IK	■

■ Stock item

Carbide | 3xd1 | 90° | 140° | Z2 | eXedur RIP

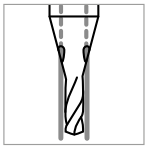
Ød_1	0.1 - 3.0 mm
Tolerance	+ 0.006 mm + 0.002 mm

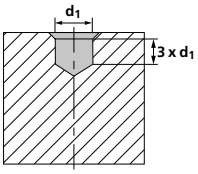
d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	l_4 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.10		3.30	1.70	8.2	3.47	4	55	2.PD.01100.090.IK	■
1.15		3.45	1.80	8.5	3.63	4	55	2.PD.01150.090.IK	■
1.20		3.60	1.80	8.8	3.79	4	55	2.PD.01200.090.IK	■
1.25		3.75	2.00	9.2	3.95	4	55	2.PD.01250.090.IK	■
1.30		3.90	2.00	9.5	4.11	4	55	2.PD.01300.090.IK	■
1.35		4.05	2.00	9.8	4.26	4	55	2.PD.01350.090.IK	■
1.40		4.20	2.25	10.1	4.42	4	55	2.PD.01400.090.IK	■
1.45		4.35	2.25	10.4	4.58	4	55	2.PD.01450.090.IK	■
1.50		4.50	2.25	10.7	4.74	4	55	2.PD.01500.090.IK	■
1.55		4.65	2.25	10.9	4.89	4	55	2.PD.01550.090.IK	■
1.587	**1/16**	4.80	2.25	11.2	5.05	4	55	2.PD.F116.IK	■
1.60		4.80	2.25	11.2	5.05	4	55	2.PD.01600.090.IK	■
1.65		4.95	2.25	11.5	5.21	4	55	2.PD.01650.090.IK	■
1.70		5.10	2.60	11.8	5.37	6	55	2.PD.01700.090.IK	■
1.75		5.25	2.60	12.0	5.53	6	55	2.PD.01750.090.IK	■
1.80		5.40	2.60	12.3	5.68	6	55	2.PD.01800.090.IK	■
1.85		5.55	2.60	12.6	5.84	6	55	2.PD.01850.090.IK	■
1.90		5.70	2.60	12.8	6.00	6	55	2.PD.01900.090.IK	■
1.95		5.85	2.60	13.1	6.16	6	55	2.PD.01950.090.IK	■
2.00		6.00	3.10	13.3	6.32	6	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

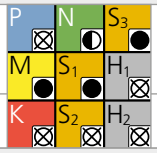




Note:
In case of external cooling reduce v_c and f of 20%

Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]
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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	35 – 50
		1.4112	X90CrMoV18	AISI 440B	
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	35 – 50
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH	
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	30 – 45
		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	2.0040	Cu-OF / CW008A	UNS C10100	40 – 100
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40 – 100
		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	15 – 30
		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
			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]

	Ød1								
	0.2 mm	0.5 mm 1/64"	0.8 mm 1/32"	1.0 mm	1.2 mm	1.4 mm	1.6 mm 1/16"	1.8 mm	2.0 mm
	f	f	f	f	f	f	f	f	f
	0.015	0.020	0.030	0.035	0.040	0.050	0.055	0.060	0.070
	0.020	0.030	0.040	0.055	0.060	0.070	0.075	0.080	0.100
	0.015	0.020	0.025	0.030	0.040	0.050	0.055	0.060	0.070
	0.010	0.020	0.025	0.030	0.035	0.045	0.050	0.055	0.060
	0.040	0.060	0.080	0.090	0.100	0.120	0.140	0.160	0.180
	0.040	0.060	0.080	0.090	0.100	0.120	0.140	0.160	0.180
	0.010	0.015	0.020	0.022	0.025	0.035	0.037	0.045	0.055
	0.020	0.030	0.040	0.055	0.060	0.070	0.075	0.080	0.100

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 ≤ 0.050 mm.

Coolant pressure: At least 15 bar 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

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.

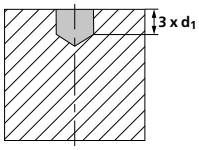
Drilling quality (position and alignment accuracy, no measurable transition from pilot to follow-up hole) and stable machining process are assured due to matched diameters of the tools.

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.

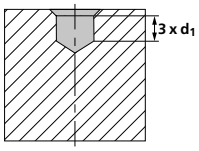
DRILLING PROCESS

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).

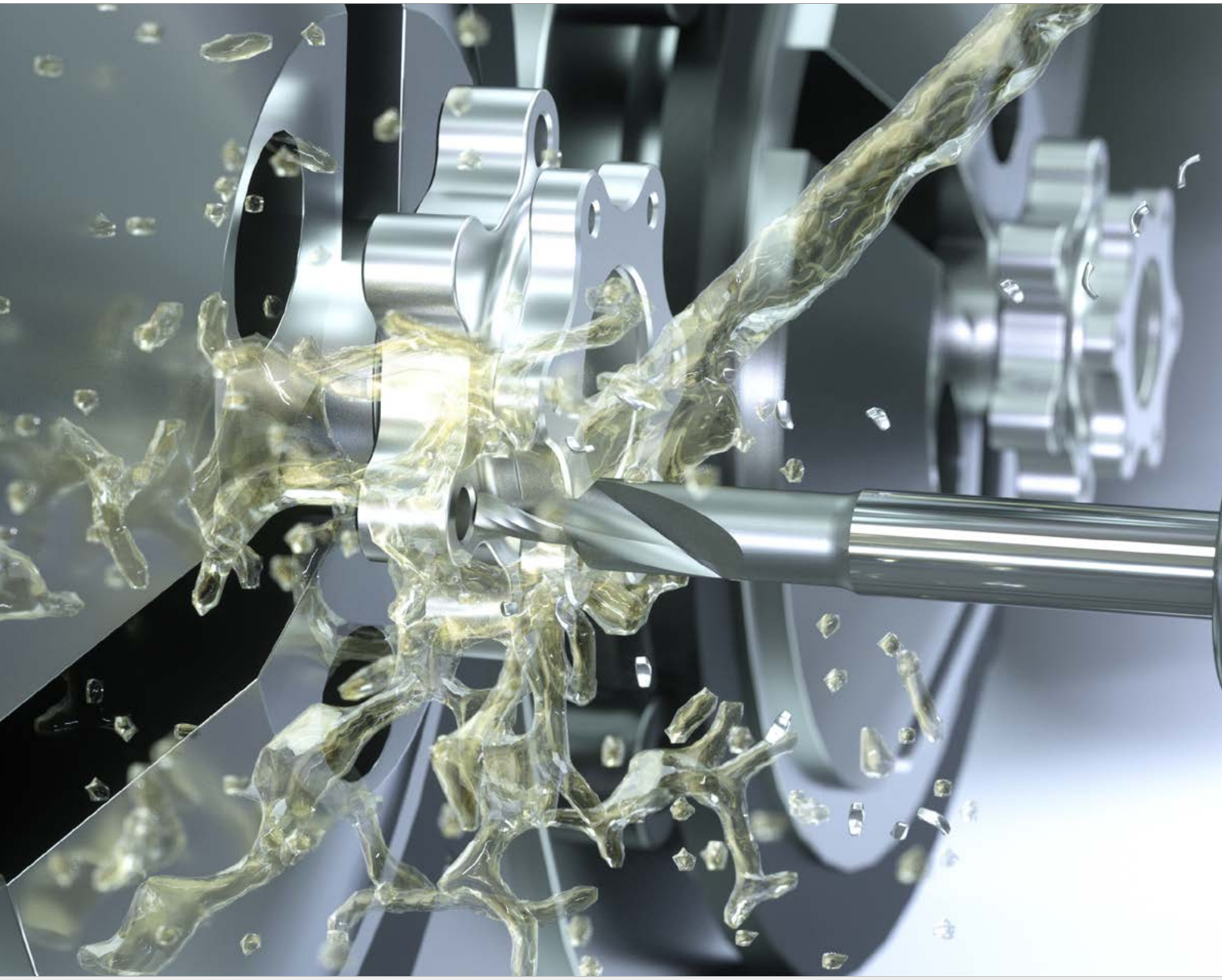


- If needed, after the desired cutting depth of 3 x d is reached, a chamfer angle of 90° can be realized.



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 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.

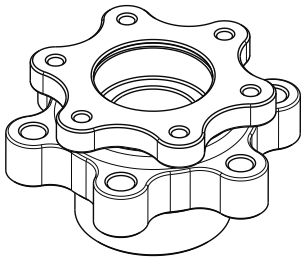
Regrinding: This product can be reground starting from Ø 1.4 mm.

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
- Drilling depth 6.2 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Pilot

DATA	MIKRON TOOL
Tool type	CrazyDrill Pilot - Carbide - Coated - External cooling
Item number	2.PD.03000.090
Cutting data	v_c = 160 m/min f = 0.16 mm/rev

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

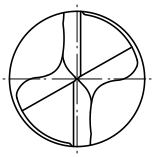
3 | COATING
Optimal coating protects the solid carbide drill from wear and increases its tool life.

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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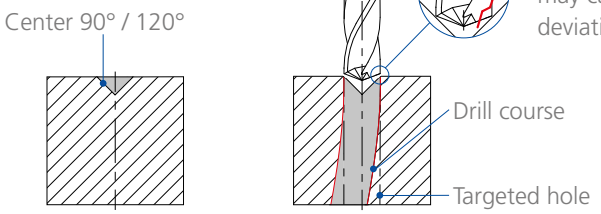
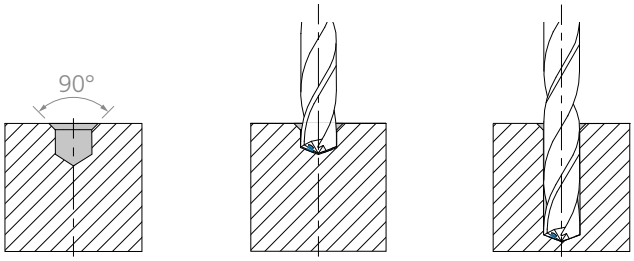
Ideal preparation for deep holes

PROCESS COMPARISON

■ Conventional



■ Mikron Tool



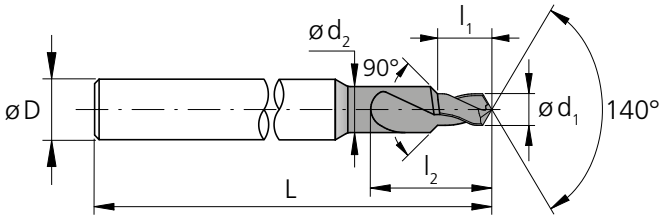
STEP 1
CrazyDrill Pilot

STEP 2
Drill guided
in pilot hole

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

CrazyDrill Pilot - 2 x d - 90° coutersink

DRILLING WITH EXTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.396	**1/64**	0.79	1.00	2.8	4	46.5	2.PD.F164.090	■
0.40		0.80	1.00	2.8	4	46.5	2.PD.00400.090	■
0.45		0.90	1.00	2.9	4	46.5	2.PD.00450.090	■
0.50		1.00	1.20	3.4	4	47.0	2.PD.00500.090	■
0.55		1.10	1.20	3.5	4	47.0	2.PD.00550.090	■
0.60		1.20	1.50	4.2	4	48.0	2.PD.00600.090	■
0.65		1.30	1.50	4.3	4	48.0	2.PD.00650.090	■
0.70		1.40	1.75	4.9	4	49.0	2.PD.00700.090	■
0.75		1.50	1.75	5.0	4	49.0	2.PD.00750.090	■
0.793	**1/32**	1.59	2.00	5.6	4	49.0	2.PD.F132.090	■
0.80		1.60	2.00	5.6	4	49.0	2.PD.00800.090	■
0.85		1.70	2.00	5.7	4	49.0	2.PD.00850.090	■
0.90		1.80	2.00	5.8	4	49.0	2.PD.00900.090	■
0.95		1.90	2.00	5.9	4	49.0	2.PD.00950.090	■
1.00		2.00	2.50	7.0	4	51.0	2.PD.01000.090	■
1.05		2.10	2.50	7.1	4	51.0	2.PD.01050.090	■
1.10		2.20	2.50	7.2	4	51.0	2.PD.01100.090	■
1.15		2.30	2.50	7.3	4	51.0	2.PD.01150.090	■
1.20		2.40	2.50	7.4	4	51.0	2.PD.01200.090	■
1.25		2.50	2.50	7.5	4	51.0	2.PD.01250.090	■
1.30		2.60	2.50	7.6	4	51.0	2.PD.01300.090	■
1.35		2.70	2.50	7.7	4	51.0	2.PD.01350.090	■
1.40		2.80	2.50	7.8	4	51.0	2.PD.01400.090	■
1.45		2.90	2.50	7.9	4	51.0	2.PD.01450.090	■
1.50		3.00	3.00	9.0	4	53.0	2.PD.01500.090	■
1.55		3.10	3.00	9.1	4	53.0	2.PD.01550.090	■
1.587	**1/16**	3.17	3.00	9.2	4	53.0	2.PD.F116.090	■
1.60		3.20	3.00	9.2	4	53.0	2.PD.01600.090	■
1.65		3.30	3.00	9.3	4	53.0	2.PD.01650.090	■
1.70		3.40	3.00	9.4	4	53.0	2.PD.01700.090	■
1.75		3.50	3.00	9.5	4	53.0	2.PD.01750.090	■
1.80		3.60	3.00	9.6	4	53.0	2.PD.01800.090	■
1.85		3.70	3.00	9.7	4	53.0	2.PD.01850.090	■
1.90		3.80	3.00	9.8	4	53.0	2.PD.01900.090	■
1.95		3.90	3.00	9.9	4	53.0	2.PD.01950.090	■
2.00		4.00	3.50	11.0	4	55.0	2.PD.02000.090	■
2.05		4.10	3.50	11.1	4	55.0	2.PD.02050.090	■
2.10		4.20	3.50	11.2	4	55.0	2.PD.02100.090	■
2.15		4.30	3.50	11.3	4	55.0	2.PD.02150.090	■
2.20		4.40	3.50	11.4	4	55.0	2.PD.02200.090	■
2.25		4.50	3.50	11.5	4	55.0	2.PD.02250.090	■
2.30		4.60	3.50	11.6	4	55.0	2.PD.02300.090	■
2.35		4.70	3.50	11.7	4	55.0	2.PD.02350.090	■
2.381	**3/32**	4.76	3.50	11.8	4	55.0	2.PD.F332.090	■
2.40		4.80	3.50	11.8	4	55.0	2.PD.02400.090	■
2.45		4.90	3.50	11.9	4	55.0	2.PD.02450.090	■
2.50		5.00	3.80	12.6	4	57.0	2.PD.02500.090	■

■ Stock item

Carbide | 2xd1 | 90° | 140° | Z2 | eXedur RIP

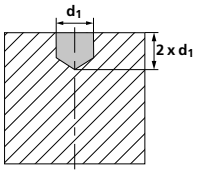
Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm + 0.002 mm	+ 0.009 mm + 0.004 mm	+ 0.012 mm + 0.006 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.55		5.10	3.80	12.7	4	57.0	2.PD.02550.090	■
2.60		5.20	3.80	12.8	4	57.0	2.PD.02600.090	■
2.65		5.30	3.80	12.9	4	57.0	2.PD.02650.090	■
2.70		5.40	3.80	13.0	4	57.0	2.PD.02700.090	■
2.75		5.50	3.80	13.1	4	57.0	2.PD.02750.090	■
2.80		5.60	3.80	13.2	4	57.0	2.PD.02800.090	■
2.85		5.70	3.80	13.3	4	57.0	2.PD.02850.090	■
2.90		5.80	3.80	13.4	4	57.0	2.PD.02900.090	■
2.95		5.90	3.80	13.5	4	57.0	2.PD.02950.090	■
3.00		6.00	3.80	13.6	4	57.0	2.PD.03000.090	■
3.05		6.10	4.50	15.1	6	61.0	2.PD.03050.090	■
3.10		6.20	4.50	15.2	6	61.0	2.PD.03100.090	■
3.15		6.30	4.50	15.3	6	61.0	2.PD.03150.090	■
3.175	**1/8**	6.35	4.50	15.4	6	61.0	2.PD.F18.090	■
3.20		6.40	4.50	15.4	6	61.0	2.PD.03200.090	■
3.25		6.50	4.50	15.5	6	61.0	2.PD.03250.090	■
3.30		6.60	4.50	15.6	6	61.0	2.PD.03300.090	■
3.35		6.70	4.50	15.7	6	61.0	2.PD.03350.090	■
3.40		6.80	4.50	15.8	6	61.0	2.PD.03400.090	■
3.45		6.90	4.50	15.9	6	61.0	2.PD.03450.090	■
3.50		7.00	4.50	16.0	6	61.0	2.PD.03500.090	■
3.55		7.10	5.30	17.7	6	64.0	2.PD.03550.090	■
3.60		7.20	5.30	17.8	6	64.0	2.PD.03600.090	■
3.65		7.30	5.30	17.9	6	64.0	2.PD.03650.090	■
3.70		7.40	5.30	18.0	6	64.0	2.PD.03700.090	■
3.75		7.50	5.30	18.1	6	64.0	2.PD.03750.090	■
3.80		7.60	5.30	18.2	6	64.0	2.PD.03800.090	■
3.85		7.70	5.30	18.3	6	64.0	2.PD.03850.090	■
3.90		7.80	5.30	18.4	6	64.0	2.PD.03900.090	■
3.95		7.90	5.30	18.5	6	64.0	2.PD.03950.090	■
3.968	**5/32**	7.94	5.30	18.6	6	64.0	2.PD.F532.090	■
4.00		8.00	5.30	18.6	6	64.0	2.PD.04000.090	■
4.10		8.20	6.00	20.2	6	70.0	2.PD.04100.090	■
4.20		8.40	6.00	20.4	6	70.0	2.PD.04200.090	■
4.30		8.60	6.00	20.6	6	70.0	2.PD.04300.090	■
4.40		8.80	6.00	20.8	6	70.0	2.PD.04400.090	■
4.50		9.00	6.00	21.0	6	70.0	2.PD.04500.090	■
4.60		9.20	6.00	21.2	6	70.0	2.PD.04600.090	■
4.70		9.40	6.00	21.4	6	70.0	2.PD.04700.090	■
4.762	**3/16**	9.52	6.00	21.6	6	70.0	2.PD.F316.090	■
4.80		9.60	6.00	21.6	6	70.0	2.PD.04800.090	■
4.90		9.80	6.00	21.8	6	70.0	2.PD.04900.090	■
5.00		10.00	6.00	22.0	6	70.0	2.PD.05000.090	■
5.10		10.20	8.00	26.2	8	80.0	2.PD.05100.090	■
5.20		10.40	8.00	26.4	8	80.0	2.PD.05200.090	■
5.30		10.60	8.00	26.6	8	80.0	2.PD.05300.090	■
5.40		10.80	8.00	26.8	8	80.0	2.PD.05400.090	■
5.50		11.00	8.00	27.0	8	80.0	2.PD.05500.090	■
5.560	**7/32**	11.12	8.00	27.2	8	80.0	2.PD.F732.090	■
5.60		11.20	8.00	27.2	8	80.0	2.PD.05600.090	■
5.70		11.40	8.00	27.4	8	80.0	2.PD.05700.090	■
5.80		11.60	8.00	27.6	8	80.0	2.PD.05800.090	■
5.90		11.80	8.00	27.8	8	80.0	2.PD.05900.090	■
6.00		12.00	8.00	28.0	8	80.0	2.PD.06000.090	■
6.350	**1/4**	12.70	8.00	28.7	8	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

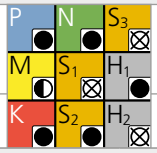
CrazyDrill Pilot - 2 x d - 90° coutersink

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



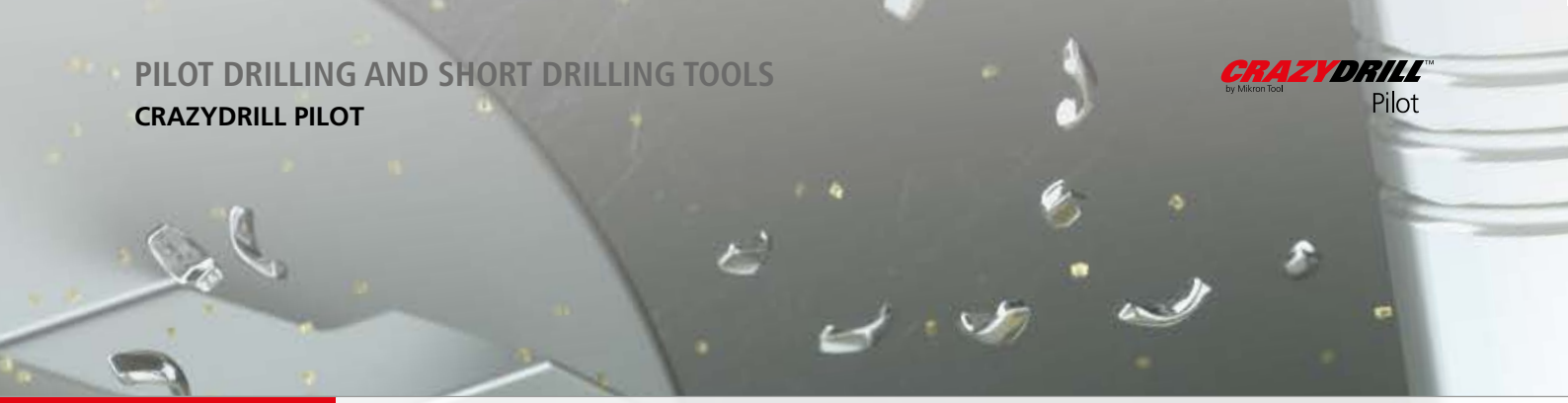
Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	32 – 64
		1.0401	C15	AISI 1015	
		1.1191	C45E/CK45	AISI 1045	
		1.0044	S275JR	AISI 1020	
		1.0715	11SMn30	AISI 1215	
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	32 – 64
		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
		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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	24 – 48
		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
		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
		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
		3.4365	AlZnMgCu1.5	ASTM 7075	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	64 – 120
		3.2381	GD-AlSi10Mg	UNS A03590	
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	40 – 80
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40 – 80
		2.0360	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	56 – 120
		2.1020	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	32 – 56
		2.0960	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
		3.7065	Gr.4	ASTM B348 / F68	
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	10 – 44
		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
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2	

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



f [mm/rev]

Ød1									
0.4 mm **1/64"** **f**	0.8 mm **1/32"** **f**	1.0 mm **f**	1.5 mm **1/16"** **f**	2.0 mm **f**	2.5 mm **3/32"** **f**	3.0 mm **1/8"** **f**	4.0 mm **5/32"** **f**	5.0 mm **3/16" - 7/32"** **f**	6.0 mm **1/4"** **f**
0.008	0.044	0.064	0.112	0.144	0.168	0.192	0.224	0.248	0.272
0.008	0.044	0.064	0.096	0.120	0.136	0.152	0.176	0.192	0.208
0.008	0.016	0.040	0.064	0.088	0.104	0.120	0.144	0.160	0.176
0.008	0.009	0.024	0.048	0.064	0.072	0.080	0.096	0.104	0.112
0.008	0.016	0.040	0.064	0.088	0.104	0.120	0.144	0.160	0.176
0.008	0.009	0.016	0.040	0.056	0.064	0.072	0.088	0.096	0.104
0.008	0.040	0.064	0.096	0.120	0.120	0.120	0.160	0.160	0.160
0.008	0.040	0.080	0.096	0.120	0.160	0.160	0.200	0.200	0.200
0.012	0.064	0.088	0.128	0.160	0.200	0.200	0.224	0.224	0.224
0.012	0.024	0.048	0.064	0.080	0.112	0.128	0.144	0.160	0.176
0.016	0.032	0.064	0.080	0.096	0.128	0.144	0.160	0.176	0.192
0.012	0.048	0.080	0.096	0.120	0.160	0.160	0.200	0.200	0.200
0.008	0.040	0.064	0.080	0.096	0.120	0.120	0.160	0.160	0.160
0.008	0.024	0.032	0.048	0.056	0.064	0.064	0.080	0.080	0.096
0.008	0.064	0.072	0.088	0.096	0.100	0.104	0.112	0.120	0.120
0.008	0.006	0.008	0.012	0.016	0.020	0.024	0.032	0.040	0.048



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

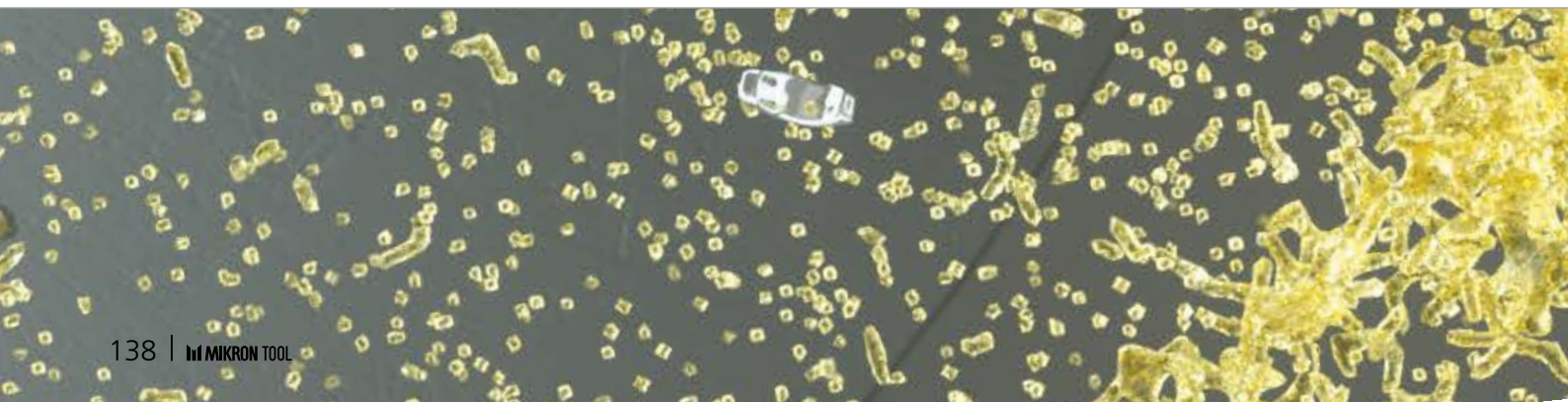
For detailed indications for tool holders see chapter "Technical information".

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.

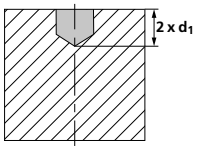
CrazyDrill Pilot not only is the perfect preparation of deep follow-up holes. Concurrently it is a short drill for highly precise and quick drilling up to 2 x d + 90° countersink.



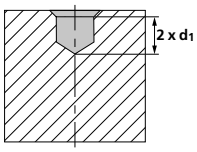
DRILLING PROCESS

1 | PILOT DRILLING OR SHORT DRILLING

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

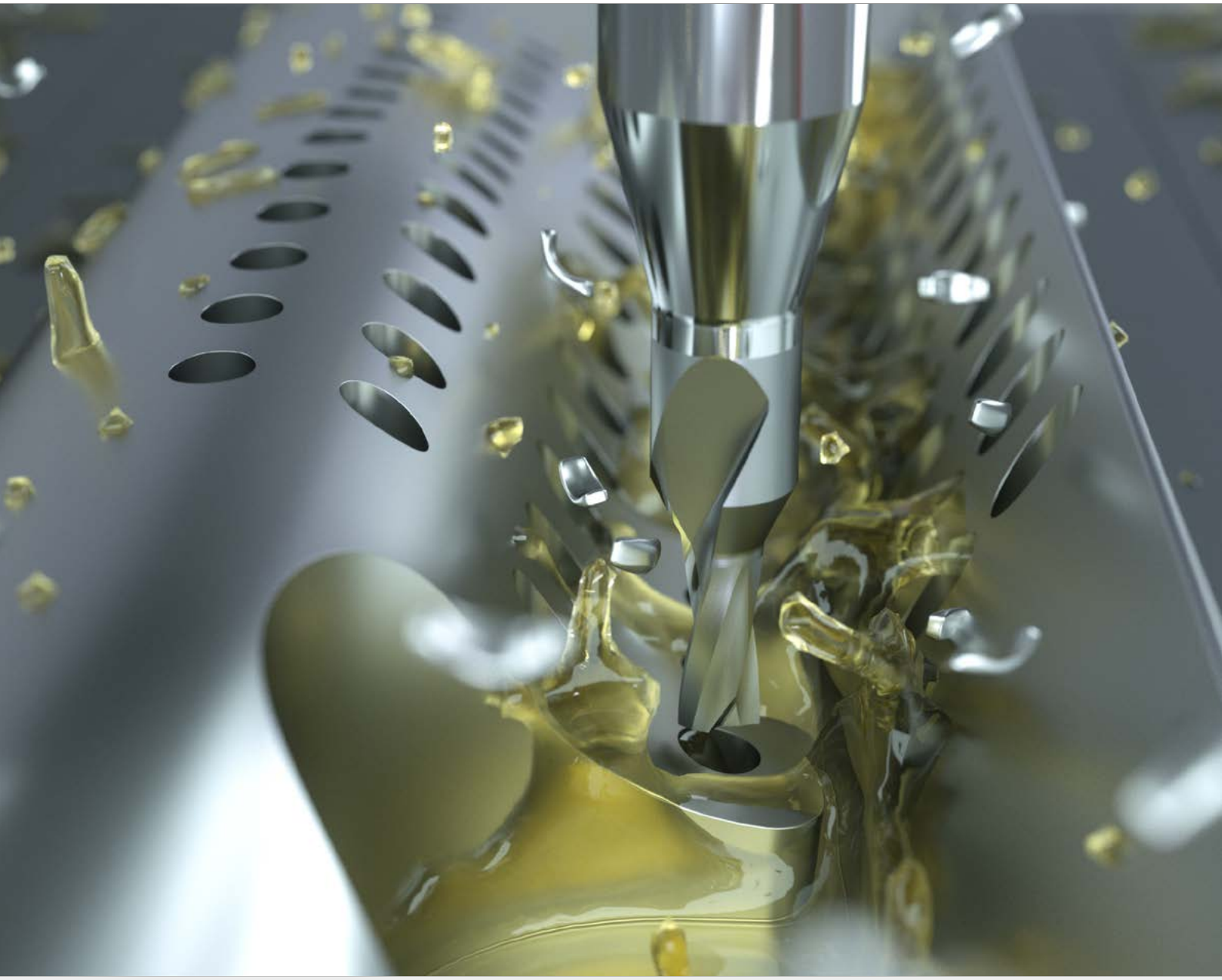


- If needed, after the desired cutting depth of 2 x d is reached, a chamfer angle of 90° can be realized.



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 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 1.4 mm.

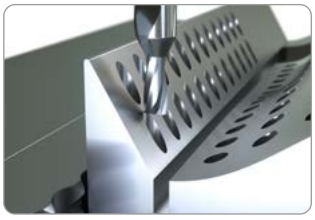
Please note: You couldn't find your suitable version of the CrazyDrill Crosspilot (diameter, length, cutting direction…)? Ask us about our customized versions!

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.

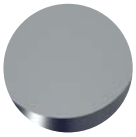
Inclined holes with angle up to 60° on convex surfaces.

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.

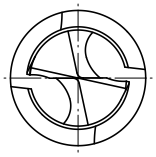
2 | SOLID CARBIDE
A special solid carbide assures high drilling speed.

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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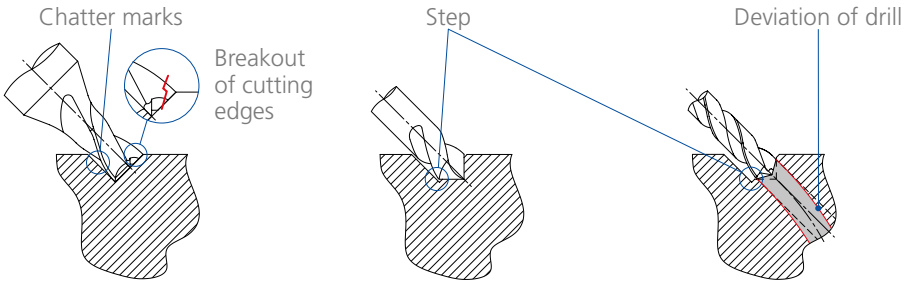
Features

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

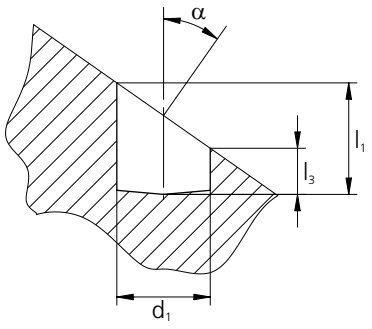
Step 1: inclined spot drilling with Mikron Tool pilot drill
Tool: CrazyDrill Crosspilot

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



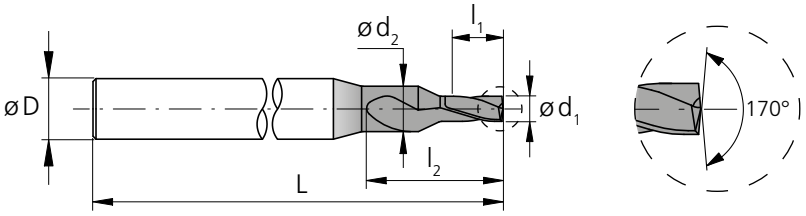
The example:
Inclination angle 35°, bore diameter 2 mm.

$l_3 = 2 \times 2\ mm - 2\ mm \times (\tan 35°) = 2.6\ mm$

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

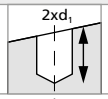
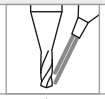
CrazyDrill Crosspilot - 2 x d (nominal)

DRILLING WITH EXTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.396	**1/64**	0.8	1.0	2.6	4	50	2.PD.F164.170	■
0.40		0.8	1.0	2.6	4	50	2.PD.00400.170	■
0.45		0.9	1.0	2.8	4	50	2.PD.00450.170	■
0.50		1.0	1.2	3.2	4	50	2.PD.00500.170	■
0.55		1.1	1.2	3.3	4	50	2.PD.00550.170	■
0.60		1.2	1.5	4.0	4	50	2.PD.00600.170	■
0.65		1.3	1.5	4.1	4	50	2.PD.00650.170	■
0.70		1.4	1.5	4.2	4	50	2.PD.00700.170	■
0.75		1.5	1.5	4.3	4	50	2.PD.00750.170	■
0.793	**1/32**	1.6	1.7	4.8	4	50	2.PD.F132.170	■
0.80		1.6	1.7	4.8	4	50	2.PD.00800.170	■
0.85		1.7	1.7	4.9	4	50	2.PD.00850.170	■
0.90		1.8	1.7	5.0	4	50	2.PD.00900.170	■
0.95		1.9	1.7	5.1	4	50	2.PD.00950.170	■
1.00		2.0	2.0	5.7	4	55	2.PD.01000.170	■
1.05		2.1	2.0	5.8	4	55	2.PD.01050.170	■
1.10		2.2	2.0	6.0	4	55	2.PD.01100.170	■
1.15		2.3	2.0	6.1	4	55	2.PD.01150.170	■
1.20		2.4	2.0	6.2	4	55	2.PD.01200.170	■
1.25		2.5	2.5	7.2	4	55	2.PD.01250.170	■
1.30		2.6	2.5	7.3	4	55	2.PD.01300.170	■
1.35		2.7	2.5	7.4	4	55	2.PD.01350.170	■
1.40		2.8	2.5	7.5	4	55	2.PD.01400.170	■
1.45		2.9	2.5	7.6	4	55	2.PD.01450.170	■
1.50		3.0	3.0	8.6	4	55	2.PD.01500.170	■
1.55		3.1	3.0	8.7	4	55	2.PD.01550.170	■
1.587	**1/16**	3.2	3.0	8.8	4	55	2.PD.F116.170	■
1.60		3.2	3.0	8.8	4	55	2.PD.01600.170	■
1.65		3.3	3.0	8.9	4	55	2.PD.01650.170	■
1.70		3.4	3.0	9.1	4	55	2.PD.01700.170	■
1.75		3.5	3.0	9.2	4	55	2.PD.01750.170	■
1.80		3.6	3.5	10.1	4	55	2.PD.01800.170	■
1.85		3.7	3.5	10.3	4	55	2.PD.01850.170	■
1.90		3.8	3.5	10.4	4	55	2.PD.01900.170	■
1.95		3.9	3.5	10.5	4	55	2.PD.01950.170	■
2.00		4.0	3.5	10.6	6	65	2.PD.02000.170	■
2.05		4.1	3.5	10.7	6	65	2.PD.02050.170	■
2.10		4.2	3.5	10.8	6	65	2.PD.02100.170	■
2.15		4.3	3.5	10.9	6	65	2.PD.02150.170	■
2.20		4.4	4.5	12.8	6	65	2.PD.02200.170	■
2.25		4.5	4.5	12.9	6	65	2.PD.02250.170	■
2.30		4.6	4.5	13.0	6	65	2.PD.02300.170	■
2.35		4.7	4.5	13.1	6	65	2.PD.02350.170	■
2.381	**3/32**	4.8	4.5	13.2	6	65	2.PD.F332.170	■
2.40		4.8	4.5	13.2	6	65	2.PD.02400.170	■
2.45		4.9	4.5	13.4	6	65	2.PD.02450.170	■
2.50		5.0	4.5	13.5	6	65	2.PD.02500.170	■

■ Stock item

Carbide |  |  | Z2 |  | 

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm	+ 0.010 mm + 0.001 mm

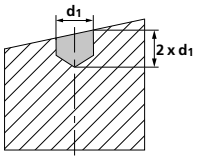
d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.55		5.1	4.5	13.6	6	65	2.PD.02550.170	■
2.60		5.2	4.5	13.7	6	65	2.PD.02600.170	■
2.65		5.3	5.0	14.7	6	65	2.PD.02650.170	■
2.70		5.4	5.0	14.8	6	65	2.PD.02700.170	■
2.75		5.5	5.0	14.9	6	65	2.PD.02750.170	■
2.80		5.6	5.0	15.0	6	65	2.PD.02800.170	■
2.85		5.7	5.0	15.1	6	65	2.PD.02850.170	■
2.90		5.8	5.0	15.2	6	65	2.PD.02900.170	■
2.95		5.9	5.0	15.4	6	65	2.PD.02950.170	■
3.00		6.0	6.0	17.2	6	70	2.PD.03000.170	■
3.05		6.1	6.0	17.3	6	70	2.PD.03050.170	■
3.10		6.2	6.0	17.4	6	70	2.PD.03100.170	■
3.15		6.3	6.0	17.5	6	70	2.PD.03150.170	■
3.175	**1/8**	6.4	6.0	17.7	6	70	2.PD.F18.170	■
3.20		6.4	6.0	17.7	6	70	2.PD.03200.170	■
3.25		6.5	6.0	17.8	6	70	2.PD.03250.170	■
3.30		6.6	6.0	17.9	6	70	2.PD.03300.170	■
3.35		6.7	6.0	18.0	6	70	2.PD.03350.170	■
3.40		6.8	6.0	18.1	6	70	2.PD.03400.170	■
3.45		6.9	6.0	18.2	6	70	2.PD.03450.170	■
3.50		7.0	6.0	18.3	6	70	2.PD.03500.170	■
3.55		7.1	6.0	18.4	6	70	2.PD.03550.170	■
3.60		7.2	6.0	18.6	6	70	2.PD.03600.170	■
3.65		7.3	6.0	18.7	6	70	2.PD.03650.170	■
3.70		7.4	6.0	18.8	6	70	2.PD.03700.170	■
3.75		7.5	6.0	18.9	6	70	2.PD.03750.170	■
3.80		7.6	6.0	19.0	6	70	2.PD.03800.170	■
3.85		7.7	6.0	19.1	6	70	2.PD.03850.170	■
3.90		7.8	6.0	19.2	6	70	2.PD.03900.170	■
3.95		7.9	6.0	19.4	6	70	2.PD.03950.170	■
3.968	**5/32**	8.0	6.0	19.5	6	70	2.PD.F532.170	■
4.00		8.0	6.0	19.5	6	70	2.PD.04000.170	■
4.10		8.2	6.0	21.3	6	70	2.PD.04100.170	■
4.20		8.4	6.0	21.4	6	70	2.PD.04200.170	■
4.30		8.6	6.0	21.6	6	70	2.PD.04300.170	■
4.40		8.8	6.0	21.7	6	70	2.PD.04400.170	■
4.50		9.0	8.0	27.0	8	80	2.PD.04500.170	■
4.60		9.2	8.0	27.1	8	80	2.PD.04600.170	■
4.70		9.4	8.0	27.3	8	80	2.PD.04700.170	■
4.762	**3/16**	9.6	8.0	27.4	8	80	2.PD.F316.170	■
4.80		9.6	8.0	27.4	8	80	2.PD.04800.170	■
4.90		9.8	8.0	27.6	8	80	2.PD.04900.170	■
5.00		10.0	8.0	27.7	8	80	2.PD.05000.170	■
5.10		10.2	8.0	27.9	8	80	2.PD.05100.170	■
5.20		10.4	8.0	28.0	8	80	2.PD.05200.170	■
5.30		10.6	8.0	28.1	8	80	2.PD.05300.170	■
5.40		10.8	8.0	28.3	8	80	2.PD.05400.170	■
5.50		11.0	8.0	28.4	8	80	2.PD.05500.170	■
5.560	**7/32**	11.2	8.0	28.6	8	80	2.PD.F732.170	■
5.60		11.2	8.0	28.6	8	80	2.PD.05600.170	■
5.70		11.4	8.0	28.7	8	80	2.PD.05700.170	■
5.80		11.6	8.0	28.9	8	80	2.PD.05800.170	■
5.90		11.8	8.0	29.0	8	80	2.PD.05900.170	■
6.00		12.0	8.0	29.1	8	80	2.PD.06000.170	■
6.350	**1/4**	12.7	8.0	29.6	8	80	2.PD.F14.170	■

Complementary products
All "CrazyDrill" family

CRAZYDRILL by Mikron Tool Crosspilot

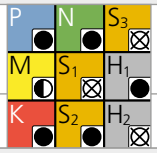
CrazyDrill Crosspilot - 2 x d (nominal)

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



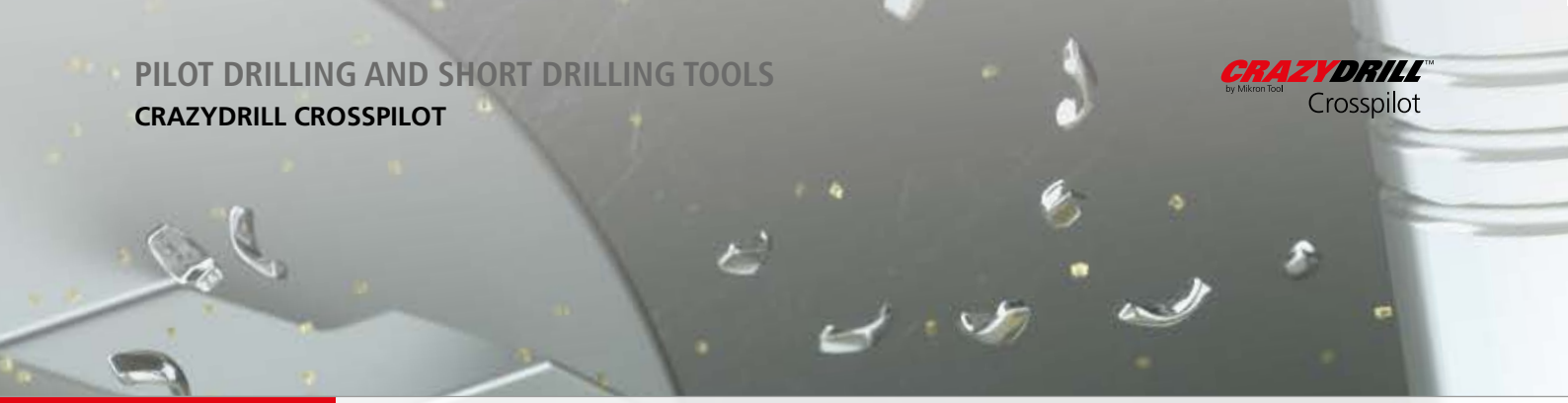
Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	80
		1.0401	C15	AISI 1015	
		1.1191	C45E/CK45	AISI 1045	
		1.0044	S275JR	AISI 1020	
		1.0715	11SMn30	AISI 1215	
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60
		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
		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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	50
		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
		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
		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
		3.4365	AlZnMgCu1.5	ASTM 7075	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	125
		3.2381	GD-AlSi10Mg	UNS A03590	
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	80
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	80
		2.0360	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	100
		2.1020	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80
		2.0960	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
		3.7065	Gr.4	ASTM B348 / F68	
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	25
		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
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2	

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



f [mm/rev]

	Ød1							
0.4 mm **1/64"** **f**	0.8 mm **1/32"** **f**	1.0 mm **f**	1.5 mm **1/16"** **f**	2.0 mm **f**	3.0 mm **1/8"** **f**	4.0 mm **5/32"** **f**	5.0 mm **3/16" - 7/32"** **f**	6.0 mm **1/4"** **f**
0.005	0.011	0.013	0.020	0.027	0.040	0.053	0.067	0.080
0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
0.002	0.004	0.005	0.008	0.010	0.015	0.020	0.025	0.030
0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
0.002	0.004	0.005	0.008	0.010	0.015	0.020	0.025	0.030
0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
0.008	0.016	0.020	0.030	0.040	0.060	0.080	0.100	0.120
0.008	0.016	0.020	0.030	0.040	0.060	0.080	0.100	0.120
0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
0.008	0.016	0.020	0.030	0.040	0.060	0.080	0.100	0.120
0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
0.001	0.003	0.003	0.005	0.007	0.010	0.013	0.017	0.020



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

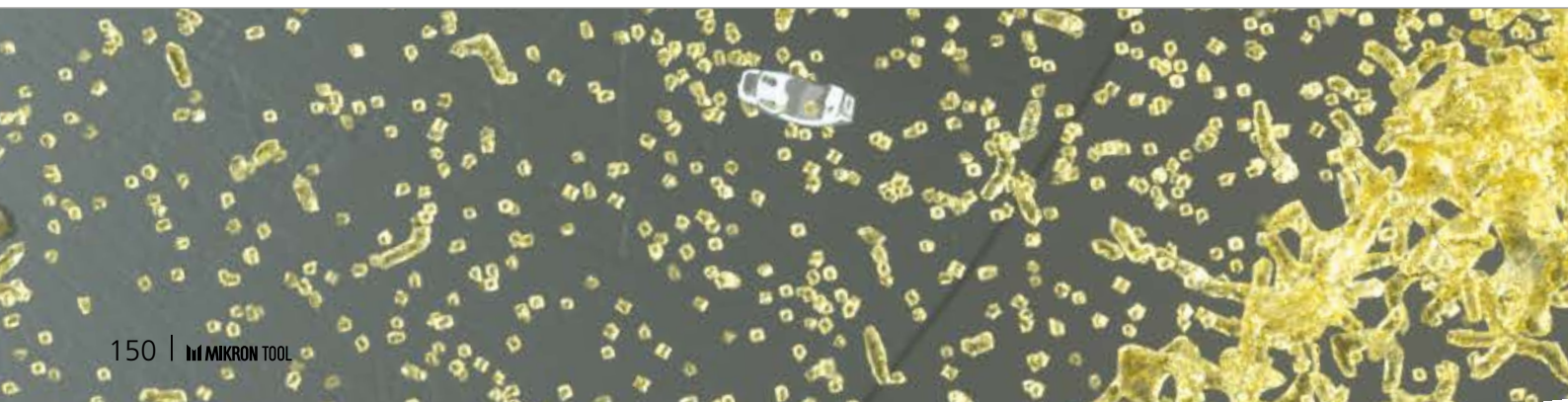
For detailed indications for tool holders see chapter "Technical information".

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.

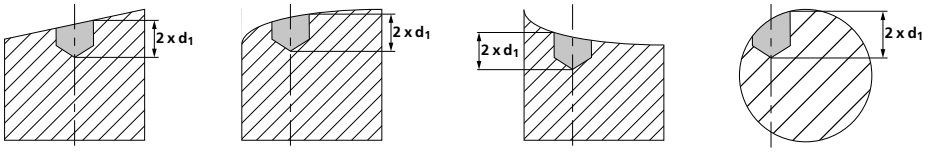
CrazyDrill Crosspilot not only is the perfect preparation of deep follow-up holes. Concurrently it is a short drill for highly precise and quick drilling on concave, convex and inclined surfaces up to a maximum inclined angle of 60°.



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 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.

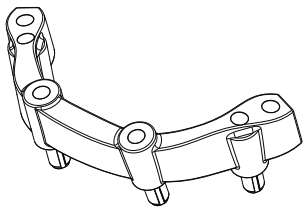
Regrinding: This product can be reground starting from Ø 1.4 mm.

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

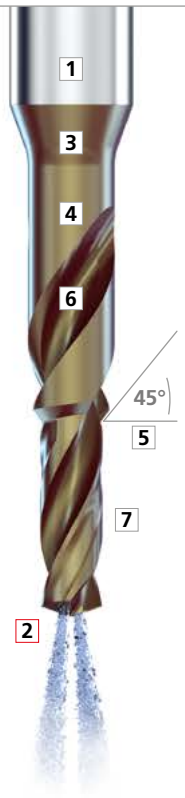
MACHINING
- Short drilling and chamfering 90°
- d = 4 mm
- drilling depth 12.1 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Coolpilot

DATA	MIKRON TOOL
Tool type	CrazyDrill Coolpilot - Carbide - Coated - Internal cooling
Item number	2.PD.04000.090.IC
Cutting data	v_c = 70 m/min f = 0.12 mm/rev

CrazyDrill Coolpilot

- Coated
- Through-tool cooling



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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 2.95 mm.

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

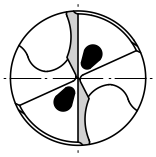
4 | NEW COATING
The high-performance coating eXedur SNP is heat-resistant and wear-resistant, prevents build up edges and promotes uniform chip flushing. The result is long tool life.

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.

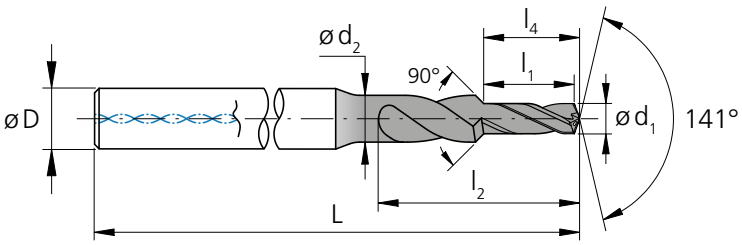
Drill tip



CRAZYDRILL by Mikron Tool Coolpilot

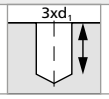
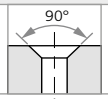
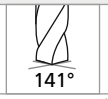
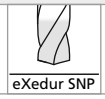
CrazyDrill Coolpilot - 3 x d - 90° countersink

DRILLING WITH THROUGH-TOOL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	l_4 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		3.00	1.60	6.5	3.20	4	50	2.PD.01000.090.IC	■
1.05		3.15	1.60	6.8	3.30	4	50	2.PD.01050.090.IC	■
1.10		3.30	1.60	7.1	3.50	4	50	2.PD.01100.090.IC	■
1.15		3.45	1.60	7.5	3.60	4	50	2.PD.01150.090.IC	■
1.20		3.60	1.90	7.8	3.80	4	50	2.PD.01200.090.IC	■
1.25		3.75	1.90	8.1	4.00	4	50	2.PD.01250.090.IC	■
1.30		3.90	1.90	8.4	4.10	4	50	2.PD.01300.090.IC	■
1.35		4.05	1.90	8.8	4.30	4	50	2.PD.01350.090.IC	■
1.40		4.20	1.90	9.1	4.40	4	50	2.PD.01400.090.IC	■
1.45		4.35	2.25	10.4	4.60	4	50	2.PD.01450.090.IC	■
1.50		4.50	2.25	10.7	4.70	4	50	2.PD.01500.090.IC	■
1.55		4.65	2.25	10.9	4.90	4	50	2.PD.01550.090.IC	■
1.587	**1/16**	4.76	2.25	11.2	5.10	4	50	2.PD.F116.IC	■
1.60		4.80	2.25	11.2	5.10	4	50	2.PD.01600.090.IC	■
1.65		4.95	2.25	11.5	5.20	4	50	2.PD.01650.090.IC	■
1.70		5.10	2.60	11.8	5.40	4	53	2.PD.01700.090.IC	■
1.75		5.25	2.60	12.1	5.50	4	53	2.PD.01750.090.IC	■
1.80		5.40	2.60	12.3	5.70	4	53	2.PD.01800.090.IC	■
1.85		5.55	2.60	12.6	5.80	4	53	2.PD.01850.090.IC	■
1.90		5.70	2.60	12.8	6.00	4	53	2.PD.01900.090.IC	■
1.95		5.85	2.60	13.1	6.20	4	53	2.PD.01950.090.IC	■
2.00		6.00	3.10	13.3	6.30	4	55	2.PD.02000.090.IC	■
2.05		6.15	3.10	13.6	6.50	4	55	2.PD.02050.090.IC	■
2.10		6.30	3.10	13.9	6.60	4	55	2.PD.02100.090.IC	■
2.15		6.45	3.10	14.1	6.80	4	55	2.PD.02150.090.IC	■
2.20		6.60	3.10	14.4	7.00	4	55	2.PD.02200.090.IC	■
2.25		6.75	3.10	14.7	7.10	4	55	2.PD.02250.090.IC	■
2.30		6.90	3.50	14.9	7.30	4	57	2.PD.02300.090.IC	■
2.35		7.05	3.50	15.2	7.40	4	57	2.PD.02350.090.IC	■
2.381	**3/32**	7.14	3.50	15.6	7.60	4	57	2.PD.F332.IC	■
2.40		7.20	3.50	15.6	7.60	4	57	2.PD.02400.090.IC	■
2.45		7.35	3.50	15.9	7.70	4	57	2.PD.02450.090.IC	■
2.50		7.50	3.50	16.2	7.90	4	57	2.PD.02500.090.IC	■
2.55		7.65	3.50	16.5	8.10	4	57	2.PD.02550.090.IC	■
2.60		7.80	4.00	16.9	8.20	4	57	2.PD.02600.090.IC	■
2.65		7.95	4.00	17.2	8.40	4	57	2.PD.02650.090.IC	■
2.70		8.10	4.00	17.5	8.50	4	57	2.PD.02700.090.IC	■
2.75		8.25	4.00	17.8	8.70	4	57	2.PD.02750.090.IC	■
2.80		8.40	4.00	18.2	8.80	4	57	2.PD.02800.090.IC	■
2.85		8.55	4.00	18.5	9.00	4	57	2.PD.02850.090.IC	■
2.90		8.70	4.00	18.8	9.20	4	57	2.PD.02900.090.IC	■

■ Stock item

Carbide |  |  |  | Z2 |  | 

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm + 0.002 mm	+ 0.009 mm + 0.004 mm	+ 0.012 mm + 0.006 mm

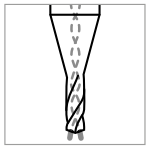
d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	l_4 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.95		8.85	4.00	19.1	9.30	4	57	2.PD.02950.090.IC	■
3.00		9.00	4.70	19.5	9.50	6	65	2.PD.03000.090.IC	■
3.05		9.15	4.70	19.8	9.60	6	65	2.PD.03050.090.IC	■
3.10		9.30	4.70	20.1	9.80	6	65	2.PD.03100.090.IC	■
3.15		9.45	4.70	20.4	10.00	6	65	2.PD.03150.090.IC	■
3.175	**1/8**	9.53	4.70	20.8	10.10	6	65	2.PD.F18.IC	■
3.20		9.60	4.70	20.8	10.10	6	65	2.PD.03200.090.IC	■
3.25		9.75	4.70	21.1	10.30	6	65	2.PD.03250.090.IC	■
3.30		9.90	4.70	21.4	10.40	6	65	2.PD.03300.090.IC	■
3.35		10.05	4.70	21.7	10.60	6	65	2.PD.03350.090.IC	■
3.40		10.20	4.70	22.1	10.70	6	65	2.PD.03400.090.IC	■
3.45		10.35	4.70	22.4	10.90	6	65	2.PD.03450.090.IC	■
3.50		10.50	5.40	22.7	11.10	6	68	2.PD.03500.090.IC	■
3.55		10.65	5.40	23.0	11.20	6	68	2.PD.03550.090.IC	■
3.60		10.80	5.40	23.4	11.40	6	68	2.PD.03600.090.IC	■
3.65		10.95	5.40	23.7	11.50	6	68	2.PD.03650.090.IC	■
3.70		11.10	5.40	24.0	11.70	6	68	2.PD.03700.090.IC	■
3.75		11.25	5.40	24.3	11.80	6	68	2.PD.03750.090.IC	■
3.80		11.40	5.40	24.7	12.00	6	68	2.PD.03800.090.IC	■
3.85		11.55	5.40	25.0	12.20	6	68	2.PD.03850.090.IC	■
3.90		11.70	5.40	25.3	12.30	6	68	2.PD.03900.090.IC	■
3.95		11.85	5.40	25.6	12.50	6	68	2.PD.03950.090.IC	■
3.968	**5/32**	11.90	5.40	26.0	12.60	6	68	2.PD.F532.IC	■
4.00		12.00	5.40	26.0	12.60	6	68	2.PD.04000.090.IC	■
4.10		12.30	6.00	26.6	12.90	6	72	2.PD.04100.090.IC	■
4.20		12.60	6.00	27.2	13.30	6	72	2.PD.04200.090.IC	■
4.30		12.90	6.00	27.9	13.60	6	72	2.PD.04300.090.IC	■
4.40		13.20	6.00	28.5	13.90	6	72	2.PD.04400.090.IC	■
4.50		13.50	6.00	29.2	14.20	6	72	2.PD.04500.090.IC	■
4.60		13.80	6.00	29.8	14.50	6	72	2.PD.04600.090.IC	■
4.70		14.10	7.00	30.5	14.80	8	75	2.PD.04700.090.IC	■
4.762	**3/16**	14.29	7.00	31.1	15.20	8	75	2.PD.F316.IC	■
4.80		14.40	7.00	31.1	15.20	8	75	2.PD.04800.090.IC	■
4.90		14.70	7.00	31.8	15.50	8	75	2.PD.04900.090.IC	■
5.00		15.00	7.00	32.4	15.80	8	75	2.PD.05000.090.IC	■
5.10		15.30	7.50	33.1	16.10	8	75	2.PD.05100.090.IC	■
5.20		15.60	7.50	33.7	16.40	8	75	2.PD.05200.090.IC	■
5.30		15.90	7.50	34.4	16.70	8	75	2.PD.05300.090.IC	■
5.40		16.20	8.00	35.0	17.10	8	80	2.PD.05400.090.IC	■
5.50		16.50	8.00	35.7	17.40	8	80	2.PD.05500.090.IC	■
5.560	**7/32**	16.68	8.00	36.3	17.70	8	80	2.PD.F732.IC	■
5.60		16.80	8.00	36.3	17.70	8	80	2.PD.05600.090.IC	■
5.70		17.10	8.00	37.0	18.00	8	80	2.PD.05700.090.IC	■
5.80		17.40	8.00	37.6	18.30	8	80	2.PD.05800.090.IC	■
5.90		17.70	8.00	38.3	18.60	8	80	2.PD.05900.090.IC	■
6.00		18.00	8.00	38.9	18.90	8	80	2.PD.06000.090.IC	■
6.350	**1/4**	19.05	8.00	41.2	20.05	8	80	2.PD.F14.IC	■

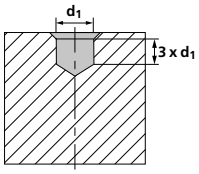
Complementary products
CrazyDrill Cool SST-Inox p.316

CRAZYDRILL by Mikron Tool Coolpilot

CrazyDrill Coolpilot - 3 x d - 90° countersink

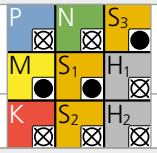
DRILLING WITH THROUGH-TOOL COOLING | CUTTING DATA OVERVIEW





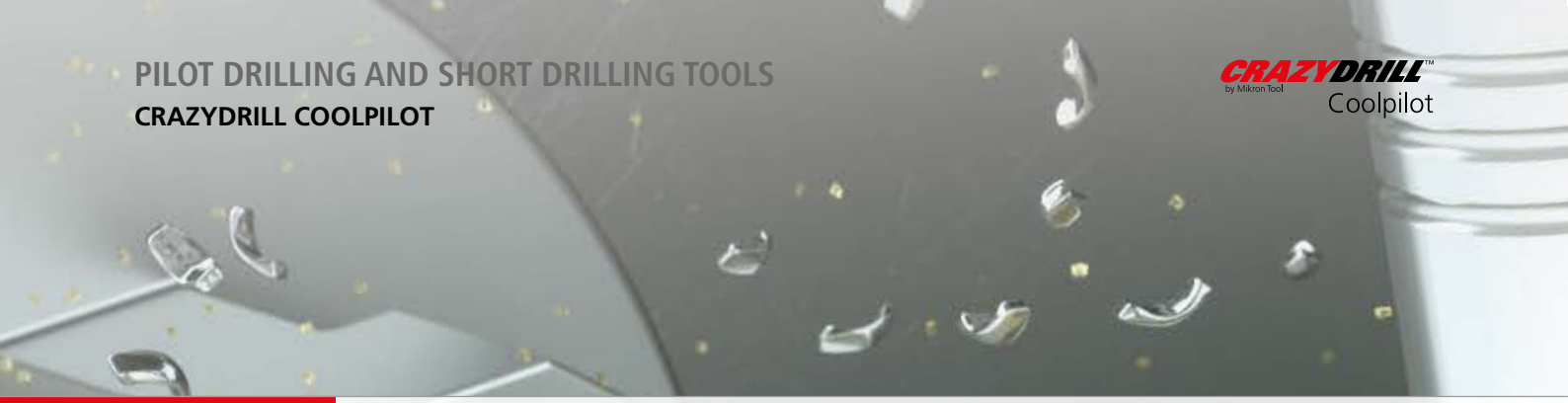
Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Low	Mid	High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010			
		1.0401	C15	AISI 1015			
		1.1191	C45E/CK45	AISI 1045			
		1.0044	S275JR	AISI 1020			
		1.0715	11SMn30	AISI 1215			
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	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	80	100
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	80	100
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	80	100
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	80	100
		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	2.0040	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	30	40	50
		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	70	90
			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]

Ød1	1.0 mm			1.25 mm			1.5 mm 1/16"			2.0 mm			2.5 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			5.0 mm 3/16" - 7/32"			6.0 mm 1/4"		
	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Tief	**Mid**	High
	0.010	0.020	0.030	0.013	0.025	0.038	0.015	0.030	0.045	0.020	0.040	0.060	0.025	0.050	0.075	0.030	0.060	0.090	0.040	0.080	0.120	0.050	0.100	0.150	0.060	0.120	0.180
	0.030	0.040	0.050	0.038	0.050	0.063	0.045	0.060	0.075	0.060	0.080	0.100	0.075	0.100	0.125	0.090	0.120	0.150	0.120	0.160	0.200	0.150	0.200	0.250	0.180	0.240	0.300
	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120	0.080	0.120	0.160	0.100	0.150	0.200	0.120	0.180	0.240
	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120	0.080	0.120	0.160	0.100	0.150	0.200	0.120	0.180	0.240
	0.010	0.015	0.020	0.013	0.019	0.025	0.015	0.023	0.030	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120
	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120	0.080	0.120	0.160	0.100	0.150	0.200	0.120	0.180	0.240



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 < 2 mm filter quality ≤ 0.010 mm.
- Drill with Ø < 3 mm filter quality ≤ 0.020 mm.
- Drill with Ø < 6.35 mm filter quality ≤ 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]	1.0 mm - 2.0 mm	2.0 mm - 4.0 mm	4.0 mm - 6.35 mm
Minimal pressure	[bar]	40	30	25

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.

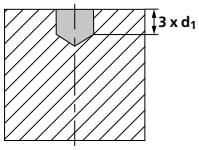
Drilling quality (position and alignment accuracy, no measurable transition from pilot to follow-up hole) and stable machining process are assured due to matched diameters of the tools.

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.

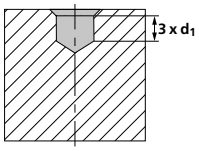
DRILLING PROCESS

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 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 1.4 mm.

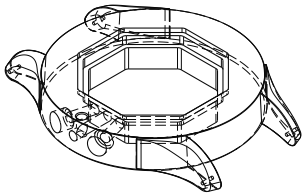
Please note: You couldn't find your suitable version of the CrazyDrill Coolpilot Titanium ATC (diameter, length, cutting direction…)? Ask us about our customized versions!

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

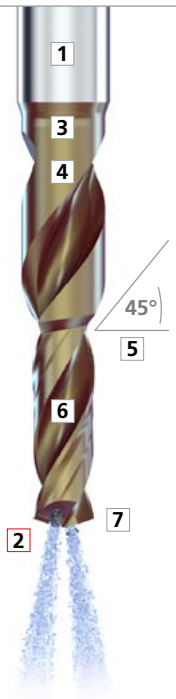
MACHINING
- Drilling
- d = 2 mm
- Drilling depth 6 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Coolpilot Titanium ATC

DATA	MIKRON TOOL
Tool type	CrazyDrill Coolpilot Titanium ATC - Carbide - Coated - Integrated cooling
Item number	2.PD.02000.ATC
Cutting data	v_c = 40 m/min f = 0.040 mm/rev

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 2.95 mm.

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

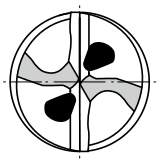
4 | NEW COATING
The high-performance coating eXedur SNP is heat-resistant and wear-resistant, prevents build up edges and promotes uniform chip flushing. The result is long tool life.

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.

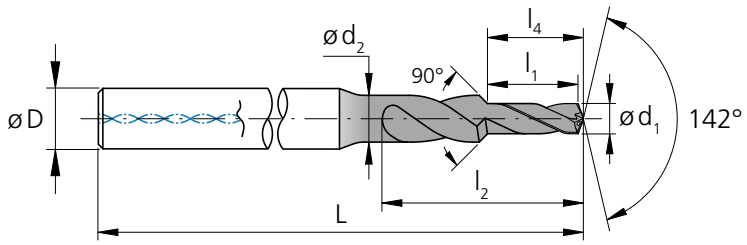
7 | SINGLE GUIDING MARGIN
The particularly smooth surfaces of the guiding margin prevent material sticking and reduce the load on the tool. The result is the highest degree of precision (straightness) and surface quality.

Drill tip



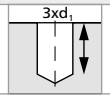
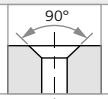
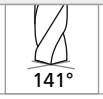
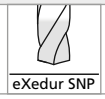
NEW CrazyDrill Coolpilot Titanium ATC - 3 x d

DRILLING WITH THROUGH-TOOL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	l_4 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		3.00	1.60	6.5	3.20	4	50	2.PD.01000.ATC	■
1.05		3.15	1.60	6.8	3.30	4	50	2.PD.01050.ATC	■
1.10		3.30	1.60	7.1	3.50	4	50	2.PD.01100.ATC	■
1.15		3.45	1.60	7.5	3.60	4	50	2.PD.01150.ATC	■
1.20		3.60	1.90	7.8	3.80	4	50	2.PD.01200.ATC	■
1.25		3.75	1.90	8.1	4.00	4	50	2.PD.01250.ATC	■
1.30		3.90	1.90	8.4	4.10	4	50	2.PD.01300.ATC	■
1.35		4.05	1.90	8.8	4.30	4	50	2.PD.01350.ATC	■
1.40		4.20	1.90	9.1	4.40	4	50	2.PD.01400.ATC	■
1.45		4.35	2.25	10.4	4.60	4	50	2.PD.01450.ATC	■
1.50		4.50	2.25	10.7	4.70	4	50	2.PD.01500.ATC	■
1.55		4.65	2.25	10.9	4.90	4	50	2.PD.01550.ATC	■
1.587	**1/16**	4.76	2.25	11.2	5.00	4	50	2.PD.F116.ATC	■
1.60		4.80	2.25	11.2	5.10	4	50	2.PD.01600.ATC	■
1.65		4.95	2.25	11.5	5.20	4	50	2.PD.01650.ATC	■
1.70		5.10	2.60	11.8	5.40	4	53	2.PD.01700.ATC	■
1.75		5.25	2.60	12.1	5.50	4	53	2.PD.01750.ATC	■
1.80		5.40	2.60	12.3	5.70	4	53	2.PD.01800.ATC	■
1.85		5.55	2.60	12.6	5.80	4	53	2.PD.01850.ATC	■
1.90		5.70	2.60	12.8	6.00	4	53	2.PD.01900.ATC	■
1.95		5.85	2.60	13.1	6.20	4	53	2.PD.01950.ATC	■
2.00		6.00	3.10	13.3	6.30	4	55	2.PD.02000.ATC	■
2.05		6.15	3.10	13.6	6.50	4	55	2.PD.02050.ATC	■
2.10		6.30	3.10	13.9	6.60	4	55	2.PD.02100.ATC	■
2.15		6.45	3.10	14.1	6.80	4	55	2.PD.02150.ATC	■
2.20		6.60	3.10	14.4	7.00	4	55	2.PD.02200.ATC	■
2.25		6.75	3.10	14.7	7.10	4	55	2.PD.02250.ATC	■
2.30		6.90	3.50	14.9	7.30	4	57	2.PD.02300.ATC	■
2.35		7.05	3.50	15.2	7.40	4	57	2.PD.02350.ATC	■
2.381	**3/32**	7.14	3.50	15.5	7.49	4	57	2.PD.F332.ATC	■
2.40		7.20	3.50	15.6	7.60	4	57	2.PD.02400.ATC	■
2.45		7.35	3.50	15.9	7.70	4	57	2.PD.02450.ATC	■
2.50		7.50	3.50	16.2	7.90	4	57	2.PD.02500.ATC	■
2.55		7.65	3.50	16.5	8.10	4	57	2.PD.02550.ATC	■
2.60		7.80	4.00	16.9	8.20	4	57	2.PD.02600.ATC	■
2.65		7.95	4.00	17.2	8.40	4	57	2.PD.02650.ATC	■
2.70		8.10	4.00	17.5	8.50	4	57	2.PD.02700.ATC	■
2.75		8.25	4.00	17.8	8.70	4	57	2.PD.02750.ATC	■
2.80		8.40	4.00	18.2	8.80	4	57	2.PD.02800.ATC	■
2.85		8.55	4.00	18.5	9.00	4	57	2.PD.02850.ATC	■
2.90		8.70	4.00	18.8	9.20	4	57	2.PD.02900.ATC	■

■ Stock item

Carbide |  |  |  | Z2 |  | 

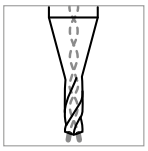
Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm + 0.002 mm	+ 0.009 mm + 0.004 mm	+ 0.012 mm + 0.006 mm

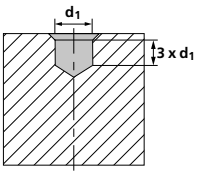
d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	l_4 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.95		8.85	4.00	19.1	9.30	4	57	2.PD.02950.ATC	■
3.00		9.00	4.70	19.5	9.50	6	65	2.PD.03000.ATC	■
3.05		9.15	4.70	19.8	9.60	6	65	2.PD.03050.ATC	■
3.10		9.30	4.70	20.1	9.80	6	65	2.PD.03100.ATC	■
3.15		9.45	4.70	20.4	10.00	6	65	2.PD.03150.ATC	■
3.175	**1/8**	9.53	4.70	20.6	10.00	6	65	2.PD.F18.ATC	■
3.20		9.60	4.70	20.8	10.10	6	65	2.PD.03200.ATC	■
3.25		9.75	4.70	21.1	10.30	6	65	2.PD.03250.ATC	■
3.30		9.90	4.70	21.4	10.40	6	65	2.PD.03300.ATC	■
3.35		10.05	4.70	21.7	10.60	6	65	2.PD.03350.ATC	■
3.40		10.20	4.70	22.1	10.70	6	65	2.PD.03400.ATC	■
3.45		10.35	4.70	22.4	10.90	6	65	2.PD.03450.ATC	■
3.50		10.50	5.40	22.7	11.10	6	68	2.PD.03500.ATC	■
3.55		10.65	5.40	23.0	11.20	6	68	2.PD.03550.ATC	■
3.60		10.80	5.40	23.4	11.40	6	68	2.PD.03600.ATC	■
3.65		10.95	5.40	23.7	11.50	6	68	2.PD.03650.ATC	■
3.70		11.10	5.40	24.0	11.70	6	68	2.PD.03700.ATC	■
3.75		11.25	5.40	24.3	11.80	6	68	2.PD.03750.ATC	■
3.80		11.40	5.40	24.7	12.00	6	68	2.PD.03800.ATC	■
3.85		11.55	5.40	25.0	12.20	6	68	2.PD.03850.ATC	■
3.90		11.70	5.40	25.3	12.30	6	68	2.PD.03900.ATC	■
3.95		11.85	5.40	25.6	12.50	6	68	2.PD.03950.ATC	■
3.968	**5/32**	11.90	5.40	25.7	12.50	6	68	2.PD.F532.ATC	■
4.00		12.00	5.40	26.0	12.60	6	68	2.PD.04000.ATC	■
4.10		12.30	6.00	26.6	12.90	6	72	2.PD.04100.ATC	■
4.20		12.60	6.00	27.2	13.30	6	72	2.PD.04200.ATC	■
4.30		12.90	6.00	27.9	13.60	6	72	2.PD.04300.ATC	■
4.40		13.20	6.00	28.5	13.90	6	72	2.PD.04400.ATC	■
4.50		13.50	6.00	29.2	14.20	6	72	2.PD.04500.ATC	■
4.60		13.80	6.00	29.8	14.50	6	72	2.PD.04600.ATC	■
4.70		14.10	7.00	30.5	14.80	8	75	2.PD.04700.ATC	■
4.762	**3/16**	14.29	7.00	30.8	15.00	8	75	2.PD.F316.ATC	■
4.80		14.40	7.00	31.1	15.20	8	75	2.PD.04800.ATC	■
4.90		14.70	7.00	31.8	15.50	8	75	2.PD.04900.ATC	■
5.00		15.00	7.00	32.4	15.80	8	75	2.PD.05000.ATC	■
5.10		15.30	7.50	33.1	16.10	8	75	2.PD.05100.ATC	■
5.20		15.60	7.50	33.7	16.40	8	75	2.PD.05200.ATC	■
5.30		15.90	7.50	34.4	16.70	8	75	2.PD.05300.ATC	■
5.40		16.20	8.00	35.0	17.10	8	80	2.PD.05400.ATC	■
5.50		16.50	8.00	35.7	17.40	8	80	2.PD.05500.ATC	■
5.560	**7/32**	16.68	8.00	36.0	17.52	8	80	2.PD.F732.ATC	■
5.60		16.80	8.00	36.3	17.70	8	80	2.PD.05600.ATC	■
5.70		17.10	8.00	37.0	18.00	8	80	2.PD.05700.ATC	■
5.80		17.40	8.00	37.6	18.30	8	80	2.PD.05800.ATC	■
5.90		17.70	8.00	38.3	18.60	8	80	2.PD.05900.ATC	■
6.00		18.00	8.00	38.9	18.90	8	80	2.PD.06000.ATC	■
6.350	**1/4**	19.05	8.00	41.1	20.02	8	80	2.PD.F14.ATC	■

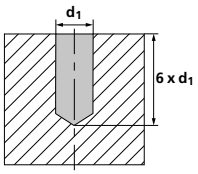
Complementary products
CrazyDrill Cool Titanium ATC p.348

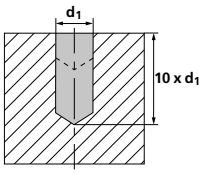
NEW CrazyDrill Coolpilot Titanium ATC - 3 x d

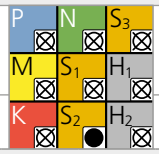
DRILLING WITH THROUGH-TOOL COOLING | CUTTING DATA OVERVIEW

	Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High
	S_2	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	40	60
			9.9367	TiAl6Nb7	ASTM F1295		









f [mm/rev]

	Ød1																	
	1.0 mm		1.25 mm		1.5 mm 1/16"		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"	
	Mid	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High
	0.020	0.025	0.025	0.030	0.030	0.035	0.035	0.045	0.045	0.055	0.050	0.065	0.060	0.075	0.070	0.085	0.075	0.090

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 < 2 mm filter quality ≤ 0.010 mm.
- Drill with Ø < 3 mm filter quality ≤ 0.020 mm.
- Drill with Ø < 6.35 mm filter quality ≤ 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]	1.0 mm - 2.0 mm	2.0 mm - 4.0 mm	4.0 mm - 6.35 mm
Minimal pressure	[bar]	40	30	25

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.

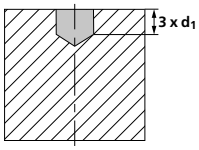
Drilling quality (position and alignment accuracy, no measurable transition from pilot to follow-up hole) and stable machining process are assured due to matched diameters of the tools.

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.

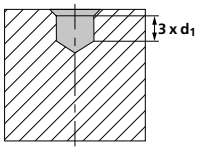
DRILLING PROCESS

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).

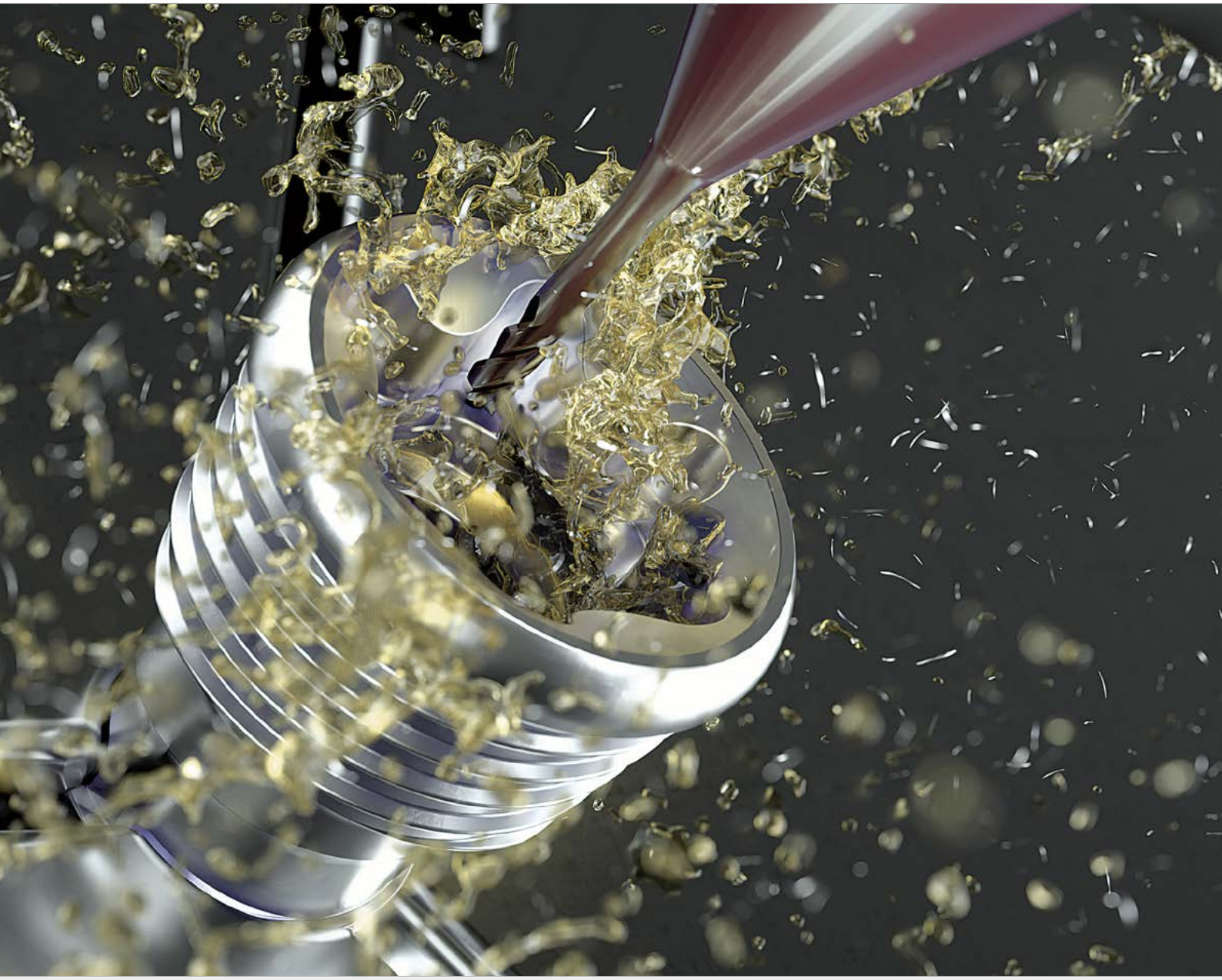


- If needed, after the desired cutting depth of 3 x d is reached, a chamfer angle of 90° can be realized.



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

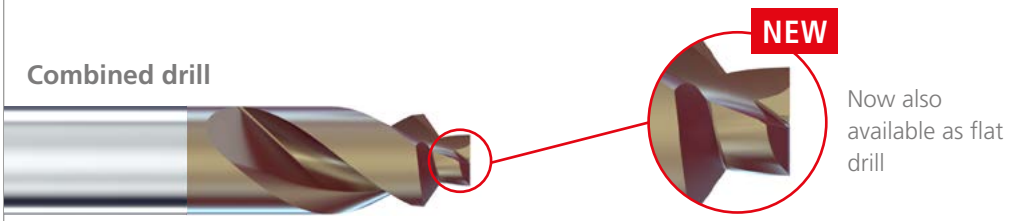
THE NEW CONCEPT FOR MACHINING YOUR TORX® SOCKET

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.

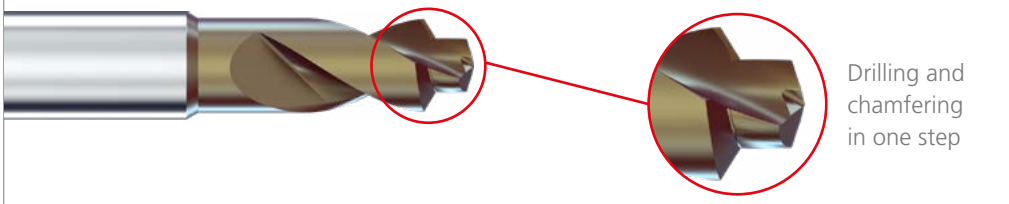
CRAZYDRILL Hexalobe FLAT

Combined drill



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!

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

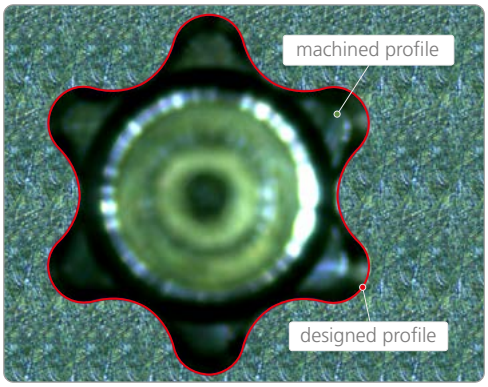
■ Cobalt chrome

S3

ASTM F1537
CrCoMo28
ISO 5832-12

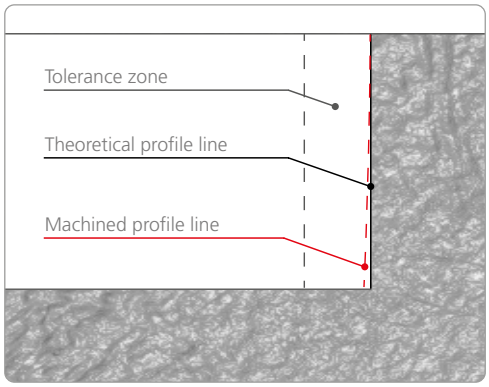
Shape precision

■ Nearly perfect profile



Perfect profile matching.

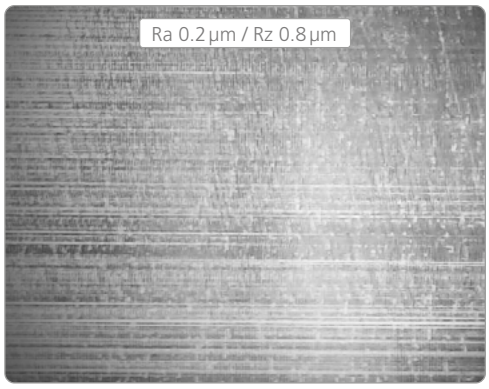
■ Perpendicularity



Guaranteed profile geometry.

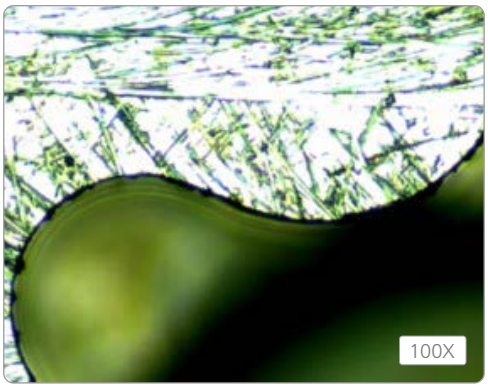
Quality and performance

Surface quality



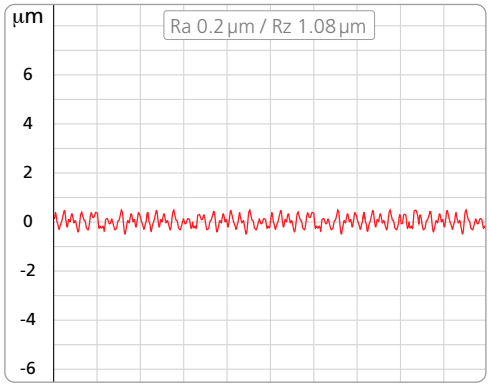
Excellent surface quality.*1

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.

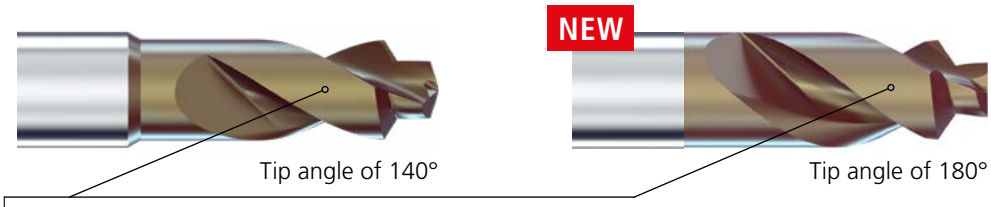
CRAZYDRILL by Mikron Tool Hexalobe

NEW High efficient drilling hexalobular socket

THE COMBINED DRILL

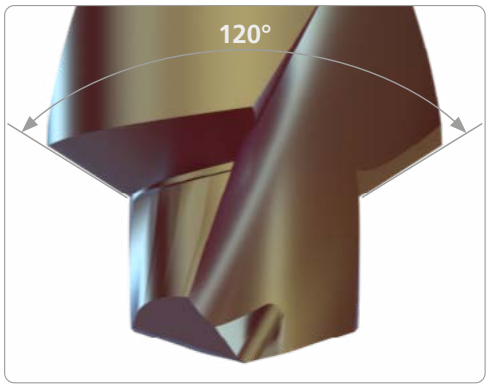
CrazyDrill Hexalobe & CrazyDrill Hexalobe Flat

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°

Ti

■ Coated
■ External cooling

Page 182

SST / CoCr

Page 182

Flat 180°

Ti / SST / CoCr

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.

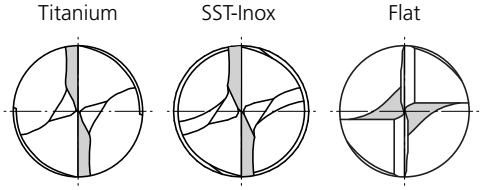
3 | NEW COATING
The high-performance coating eXedur SNP is heat-resistant and super wear-resistant, prevents buildup edges and promotes uniform chip flushing. The result is long tool life.

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



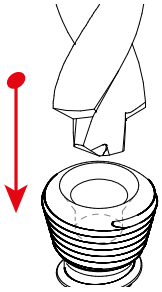
NEW Machining process

HELICAL INTERPOLATION FOR TITANIUM

Ti
S2

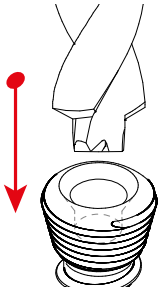
Step 1

Pre-hole drilling with 120° chamfer



140° tip angle

or

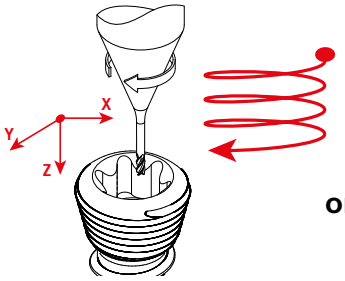


180° tip angle

Step 2

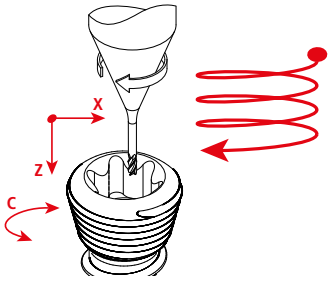
Helical interpolation XYZ

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



or

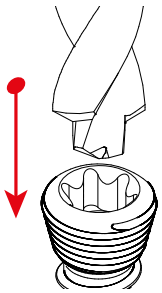
Helical interpolation XCZ



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

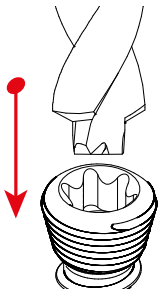
Step 3

Deburring



140° tip angle

or



180° tip angle

Repeat chamfering to clean the burrs.

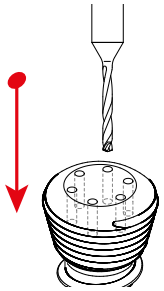
Titanium: Helical interpolation is the optimum process, ssaving up to 20% of cycle time in comparison to side milling process (see page 180).

LOBE DRILLING AND HELICAL INTERPOLATION FOR STAINLESS STEEL AND COBALT CHROME

SST M | CoCr S3

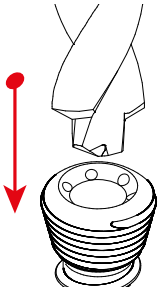
Step 1

Lobe drilling



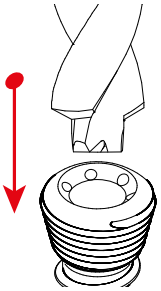
Step 2

Pre-hole drilling with 120° chamfer



140° tip angle

or

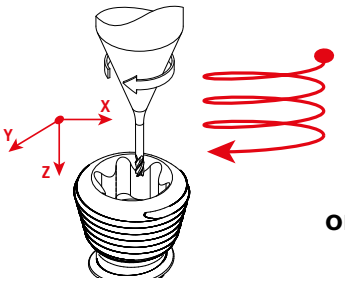


180° tip angle

Step 3

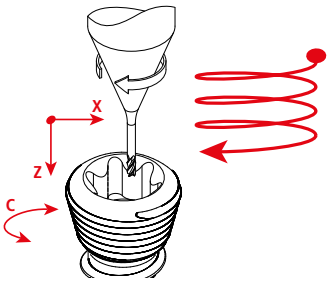
Helical interpolation XYZ

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



or

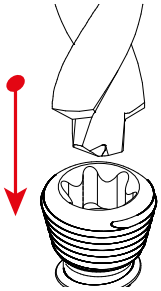
Helical interpolation XCZ



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

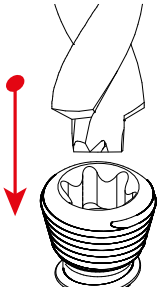
Step 4

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).

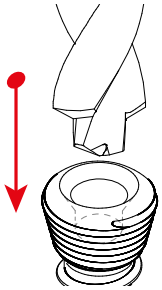
NEW Machining process

SIDE MILLING FOR TITANIUM AND STAINLESS STEEL

Ti S2 | SST M

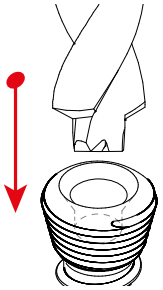
Step 1

Pre-hole drilling with 120° chamfer



140° tip angle

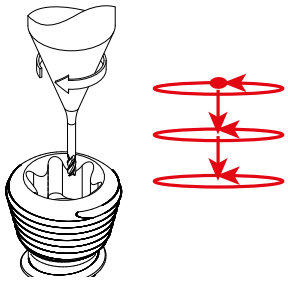
or



180° tip angle

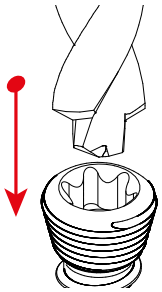
Step 2

Side milling



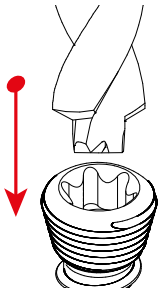
Step 3

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.

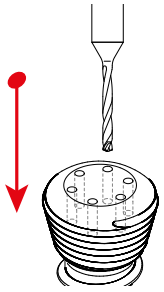
Stainless steel: With helical iterpolation, drilling of the lobes is required (see page 179). Result: longer tool life, better dimensional control of the TORX® shape and a more stable process in comparison to side milling process.

LOBE DRILLING AND SIDE MILLING FOR COBALT CHROME

CoCr
S3

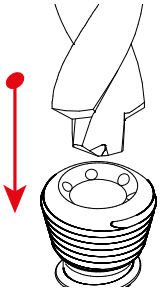
Step 1

Lobe drilling



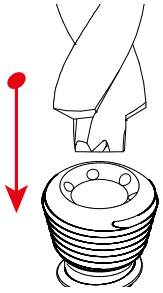
Step 2

Pre-hole drilling with 120° chamfer



140° tip angle

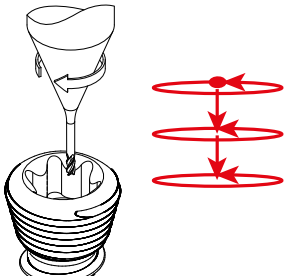
or



180° tip angle

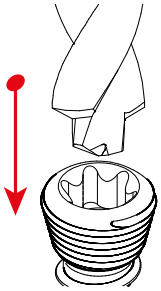
Step 3

Side milling



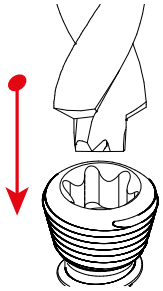
Step 4

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.

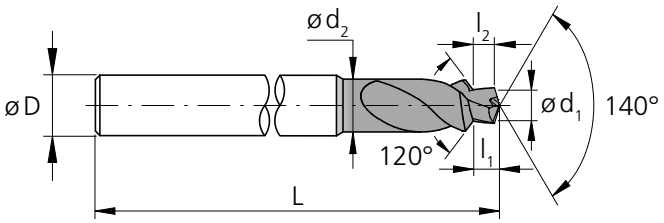
CRAZYDRILL by Mikron Tool Hexalobe

CrazyDrill Hexalobe - Tip 140°

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

Ød_1	0.9 - 3.8 mm
Tolerance	0 - 0.008 mm

Dimensions related to ISO 10664



SST M | Ti S2 | CoCr S3

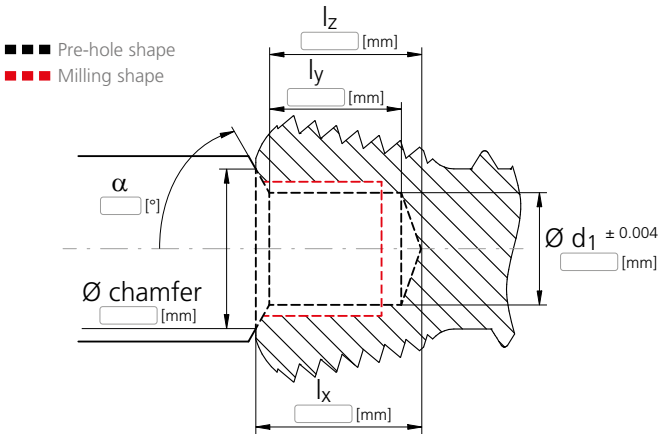
TORX® type	d_1 0/-0.008 [mm]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Titanium	SST-Inox / CoCr	Availability
T4	0.9	0.70	1.7	0.56	3	40	2.CD.006090.120	.T	.I	■
T5	1.0	0.87	2.0	0.72	3	40	2.CD.007100.120	.T	.I	■
T5	1.0	0.75	2.0	0.59	3	40	2.CD.006100.120	.T	.I	■
T6	1.2	1.06	2.2	0.88	3	40	2.CD.007120.120	.T	.I	■
T6	1.2	0.86	2.2	0.67	3	40	2.CD.006120.120	.T	.I	■
T7	1.4	1.05	3.0	0.83	3	40	2.CD.006140.120	.T	.I	■
T7	1.4	1.01	3.0	0.79	3	40	2.CD.005140.120	.T	.I	■
T8	1.6	1.40	3.0	1.15	3	40	2.CD.007160.120	.T	.I	■
T8	1.6	1.05	3.0	0.81	3	40	2.CD.005160.120	.T	.I	■
T10	1.9	1.42	4.0	1.13	4	40	2.CD.005190.120	.T	.I	■
T15	2.3	1.78	4.0	1.42	4	50	2.CD.006230.120	.T	.I	■
T20	2.7	2.12	5.0	1.70	6	50	2.CD.006270.120	.T	.I	■
T25	3.1	2.84	6.0	2.36	6	50	2.CD.007310.120	.T	.I	■
T30	3.8	3.52	6.0	2.93	6	50	2.CD.008380.120	.T	.I	■
T30	3.8	3.04	6.0	2.45	6	50	2.CD.007380.120	.T	.I	■

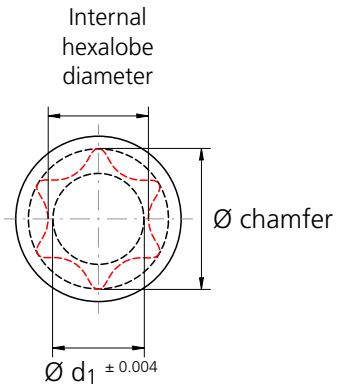
■ Stock item

Complementary products

CrazyMill Hexalobe p.522

Customized combined drill





Mikron Tool has an international team of cutting technology experts who are pleased to meet your specific needs and requirements.

You can contact us at **mto@mikron.com**

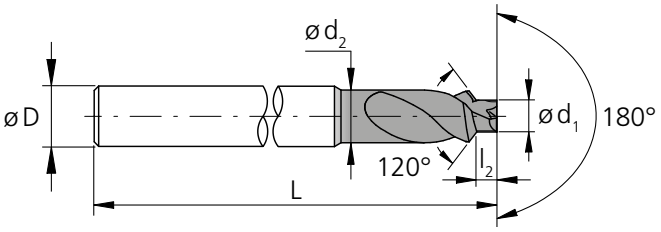
CrazyDrill Hexalobe Flat - Tip 180°

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

Ød_1	0.9 - 3.8 mm
Tolerance	0 - 0.008 mm

NEW

Dimensions related to ISO 10664



SST M | Ti S2 | CoCr S3

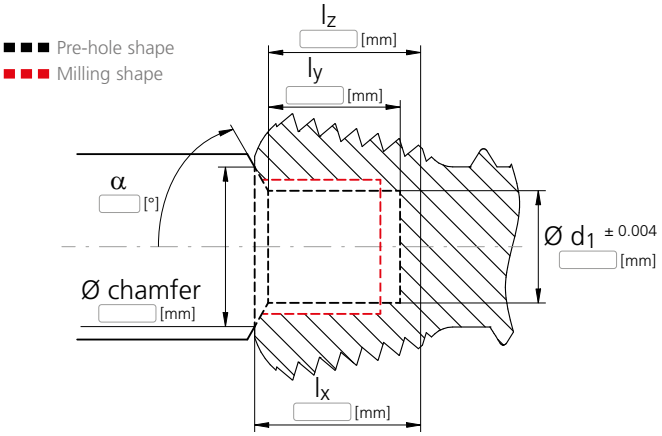
TORX® type	d_1 0/-0.008 [mm]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
T4	0.9	0.70	1.7	0.56	3	40	2.CDF.006090.120	■
T5	1.0	0.87	2.0	0.72	3	40	2.CDF.007100.120	■
T5	1.0	0.75	2.0	0.59	3	40	2.CDF.006100.120	■
T6	1.2	1.06	2.2	0.88	3	40	2.CDF.007120.120	■
T6	1.2	0.86	2.2	0.67	3	40	2.CDF.006120.120	■
T7	1.4	1.05	3.0	0.83	3	40	2.CDF.006140.120	■
T7	1.4	1.01	3.0	0.79	3	40	2.CDF.005140.120	■
T8	1.6	1.40	3.0	1.15	3	40	2.CDF.007160.120	■
T8	1.6	1.05	3.0	0.81	3	40	2.CDF.005160.120	■
T10	1.9	1.42	4.0	1.13	4	40	2.CDF.005190.120	■
T15	2.3	1.78	4.0	1.42	4	50	2.CDF.006230.120	■
T20	2.7	2.12	5.0	1.70	6	50	2.CDF.006270.120	■
T25	3.1	2.84	6.0	2.36	6	50	2.CDF.007310.120	■
T30	3.8	3.52	6.0	2.93	6	50	2.CDF.008380.120	■
T30	3.8	3.04	6.0	2.45	6	50	2.CDF.007380.120	■

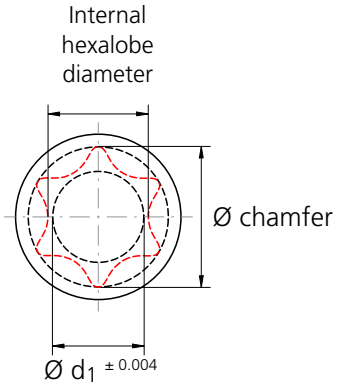
■ Stock item

Complementary products

CrazyMill Hexalobe p.522

Customized combined drill





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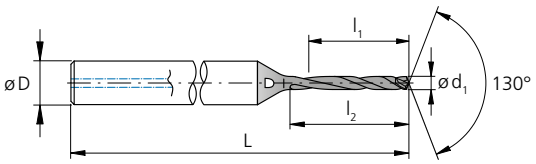
You can contact us at **mto@mikron.com**

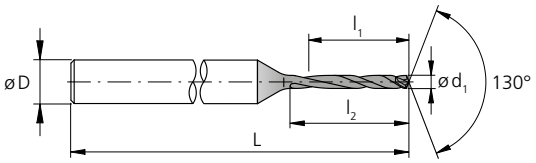
CRAZYDRILL by Mikron Tool Hexalobe

CrazyDrill SST-Inox - Type IK / IN

Carbide	8xd1	130°	Z2	eXedur RIP

Ød_1	0.1 - 3.0 mm
Tolerance	+ 0.004 mm 0





SST M | CoCr S3

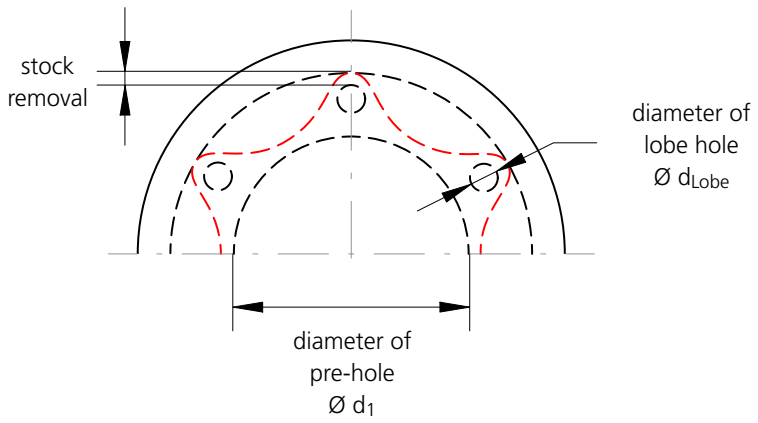
TORX® type	d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number **Integrated cooling**	Item number **External cooling**	Availability
T4 - T5	0.25	2.0	2.5	3	38	2.CD.080025.IK	2.CD.080025.IN	■
T6	0.30	2.4	2.9	3	38	2.CD.080030.IK	2.CD.080030.IN	■
T7	0.35	2.8	3.4	3	38	2.CD.080035.IK	2.CD.080035.IN	■
T8	0.40	3.2	3.9	3	38	2.CD.080040.IK	2.CD.080040.IN	■
T10	0.50	4.0	4.9	3	42	2.CD.080050.IK	2.CD.080050.IN	■
T15	0.60	4.8	5.9	3	42	2.CD.080060.IK	2.CD.080060.IN	■
T20	0.70	5.6	6.9	3	45	2.CD.080070.IK	2.CD.080070.IN	■
T25	0.80	6.4	7.8	3	45	2.CD.080080.IK	2.CD.080080.IN	■
T30	1.00	8.0	9.8	3	48	2.CD.080100.IK	2.CD.080100.IN	■

■ Stock item

Cutting tool recommendation

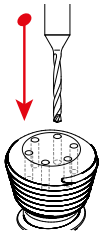
Only for process with lobe drilling in stainless steel or chrome cobalt

TORX® type	d_{Lobe} [mm]	Stock removal [mm]	Lobe drilling		Pre-hole drilling	Socket milling	
			Integrated cooling	External cooling		Stainless steel	Chrome cobalt
T4	0.25	0.02	2.CD.080025.IK	2.CD.080025.IN	2.CD.006090.120.I	2.CMI35.B1Z3.020.1 2.CMI35.C1Z3.020.1	2.CMR35.B1Z3.020.1 2.CMR35.C1Z3.020.1
T5	0.25	0.05	2.CD.080025.IK	2.CD.080025.IN	2.CD.007100.120.I	2.CMI35.B1Z3.020.1 2.CMI35.C1Z3.020.1	2.CMR35.B1Z3.020.1 2.CMR35.C1Z3.020.1
T5	0.25	0.05	2.CD.080025.IK	2.CD.080025.IN	2.CD.006100.120.I	2.CMI35.B1Z3.020.1 2.CMI35.C1Z3.020.1	2.CMR35.B1Z3.020.1 2.CMR35.C1Z3.020.1
T6	0.30	0.05	2.CD.080030.IK	2.CD.080030.IN	2.CD.007120.120.I	2.CMI35.B1Z3.030.1 2.CMI35.C1Z3.030.1	2.CMR35.B1Z3.030.1 2.CMR35.C1Z3.030.1
T6	0.30	0.05	2.CD.080030.IK	2.CD.080030.IN	2.CD.006120.120.I	2.CMI35.B1Z3.030.1 2.CMI35.C1Z3.030.1	2.CMR35.B1Z3.030.1 2.CMR35.C1Z3.030.1
T7	0.35	0.07	2.CD.080035.IK	2.CD.080035.IN	2.CD.006140.120.I	2.CMI35.B1Z3.030.1 2.CMI35.C1Z3.030.1	2.CMR35.B1Z3.030.1 2.CMR35.C1Z3.030.1
T7	0.35	0.07	2.CD.080035.IK	2.CD.080035.IN	2.CD.005140.120.I	2.CMI35.B1Z3.030.1 2.CMI35.C1Z3.030.1	2.CMR35.B1Z3.030.1 2.CMR35.C1Z3.030.1
T8	0.40	0.08	2.CD.080040.IK	2.CD.080040.IN	2.CD.007160.120.I	2.CMI35.B1Z4.040.1 2.CMI35.C1Z4.040.1	2.CMR35.B1Z4.040.1 2.CMR35.C1Z4.040.1
T8	0.40	0.08	2.CD.080040.IK	2.CD.080040.IN	2.CD.005160.120.I	2.CMI35.B1Z4.040.1 2.CMI35.C1Z4.040.1	2.CMR35.B1Z4.040.1 2.CMR35.C1Z4.040.1
T10	0.50	0.06	2.CD.080050.IK	2.CD.080050.IN	2.CD.005190.120.I	2.CMI35.B1Z4.040.1 2.CMI35.C1Z4.040.1 2.CMI35.B1Z4.050.1 2.CMI35.C1Z4.050.1	2.CMR35.B1Z4.040.1 2.CMR35.C1Z4.040.1 2.CMR35.B1Z4.050.1 2.CMR35.C1Z4.050.1
T15	0.60	0.07	2.CD.080060.IK	2.CD.080060.IN	2.CD.006230.120.I	2.CMI35.B1Z4.050.1 2.CMI35.C1Z4.050.1	2.CMR35.B1Z4.050.1 2.CMR35.C1Z4.050.1
T20	0.70	0.09	2.CD.080070.IK	2.CD.080070.IN	2.CD.006270.120.I	2.CMI35.B1Z4.060.1 2.CMI35.C1Z4.060.1	2.CMR35.B1Z4.060.1 2.CMR35.C1Z4.060.1
T25	0.80	0.10	2.CD.080080.IK	2.CD.080080.IN	2.CD.007310.120.I	2.CMI35.B1Z4.080.1 2.CMI35.C1Z4.080.1	2.CMR35.B1Z4.080.1 2.CMR35.C1Z4.080.1
T30	1.00	0.12	2.CD.080100.IK	2.CD.080100.IN	2.CD.008380.120.I	2.CMI35.B1Z4.100.1 2.CMI35.C1Z4.100.1	2.CMR35.B1Z4.100.1 2.CMR35.C1Z4.100.1
T30	1.00	0.12	2.CD.080100.IK	2.CD.080100.IN	2.CD.007380.120.I	2.CMI35.B1Z4.100.1 2.CMI35.C1Z4.100.1	2.CMR35.B1Z4.100.1 2.CMR35.C1Z4.100.1



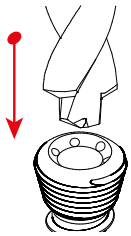
CRAZYDRILL by Mikron Tool Hexalobe

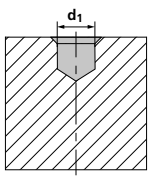
NEW Pre-hole drilling



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]	Q_1	Q_x
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	30 – 45	1-4xd1	1-2xd1
		1.4441	X2CrNiMo 18-15-3	AISI 316LM			
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	40 – 50	1-3xd1	1-2xd1
			CrCoMo28	ASTM F1537			
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	25 – 30	0.5-1xd1	0.5xd1
		1.4441	X2CrNiMo 18-15-3	AISI 316LM			
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	25 – 35	0.5-1xd1	0.5xd1
			CrCoMo28	ASTM F1537			

NEW Pre-hole drilling

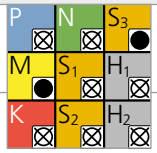




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	25 – 35
		1.4441	X2CrNiMo 18-15-3	AISI 316LM	
S_2	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20 – 30
		9.9367	TiAl6Nb7	ASTM F1295	
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes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

v_c [m/min]
f [mm/rev]

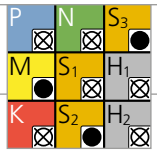
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



	T4 Ød1 0.25 mm f	T5 Ød1 0.30 mm f	T6 Ød1 0.30 mm f	T7 Ød1 0.30 mm f	T8 Ød1 0.40 mm f	T10 Ød1 0.50 mm f	T15 Ød1 0.60 mm f	T20 Ød1 0.70 mm f	T25 Ød1 0.80 mm f	T30 Ød1 1.00 mm f
	0.01 - 0.02	0.01 - 0.02	0.01 - 0.02	0.01 - 0.02	0.01 - 0.02	0.01 - 0.02	0.015 - 0.025	0.015 - 0.025	0.015 - 0.025	0.025 - 0.035
	0.02 - 0.03	0.02 - 0.03	0.02 - 0.03	0.02 - 0.03	0.02 - 0.03	0.02 - 0.03	0.015 - 0.020	0.015 - 0.020	0.015 - 0.020	0.05 - 0.06
	0.010 - 0.015	0.010 - 0.015	0.010 - 0.015	0.010 - 0.015	0.010 - 0.015	0.010 - 0.015	0.015 - 0.020	0.015 - 0.020	0.015 - 0.020	0.02 - 0.03
	0.015 - 0.025	0.015 - 0.025	0.015 - 0.025	0.015 - 0.025	0.015 - 0.025	0.015 - 0.025	0.025 - 0.035	0.025 - 0.035	0.025 - 0.035	0.04 - 0.05

v_c [m/min]
f [mm/rev]

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



	T4 Ød1 0.9 mm f	T5 Ød1 1.0 mm f	T6 Ød1 1.2 mm f	T7 Ød1 1.4 mm f	T8 Ød1 1.6 mm f	T10 Ød1 1.9 mm f	T15 Ød1 2.3 mm f	T20 Ød1 2.7 mm f	T25 Ød1 3.1 mm f	T30 Ød1 3.8 mm f
	0.02 - 0.03	0.02 - 0.03	0.03 - 0.04	0.03 - 0.04	0.03 - 0.04	0.05 - 0.06	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08	0.07 - 0.08
	0.010 - 0.015	0.010 - 0.015	0.012 - 0.018	0.014 - 0.020	0.015 - 0.025	0.020 - 0.030	0.025 - 0.035	0.025 - 0.040	0.030 - 0.045	0.045 - 0.070
	0.005 - 0.015	0.005 - 0.015	0.006 - 0.018	0.007 - 0.020	0.008 - 0.025	0.010 - 0.030	0.012 - 0.035	0.015 - 0.040	0.015 - 0.050	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

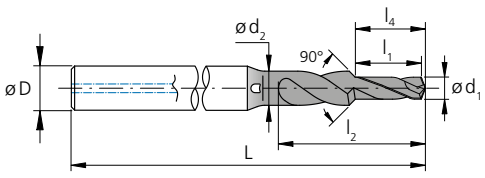
For detailed indications for tool holders see chapter "Technical information".

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.: 0.1 mm
- Diameter max.: 32.0 mm, please contact us for larger diameters
- Maximum tool length: 415 mm
- Tool diameter tolerance max.: ± 0.5 µm
- Chamfer and point angle as per customer need
- Step drill: see customer-specific step drill
- Concentricity between shank and diameters max.: ≤ 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

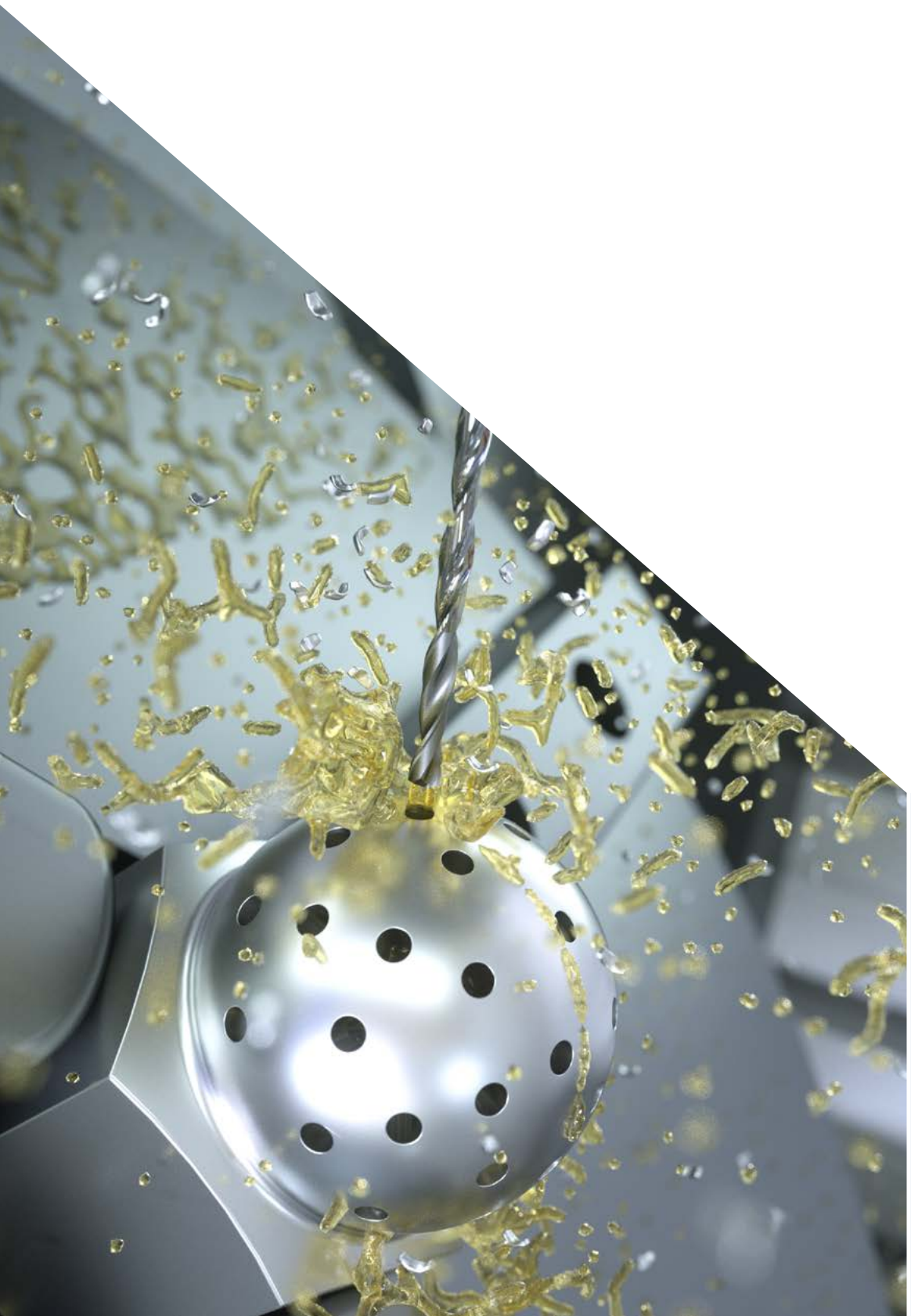
MATERIAL TO BE MACHINED

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

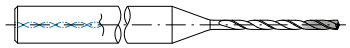
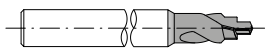
crazy about drilling



06

Overview

CUTTING TOOL SOLUTIONS

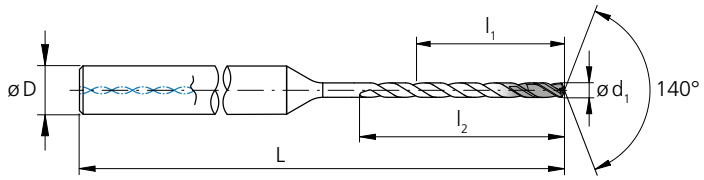
	MIQUDRILL 210	
	CRAZYDRILL Steel	
	CRAZYDRILL Alu	
	CRAZYDRILL SST-Inox	
	CRAZYDRILL Cool	
	CRAZYDRILL Cool XL	
	CRAZYDRILL Cool SST-Inox	
NEW	CRAZYDRILL Cool Titanium ATC	
NEW	CRAZYDRILL Cool Titanium PTC	
	CRAZYDRILL Flex	
	Customized drills	
	Customized step drills	

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

ø - range [mm]	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	Alloyed titanium	Pure titanium	CrCo alloys	Hardened steel <55 HRC	Hardened steel ≥55 HRC	
0.1–3.0	up to 8 x d	–	✔	◐	⊠	◐	◐	⊠	⊠	⊠	⊠	◐	⊠	**196**
0.4–6.35	4 x d 6 - 7 x d	–	✔	●	⊠	●	◐	○	○	○	○	◐	⊠	**210**
0.4–3.0	5 x d 10 x d	–	✔	⊠	⊠	⊠	●	⊠	⊠	⊠	⊠	⊠	⊠	**226**
0.2–2.0	8 x d 12 x d	✔	✔	⊠	●	⊠	◐	●	⊠	⊠	●	⊠	⊠	**242**
0.75–6.0	6 x d 10 x d 15 x d	✔	–	●	○	●	◐	○	○	○	○	●	⊠	**256**
1.0–6.0	15 x d 20 x d 30 x d 40 x d	✔	–	●	○	●	●	⊠	○	○	○	◐	⊠	**282**
1.0–6.35	6 x d 10 x d 15 x d 20 x d 30 x d 40 x d	✔	–	⊠	●	⊠	⊠	●	⊠	⊠	●	⊠	⊠	**306**
1.0–6.35	6 x d 10 x d	✔	–	⊠	⊠	⊠	⊠	⊠	●	⊠	⊠	⊠	⊠	**336**
1.0–6.35	3 x d 6 x d	✔	–	⊠	⊠	⊠	⊠	⊠	⊠	●	⊠	⊠	⊠	**336**
0.1–2.0	20 x d 30 x d 50 x d	✔	✔	●	●	●	●	●	●	●	●	⊠	⊠	**364**
0.1–32.0	as required	✔	✔	●	●	●	●	●	●	●	●	●	●	**408**
0.1–32.0	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

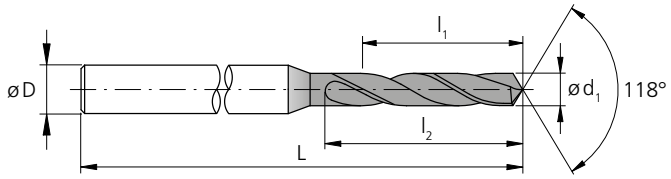
Family
- CFI = CrazyDrill Flex SST-Inox
- CFS = CrazyDrill Flex Steel
- CFT = CrazyDrill Flex Titanium

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 0.3 mm to 3.0 mm - coated version (eXedur RIP)
- from 0.1 mm to 3.0 mm - uncoated version

with the following increment:

- 0.01 mm in the diameter range from 0.1 mm to 2.0 mm
- 0.05 mm from 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.

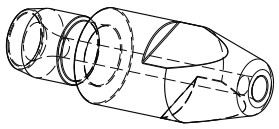
Regrinding: This product is not suitable for regrinding.

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
- Drilling depth 6 mm

DRILLING TOOL
Mikron Tool - MiquDrill 210 - coated

DATA	MIKRON TOOL
Tool type	MiquDrill 210 - Carbide - Coated - External cooling
Item number	2.MD.210200.1
Cutting data	v_c = 80 m/min f = 0.048 mm/rev Q_1 = 4 mm Q_x = 2 mm

Uncoated

- External cooling
- Ø0.1 - 3.0 mm

Page 200

Coated

- External cooling
- Ø0.3 - 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.

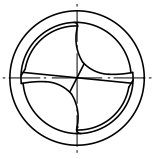
3 | COATING
The coated version of the drill is adapted for hardened steels < 55 HRC and reaches even a better tool life.

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.

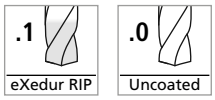
6 | DIAMETER RANGE AND INCREMENTS
Available from stock in diameters from 0.1 mm and in smallest diameter increments of 0.01 mm, respectively of 0.05 mm starting from Ø 2.0 mm.

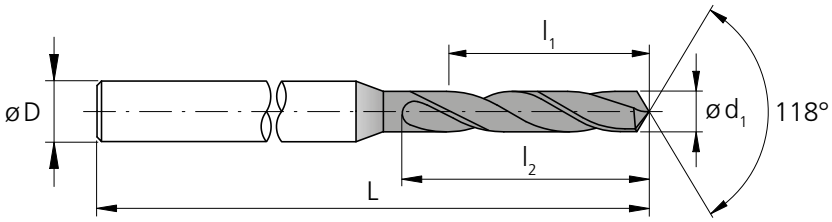
Tip drill



MiquDrill 210 - coated / uncoated

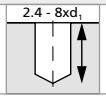
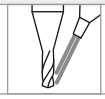
DRILLING WITH EXTERNAL COOLING





d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.10	0.50	0.6	1.0	30	2.MD.210010	-	.0	◪
0.11	0.49	0.6	1.0	30	2.MD.210011	-	.0	◪
0.12	0.48	0.6	1.0	30	2.MD.210012	-	.0	◪
0.13	0.67	0.8	1.0	30	2.MD.210013	-	.0	◪
0.14	0.66	0.8	1.0	30	2.MD.210014	-	.0	◪
0.15	0.65	0.8	1.0	30	2.MD.210015	-	.0	◪
0.16	0.84	1.0	1.0	30	2.MD.210016	-	.0	◪
0.17	0.83	1.0	1.0	30	2.MD.210017	-	.0	◪
0.18	0.82	1.0	1.0	30	2.MD.210018	-	.0	◪
0.19	0.81	1.0	1.0	30	2.MD.210019	-	.0	◪
0.20	0.80	1.0	1.0	30	2.MD.210020	-	.0	◪
0.21	0.79	1.0	1.0	30	2.MD.210021	-	.0	◪
0.22	0.78	1.0	1.0	30	2.MD.210022	-	.0	◪
0.23	0.77	1.0	1.0	30	2.MD.210023	-	.0	◪
0.24	0.76	1.0	1.0	30	2.MD.210024	-	.0	◪
0.25	0.75	1.0	1.0	30	2.MD.210025	-	.0	◪
0.26	0.74	1.0	1.0	30	2.MD.210026	-	.0	◪
0.27	0.73	1.0	1.0	30	2.MD.210027	-	.0	◪
0.28	0.72	1.0	1.0	30	2.MD.210028	-	.0	◪
0.29	0.71	1.0	1.0	30	2.MD.210029	-	.0	◪
0.30	1.20	1.5	1.0	30	2.MD.210030	.1	.0	■
0.31	1.19	1.5	1.0	30	2.MD.210031	.1	.0	■
0.32	1.18	1.5	1.0	30	2.MD.210032	.1	.0	■
0.33	1.17	1.5	1.0	30	2.MD.210033	.1	.0	■
0.34	1.16	1.5	1.0	30	2.MD.210034	.1	.0	■
0.35	1.15	1.5	1.0	30	2.MD.210035	.1	.0	■
0.36	1.14	1.5	1.0	30	2.MD.210036	.1	.0	■
0.37	1.13	1.5	1.0	30	2.MD.210037	.1	.0	■
0.38	1.12	1.5	1.0	30	2.MD.210038	.1	.0	■
0.39	1.11	1.5	1.0	30	2.MD.210039	.1	.0	■
0.40	1.60	2.0	1.0	30	2.MD.210040	.1	.0	■
0.41	1.59	2.0	1.0	30	2.MD.210041	.1	.0	■
0.42	1.58	2.0	1.0	30	2.MD.210042	.1	.0	■
0.43	1.57	2.0	1.0	30	2.MD.210043	.1	.0	■
0.44	1.56	2.0	1.0	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			Z2	

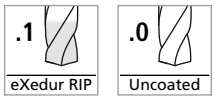
Ø d_1	0.1 - 3.0 mm
Tolerance	0 - 0.004 mm

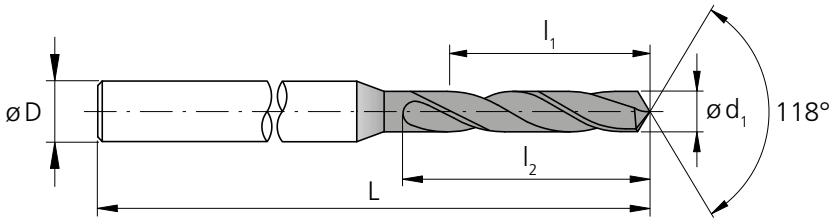
d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.45	3.05	3.5	1.0	30	2.MD.210045	.1	.0	■
0.46	3.04	3.5	1.0	30	2.MD.210046	.1	.0	■
0.47	3.03	3.5	1.0	30	2.MD.210047	.1	.0	■
0.48	3.02	3.5	1.0	30	2.MD.210048	.1	.0	■
0.49	3.51	4.0	1.0	30	2.MD.210049	.1	.0	■
0.50	3.50	4.0	1.0	30	2.MD.210050	.1	.0	■
0.51	3.49	4.0	1.0	30	2.MD.210051	.1	.0	■
0.52	3.48	4.0	1.0	30	2.MD.210052	.1	.0	■
0.53	3.47	4.0	1.0	30	2.MD.210053	.1	.0	■
0.54	3.96	4.5	1.0	30	2.MD.210054	.1	.0	■
0.55	3.95	4.5	1.0	30	2.MD.210055	.1	.0	■
0.56	3.94	4.5	1.0	30	2.MD.210056	.1	.0	■
0.57	3.93	4.5	1.0	30	2.MD.210057	.1	.0	■
0.58	3.92	4.5	1.0	30	2.MD.210058	.1	.0	■
0.59	3.91	4.5	1.0	30	2.MD.210059	.1	.0	■
0.60	3.90	4.5	1.0	30	2.MD.210060	.1	.0	■
0.61	4.39	5.0	1.0	30	2.MD.210061	.1	.0	■
0.62	4.38	5.0	1.0	30	2.MD.210062	.1	.0	■
0.63	4.37	5.0	1.0	30	2.MD.210063	.1	.0	■
0.64	4.36	5.0	1.0	30	2.MD.210064	.1	.0	■
0.65	4.35	5.0	1.0	30	2.MD.210065	.1	.0	■
0.66	4.34	5.0	1.0	30	2.MD.210066	.1	.0	■
0.67	4.33	5.0	1.0	30	2.MD.210067	.1	.0	■
0.68	4.92	5.6	1.0	30	2.MD.210068	.1	.0	■
0.69	4.91	5.6	1.0	30	2.MD.210069	.1	.0	■
0.70	4.90	5.6	1.0	30	2.MD.210070	.1	.0	■
0.71	4.89	5.6	1.0	30	2.MD.210071	.1	.0	■
0.72	4.88	5.6	1.0	30	2.MD.210072	.1	.0	■
0.73	4.87	5.6	1.0	30	2.MD.210073	.1	.0	■
0.74	4.86	5.6	1.0	30	2.MD.210074	.1	.0	■
0.75	4.85	5.6	1.0	30	2.MD.210075	.1	.0	■
0.76	5.74	6.5	1.0	30	2.MD.210076	.1	.0	■
0.77	5.73	6.5	1.0	30	2.MD.210077	.1	.0	■
0.78	5.72	6.5	1.0	30	2.MD.210078	.1	.0	■
0.79	5.71	6.5	1.0	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





d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.80	5.70	6.5	1.5	30	2.MD.210080	.1	.0	■
0.81	5.69	6.5	1.5	30	2.MD.210081	.1	.0	■
0.82	5.68	6.5	1.5	30	2.MD.210082	.1	.0	■
0.83	5.67	6.5	1.5	30	2.MD.210083	.1	.0	■
0.84	5.66	6.5	1.5	30	2.MD.210084	.1	.0	■
0.85	5.65	6.5	1.5	30	2.MD.210085	.1	.0	■
0.86	6.14	7.0	1.5	30	2.MD.210086	.1	.0	■
0.87	6.13	7.0	1.5	30	2.MD.210087	.1	.0	■
0.88	6.12	7.0	1.5	30	2.MD.210088	.1	.0	■
0.89	6.11	7.0	1.5	30	2.MD.210089	.1	.0	■
0.90	6.10	7.0	1.5	30	2.MD.210090	.1	.0	■
0.91	6.09	7.0	1.5	30	2.MD.210091	.1	.0	■
0.92	6.08	7.0	1.5	30	2.MD.210092	.1	.0	■
0.93	6.07	7.0	1.5	30	2.MD.210093	.1	.0	■
0.94	6.06	7.0	1.5	30	2.MD.210094	.1	.0	■
0.95	6.05	7.0	1.5	30	2.MD.210095	.1	.0	■
0.96	7.04	8.0	1.5	30	2.MD.210096	.1	.0	■
0.97	7.03	8.0	1.5	30	2.MD.210097	.1	.0	■
0.98	7.02	8.0	1.5	30	2.MD.210098	.1	.0	■
0.99	7.01	8.0	1.5	30	2.MD.210099	.1	.0	■
1.00	8.00	9.0	1.5	30	2.MD.210100	.1	.0	■
1.01	7.99	9.0	1.5	30	2.MD.210101	.1	.0	■
1.02	7.98	9.0	1.5	30	2.MD.210102	.1	.0	■
1.03	7.97	9.0	1.5	30	2.MD.210103	.1	.0	■
1.04	7.96	9.0	1.5	30	2.MD.210104	.1	.0	■
1.05	7.95	9.0	1.5	30	2.MD.210105	.1	.0	■
1.06	7.94	9.0	1.5	30	2.MD.210106	.1	.0	■
1.07	7.93	9.0	1.5	30	2.MD.210107	.1	.0	■
1.08	7.92	9.0	1.5	30	2.MD.210108	.1	.0	■
1.09	7.91	9.0	1.5	30	2.MD.210109	.1	.0	■
1.10	7.90	9.0	1.5	30	2.MD.210110	.1	.0	■
1.11	7.89	9.0	1.5	30	2.MD.210111	.1	.0	■
1.12	7.88	9.0	1.5	30	2.MD.210112	.1	.0	■
1.13	7.87	9.0	1.5	30	2.MD.210113	.1	.0	■
1.14	7.86	9.0	1.5	30	2.MD.210114	.1	.0	■
1.15	7.85	9.0	1.5	30	2.MD.210115	.1	.0	■

d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
1.16	7.84	9.0	1.5	30	2.MD.210116	.1	.0	■
1.17	7.83	9.0	1.5	30	2.MD.210117	.1	.0	■
1.18	7.82	9.0	1.5	30	2.MD.210118	.1	.0	■
1.19	8.81	10.0	1.5	30	2.MD.210119	.1	.0	■
1.20	8.80	10.0	1.5	30	2.MD.210120	.1	.0	■
1.21	8.79	10.0	1.5	30	2.MD.210121	.1	.0	■
1.22	8.78	10.0	1.5	30	2.MD.210122	.1	.0	■
1.23	8.77	10.0	1.5	30	2.MD.210123	.1	.0	■
1.24	8.76	10.0	1.5	30	2.MD.210124	.1	.0	■
1.25	8.75	10.0	1.5	30	2.MD.210125	.1	.0	■
1.26	8.74	10.0	1.5	30	2.MD.210126	.1	.0	■
1.27	8.73	10.0	1.5	30	2.MD.210127	.1	.0	■
1.28	8.72	10.0	1.5	30	2.MD.210128	.1	.0	■
1.29	8.71	10.0	1.5	30	2.MD.210129	.1	.0	■
1.30	8.70	10.0	1.5	30	2.MD.210130	.1	.0	■
1.31	8.69	10.0	1.5	30	2.MD.210131	.1	.0	■
1.32	8.68	10.0	1.5	30	2.MD.210132	.1	.0	■
1.33	10.17	11.5	1.5	30	2.MD.210133	.1	.0	■
1.34	10.16	11.5	1.5	30	2.MD.210134	.1	.0	■
1.35	10.15	11.5	1.5	30	2.MD.210135	.1	.0	■
1.36	10.14	11.5	1.5	30	2.MD.210136	.1	.0	■
1.37	10.13	11.5	1.5	30	2.MD.210137	.1	.0	■
1.38	10.12	11.5	1.5	30	2.MD.210138	.1	.0	■
1.39	10.11	11.5	1.5	30	2.MD.210139	.1	.0	■
1.40	10.10	11.5	1.5	30	2.MD.210140	.1	.0	■
1.41	10.09	11.5	1.5	30	2.MD.210141	.1	.0	■
1.42	10.08	11.5	1.5	30	2.MD.210142	.1	.0	■
1.43	10.07	11.5	1.5	30	2.MD.210143	.1	.0	■
1.44	10.06	11.5	1.5	30	2.MD.210144	.1	.0	■
1.45	10.05	11.5	1.5	30	2.MD.210145	.1	.0	■
1.46	10.04	11.5	1.5	30	2.MD.210146	.1	.0	■
1.47	10.03	11.5	1.5	30	2.MD.210147	.1	.0	■
1.48	10.02	11.5	1.5	30	2.MD.210148	.1	.0	■
1.49	10.01	11.5	1.5	30	2.MD.210149	.1	.0	■
1.50	10.50	12.0	2.0	38	2.MD.210150	.1	.0	■
1.51	10.49	12.0	2.0	38	2.MD.210151	.1	.0	■

■ Stock item, packing unit of 5 pcs.

Carbide | 2.4 - 8xd$_1$ | 118° | Z2

Ø d$_1$	0.1 - 3.0 mm
Tolerance	0 - 0.004 mm

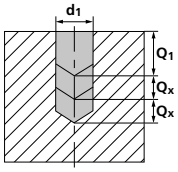
d$_1$ [mm]	l$_1$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	Item number	Coated .1	Uncoated .0	Availability
1.52	10.48	12.0	2.0	38	2.MD.210152	.1	.0	■
1.53	10.47	12.0	2.0	38	2.MD.210153	.1	.0	■
1.54	10.46	12.0	2.0	38	2.MD.210154	.1	.0	■
1.55	10.45	12.0	2.0	38	2.MD.210155	.1	.0	■
1.56	10.44	12.0	2.0	38	2.MD.210156	.1	.0	■
1.57	10.43	12.0	2.0	38	2.MD.210157	.1	.0	■
1.58	10.42	12.0	2.0	38	2.MD.210158	.1	.0	■
1.59	10.41	12.0	2.0	38	2.MD.210159	.1	.0	■
1.60	10.40	12.0	2.0	38	2.MD.210160	.1	.0	■
1.61	10.39	12.0	2.0	38	2.MD.210161	.1	.0	■
1.62	10.38	12.0	2.0	38	2.MD.210162	.1	.0	■
1.63	10.37	12.0	2.0	38	2.MD.210163	.1	.0	■
1.64	10.36	12.0	2.0	38	2.MD.210164	.1	.0	■
1.65	10.35	12.0	2.0	38	2.MD.210165	.1	.0	■
1.66	10.34	12.0	2.0	38	2.MD.210166	.1	.0	■
1.67	10.33	12.0	2.0	38	2.MD.210167	.1	.0	■
1.68	10.32	12.0	2.0	38	2.MD.210168	.1	.0	■
1.69	10.31	12.0	2.0	38	2.MD.210169	.1	.0	■
1.70	10.30	12.0	2.0	38	2.MD.210170	.1	.0	■
1.71	10.29	12.0	2.0	38	2.MD.210171	.1	.0	■
1.72	10.28	12.0	2.0	38	2.MD.210172	.1	.0	■
1.73	10.27	12.0	2.0	38	2.MD.210173	.1	.0	■
1.74	10.26	12.0	2.0	38	2.MD.210174	.1	.0	■
1.75	10.25	12.0	2.0	38	2.MD.210175	.1	.0	■
1.76	10.24	12.0	2.0	38	2.MD.210176	.1	.0	■
1.77	10.23	12.0	2.0	38	2.MD.210177	.1	.0	■
1.78	10.22	12.0	2.0	38	2.MD.210178	.1	.0	■
1.79	10.21	12.0	2.0	38	2.MD.210179	.1	.0	■
1.80	10.20	12.0	2.0	38	2.MD.210180	.1	.0	■
1.81	10.19	12.0	2.0	38	2.MD.210181	.1	.0	■
1.82	10.18	12.0	2.0	38	2.MD.210182	.1	.0	■
1.83	10.17	12.0	2.0	38	2.MD.210183	.1	.0	■
1.84	10.16	12.0	2.0	38	2.MD.210184	.1	.0	■
1.85	10.15	12.0	2.0	38	2.MD.210185	.1	.0	■
1.86	10.14	12.0	2.0	38	2.MD.210186	.1	.0	■
1.87	10.13	12.0	2.0	38	2.MD.210187	.1	.0	■

d$_1$ [mm]	l$_1$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	Item number	Coated .1	Uncoated .0	Availability
1.88	10.12	12.0	2.0	38	2.MD.210188	.1	.0	■
1.89	10.11	12.0	2.0	38	2.MD.210189	.1	.0	■
1.90	10.10	12.0	2.0	38	2.MD.210190	.1	.0	■
1.91	10.09	12.0	2.0	38	2.MD.210191	.1	.0	■
1.92	10.08	12.0	2.0	38	2.MD.210192	.1	.0	■
1.93	10.07	12.0	2.0	38	2.MD.210193	.1	.0	■
1.94	10.06	12.0	2.0	38	2.MD.210194	.1	.0	■
1.95	10.05	12.0	2.0	38	2.MD.210195	.1	.0	■
1.96	10.04	12.0	2.0	38	2.MD.210196	.1	.0	■
1.97	10.03	12.0	2.0	38	2.MD.210197	.1	.0	■
1.98	10.02	12.0	2.0	38	2.MD.210198	.1	.0	■
1.99	10.01	12.0	2.0	38	2.MD.210199	.1	.0	■
2.00	10.00	12.0	3.0	38	2.MD.210200	.1	.0	■
2.05	9.95	12.0	3.0	38	2.MD.210205	.1	.0	■
2.10	9.90	12.0	3.0	38	2.MD.210210	.1	.0	■
2.15	9.85	12.0	3.0	38	2.MD.210215	.1	.0	■
2.20	9.80	12.0	3.0	38	2.MD.210220	.1	.0	■
2.25	9.75	12.0	3.0	38	2.MD.210225	.1	.0	■
2.30	9.70	12.0	3.0	38	2.MD.210230	.1	.0	■
2.35	9.65	12.0	3.0	38	2.MD.210235	.1	.0	■
2.40	9.60	12.0	3.0	38	2.MD.210240	.1	.0	■
2.45	9.55	12.0	3.0	38	2.MD.210245	.1	.0	■
2.50	9.50	12.0	3.0	38	2.MD.210250	.1	.0	■
2.55	9.45	12.0	3.0	38	2.MD.210255	.1	.0	■
2.60	9.40	12.0	3.0	38	2.MD.210260	.1	.0	■
2.65	9.35	12.0	3.0	38	2.MD.210265	.1	.0	■
2.70	9.30	12.0	3.0	38	2.MD.210270	.1	.0	■
2.75	9.25	12.0	3.0	38	2.MD.210275	.1	.0	■
2.80	9.20	12.0	3.0	38	2.MD.210280	.1	.0	■
2.85	9.15	12.0	3.0	38	2.MD.210285	.1	.0	■
2.90	9.10	12.0	3.0	38	2.MD.210290	.1	.0	■
2.95	9.05	12.0	3.0	38	2.MD.210295	.1	.0	■
3.00	9.00	12.0	3.0	38	2.MD.210300	.1	.0	■

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

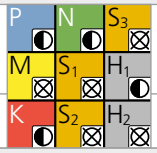
MiquDrill 210 - coated

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	40 – 70	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	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	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	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	2xd1	1xd1
		3.4365	AlZnMgCu1.5	ASTM 7075			
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60 – 100	2xd1	1xd1
		3.2381	GD-AlSi10Mg	UNS A03590			
	Copper	2.004	Cu-OF / CW008A	UNS C10100	40 – 70	2xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40 – 70	2xd1	1xd1
		2.036	CuZn40 CW509L	UNS C28000			
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	40 – 150	2xd1	1xd1
		2.102	CuSn6	UNS C51900			
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	30 – 40	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	0.5xd1	0.5xd1
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2			

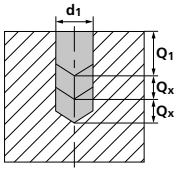
RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



	f [mm/rev]				
	Ød1				
	0.3–0.6 mm	0.6–1.0 mm	1.0–1.5 mm	1.5–2.0 mm	2.0–3.0 mm
	f	f	f	f	f
	0.009	0.016	0.023	0.033	0.045
	0.007	0.011	0.015	0.023	0.035
	0.004	0.009	0.014	0.020	0.028
	0.007	0.013	0.023	0.030	0.045
	0.010	0.023	0.038	0.050	0.070
	0.008	0.019	0.030	0.045	0.060
	0.008	0.014	0.023	0.030	0.045
	0.008	0.014	0.023	0.030	0.045
	0.008	0.017	0.030	0.045	0.065
	0.007	0.011	0.015	0.023	0.035
	0.003	0.004	0.007	0.009	0.009

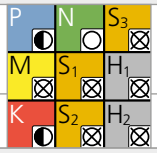
MiquDrill 210 - uncoated

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	30–60	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	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	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	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	2xd1	1xd1
		3.4365	AlZnMgCu1.5	ASTM 7075			
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	40–80	2xd1	1xd1
		3.2381	GD-AlSi10Mg	UNS A03590			
	Copper	2.004	Cu-OF / CW008A	UNS C10100	30–50	2xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	30–50	2xd1	1xd1
		2.036	CuZn40 CW509L	UNS C28000			
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	30–80	2xd1	1xd1
		2.102	CuSn6	UNS C51900			
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	25–40	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]

	Ød1					
	0.1–0.3 mm	0.3–0.6 mm	0.6–1.0 mm	1.0–1.5 mm	1.5–2.0 mm	2.0–3.0 mm
	f	**f**	**f**	**f**	**f**	**f**
	0.003	0.009	0.016	0.023	0.033	0.045
	0.003	0.007	0.011	0.015	0.023	0.035
	0.002	0.004	0.009	0.014	0.020	0.028
	0.003	0.007	0.013	0.023	0.030	0.045
	0.006	0.010	0.023	0.038	0.050	0.070
	0.005	0.008	0.019	0.030	0.045	0.060
	0.004	0.008	0.014	0.023	0.030	0.045
	0.004	0.008	0.014	0.023	0.030	0.045
	0.005	0.008	0.017	0.030	0.045	0.065
	0.003	0.007	0.011	0.015	0.023	0.035
	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.

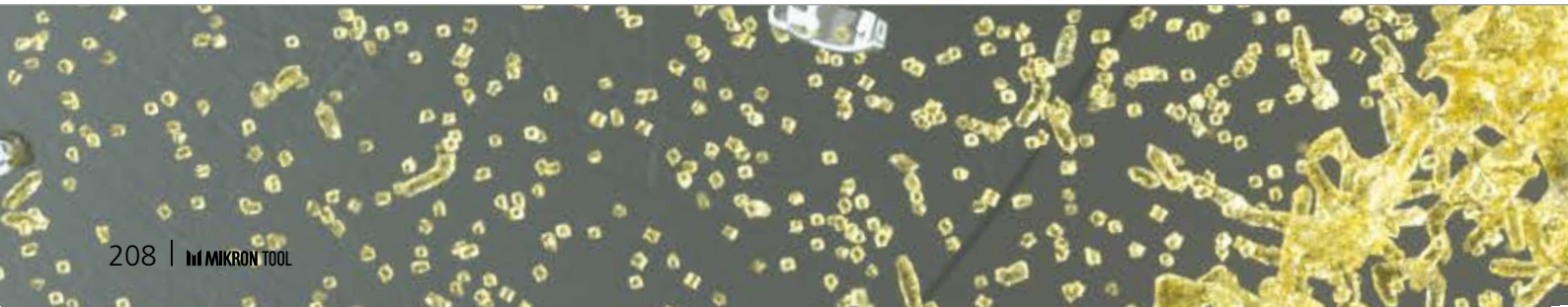
Center drilling / pilot drilling and drilling

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)

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

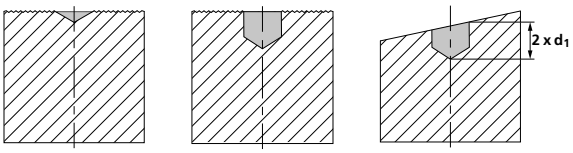
Drilling according DIN 66025 / PAL

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

Q = depth of the respective peck

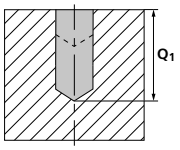
1 | CENTER OR PILOT DRILLING (ONLY IF NECESSARY)

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

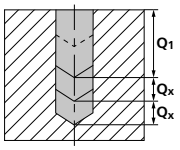


2 | DRILLING

- 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.

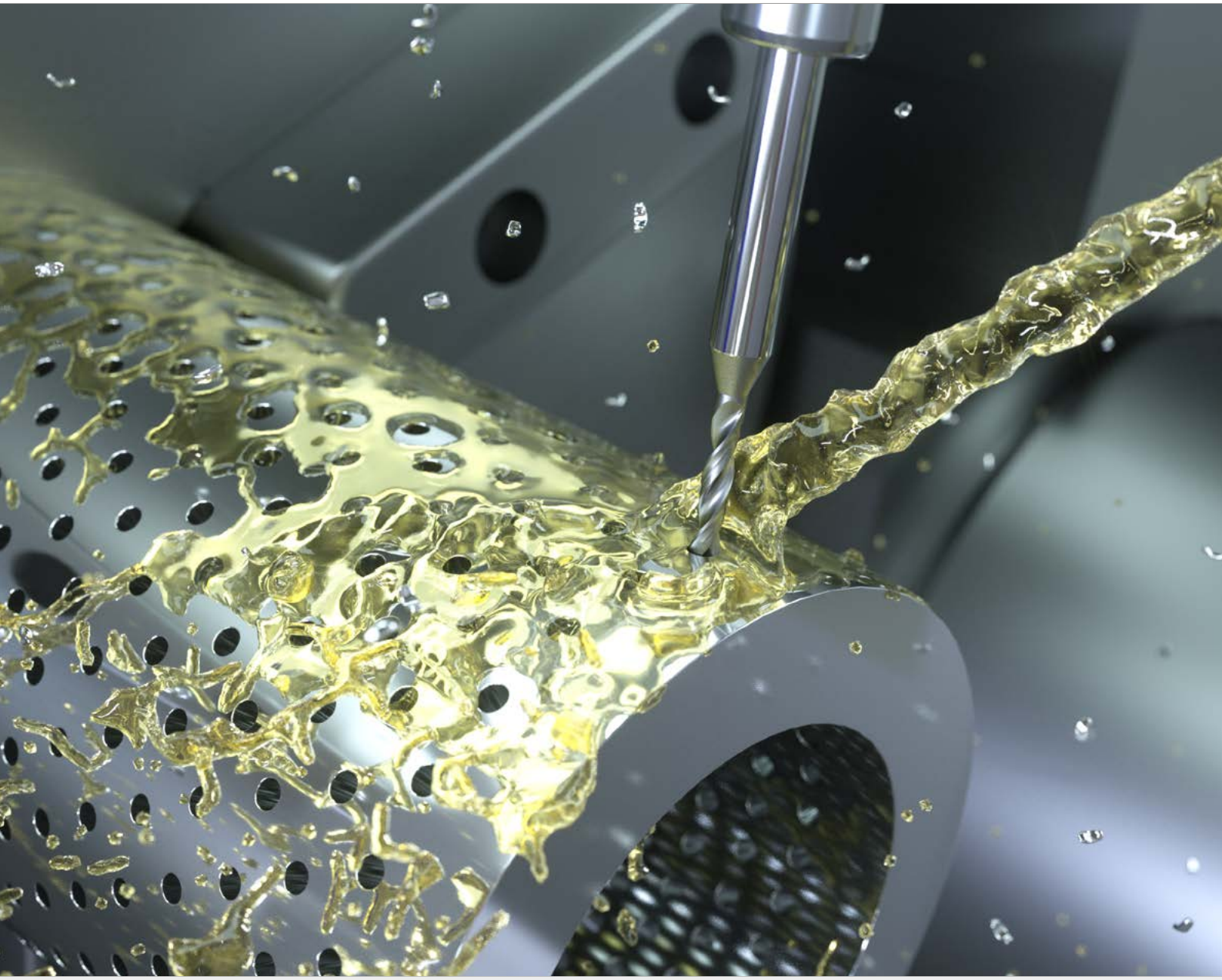


Note:

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 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 1.4 mm.

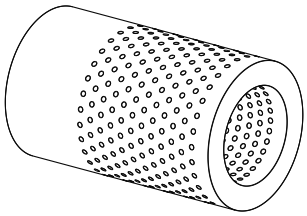
Please note: You couldn't find your suitable version of the CrazyDrill Steel (diameter, length, cutting direction…)? Ask us about our customized versions!

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
- Drilling depth 4.5 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Steel - 6 x d

DATA	MIKRON TOOL
Tool type	CrazyDrill Steel - Carbide - Coated - External cooling
Item number	2.CD.070080.S
Cutting data	v_c = 80 m/min f = 0.030 mm/rev Q_1 = 4.5 mm

4 x d

- External cooling
- Coated

Page 214

6 - 7 x d

- External cooling
- Coated

Page 218

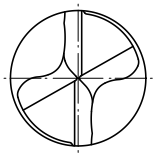
1 | SHAFT
The robust carbide shaft guarantees a high degree of concentricity accuracy and therefore highest drilling reliability.

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.

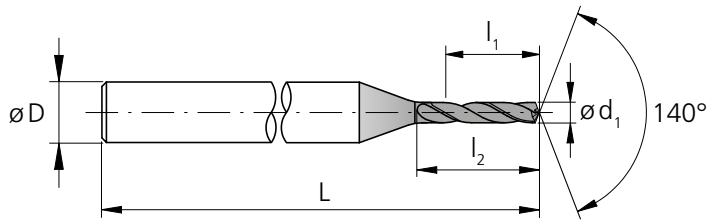
4 | HELICAL FLUTE
The geometry of the helical flute provides optimal chip flow, only minimal chip removal (pecking) is requested.

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



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.396	**1/64**	1.60	2.3	3	42.0	2.CD.040F164.S	■
0.40		1.60	2.3	3	42.0	2.CD.040040.S	■
0.45		1.80	2.6	3	42.0	2.CD.040045.S	■
0.50		2.00	2.9	3	42.0	2.CD.040050.S	■
0.55		2.20	3.2	3	42.0	2.CD.040055.S	■
0.60		2.40	3.5	3	43.5	2.CD.040060.S	■
0.65		2.60	3.8	3	43.5	2.CD.040065.S	■
0.70		2.80	4.1	3	43.5	2.CD.040070.S	■
0.75		3.00	4.4	3	43.5	2.CD.040075.S	■
0.793	**1/32**	3.20	4.6	3	43.5	2.CD.040F132.S	■
0.80		3.20	4.6	3	43.5	2.CD.040080.S	■
0.85		3.40	4.9	3	43.5	2.CD.040085.S	■
0.90		3.60	5.2	3	43.5	2.CD.040090.S	■
0.95		3.80	5.5	3	43.5	2.CD.040095.S	■
1.00		4.00	5.8	3	44.0	2.CD.040100.S	■
1.05		4.20	6.1	3	44.0	2.CD.040105.S	■
1.10		4.40	6.3	3	44.0	2.CD.040110.S	■
1.15		4.60	6.6	3	44.0	2.CD.040115.S	■
1.20		4.80	7.0	3	45.0	2.CD.040120.S	■
1.25		5.00	7.3	3	45.0	2.CD.040125.S	■
1.30		5.20	7.6	3	45.0	2.CD.040130.S	■
1.35		5.40	7.9	3	45.0	2.CD.040135.S	■
1.40		5.60	8.2	3	46.0	2.CD.040140.S	■
1.45		5.80	8.6	3	46.0	2.CD.040145.S	■
1.50		6.00	8.7	3	46.0	2.CD.040150.S	■
1.55		6.20	9.1	3	46.0	2.CD.040155.S	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.587	**1/16**	6.40	9.5	3	47.0	2.CD.040F116.S	■
1.60		6.40	9.5	3	47.0	2.CD.040160.S	■
1.65		6.60	9.7	3	47.0	2.CD.040165.S	■
1.70		6.80	10.0	3	47.0	2.CD.040170.S	■
1.75		7.00	10.3	3	47.0	2.CD.040175.S	■
1.80		7.20	10.8	3	48.0	2.CD.040180.S	■
1.85		7.40	11.0	3	48.0	2.CD.040185.S	■
1.90		7.60	11.2	3	48.0	2.CD.040190.S	■
1.95		7.80	11.4	3	48.0	2.CD.040195.S	■
2.00		8.00	11.9	4	55.0	2.CD.040200.S	■
2.05		8.20	12.1	4	55.0	2.CD.040205.S	■
2.10		8.40	12.3	4	55.0	2.CD.040210.S	■
2.15		8.60	12.6	4	55.0	2.CD.040215.S	■
2.20		8.80	13.0	4	56.0	2.CD.040220.S	■
2.25		9.00	13.3	4	56.0	2.CD.040225.S	■
2.30		9.20	13.6	4	56.0	2.CD.040230.S	■
2.35		9.40	13.9	4	56.0	2.CD.040235.S	■
2.381	**3/32**	9.60	14.2	4	57.0	2.CD.040F332.S	■
2.40		9.60	14.2	4	57.0	2.CD.040240.S	■
2.45		9.80	14.6	4	57.0	2.CD.040245.S	■
2.50		10.00	14.7	4	57.0	2.CD.040250.S	■
2.55		10.20	15.1	4	57.0	2.CD.040255.S	■
2.60		10.40	15.5	4	58.0	2.CD.040260.S	■
2.65		10.60	15.7	4	58.0	2.CD.040265.S	■
2.70		10.80	16.0	4	58.0	2.CD.040270.S	■
2.75		11.00	16.3	4	58.0	2.CD.040275.S	■

■ Stock item

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

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm	+ 0.007 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.80		11.20	16.8	4	59.0	2.CD.040280.S	■
2.85		11.40	17.0	4	59.0	2.CD.040285.S	■
2.90		11.60	17.2	4	59.0	2.CD.040290.S	■
2.95		11.80	17.4	4	59.0	2.CD.040295.S	■
3.00		12.00	17.6	4	59.0	2.CD.040300.S	■
3.05		12.20	17.8	4	60.0	2.CD.040305.S	■
3.10		12.40	18.1	4	60.0	2.CD.040310.S	■
3.15		12.60	18.4	4	60.0	2.CD.040315.S	■
3.175	**1/8**	12.80	18.7	4	60.0	2.CD.040F18.S	■
3.20		12.80	18.7	4	60.0	2.CD.040320.S	■
3.25		13.00	19.0	4	60.0	2.CD.040325.S	■
3.30		13.20	19.3	4	60.0	2.CD.040330.S	■
3.35		13.40	19.6	4	60.0	2.CD.040335.S	■
3.40		13.60	19.9	4	60.0	2.CD.040340.S	■
3.45		13.80	20.2	4	60.0	2.CD.040345.S	■
3.50		14.00	20.5	4	60.0	2.CD.040350.S	■
3.55		14.20	20.8	4	60.0	2.CD.040355.S	■
3.60		14.40	21.1	4	64.5	2.CD.040360.S	■
3.65		14.60	21.4	4	64.5	2.CD.040365.S	■
3.70		14.80	21.6	4	64.5	2.CD.040370.S	■
3.75		15.00	21.9	4	64.5	2.CD.040375.S	■
3.80		15.20	22.2	4	64.5	2.CD.040380.S	■
3.85		15.40	22.5	4	64.5	2.CD.040385.S	■
3.90		15.60	22.8	4	64.5	2.CD.040390.S	■
3.95		15.80	23.1	4	64.5	2.CD.040395.S	■
3.968	**5/32**	16.00	23.4	6	70.0	2.CD.040F532.S	■

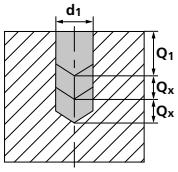
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.00		16.00	23.4	6	70.0	2.CD.040400.S	■
4.10		16.40	24.0	6	70.0	2.CD.040410.S	■
4.20		16.80	24.6	6	70.0	2.CD.040420.S	■
4.30		17.20	25.2	6	70.0	2.CD.040430.S	■
4.40		17.60	25.7	6	70.0	2.CD.040440.S	■
4.50		18.00	26.3	6	70.0	2.CD.040450.S	■
4.60		18.40	26.9	6	70.0	2.CD.040460.S	■
4.70		18.80	27.5	6	70.0	2.CD.040470.S	■
4.762	**3/16**	19.20	28.1	6	70.0	2.CD.040F316.S	■
4.80		19.20	28.1	6	70.0	2.CD.040480.S	■
4.90		19.60	28.7	6	70.0	2.CD.040490.S	■
5.00		20.00	29.2	6	70.0	2.CD.040500.S	■
5.10		20.40	29.8	6	70.0	2.CD.040510.S	■
5.20		20.80	30.4	6	75.0	2.CD.040520.S	■
5.30		21.20	31.0	6	75.0	2.CD.040530.S	■
5.40		21.60	31.6	6	75.0	2.CD.040540.S	■
5.50		22.00	32.2	6	75.0	2.CD.040550.S	■
5.560	**7/32**	22.40	32.8	6	75.0	2.CD.040F732.S	■
5.60		22.40	32.8	6	75.0	2.CD.040560.S	■
5.70		22.80	33.3	6	75.0	2.CD.040570.S	■
5.80		23.20	33.9	6	75.0	2.CD.040580.S	■
5.90		23.60	34.5	6	75.0	2.CD.040590.S	■
6.00		24.00	35.1	6	75.0	2.CD.040600.S	■
6.350	**1/4**	25.40	37.1	8	75.0	2.CD.040F14.S	■

Complementary products

CrazyDrill Crosspilot p.146

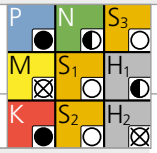
CrazyDrill Steel 4 x d

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	80	120	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	80	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	60	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	150	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	220	4xd1	–
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	150	200	4xd1	–
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	80	120	1.5xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	150	1.5xd1	1xd1
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	70	100	1.5xd1	1xd1
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	70	100	4xd1	–
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	20	40	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	40	1xd1	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	1xd1	0.3xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	15	30	4xd1	–
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	15	30	4xd1	–
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

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

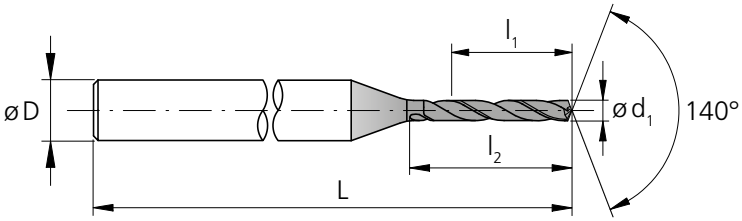


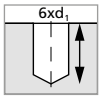
f [mm/rev]

	$Ød_1$ 0.4 mm 1/64" f	0.8 mm 1/32" f	1.0 mm f	1.25 mm f	1.5 mm 1/16" f	2.0 mm f	2.5 mm 3/32" f	3.0 mm 1/8" f	4.0 mm 5/32" f	5.0 mm 3/16" - 7/32" f	6.0 mm 1/4" f
	0.040	0.075	0.095	0.110	0.130	0.170	0.200	0.230	0.270	0.290	0.300
	0.030	0.060	0.075	0.090	0.110	0.140	0.160	0.180	0.220	0.230	0.240
	0.035	0.065	0.080	0.100	0.110	0.140	0.170	0.200	0.230	0.250	0.260
	0.040	0.080	0.095	0.120	0.140	0.175	0.210	0.240	0.290	0.330	0.360
	0.035	0.065	0.080	0.100	0.110	0.140	0.170	0.200	0.230	0.250	0.260
	0.030	0.060	0.075	0.090	0.100	0.135	0.160	0.180	0.220	0.235	0.240
	0.030	0.055	0.070	0.085	0.100	0.130	0.150	0.170	0.200	0.220	0.230
	0.030	0.050	0.065	0.070	0.075	0.090	0.110	0.140	0.160	0.200	0.220
	0.035	0.055	0.070	0.080	0.090	0.110	0.130	0.150	0.180	0.220	0.240
	0.015	0.025	0.035	0.050	0.060	0.075	0.095	0.110	0.130	0.160	0.220
	0.002	0.004	0.005	0.006	0.007	0.010	0.012	0.015	0.020	0.025	0.030
	0.014	0.025	0.030	0.040	0.045	0.060	0.070	0.080	0.095	0.100	0.110
	0.020	0.030	0.040	0.050	0.055	0.070	0.080	0.100	0.120	0.130	0.140
	0.006	0.012	0.015	0.020	0.025	0.030	0.035	0.045	0.060	0.075	0.090
	0.005	0.007	0.010	0.011	0.012	0.015	0.020	0.025	0.030	0.035	0.040

CrazyDrill Steel 6 x d / 7 x d

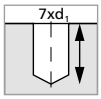
DRILLING WITH EXTERNAL COOLING





d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.396	**1/64**	2.40	3.1	3	42.0	2.CD.070F164.S	■
0.40		2.40	3.1	3	42.0	2.CD.070040.S	■
0.45		2.70	3.5	3	42.0	2.CD.070045.S	■
0.50		3.00	3.9	3	42.0	2.CD.070050.S	■
0.55		3.30	4.3	3	42.0	2.CD.070055.S	■
0.60		3.60	4.7	3	43.5	2.CD.070060.S	■
0.65		3.90	5.0	3	43.5	2.CD.070065.S	■
0.70		4.20	5.4	3	43.5	2.CD.070070.S	■
0.75		4.50	5.8	3	43.5	2.CD.070075.S	■
0.793	**1/32**	4.80	6.2	3	45.0	2.CD.070F132.S	■
0.80		4.80	6.2	3	45.0	2.CD.070080.S	■
0.85		5.10	6.6	3	45.0	2.CD.070085.S	■
0.90		5.40	7.0	3	45.0	2.CD.070090.S	■
0.95		5.70	7.4	3	45.0	2.CD.070095.S	■
1.00		6.00	7.8	3	46.0	2.CD.070100.S	■
1.05		6.30	8.1	3	46.0	2.CD.070105.S	■
1.10		6.60	8.6	3	46.0	2.CD.070110.S	■
1.15		6.90	8.7	3	46.0	2.CD.070115.S	■

■ Stock item



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.20		8.40	10.9	3	49.0	2.CD.070120.S	■
1.25		8.75	11.1	3	49.0	2.CD.070125.S	■
1.30		9.10	11.5	3	49.0	2.CD.070130.S	■
1.35		9.45	11.9	3	49.0	2.CD.070135.S	■
1.40		9.80	12.7	3	50.5	2.CD.070140.S	■
1.45		10.15	12.9	3	50.5	2.CD.070145.S	■
1.50		10.50	13.4	3	50.5	2.CD.070150.S	■
1.55		10.85	13.7	3	50.5	2.CD.070155.S	■
1.587	**1/16**	11.20	14.5	3	52.0	2.CD.070F116.S	■
1.60		11.20	14.5	3	52.0	2.CD.070160.S	■
1.65		11.55	14.7	3	52.0	2.CD.070165.S	■

■ Stock item

Carbide | 140° | Z2 | eXedur RIP

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm	+ 0.007 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.70		11.90	15.0	3	52.0	2.CD.070170.S	■
1.75		12.25	15.3	3	52.0	2.CD.070175.S	■
1.80		12.60	16.3	3	53.5	2.CD.070180.S	■
1.85		12.95	16.5	3	53.5	2.CD.070185.S	■
1.90		13.30	16.9	3	53.5	2.CD.070190.S	■
1.95		13.65	17.1	3	53.5	2.CD.070195.S	■
2.00		14.00	18.0	4	61.5	2.CD.070200.S	■
2.05		14.35	18.3	4	61.5	2.CD.070205.S	■
2.10		14.70	18.7	4	61.5	2.CD.070210.S	■
2.15		15.05	19.1	4	61.5	2.CD.070215.S	■
2.20		15.40	20.0	4	63.0	2.CD.070220.S	■
2.25		15.75	20.3	4	63.0	2.CD.070225.S	■
2.30		16.10	20.6	4	63.0	2.CD.070230.S	■
2.35		16.45	20.9	4	63.0	2.CD.070235.S	■
2.381	**3/32**	16.80	21.7	4	64.5	2.CD.070F332.S	■
2.40		16.80	21.7	4	64.5	2.CD.070240.S	■
2.45		17.15	22.1	4	64.5	2.CD.070245.S	■
2.50		17.50	22.2	4	64.5	2.CD.070250.S	■
2.55		17.85	22.6	4	64.5	2.CD.070255.S	■
2.60		18.20	23.5	4	66.0	2.CD.070260.S	■
2.65		18.55	23.7	4	66.0	2.CD.070265.S	■
2.70		18.90	24.0	4	66.0	2.CD.070270.S	■
2.75		19.25	24.3	4	66.0	2.CD.070275.S	■
2.80		19.60	25.3	4	67.5	2.CD.070280.S	■
2.85		19.95	25.5	4	67.5	2.CD.070285.S	■
2.90		20.30	25.7	4	67.5	2.CD.070290.S	■
2.95		20.65	25.9	4	67.5	2.CD.070295.S	■
3.00		21.00	26.2	4	67.5	2.CD.070300.S	■
3.05		21.35	27.5	4	70.0	2.CD.070305.S	■
3.10		21.70	27.9	4	70.0	2.CD.070310.S	■
3.15		22.05	28.4	4	70.0	2.CD.070315.S	■
3.175	**1/8**	22.40	28.8	4	70.0	2.CD.070F18.S	■
3.20		22.40	28.8	4	70.0	2.CD.070320.S	■
3.25		22.75	29.3	4	70.0	2.CD.070325.S	■
3.30		23.10	29.7	4	70.0	2.CD.070330.S	■
3.35		23.45	30.2	4	70.0	2.CD.070335.S	■
3.40		23.80	30.6	4	70.0	2.CD.070340.S	■
3.45		24.15	31.1	4	75.0	2.CD.070345.S	■
3.50		24.50	31.5	4	75.0	2.CD.070350.S	■

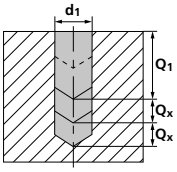
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.55		24.85	32.0	4	75.0	2.CD.070355.S	■
3.60		25.20	32.4	4	75.0	2.CD.070360.S	■
3.65		25.55	32.9	4	75.0	2.CD.070365.S	■
3.70		25.90	33.3	4	75.0	2.CD.070370.S	■
3.75		26.25	33.8	4	75.0	2.CD.070375.S	■
3.80		26.60	34.2	4	75.0	2.CD.070380.S	■
3.85		26.95	34.7	4	75.0	2.CD.070385.S	■
3.90		27.30	35.1	4	75.0	2.CD.070390.S	■
3.95		27.65	35.6	4	75.0	2.CD.070395.S	■
3.968	**5/32**	28.00	36.0	6	80.0	2.CD.070F532.S	■
4.00		28.00	36.0	6	80.0	2.CD.070400.S	■
4.10		28.70	36.9	6	80.0	2.CD.070410.S	■
4.20		29.40	37.8	6	80.0	2.CD.070420.S	■
4.30		30.10	38.7	6	80.0	2.CD.070430.S	■
4.40		30.80	39.6	6	80.0	2.CD.070440.S	■
4.50		31.50	40.5	6	85.0	2.CD.070450.S	■
4.60		32.20	41.4	6	85.0	2.CD.070460.S	■
4.70		32.90	42.3	6	85.0	2.CD.070470.S	■
4.762	**3/16**	33.60	43.2	6	85.0	2.CD.070F316.S	■
4.80		33.60	43.2	6	85.0	2.CD.070480.S	■
4.90		34.30	44.1	6	85.0	2.CD.070490.S	■
5.00		35.00	45.0	6	85.0	2.CD.070500.S	■
5.10		35.70	45.9	6	90.0	2.CD.070510.S	■
5.20		36.40	46.8	6	90.0	2.CD.070520.S	■
5.30		37.10	47.7	6	90.0	2.CD.070530.S	■
5.40		37.80	48.6	6	90.0	2.CD.070540.S	■
5.50		38.50	49.5	6	90.0	2.CD.070550.S	■
5.560	**7/32**	39.20	50.4	6	90.0	2.CD.070F732.S	■
5.60		39.20	50.4	6	90.0	2.CD.070560.S	■
5.70		39.90	51.3	6	95.0	2.CD.070570.S	■
5.80		40.60	52.2	6	95.0	2.CD.070580.S	■
5.90		41.30	53.1	6	95.0	2.CD.070590.S	■
6.00		42.00	54.0	6	95.0	2.CD.070600.S	■
6.350	**1/4**	44.45	57.2	8	95.0	2.CD.070F14.S	■

Complementary products

CrazyDrill Pilot p.134
CrazyDrill Crosspilot p.146

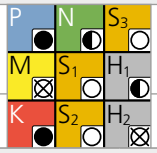
CrazyDrill Steel 6 x d / 7 x d

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]		Q_1	Q_x	Q_1	Q_x
					Mid	High	6xd		7xd	
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	80	120	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	80	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	60	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	150	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	220	4xd1	2xd1	4xd1	2xd1
		3.4365	AlZnMgCu1.5	ASTM 7075						
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	150	200	4xd1	2xd1	4xd1	2xd1
		3.2381	GD-AlSi10Mg	UNS A03590						
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	80	120	1.5xd1	1xd1	1.5xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000						
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	150	1.5xd1	1xd1	1.5xd1	1xd1
		2.0360	CuZn40 CW509L	UNS C28000						
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	70	100	1.5xd1	1xd1	1.5xd1	1xd1
		2.1020	CuSn6	UNS C51900						
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	70	100	4xd1	2xd1	4xd1	3xd1
		2.0960	CuAl9Mn2	UNS C63200						
S_1	Super alloys	2.4856		Inconel 625	20	40	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	40	1xd1	0.25xd1	1xd1	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68						
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	1xd1	0.3xd1	1xd1	0.3xd1
		9.9367	TiAl6Nb7	ASTM F1295						
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	15	30	4xd1	0.25xd1	4xd1	0.25xd1
			CrCoMo28	ASTM F1537						
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	15	30	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]

Ød1	0.4 mm 1/64" f	0.8 mm 1/32" f	1.0 mm f	1.25 mm f	1.5 mm 1/16" f	2.0 mm f	2.5 mm 3/32" f	3.0 mm 1/8" f	4.0 mm 5/32" f	5.0 mm 3/16" - 7/32" f	6.0 mm 1/4" f
	0.040	0.075	0.095	0.110	0.130	0.170	0.200	0.230	0.270	0.290	0.300
	0.030	0.060	0.075	0.090	0.110	0.140	0.160	0.180	0.220	0.230	0.240
	0.035	0.065	0.080	0.100	0.110	0.140	0.170	0.200	0.230	0.250	0.260
	0.040	0.080	0.095	0.120	0.140	0.175	0.210	0.240	0.290	0.330	0.360
	0.035	0.065	0.080	0.100	0.110	0.140	0.170	0.200	0.230	0.250	0.260
	0.030	0.060	0.075	0.090	0.100	0.135	0.160	0.180	0.220	0.235	0.240
	0.030	0.055	0.070	0.085	0.100	0.130	0.150	0.170	0.200	0.220	0.230
	0.030	0.050	0.065	0.070	0.075	0.090	0.110	0.140	0.160	0.200	0.220
	0.035	0.055	0.070	0.080	0.090	0.110	0.130	0.150	0.180	0.220	0.240
	0.015	0.025	0.035	0.050	0.060	0.075	0.095	0.110	0.130	0.160	0.220
	0.002	0.004	0.005	0.006	0.007	0.010	0.012	0.015	0.020	0.025	0.030
	0.014	0.025	0.030	0.040	0.045	0.060	0.070	0.080	0.095	0.100	0.110
	0.020	0.030	0.040	0.050	0.055	0.070	0.080	0.100	0.120	0.130	0.140
	0.006	0.012	0.015	0.020	0.025	0.030	0.035	0.045	0.060	0.075	0.090
	0.005	0.007	0.010	0.011	0.012	0.015	0.020	0.025	0.030	0.035	0.040

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 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 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.

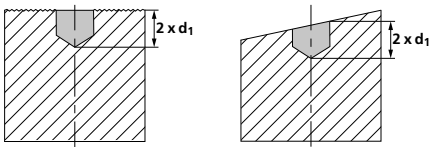
The quality of drilling (position and alignment accuracy, no measurable transition from pilot hole to follow-up hole) and a stable machining process are guaranteed by means of a predetermined tool.

Drilling process CrazyDrill Steel

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

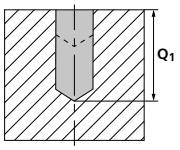
1 | PILOT DRILLING

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

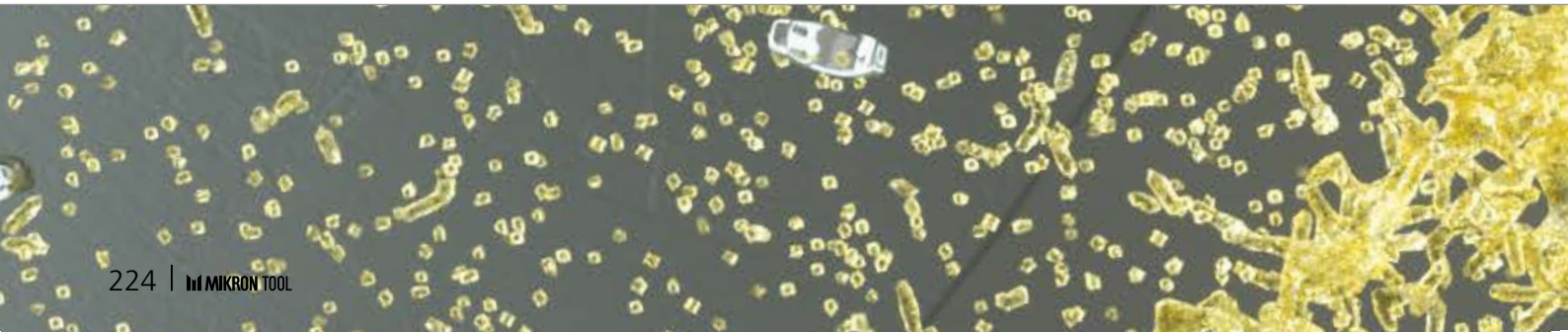


2 | DRILLING

- 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.

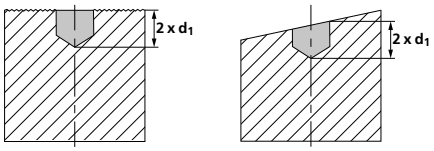


DRILLING AS PER DIN 66025 / PAL (DEPENDING ON MATERIAL, SEE CUTTING DATA CHART)

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

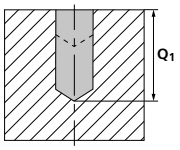
1 | PILOT DRILLING

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

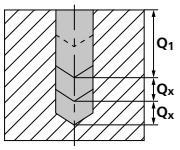


2 | DRILLING

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

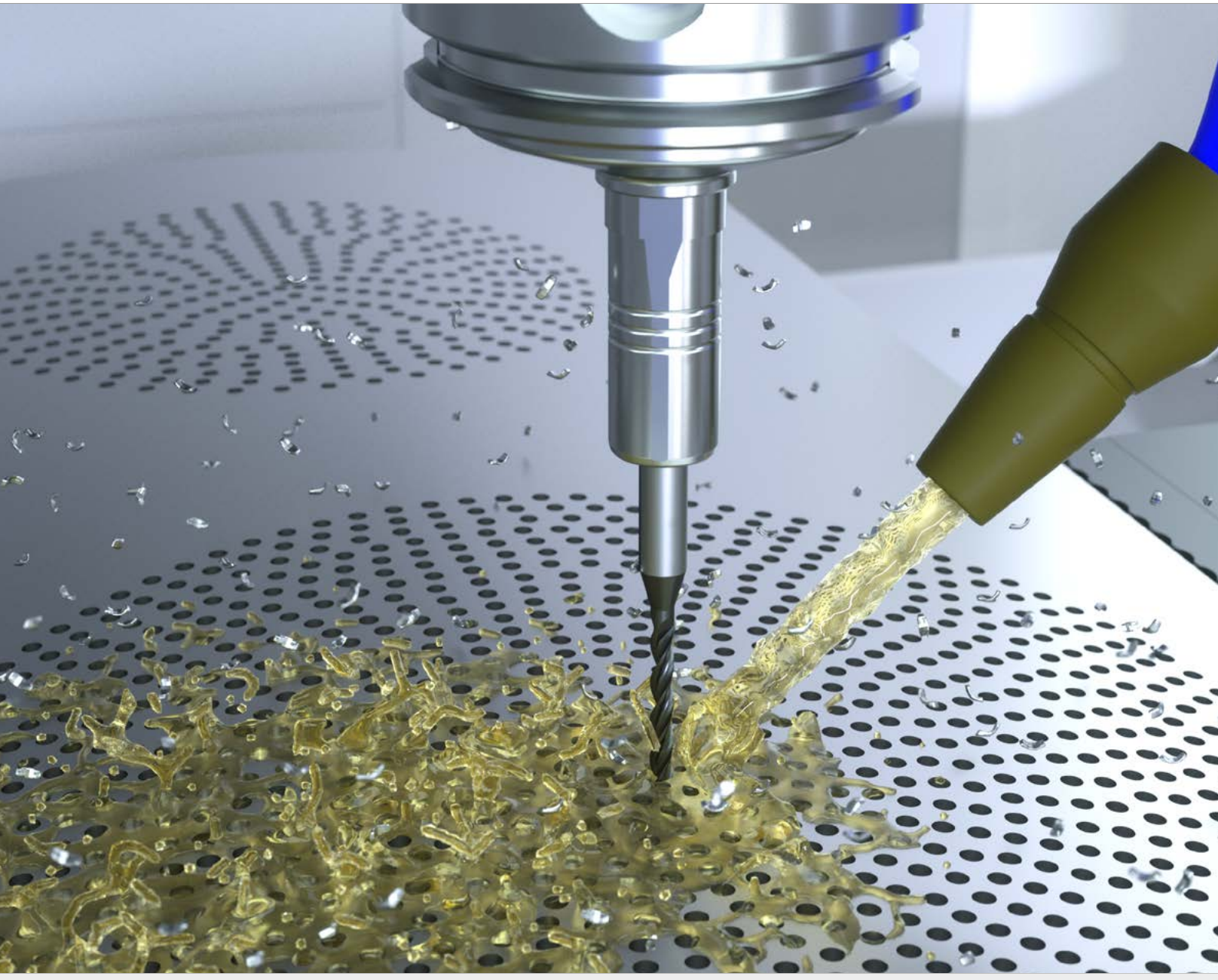


- Further pecks Q_X according to cutting data table, with subsequent chip removal.



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 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 1.4 mm.

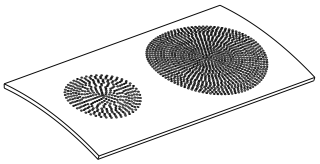
Please note: You couldn't find your suitable version of the CrazyDrill Alu (diameter, length, cutting direction…)? Ask us about our customized versions!

CRAZYDRILL by Mikron Tool Alu

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

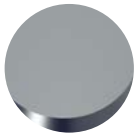
MACHINING
- 2'000 holes
- d = 1.2 mm
- Drilling depth 5 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Alu - 5 x d

DATA	MIKRON TOOL
Tool type	CrazyDrill Alu - Carbide - Coated - External cooling
Item number	2.CD.050120.A
Cutting data	v_c = 150 m/min f = 0.07 mm/rev Q_1 = 5 mm

5 x d

- External cooling
- Coated



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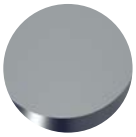
10 x d

- External cooling
- Coated



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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.

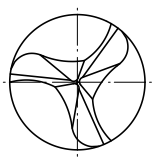
3 | THREE FLUTES WITH REDUCED CHISEL GEOMETRY
Allows stable self-centering, spot drilling or pilot drilling are not necessary.

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.

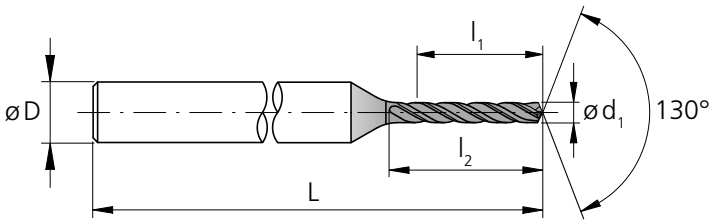
6 | TIP ANGLE OF 130°
Burr free drilling is assured by the 130° tip angle and sharp cutting edges. Highest drilling accuracy is guaranteed.

Drill tip



CrazyDrill Alu 5 x d

DRILLING WITH EXTERNAL COOLING



d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.40	2.00	2.9	3	43.0	2.CD.050040.A	■
0.45	2.25	3.3	3	43.0	2.CD.050045.A	■
0.50	2.50	3.6	3	43.0	2.CD.050050.A	■
0.55	2.75	4.0	3	43.0	2.CD.050055.A	■
0.60	3.00	4.3	3	43.0	2.CD.050060.A	■
0.65	3.25	4.7	3	43.0	2.CD.050065.A	■
0.70	3.50	5.1	3	45.0	2.CD.050070.A	■
0.75	3.75	5.4	3	45.0	2.CD.050075.A	■
0.80	4.00	5.8	3	45.0	2.CD.050080.A	■
0.85	4.25	6.1	3	45.0	2.CD.050085.A	■
0.90	4.50	6.5	3	45.0	2.CD.050090.A	■
0.95	4.75	6.9	3	46.0	2.CD.050095.A	■
1.00	5.00	7.2	3	46.0	2.CD.050100.A	■
1.05	5.25	7.6	3	46.0	2.CD.050105.A	■
1.10	5.50	8.0	3	46.0	2.CD.050110.A	■
1.15	5.75	8.3	3	48.0	2.CD.050115.A	■
1.20	6.00	8.7	3	48.0	2.CD.050120.A	■
1.25	6.25	9.0	3	48.0	2.CD.050125.A	■
1.30	6.50	9.4	3	48.0	2.CD.050130.A	■
1.35	6.75	9.8	3	48.0	2.CD.050135.A	■
1.40	7.00	10.1	3	48.0	2.CD.050140.A	■
1.45	7.25	10.5	3	49.0	2.CD.050145.A	■
1.50	7.50	10.9	3	49.0	2.CD.050150.A	■
1.55	7.75	11.2	3	50.5	2.CD.050155.A	■
1.60	8.00	11.6	3	50.5	2.CD.050160.A	■
1.65	8.25	11.9	3	50.5	2.CD.050165.A	■
1.70	8.50	12.3	3	50.5	2.CD.050170.A	■

■ Stock item

Carbide | 5xd$_1$ | 130° | Z3 | DLC

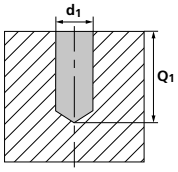
Ø d$_1$	0.1 - 3.0 mm
Tolerance	+ 0.004 mm 0

d$_1$ [mm]	l$_1$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.75	8.75	12.7	3	52.0	2.CD.050175.A	■
1.80	9.00	13.0	3	52.0	2.CD.050180.A	■
1.85	9.25	13.4	3	52.0	2.CD.050185.A	■
1.90	9.50	13.7	3	53.5	2.CD.050190.A	■
1.95	9.75	14.1	3	53.5	2.CD.050195.A	■
2.00	10.00	14.5	4	60.0	2.CD.050200.A	■
2.05	10.25	14.8	4	60.0	2.CD.050205.A	■
2.10	10.50	15.2	4	60.0	2.CD.050210.A	■
2.15	10.75	15.6	4	60.0	2.CD.050215.A	■
2.20	11.00	15.9	4	61.5	2.CD.050220.A	■
2.25	11.25	16.3	4	61.5	2.CD.050225.A	■
2.30	11.50	16.6	4	61.5	2.CD.050230.A	■
2.35	11.75	17.0	4	61.5	2.CD.050235.A	■
2.40	12.00	17.4	4	62.0	2.CD.050240.A	■
2.45	12.25	17.7	4	62.0	2.CD.050245.A	■
2.50	12.50	18.1	4	62.0	2.CD.050250.A	■
2.55	12.75	18.4	4	63.0	2.CD.050255.A	■
2.60	13.00	18.8	4	63.0	2.CD.050260.A	■
2.65	13.25	19.2	4	63.0	2.CD.050265.A	■
2.70	13.50	19.5	4	63.0	2.CD.050270.A	■
2.75	13.75	19.9	4	64.5	2.CD.050275.A	■
2.80	14.00	20.3	4	64.5	2.CD.050280.A	■
2.85	14.25	20.6	4	64.5	2.CD.050285.A	■
2.90	14.50	21.0	4	65.0	2.CD.050290.A	■
2.95	14.75	21.3	4	65.0	2.CD.050295.A	■
3.00	15.00	21.7	4	65.0	2.CD.050300.A	■

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

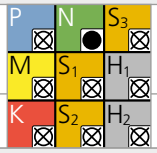
CrazyDrill Alu 5 x d

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Low	v_c [m/min] 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	300	5xd1
		3.4365	AlZnMgCu1.5	ASTM 7075			
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	40	200	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

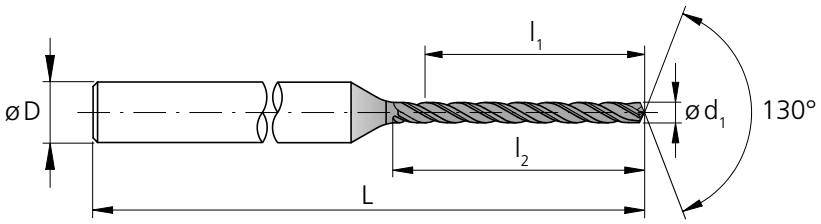


f [mm/rev]

	Ød1					
	0.5 mm	1.0 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm
	f	**f**	**f**	**f**	**f**	**f**
	0.04	0.07	0.10	0.12	0.15	0.18
	0.05	0.08	0.11	0.15	0.18	0.21

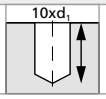
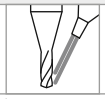
CrazyDrill Alu 10 x d

DRILLING WITH EXTERNAL COOLING



d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.40	4.00	4.9	3	45.0	2.CD.100040.A	■
0.45	4.50	5.5	3	45.0	2.CD.100045.A	■
0.50	5.00	6.1	3	45.0	2.CD.100050.A	■
0.55	5.50	6.7	3	45.0	2.CD.100055.A	■
0.60	6.00	7.3	3	47.0	2.CD.100060.A	■
0.65	6.50	8.0	3	47.0	2.CD.100065.A	■
0.70	7.00	8.6	3	47.0	2.CD.100070.A	■
0.75	7.50	9.2	3	49.0	2.CD.100075.A	■
0.80	8.00	9.8	3	49.0	2.CD.100080.A	■
0.85	8.50	10.4	3	49.0	2.CD.100085.A	■
0.90	9.00	11.0	3	49.0	2.CD.100090.A	■
0.95	9.50	11.6	3	50.5	2.CD.100095.A	■
1.00	10.00	12.2	3	50.5	2.CD.100100.A	■
1.05	10.50	12.8	3	52.0	2.CD.100105.A	■
1.10	11.00	13.5	3	52.0	2.CD.100110.A	■
1.15	11.50	14.1	3	53.5	2.CD.100115.A	■
1.20	12.00	14.7	3	53.5	2.CD.100120.A	■
1.25	12.50	15.3	3	53.5	2.CD.100125.A	■
1.30	13.00	15.9	3	55.5	2.CD.100130.A	■
1.35	13.50	16.5	3	55.5	2.CD.100135.A	■
1.40	14.00	17.1	3	55.5	2.CD.100140.A	■
1.45	14.50	17.7	3	55.5	2.CD.100145.A	■
1.50	15.00	18.4	4	64.5	2.CD.100150.A	■
1.55	15.50	19.0	4	64.5	2.CD.100155.A	■
1.60	16.00	19.6	4	64.5	2.CD.100160.A	■
1.65	16.50	20.2	4	64.5	2.CD.100165.A	■
1.70	17.00	20.8	4	67.0	2.CD.100170.A	■

■ Stock item

Carbide |  |  | Z3 |  | 

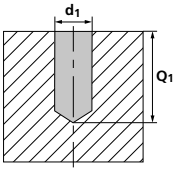
Ø d_1	0.1 - 3.0 mm
Tolerance	+ 0.004 mm 0

d_1 [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.75	17.50	21.4	4	67.0	2.CD.100175.A	■
1.80	18.00	22.0	4	67.0	2.CD.100180.A	■
1.85	18.50	22.6	4	68.5	2.CD.100185.A	■
1.90	19.00	23.2	4	68.5	2.CD.100190.A	■
1.95	19.50	23.9	4	68.5	2.CD.100195.A	■
2.00	20.00	24.5	4	70.0	2.CD.100200.A	■
2.05	20.50	25.1	4	70.0	2.CD.100205.A	■
2.10	21.00	25.7	4	70.0	2.CD.100210.A	■
2.15	21.50	26.3	4	72.0	2.CD.100215.A	■
2.20	22.00	26.9	4	72.0	2.CD.100220.A	■
2.25	22.50	27.5	4	72.0	2.CD.100225.A	■
2.30	23.00	28.1	4	73.5	2.CD.100230.A	■
2.35	23.50	28.7	4	73.5	2.CD.100235.A	■
2.40	24.00	29.4	4	73.5	2.CD.100240.A	■
2.45	24.50	30.0	4	75.0	2.CD.100245.A	■
2.50	25.00	30.6	4	75.0	2.CD.100250.A	■
2.55	25.50	31.2	4	75.0	2.CD.100255.A	■
2.60	26.00	31.8	4	76.5	2.CD.100260.A	■
2.65	26.50	32.4	4	76.5	2.CD.100265.A	■
2.70	27.00	33.0	4	76.5	2.CD.100270.A	■
2.75	27.50	33.6	4	78.0	2.CD.100275.A	■
2.80	28.00	34.3	4	78.0	2.CD.100280.A	■
2.85	28.50	34.9	4	78.0	2.CD.100285.A	■
2.90	29.00	35.5	4	80.0	2.CD.100290.A	■
2.95	29.50	36.1	4	80.0	2.CD.100295.A	■
3.00	30.00	36.7	4	80.0	2.CD.100300.A	■

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

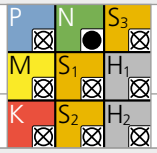
CrazyDrill Alu 10 x d

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Low	v_c [m/min] 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	300	5xd1	1xd1 - 2xd1
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	40	200	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]

Ød1					
0.5 mm **f**	1.0 mm **f**	1.5 mm **f**	2.0 mm **f**	2.5 mm **f**	3.0 mm **f**
0.04	0.07	0.10	0.12	0.15	0.18
0.05	0.08	0.11	0.15	0.18	0.21

Drilling process CrazyDrill Alu

ACCURATE AND QUICK DRILLING UP TO 10 X D

Coolant type, pressure and filtration

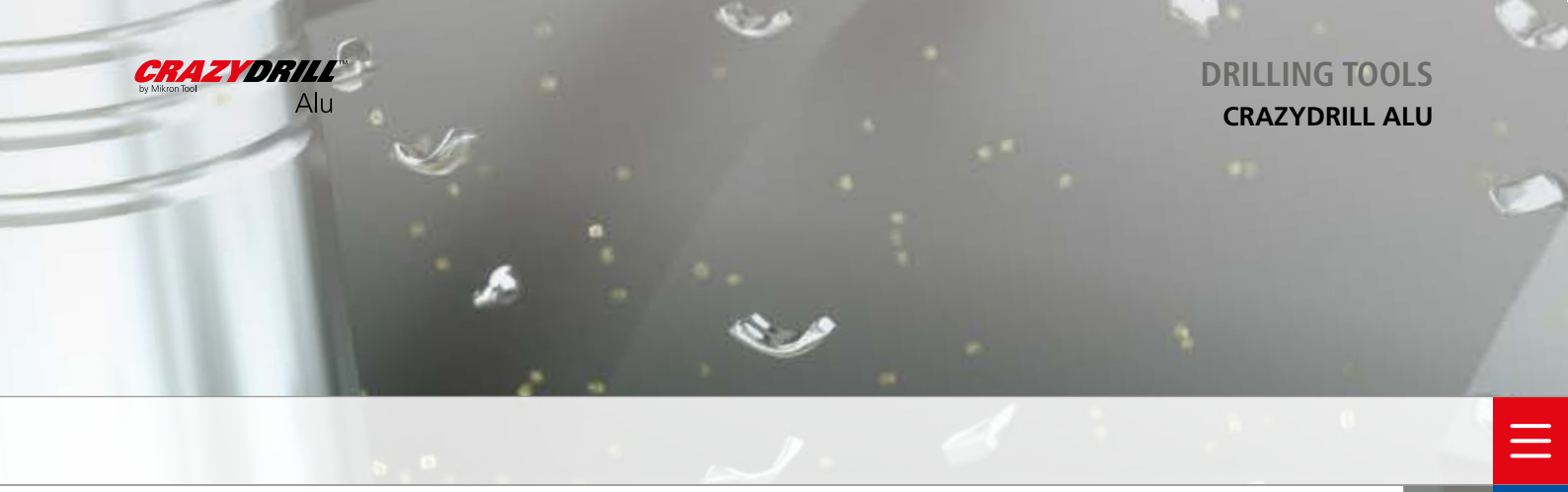
For best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

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.

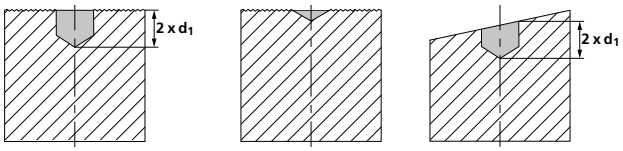
The quality of drilling (position and alignment accuracy, no measurable transition from pilot hole to the following drilling steps) and a stable machining process is guaranteed by carefully determined tool tolerances.

Drilling process CrazyDrill Alu

ONE STEP DRILLING UP TO 5 X D

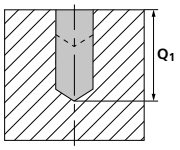
1 | PILOT DRILLING

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

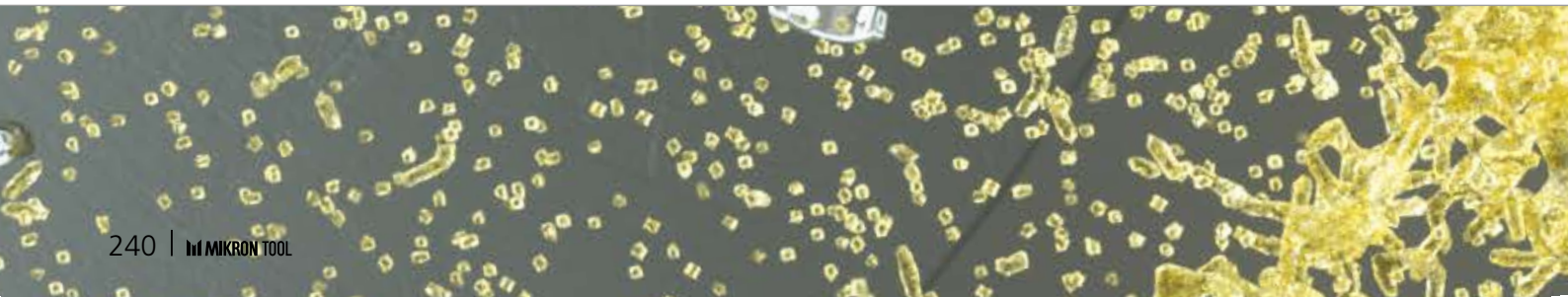


2 | DRILLING

- 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.

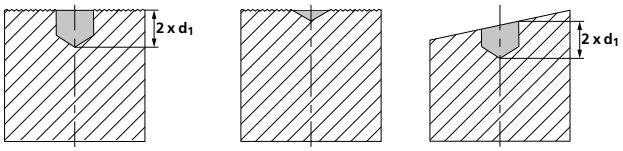


DRILLING UP TO 10 X D AS PER DIN 66025 / PAL

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

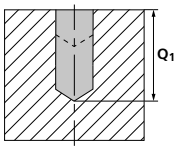
1 | PILOT DRILLING

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

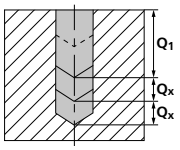


2 | DRILLING

- 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.



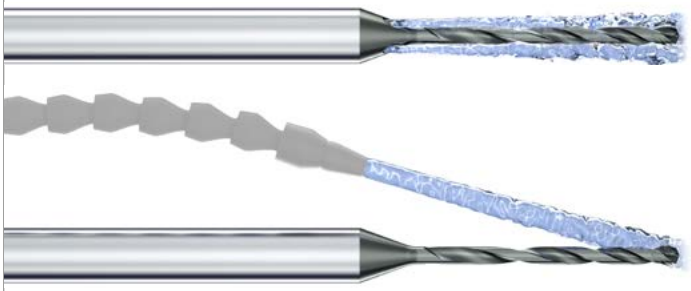
Note:
Drill can be retracted completely from the hole between pecks. However if vibrations occur, we recommend that the drill is not retracted completely from the hole.
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety 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 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!

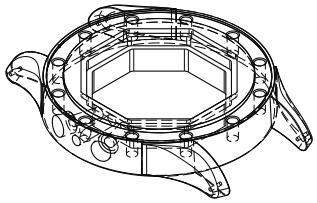
CRAZYDRILL by Mikron Tool SST-Inox

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
- Drilling depth 3 mm

DRILLING TOOL
Mikron Tool - CrazyDrill SST-Inox IK - 8 x d

DATA	MIKRON TOOL
Tool type	CrazyDrill SST-Inox - Carbide - Coated - Integrated cooling
Item number	2.CD.080060.IK
Cutting data	v_c = 40 m/min f = 0.025 mm/rev Q_1 = 1.2 mm Q_x = 0.9 mm

Type IN

- External cooling
- Coated

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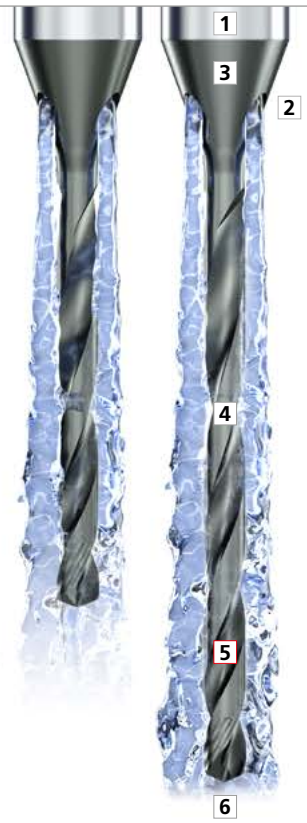
Type IK

- Integrated cooling
- Coated



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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.

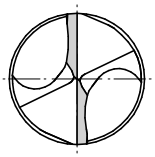
4 | COATING
The especially developed high-performance coating eXedur RIP is abrasion and heat resistant. It prevents build up material and supports a smooth chip removal. The result is a long tool life.

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:

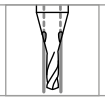
- high cutting edge stability
- short chips
- self-centering

Drill tip

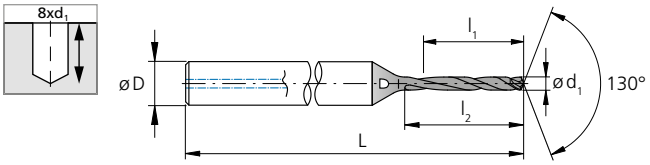


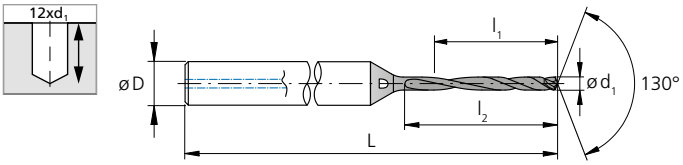
CRAZYDRILL by Mikron Tool SST-Inox

Type IK 8 x d / 12 x d



DRILLING WITH INTEGRATED COOLING





d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.20		1.6	2.0	3	38	2.CD.080020.IK	■
0.25		2.0	2.5	3	38	2.CD.080025.IK	■
0.30		2.4	2.9	3	38	2.CD.080030.IK	■
0.35		2.8	3.4	3	38	2.CD.080035.IK	■
0.396	**1/64**	3.2	3.9	3	38	2.CD.080F164.IK	■
0.40		3.2	3.9	3	38	2.CD.080040.IK	■
0.45		3.6	4.4	3	42	2.CD.080045.IK	■
0.50		4.0	4.9	3	42	2.CD.080050.IK	■
0.55		4.4	5.4	3	42	2.CD.080055.IK	■
0.60		4.8	5.9	3	42	2.CD.080060.IK	■
0.65		5.2	6.4	3	45	2.CD.080065.IK	■
0.70		5.6	6.9	3	45	2.CD.080070.IK	■
0.75		6.0	7.4	3	45	2.CD.080075.IK	■
0.793	**1/32**	6.4	7.8	3	45	2.CD.080F132.IK	■
0.80		6.4	7.8	3	45	2.CD.080080.IK	■
0.85		6.8	8.3	3	45	2.CD.080085.IK	■
0.90		7.2	8.8	3	45	2.CD.080090.IK	■
0.95		7.6	9.3	3	48	2.CD.080095.IK	■
1.00		8.0	9.8	3	48	2.CD.080100.IK	■
1.05		8.4	10.3	3	48	2.CD.080105.IK	■
1.10		8.8	10.8	3	48	2.CD.080110.IK	■
1.15		9.2	11.3	3	48	2.CD.080115.IK	■
1.20		9.6	11.8	3	48	2.CD.080120.IK	■
1.25		10.0	12.3	4	52	2.CD.080125.IK	■
1.30		10.4	12.7	4	52	2.CD.080130.IK	■
1.35		10.8	13.2	4	52	2.CD.080135.IK	■
1.40		11.2	13.7	4	52	2.CD.080140.IK	■
1.45		11.6	14.2	4	52	2.CD.080145.IK	■
1.50		12.0	14.7	4	52	2.CD.080150.IK	■
1.55		12.4	15.2	4	55	2.CD.080155.IK	■
1.587	**1/16**	12.8	15.7	4	55	2.CD.080F116.IK	■
1.60		12.8	15.7	4	55	2.CD.080160.IK	■
1.65		13.2	16.2	4	55	2.CD.080165.IK	■
1.70		13.6	16.7	4	55	2.CD.080170.IK	■
1.75		14.0	17.2	4	55	2.CD.080175.IK	■
1.80		14.4	17.6	4	55	2.CD.080180.IK	■
1.85		14.8	18.1	4	55	2.CD.080185.IK	■
1.90		15.2	18.6	4	55	2.CD.080190.IK	■
1.95		15.6	19.1	4	55	2.CD.080195.IK	■
2.00		16.0	19.6	4	55	2.CD.080200.IK	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.20		2.4	2.8	3	38	2.CD.120020.IK	■
0.25		3.0	3.5	3	38	2.CD.120025.IK	■
0.30		3.6	4.1	3	38	2.CD.120030.IK	■
0.35		4.2	4.8	3	38	2.CD.120035.IK	■
0.396	**1/64**	4.8	5.5	3	38	2.CD.120F164.IK	■
0.40		4.8	5.5	3	38	2.CD.120040.IK	■
0.45		5.4	6.2	3	42	2.CD.120045.IK	■
0.50		6.0	6.9	3	42	2.CD.120050.IK	■
0.55		6.6	7.6	3	42	2.CD.120055.IK	■
0.60		7.2	8.3	3	42	2.CD.120060.IK	■
0.65		7.8	9.0	3	45	2.CD.120065.IK	■
0.70		8.4	9.7	3	45	2.CD.120070.IK	■
0.75		9.0	10.4	3	45	2.CD.120075.IK	■
0.793	**1/32**	9.6	11.0	3	45	2.CD.120F132.IK	■
0.80		9.6	11.0	3	45	2.CD.120080.IK	■
0.85		10.2	11.7	3	45	2.CD.120085.IK	■
0.90		10.8	12.4	3	45	2.CD.120090.IK	■
0.95		11.4	13.1	3	48	2.CD.120095.IK	■
1.00		12.0	13.8	3	48	2.CD.120100.IK	■
1.05		12.6	14.5	3	48	2.CD.120105.IK	■
1.10		13.2	15.2	3	48	2.CD.120110.IK	■
1.15		13.8	15.9	3	48	2.CD.120115.IK	■
1.20		14.4	16.6	3	48	2.CD.120120.IK	■
1.25		15.0	17.3	4	55	2.CD.120125.IK	■
1.30		15.6	17.9	4	55	2.CD.120130.IK	■
1.35		16.2	18.6	4	55	2.CD.120135.IK	■
1.40		16.8	19.3	4	55	2.CD.120140.IK	■
1.45		17.4	20.0	4	55	2.CD.120145.IK	■
1.50		18.0	20.7	4	55	2.CD.120150.IK	■
1.55		18.6	21.4	4	58	2.CD.120155.IK	■
1.587	**1/16**	19.2	22.1	4	58	2.CD.120F116.IK	■
1.60		19.2	22.1	4	58	2.CD.120160.IK	■
1.65		19.8	22.8	4	58	2.CD.120165.IK	■
1.70		20.4	23.5	4	58	2.CD.120170.IK	■
1.75		21.0	24.2	4	58	2.CD.120175.IK	■
1.80		21.6	24.8	4	58	2.CD.120180.IK	■
1.85		22.2	25.5	4	60	2.CD.120185.IK	■
1.90		22.8	26.2	4	60	2.CD.120190.IK	■
1.95		23.4	26.9	4	60	2.CD.120195.IK	■
2.00		24.0	27.6	4	60	2.CD.120200.IK	■

■ Stock item

Complementary products

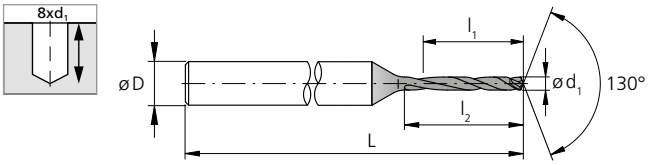
CrazyDrill Twicenter	p.72
CrazyDrill Pilot SST-Inox	p.122
CrazyDrill Crosspilot	p.146

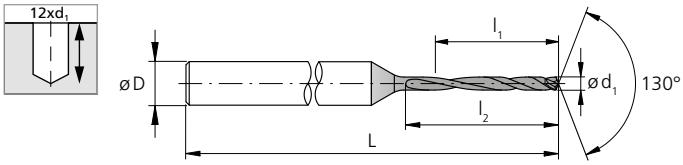
Type IN 8 x d / 12 x d

Carbide | 130° | Z2 | eXedur RIP

DRILLING WITH EXTERNAL COOLING

Ød_1	0.1 - 3.0 mm
Tolerance	+ 0.004 mm 0





d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.20		1.6	2.0	3	38	2.CD.080020.IN	■
0.25		2.0	2.5	3	38	2.CD.080025.IN	■
0.30		2.4	2.9	3	38	2.CD.080030.IN	■
0.35		2.8	3.4	3	38	2.CD.080035.IN	■
0.396	**1/64**	3.2	3.9	3	38	2.CD.080F164.IN	■
0.40		3.2	3.9	3	38	2.CD.080040.IN	■
0.45		3.6	4.4	3	42	2.CD.080045.IN	■
0.50		4.0	4.9	3	42	2.CD.080050.IN	■
0.55		4.4	5.4	3	42	2.CD.080055.IN	■
0.60		4.8	5.9	3	42	2.CD.080060.IN	■
0.65		5.2	6.4	3	45	2.CD.080065.IN	■
0.70		5.6	6.9	3	45	2.CD.080070.IN	■
0.75		6.0	7.4	3	45	2.CD.080075.IN	■
0.793	**1/32**	6.4	7.8	3	45	2.CD.080F132.IN	■
0.80		6.4	7.8	3	45	2.CD.080080.IN	■
0.85		6.8	8.3	3	45	2.CD.080085.IN	■
0.90		7.2	8.8	3	45	2.CD.080090.IN	■
0.95		7.6	9.3	3	48	2.CD.080095.IN	■
1.00		8.0	9.8	3	48	2.CD.080100.IN	■
1.05		8.4	10.3	3	48	2.CD.080105.IN	■
1.10		8.8	10.8	3	48	2.CD.080110.IN	■
1.15		9.2	11.3	3	48	2.CD.080115.IN	■
1.20		9.6	11.8	3	48	2.CD.080120.IN	■
1.25		10.0	12.3	3	52	2.CD.080125.IN	■
1.30		10.4	12.7	3	52	2.CD.080130.IN	■
1.35		10.8	13.2	3	52	2.CD.080135.IN	■
1.40		11.2	13.7	3	52	2.CD.080140.IN	■
1.45		11.6	14.2	3	52	2.CD.080145.IN	■
1.50		12.0	14.7	3	52	2.CD.080150.IN	■
1.55		12.4	15.2	3	55	2.CD.080155.IN	■
1.587	**1/16**	12.8	15.7	3	55	2.CD.080F116.IN	■
1.60		12.8	15.7	3	55	2.CD.080160.IN	■
1.65		13.2	16.2	3	55	2.CD.080165.IN	■
1.70		13.6	16.7	3	55	2.CD.080170.IN	■
1.75		14.0	17.2	3	55	2.CD.080175.IN	■
1.80		14.4	17.6	3	55	2.CD.080180.IN	■
1.85		14.8	18.1	3	55	2.CD.080185.IN	■
1.90		15.2	18.6	3	55	2.CD.080190.IN	■
1.95		15.6	19.1	3	55	2.CD.080195.IN	■
2.00		16.0	19.6	3	55	2.CD.080200.IN	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.20		2.4	2.8	3	38	2.CD.120020.IN	■
0.25		3.0	3.5	3	38	2.CD.120025.IN	■
0.30		3.6	4.1	3	38	2.CD.120030.IN	■
0.35		4.2	4.8	3	38	2.CD.120035.IN	■
0.396	**1/64**	4.8	5.5	3	38	2.CD.120F164.IN	■
0.40		4.8	5.5	3	38	2.CD.120040.IN	■
0.45		5.4	6.2	3	42	2.CD.120045.IN	■
0.50		6.0	6.9	3	42	2.CD.120050.IN	■
0.55		6.6	7.6	3	42	2.CD.120055.IN	■
0.60		7.2	8.3	3	42	2.CD.120060.IN	■
0.65		7.8	9.0	3	45	2.CD.120065.IN	■
0.70		8.4	9.7	3	45	2.CD.120070.IN	■
0.75		9.0	10.4	3	45	2.CD.120075.IN	■
0.793	**1/32**	9.6	11.0	3	45	2.CD.120F132.IN	■
0.80		9.6	11.0	3	45	2.CD.120080.IN	■
0.85		10.2	11.7	3	45	2.CD.120085.IN	■
0.90		10.8	12.4	3	45	2.CD.120090.IN	■
0.95		11.4	13.1	3	48	2.CD.120095.IN	■
1.00		12.0	13.8	3	48	2.CD.120100.IN	■
1.05		12.6	14.5	3	48	2.CD.120105.IN	■
1.10		13.2	15.2	3	48	2.CD.120110.IN	■
1.15		13.8	15.9	3	48	2.CD.120115.IN	■
1.20		14.4	16.6	3	48	2.CD.120120.IN	■
1.25		15.0	17.3	3	55	2.CD.120125.IN	■
1.30		15.6	17.9	3	55	2.CD.120130.IN	■
1.35		16.2	18.6	3	55	2.CD.120135.IN	■
1.40		16.8	19.3	3	55	2.CD.120140.IN	■
1.45		17.4	20.0	3	55	2.CD.120145.IN	■
1.50		18.0	20.7	3	55	2.CD.120150.IN	■
1.55		18.6	21.4	3	58	2.CD.120155.IN	■
1.587	**1/16**	19.2	22.1	3	58	2.CD.120F116.IN	■
1.60		19.2	22.1	3	58	2.CD.120160.IN	■
1.65		19.8	22.8	3	58	2.CD.120165.IN	■
1.70		20.4	23.5	3	58	2.CD.120170.IN	■
1.75		21.0	24.2	3	58	2.CD.120175.IN	■
1.80		21.6	24.8	3	58	2.CD.120180.IN	■
1.85		22.2	25.5	3	60	2.CD.120185.IN	■
1.90		22.8	26.2	3	60	2.CD.120190.IN	■
1.95		23.4	26.9	3	60	2.CD.120195.IN	■
2.00		24.0	27.6	3	60	2.CD.120200.IN	■

■ Stock item

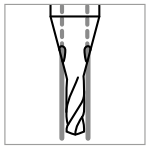
Complementary products

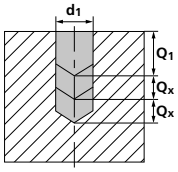
CrazyDrill Twicenter	p.72
CrazyDrill Pilot SST-Inox	p.122
CrazyDrill Crosspilot	p.146

CRAZYDRILL by Mikron Tool SST-Inox

Type IK 8 x d / 12 x d

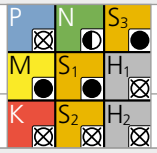
DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] 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	50	1xd1 – 4xd1
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	35	50	1xd1 – 4xd1
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	35	50	1xd1 – 4xd1
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	30	45	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	2.0040	Cu-OF / CW008A	UNS C10100	40	100	4xd1 – 8xd1
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40	100	4xd1 – 8xd1
		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	15	30	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	50	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

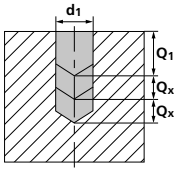


f [mm/rev]

Q_x	Ød1 0.2–0.5 mm 1/64" f	0.6–0.8 mm 1/32" f	0.9–1.1 mm f	1.2–1.4 mm f	1.5–1.7 mm 1/16" f	1.8–2.0 mm f
1xd1–2xd1	0.010–0.020	0.020–0.030	0.030–0.040	0.040–0.050	0.050–0.060	0.060–0.070
1xd1–2xd1	0.015–0.030	0.030–0.040	0.040–0.050	0.050–0.060	0.060–0.070	0.070–0.080
1xd1–2xd1	0.010–0.020	0.020–0.025	0.025–0.035	0.040–0.050	0.050–0.060	0.060–0.070
1xd1–2xd1	0.010–0.020	0.020–0.030	0.030–0.035	0.035–0.045	0.045–0.055	0.055–0.060
4xd1	0.040–0.060	0.050–0.080	0.060–0.100	0.080–0.120	0.100–0.150	0.120–0.180
4xd1	0.040–0.060	0.050–0.080	0.060–0.100	0.080–0.120	0.100–0.150	0.120–0.180
0.5xd1	0.010–0.015	0.015–0.020	0.020–0.025	0.025–0.035	0.035–0.040	0.045–0.055
1xd1–2xd1	0.020–0.030	0.030–0.040	0.050–0.060	0.060–0.070	0.070–0.080	0.080–0.100

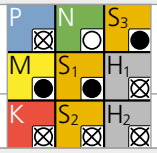
Type IN 8 x d / 12 x d

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] 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	40	0.5xd1 – 1xd1
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	30	40	0.5xd1 – 1xd1
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	30	40	0.5xd1 – 1xd1
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	25	30	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	100	2xd1 – 4xd1
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	30	100	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	25	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	35	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]

Q_x	Ød1 0.2–0.5 mm 1/64" f	0.6–0.8 mm 1/32" f	0.9–1.1 mm f	1.2–1.4 mm f	1.5–1.7 mm 1/16" f	1.8–2.0 mm f
0.5xd1	0.010–0.015	0.015–0.025	0.025–0.030	0.030–0.040	0.040–0.050	0.050–0.060
0.5xd1	0.015–0.020	0.020–0.025	0.030–0.035	0.040–0.050	0.050–0.060	0.060–0.070
0.5xd1	0.010–0.015	0.015–0.020	0.020–0.030	0.030–0.040	0.040–0.050	0.050–0.060
0.5xd1	0.010–0.015	0.015–0.020	0.020–0.030	0.030–0.040	0.040–0.045	0.040–0.060
2xd1	0.030–0.060	0.040–0.080	0.050–0.100	0.060–0.120	0.070–0.150	0.080–0.180
1xd1–2xd1	0.030–0.060	0.040–0.080	0.050–0.100	0.060–0.120	0.070–0.150	0.080–0.180
0.25xd1	0.005–0.010	0.010 –0.015	0.015–0.020	0.020–0.025	0.030–0.035	0.030–0.040
0.5xd1	0.015–0.025	0.025–0.035	0.040–0.050	0.050–0.060	0.060–0.070	0.070–0.080

Drilling process CrazyDrill SST-Inox

PRECISE AND EFFICIENT DRILLING FROM Ø 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 ≤ 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

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 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:

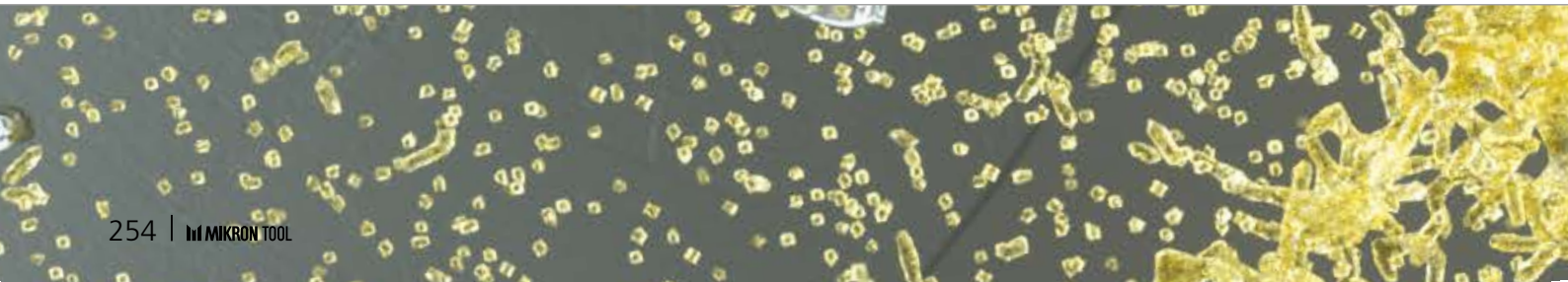
- **CrazyDrill Pilot SST-Inox** as pilot drill
- **CrazyDrill Twicenter** as center drill
- **CrazyDrill Crosspilot** as pilot drill for inclined surfaces

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

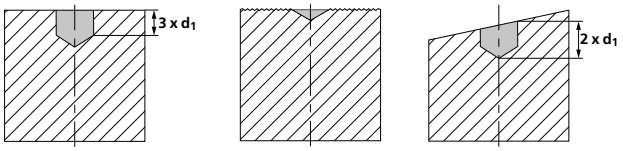
Drilling according DIN 66025 / PAL

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

Q = depth of the respective peck

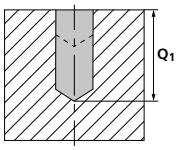
1 | CENTERING OR PILOT DRILLING

- 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.

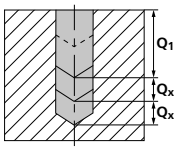


2 | DRILLING

- 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 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 1.4 mm.

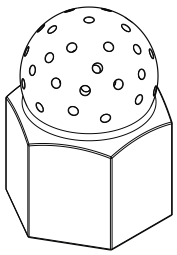
Please note: You couldn't find your suitable version of the CrazyDrill Cool - coated / uncoated (diameter, length, cutting direction…)? Ask us about our customized versions!

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
- Drilling depth 15 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Cool - 15 x d - coated

DATA	MIKRON TOOL
Tool type	CrazyDrill Cool - Carbide - Coated - Internal cooling
Item number	2.CD.150100.CS
Cutting data	v_c = 50 m/min f = 0.03 mm/rev Q_1 = 0.5 mm Q_x = 0.25 mm

6 x d	10 x d	15 x d
■ Internal cooling ■ Coated / uncoated	■ Internal cooling ■ Coated / uncoated	■ Internal cooling ■ Coated / uncoated
		
		
		
Page 260	Page 266	Page 272

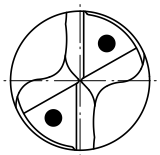
1 | SHAFT
The robust solid carbide shaft guarantees a high degree of concentric accuracy and reliability.

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 

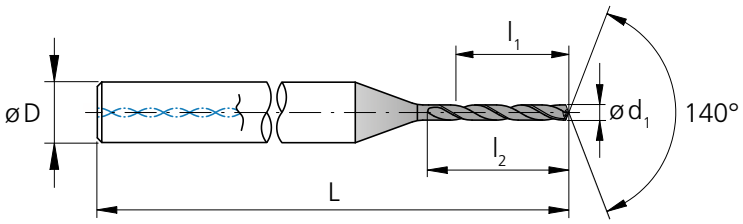
CRAZYDRILL by Mikron Tool Cool

CrazyDrill Cool 6 x d - coated / uncoated

DRILLING WITH INTERNAL COOLING

CS eXedur RIP

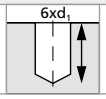
CA Uncoated



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.75		4.50	6.8	3	51.5	2.CD.060075	.CS	.CA	■
0.793	1/32	4.76	7.2	3	51.5	2.CD.060F132	.CS	-	◪
0.80		4.80	7.2	3	51.5	2.CD.060080	.CS	.CA	■
0.85		5.10	7.7	3	51.5	2.CD.060085	.CS	.CA	■
0.90		5.40	8.1	3	51.5	2.CD.060090	.CS	.CA	■
0.95		5.70	8.6	3	51.5	2.CD.060095	.CS	.CA	■
1.00		6.00	9.0	4	55.0	2.CD.060100	.CS	.CA	■
1.05		6.30	9.5	4	55.0	2.CD.060105	.CS	.CA	■
1.10		6.60	9.9	4	55.0	2.CD.060110	.CS	.CA	■
1.15		6.90	10.4	4	55.0	2.CD.060115	.CS	.CA	■
1.20		7.20	10.8	4	55.0	2.CD.060120	.CS	.CA	■
1.25		7.50	11.3	4	55.0	2.CD.060125	.CS	.CA	■
1.30		7.80	11.7	4	57.0	2.CD.060130	.CS	.CA	■
1.35		8.10	12.2	4	57.0	2.CD.060135	.CS	.CA	■
1.40		8.40	12.6	4	57.0	2.CD.060140	.CS	.CA	■
1.45		8.70	13.1	4	57.0	2.CD.060145	.CS	.CA	■
1.50		9.00	13.5	4	57.0	2.CD.060150	.CS	.CA	■
1.55		9.30	14.0	4	59.0	2.CD.060155	.CS	.CA	■
1.587	1/16	9.52	14.4	4	59.0	2.CD.060F116	.CS	-	◪
1.60		9.60	14.4	4	59.0	2.CD.060160	.CS	.CA	■
1.65		9.90	14.9	4	59.0	2.CD.060165	.CS	.CA	■
1.70		10.20	15.3	4	59.0	2.CD.060170	.CS	.CA	■
1.75		10.50	15.8	4	59.0	2.CD.060175	.CS	.CA	■
1.80		10.80	16.2	4	61.0	2.CD.060180	.CS	.CA	■
1.85		11.10	16.7	4	61.0	2.CD.060185	.CS	.CA	■
1.90		11.40	17.1	4	61.0	2.CD.060190	.CS	.CA	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
1.95		11.70	17.6	4	61.0	2.CD.060195	.CS	.CA	■
2.00		12.00	18.0	4	63.0	2.CD.060200	.CS	.CA	■
2.05		12.30	18.5	4	63.0	2.CD.060205	.CS	.CA	■
2.10		12.60	18.9	4	63.0	2.CD.060210	.CS	.CA	■
2.15		12.90	19.4	4	63.0	2.CD.060215	.CS	.CA	■
2.20		13.20	19.8	4	63.0	2.CD.060220	.CS	.CA	■
2.25		13.50	20.3	4	63.0	2.CD.060225	.CS	.CA	■
2.30		13.80	20.7	4	65.0	2.CD.060230	.CS	.CA	■
2.35		14.10	21.2	4	65.0	2.CD.060235	.CS	.CA	■
2.381	3/32	14.29	21.6	4	65.0	2.CD.060F332	.CS	-	◪
2.40		14.40	21.6	4	65.0	2.CD.060240	.CS	.CA	■
2.45		14.70	22.1	4	65.0	2.CD.060245	.CS	.CA	■
2.50		15.00	22.5	4	65.0	2.CD.060250	.CS	.CA	■
2.55		15.30	22.7	4	65.0	2.CD.060255	.CS	.CA	■
2.60		15.60	23.4	4	66.5	2.CD.060260	.CS	.CA	■
2.65		15.90	23.9	4	66.5	2.CD.060265	.CS	.CA	■
2.70		16.20	24.3	4	66.5	2.CD.060270	.CS	.CA	■
2.75		16.50	24.8	4	68.5	2.CD.060275	.CS	.CA	■
2.80		16.80	25.2	4	68.5	2.CD.060280	.CS	.CA	■
2.85		17.10	25.7	4	68.5	2.CD.060285	.CS	.CA	■
2.90		17.40	26.1	4	68.5	2.CD.060290	.CS	.CA	■
2.95		17.70	26.6	4	68.5	2.CD.060295	.CS	.CA	■
3.00		18.00	27.0	6	73.0	2.CD.060300	.CS	.CA	■
3.05		18.30	27.5	6	73.0	2.CD.060305	.CS	.CA	■
3.10		18.60	27.9	6	73.0	2.CD.060310	.CS	.CA	■
3.15		18.90	28.4	6	73.0	2.CD.060315	.CS	.CA	■

■ Stock item
◪ Stock item only in one version

Carbide			Z2	

Ød1	0.1 - 3.0 mm	3.05 - 6.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm

d1 [mm]	d1 [inch]	l1 [mm]	l2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
3.175	1/8	19.05	28.8	6	73.0	2.CD.060F18	.CS	-	◪
3.20		19.20	28.8	6	73.0	2.CD.060320	.CS	.CA	■
3.25		19.50	29.3	6	73.0	2.CD.060325	.CS	.CA	■
3.30		19.80	29.7	6	75.5	2.CD.060330	.CS	.CA	■
3.35		20.10	30.2	6	75.5	2.CD.060335	.CS	.CA	■
3.40		20.40	30.6	6	75.5	2.CD.060340	.CS	.CA	■
3.45		20.70	31.1	6	75.5	2.CD.060345	.CS	.CA	■
3.50		21.00	31.5	6	75.5	2.CD.060350	.CS	.CA	■
3.55		21.30	32.0	6	75.5	2.CD.060355	.CS	.CA	■
3.60		21.60	32.4	6	77.5	2.CD.060360	.CS	.CA	■
3.65		21.90	32.9	6	77.5	2.CD.060365	.CS	.CA	■
3.70		22.20	33.3	6	77.5	2.CD.060370	.CS	.CA	■
3.75		22.50	33.8	6	77.5	2.CD.060375	.CS	.CA	■
3.80		22.80	34.2	6	77.5	2.CD.060380	.CS	.CA	■
3.85		23.10	34.7	6	79.0	2.CD.060385	.CS	.CA	■
3.90		23.40	35.1	6	79.0	2.CD.060390	.CS	.CA	■
3.95		23.70	35.6	6	79.0	2.CD.060395	.CS	.CA	■
3.968	5/32	23.81	36.0	6	79.0	2.CD.060F532	.CS	-	◪
4.00		24.00	36.0	6	79.0	2.CD.060400	.CS	.CA	■
4.10		24.60	35.3	6	80.5	2.CD.060410	.CS	.CA	■
4.20		25.20	36.1	6	80.5	2.CD.060420	.CS	.CA	■
4.30		25.80	36.1	6	80.5	2.CD.060430	.CS	.CA	■
4.40		26.40	37.0	6	80.5	2.CD.060440	.CS	.CA	■
4.50		27.00	37.8	6	80.5	2.CD.060450	.CS	.CA	■
4.60		27.60	38.6	6	80.5	2.CD.060460	.CS	.CA	■
4.70		28.20	39.5	6	84.5	2.CD.060470	.CS	.CA	■

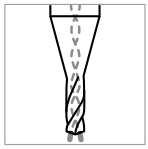
d1 [mm]	d1 [inch]	l1 [mm]	l2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
4.762	3/16	28.57	40.3	6	84.5	2.CD.060F316	.CS	-	◪
4.80		28.80	40.3	6	84.5	2.CD.060480	.CS	.CA	■
4.90		29.40	41.2	6	84.5	2.CD.060490	.CS	.CA	■
5.00		30.00	42.0	6	84.5	2.CD.060500	.CS	.CA	■
5.10		30.60	40.8	6	84.5	2.CD.060510	.CS	.CA	■
5.20		31.20	41.6	6	84.5	2.CD.060520	.CS	.CA	■
5.30		31.80	42.4	6	84.5	2.CD.060530	.CS	.CA	■
5.40		32.40	45.4	6	88.0	2.CD.060540	.CS	.CA	■
5.50		33.00	46.2	6	88.0	2.CD.060550	.CS	.CA	■
5.560	7/32	33.36	47.0	6	88.0	2.CD.060F732	.CS	-	◪
5.60		33.60	47.0	6	88.0	2.CD.060560	.CS	.CA	■
5.70		34.20	45.6	6	88.0	2.CD.060570	.CS	.CA	■
5.80		34.80	46.4	6	88.0	2.CD.060580	.CS	.CA	■
5.90		35.40	47.2	6	88.0	2.CD.060590	.CS	.CA	■
6.00		36.00	48.0	6	88.0	2.CD.060600	.CS	.CA	■

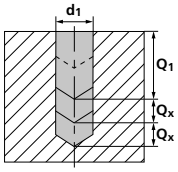
Complementary products	
CrazyDrill Pilot	p.134
CrazyDrill Crosspilot	p.146
CrazyDrill Coolpilot	p.156
CrazyDrill Pilot SST-Inox	p.122

CRAZYDRILL by Mikron Tool Cool

CrazyDrill Cool 6 x d - coated

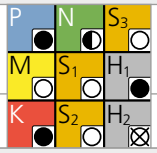
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	140	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	120	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	80	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	50	0.5xd1	0.25xd1
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	20	40	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	40	0.5xd1	0.25xd1
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	20	40	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	140	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	300	6xd1	–
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100	200	6xd1	–
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	100	200	1.5xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	140	1xd1	0.5xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	80	120	2xd1	1xd1
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80	150	6xd1	–
		2.096	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	15	20	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	40	0.5xd1	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	0.5xd1	0.25xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	15	20	0.5xd1	0.25xd1
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	20	40	0.5xd1	0.25xd1
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

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



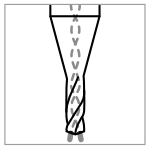
f [mm/rev]

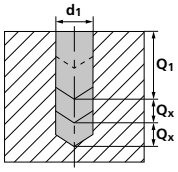
	Ød1									
	0.8 mm **1/32"** f	1.0 mm f	1.25 mm f	1.5 mm **1/16"** f	2.0 mm f	2.5 mm **3/32"** f	3.0 mm **1/8"** f	4.0 mm **5/32"** f	5.0 mm **3/16" - 7/32"** f	6.0 mm f
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.040	0.050	0.060	0.070	0.090	0.110	0.120	0.150	0.170	0.180
	0.030	0.040	0.050	0.060	0.070	0.090	0.100	0.120	0.150	0.170
	0.011	0.030	0.045	0.060	0.080	0.090	0.100	0.120	0.130	0.140
	0.020	0.050	0.065	0.080	0.110	0.130	0.150	0.180	0.200	0.220
	0.010	0.020	0.030	0.040	0.060	0.080	0.090	0.110	0.120	0.130
	0.010	0.020	0.030	0.040	0.060	0.080	0.090	0.110	0.120	0.130
	0.075	0.100	0.120	0.140	0.170	0.190	0.210	0.240	0.260	0.280
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.060	0.070	0.090	0.100	0.130	0.150	0.170	0.210	0.250	0.300
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.080	0.100	0.110	0.130	0.150	0.170	0.190	0.200	0.210	0.230
	0.020	0.030	0.040	0.055	0.070	0.090	0.110	0.130	0.150	0.200
	0.009	0.012	0.014	0.017	0.020	0.022	0.024	0.034	0.039	0.044
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.009	0.012	0.014	0.019	0.024	0.029	0.034	0.039	0.044	0.054
	0.008	0.010	0.012	0.015	0.020	0.025	0.030	0.040	0.050	0.060

CRAZYDRILL by Mikron Tool Cool

CrazyDrill Cool 6 x d - uncoated

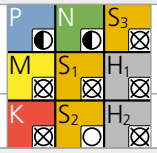
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	40	60	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	60	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	40	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	300	6xd1	–
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100	200	6xd1	–
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	100	200	1.5xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	140	1xd1	0.5xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	80	120	2xd1	1xd1
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80	150	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	40	0.5xd1	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	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]

	Ød1									
	0.8 mm	1.0 mm	1.25 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm	4.0 mm	5.0 mm	6.0 mm
	f	**f**	**f**	**f**	**f**	**f**	**f**	**f**	**f**	**f**
	0.045	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.040	0.050	0.060	0.070	0.090	0.110	0.120	0.150	0.170	0.180
	0.030	0.040	0.050	0.060	0.070	0.090	0.100	0.120	0.150	0.170
	Recommended: CrazyDrill Cool - coated									
	Recommended: CrazyDrill Cool - coated									
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.060	0.070	0.090	0.100	0.130	0.150	0.170	0.210	0.250	0.300
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.080	0.100	0.110	0.130	0.150	0.170	0.190	0.200	0.210	0.230
	0.020	0.030	0.040	0.055	0.070	0.090	0.110	0.130	0.150	0.200
	Recommended: CrazyDrill Cool - coated									
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	Recommended: CrazyDrill Cool - coated									
	Recommended: CrazyDrill Cool - coated									

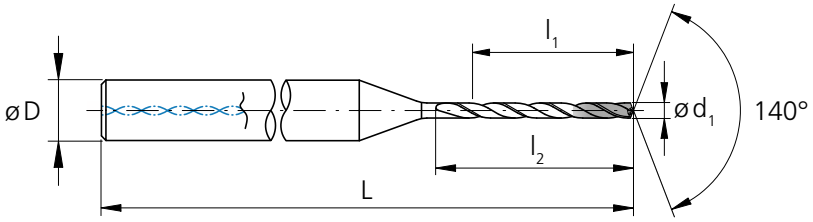
CRAZYDRILL by Mikron Tool Cool

CrazyDrill Cool 10 x d - coated / uncoated

DRILLING WITH INTERNAL COOLING

CS eXedur RIP

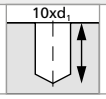
CA Uncoated



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.75		7.5	9.8	3	54.0	2.CD.100075	.CS	.CA	■
0.793	1/32	8.0	10.4	3	54.0	2.CD.100F132	.CS	-	◪
0.80		8.0	10.4	3	54.0	2.CD.100080	.CS	.CA	■
0.85		8.5	11.1	3	56.0	2.CD.100085	.CS	.CA	■
0.90		9.0	11.7	3	56.0	2.CD.100090	.CS	.CA	■
0.95		9.5	12.4	3	56.0	2.CD.100095	.CS	.CA	■
1.00		10.0	13.0	4	59.0	2.CD.100100	.CS	.CA	■
1.05		10.5	13.7	4	59.0	2.CD.100105	.CS	.CA	■
1.10		11.0	14.3	4	59.0	2.CD.100110	.CS	.CA	■
1.15		11.5	15.0	4	59.0	2.CD.100115	.CS	.CA	■
1.20		12.0	15.6	4	61.5	2.CD.100120	.CS	.CA	■
1.25		12.5	16.3	4	61.5	2.CD.100125	.CS	.CA	■
1.30		13.0	16.9	4	61.5	2.CD.100130	.CS	.CA	■
1.35		13.5	17.6	4	61.5	2.CD.100135	.CS	.CA	■
1.40		14.0	18.0	4	61.5	2.CD.100140	.CS	.CA	■
1.45		14.5	18.9	4	63.5	2.CD.100145	.CS	.CA	■
1.50		15.0	19.5	4	63.5	2.CD.100150	.CS	.CA	■
1.55		15.5	20.2	4	63.5	2.CD.100155	.CS	.CA	■
1.587	1/16	16.0	20.8	4	66.0	2.CD.100F116	.CS	-	◪
1.60		16.0	20.8	4	66.0	2.CD.100160	.CS	.CA	■
1.65		16.5	21.5	4	66.0	2.CD.100165	.CS	.CA	■
1.70		17.0	22.1	4	66.0	2.CD.100170	.CS	.CA	■
1.75		17.5	22.8	4	66.0	2.CD.100175	.CS	.CA	■
1.80		18.0	23.4	4	68.0	2.CD.100180	.CS	.CA	■
1.85		18.5	24.1	4	68.0	2.CD.100185	.CS	.CA	■
1.90		19.0	24.7	4	68.0	2.CD.100190	.CS	.CA	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
1.95		19.5	25.0	4	68.0	2.CD.100195	.CS	.CA	■
2.00		20.0	26.0	4	70.0	2.CD.100200	.CS	.CA	■
2.05		20.5	26.7	4	70.0	2.CD.100205	.CS	.CA	■
2.10		21.0	27.3	4	70.0	2.CD.100210	.CS	.CA	■
2.15		21.5	28.0	4	72.0	2.CD.100215	.CS	.CA	■
2.20		22.0	28.6	4	72.0	2.CD.100220	.CS	.CA	■
2.25		22.5	29.3	4	72.0	2.CD.100225	.CS	.CA	■
2.30		23.0	29.9	4	74.0	2.CD.100230	.CS	.CA	■
2.35		23.5	30.6	4	74.0	2.CD.100235	.CS	.CA	■
2.381	3/32	24.0	31.2	4	74.0	2.CD.100F332	.CS	-	◪
2.40		24.0	31.2	4	74.0	2.CD.100240	.CS	.CA	■
2.45		24.5	31.9	4	75.5	2.CD.100245	.CS	.CA	■
2.50		25.0	32.5	4	75.5	2.CD.100250	.CS	.CA	■
2.55		25.5	33.2	4	75.5	2.CD.100255	.CS	.CA	■
2.60		26.0	33.8	4	77.5	2.CD.100260	.CS	.CA	■
2.65		26.5	34.5	4	77.5	2.CD.100265	.CS	.CA	■
2.70		27.0	35.1	4	77.5	2.CD.100270	.CS	.CA	■
2.75		27.5	35.8	4	79.0	2.CD.100275	.CS	.CA	■
2.80		28.0	36.4	4	79.0	2.CD.100280	.CS	.CA	■
2.85		28.5	37.1	4	79.0	2.CD.100285	.CS	.CA	■
2.90		29.0	37.7	4	80.5	2.CD.100290	.CS	.CA	■
2.95		29.5	38.4	4	80.5	2.CD.100295	.CS	.CA	■
3.00		30.0	39.0	6	85.0	2.CD.100300	.CS	.CA	■
3.05		30.5	39.7	6	85.0	2.CD.100305	.CS	.CA	■
3.10		31.0	40.3	6	85.0	2.CD.100310	.CS	.CA	■
3.15		31.5	41.0	6	86.5	2.CD.100315	.CS	.CA	■

■ Stock item
◪ Stock item only in one version

Carbide			Z2	

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
3.175	**1/8**	32.0	41.6	6	86.5	2.CD.100F18	.CS	-	◪
3.20		32.0	41.6	6	86.5	2.CD.100320	.CS	.CA	■
3.25		32.5	42.3	6	86.5	2.CD.100325	.CS	.CA	■
3.30		33.0	42.9	6	86.5	2.CD.100330	.CS	.CA	■
3.35		33.5	43.6	6	89.0	2.CD.100335	.CS	.CA	■
3.40		34.0	44.2	6	89.0	2.CD.100340	.CS	.CA	■
3.45		34.5	44.9	6	89.0	2.CD.100345	.CS	.CA	■
3.50		35.0	45.5	6	91.0	2.CD.100350	.CS	.CA	■
3.55		35.5	46.2	6	91.0	2.CD.100355	.CS	.CA	■
3.60		36.0	46.8	6	91.0	2.CD.100360	.CS	.CA	■
3.65		36.5	47.5	6	91.0	2.CD.100365	.CS	.CA	■
3.70		37.0	48.1	6	93.0	2.CD.100370	.CS	.CA	■
3.75		37.5	48.8	6	93.0	2.CD.100375	.CS	.CA	■
3.80		38.0	49.4	6	93.0	2.CD.100380	.CS	.CA	■
3.85		38.5	50.1	6	95.0	2.CD.100385	.CS	.CA	■
3.90		39.0	50.7	6	95.0	2.CD.100390	.CS	.CA	■
3.95		39.5	51.4	6	95.0	2.CD.100395	.CS	.CA	■
3.968	**5/32**	40.0	52.0	6	95.0	2.CD.100F532	.CS	-	◪
4.00		40.0	52.0	6	95.0	2.CD.100400	.CS	.CA	■
4.10		41.0	53.3	6	98.5	2.CD.100410	.CS	.CA	■
4.20		42.0	54.6	6	98.5	2.CD.100420	.CS	.CA	■
4.30		43.0	54.2	6	98.5	2.CD.100430	.CS	.CA	■
4.40		44.0	55.4	6	98.5	2.CD.100440	.CS	.CA	■
4.50		45.0	54.9	6	98.5	2.CD.100450	.CS	.CA	■
4.60		46.0	56.1	6	98.5	2.CD.100460	.CS	.CA	■
4.70		47.0	61.1	6	106.0	2.CD.100470	.CS	.CA	■

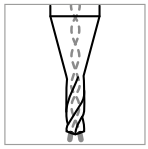
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
4.762	**3/16**	48.0	62.4	6	106.0	2.CD.100F316	.CS	-	◪
4.80		48.0	62.4	6	106.0	2.CD.100480	.CS	.CA	■
4.90		49.0	61.7	6	106.0	2.CD.100490	.CS	.CA	■
5.00		50.0	63.0	6	106.0	2.CD.100500	.CS	.CA	■
5.10		51.0	64.3	6	106.0	2.CD.100510	.CS	.CA	■
5.20		52.0	62.4	6	106.0	2.CD.100520	.CS	.CA	■
5.30		53.0	63.6	6	106.0	2.CD.100530	.CS	.CA	■
5.40		54.0	70.2	6	113.5	2.CD.100540	.CS	.CA	■
5.50		55.0	71.5	6	113.5	2.CD.100550	.CS	.CA	■
5.560	**7/32**	56.0	72.8	6	113.5	2.CD.100F732	.CS	-	◪
5.60		56.0	72.8	6	113.5	2.CD.100560	.CS	.CA	■
5.70		57.0	71.8	6	113.5	2.CD.100570	.CS	.CA	■
5.80		58.0	73.1	6	113.5	2.CD.100580	.CS	.CA	■
5.90		59.0	72.0	6	113.5	2.CD.100590	.CS	.CA	■
6.00		60.0	73.2	6	113.5	2.CD.100600	.CS	.CA	■

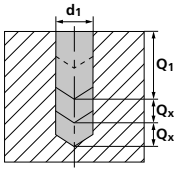
Complementary products	
CrazyDrill Pilot	p.134
CrazyDrill Crosspilot	p.146
CrazyDrill Coolpilot	p.156
CrazyDrill Pilot SST-Inox	p.122

CRAZYDRILL by Mikron Tool Cool

CrazyDrill Cool 10 x d - coated

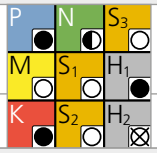
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	140	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	120	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	80	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	50	0.5xd1	0.25xd1
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	20	40	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	40	0.5xd1	0.25xd1
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	20	40	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	140	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	300	10xd1	–
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100	200	10xd1	–
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	100	200	1.5xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	140	1xd1	0.5xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	80	120	2xd1	1xd1
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80	150	10xd1	–
		2.096	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	15	20	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	40	0.5xd1	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	0.5xd1	0.25xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	15	20	0.5xd1	0.25xd1
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	20	40	0.5xd1	0.25xd1
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

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



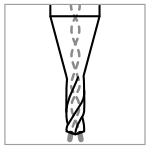
f [mm/rev]

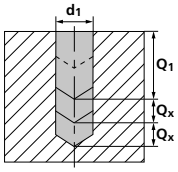
	Ød1									
	0.8 mm **1/32"** **f**	1.0 mm **f**	1.25 mm **f**	1.5 mm **1/16"** **f**	2.0 mm **f**	2.5 mm **3/32"** **f**	3.0 mm **1/8"** **f**	4.0 mm **5/32"** **f**	5.0 mm **3/16" - 7/32"** **f**	6.0 mm **f**
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.040	0.050	0.060	0.070	0.090	0.110	0.120	0.150	0.170	0.180
	0.030	0.040	0.050	0.060	0.070	0.090	0.100	0.120	0.150	0.170
	0.011	0.030	0.045	0.060	0.080	0.090	0.100	0.120	0.130	0.140
	0.020	0.050	0.065	0.080	0.110	0.130	0.150	0.180	0.200	0.220
	0.010	0.020	0.030	0.040	0.060	0.080	0.090	0.110	0.120	0.130
	0.010	0.020	0.030	0.040	0.060	0.080	0.090	0.110	0.120	0.130
	0.075	0.100	0.120	0.140	0.170	0.190	0.210	0.240	0.260	0.280
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.060	0.070	0.090	0.100	0.130	0.150	0.170	0.210	0.250	0.300
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.080	0.100	0.110	0.130	0.150	0.170	0.190	0.200	0.210	0.230
	0.020	0.030	0.040	0.055	0.070	0.090	0.110	0.130	0.150	0.200
	0.007	0.010	0.012	0.015	0.018	0.020	0.022	0.032	0.037	0.042
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.007	0.010	0.012	0.017	0.022	0.027	0.032	0.037	0.042	0.052
	0.008	0.010	0.012	0.015	0.020	0.025	0.030	0.040	0.050	0.060

CRAZYDRILL by Mikron Tool Cool

CrazyDrill Cool 10 x d - uncoated

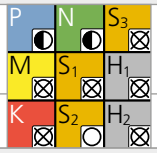
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	40	60	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	60	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	40	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	300	10xd1	–
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100	200	10xd1	–
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	100	200	1.5xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	140	1xd1	0.5xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	80	120	2xd1	1xd1
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80	150	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	40	0.5xd1	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	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]									
	Ød1									
	0.8 mm	1.0 mm	1.25 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm	4.0 mm	5.0 mm	6.0 mm
	f	f	f	f	f	f	f	f	f	f
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.040	0.050	0.060	0.070	0.090	0.110	0.120	0.150	0.170	0.180
	0.030	0.040	0.050	0.060	0.070	0.090	0.100	0.120	0.150	0.170
	Recommended: CrazyDrill Cool - coated									
	Recommended: CrazyDrill Cool - coated									
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.060	0.070	0.090	0.100	0.130	0.150	0.170	0.210	0.250	0.300
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.080	0.100	0.110	0.130	0.150	0.170	0.190	0.200	0.210	0.230
	0.020	0.030	0.040	0.055	0.070	0.090	0.110	0.130	0.150	0.200
	Recommended: CrazyDrill Cool - coated									
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	Recommended: CrazyDrill Cool - coated									
	Recommended: CrazyDrill Cool - coated									

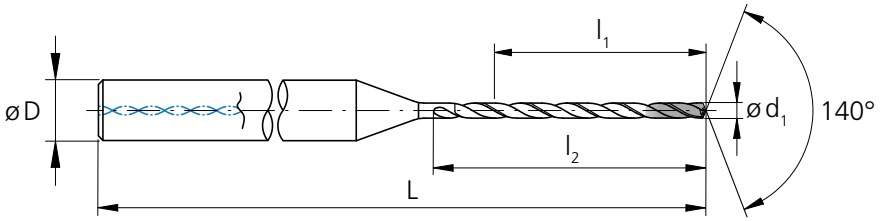
CRAZYDRILL by Mikron Tool Cool

CrazyDrill Cool 15 x d - coated / uncoated

DRILLING WITH INTERNAL COOLING

CS eXedur RIP

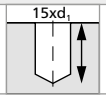
CA Uncoated



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.75		11.25	13.5	3	58.0	2.CD.150075	.CS	.CA	■
0.793	**1/32**	12.00	14.4	3	58.0	2.CD.150F132	.CS	-	◪
0.80		12.00	14.4	3	58.0	2.CD.150080	.CS	.CA	■
0.85		12.75	15.3	3	60.0	2.CD.150085	.CS	.CA	■
0.90		13.50	16.2	3	60.0	2.CD.150090	.CS	.CA	■
0.95		14.25	17.1	3	60.0	2.CD.150095	.CS	.CA	■
1.00		15.00	18.0	4	64.0	2.CD.150100	.CS	.CA	■
1.05		15.75	18.9	4	64.0	2.CD.150105	.CS	.CA	■
1.10		16.50	19.8	4	64.0	2.CD.150110	.CS	.CA	■
1.15		17.25	20.7	4	66.5	2.CD.150115	.CS	.CA	■
1.20		18.00	21.6	4	66.5	2.CD.150120	.CS	.CA	■
1.25		18.75	22.5	4	66.5	2.CD.150125	.CS	.CA	■
1.30		19.50	23.4	4	69.0	2.CD.150130	.CS	.CA	■
1.35		20.25	24.3	4	69.0	2.CD.150135	.CS	.CA	■
1.40		21.00	25.2	4	69.0	2.CD.150140	.CS	.CA	■
1.45		21.75	26.1	4	71.5	2.CD.150145	.CS	.CA	■
1.50		22.50	27.0	4	71.5	2.CD.150150	.CS	.CA	■
1.55		23.25	27.9	4	71.5	2.CD.150155	.CS	.CA	■
1.587	**1/16**	24.00	28.8	4	74.0	2.CD.150F116	.CS	-	◪
1.60		24.00	28.8	4	74.0	2.CD.150160	.CS	.CA	■
1.65		24.75	29.7	4	74.0	2.CD.150165	.CS	.CA	■
1.70		25.50	30.6	4	74.0	2.CD.150170	.CS	.CA	■
1.75		26.25	31.5	4	76.5	2.CD.150175	.CS	.CA	■
1.80		27.00	32.4	4	76.5	2.CD.150180	.CS	.CA	■
1.85		27.75	33.3	4	76.5	2.CD.150185	.CS	.CA	■
1.90		28.50	34.2	4	79.0	2.CD.150190	.CS	.CA	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
1.95		29.25	35.1	4	79.0	2.CD.150195	.CS	.CA	■
2.00		30.00	36.0	4	79.0	2.CD.150200	.CS	.CA	■
2.05		30.75	36.9	4	81.5	2.CD.150205	.CS	.CA	■
2.10		31.50	37.8	4	81.5	2.CD.150210	.CS	.CA	■
2.15		32.25	38.7	4	81.5	2.CD.150215	.CS	.CA	■
2.20		33.00	39.6	4	84.0	2.CD.150220	.CS	.CA	■
2.25		33.75	40.5	4	84.0	2.CD.150225	.CS	.CA	■
2.30		34.50	41.4	4	84.0	2.CD.150230	.CS	.CA	■
2.35		35.25	42.3	4	86.5	2.CD.150235	.CS	.CA	■
2.381	**3/32**	36.00	43.2	4	86.5	2.CD.150F332	.CS	-	◪
2.40		36.00	43.2	4	86.5	2.CD.150240	.CS	.CA	■
2.45		36.75	44.1	4	86.5	2.CD.150245	.CS	.CA	■
2.50		37.50	45.0	4	89.0	2.CD.150250	.CS	.CA	■
2.55		38.25	45.9	4	89.0	2.CD.150255	.CS	.CA	■
2.60		39.00	46.8	4	89.0	2.CD.150260	.CS	.CA	■
2.65		39.75	47.7	4	91.0	2.CD.150265	.CS	.CA	■
2.70		40.50	48.6	4	91.0	2.CD.150270	.CS	.CA	■
2.75		41.25	49.5	4	92.5	2.CD.150275	.CS	.CA	■
2.80		42.00	50.4	4	92.5	2.CD.150280	.CS	.CA	■
2.85		42.75	51.3	4	94.5	2.CD.150285	.CS	.CA	■
2.90		43.50	52.2	4	94.5	2.CD.150290	.CS	.CA	■
2.95		44.25	53.1	4	96.0	2.CD.150295	.CS	.CA	■
3.00		45.00	54.0	6	100.0	2.CD.150300	.CS	.CA	■
3.05		45.75	54.9	6	100.0	2.CD.150305	.CS	.CA	■
3.10		46.50	55.8	6	100.0	2.CD.150310	.CS	.CA	■
3.15		47.25	56.7	6	103.0	2.CD.150315	.CS	.CA	■

■ Stock item
◪ Stock item only in one version

Carbide			Z2	

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
3.175	**1/8**	48.00	57.6	6	103.0	2.CD.150F18	.CS	-	◪
3.20		48.00	57.6	6	103.0	2.CD.150320	.CS	.CA	■
3.25		48.75	58.5	6	103.0	2.CD.150325	.CS	.CA	■
3.30		49.50	59.4	6	103.0	2.CD.150330	.CS	.CA	■
3.35		50.25	60.3	6	106.0	2.CD.150335	.CS	.CA	■
3.40		51.00	61.2	6	106.0	2.CD.150340	.CS	.CA	■
3.45		51.75	62.1	6	106.0	2.CD.150345	.CS	.CA	■
3.50		52.50	63.0	6	108.5	2.CD.150350	.CS	.CA	■
3.55		53.25	63.9	6	108.5	2.CD.150355	.CS	.CA	■
3.60		54.00	64.8	6	108.5	2.CD.150360	.CS	.CA	■
3.65		54.75	65.7	6	111.0	2.CD.150365	.CS	.CA	■
3.70		55.50	66.6	6	111.0	2.CD.150370	.CS	.CA	■
3.75		56.25	67.5	6	111.0	2.CD.150375	.CS	.CA	■
3.80		57.00	68.4	6	113.5	2.CD.150380	.CS	.CA	■
3.85		57.75	69.3	6	113.5	2.CD.150385	.CS	.CA	■
3.90		58.50	70.2	6	113.5	2.CD.150390	.CS	.CA	■
3.95		59.25	71.1	6	115.5	2.CD.150395	.CS	.CA	■
3.968	**5/32**	60.00	72.0	6	115.5	2.CD.150F532	.CS	-	◪
4.00		60.00	72.0	6	115.5	2.CD.150400	.CS	.CA	■
4.10		61.50	73.8	6	121.5	2.CD.150410	.CS	.CA	■
4.20		63.00	73.9	6	121.5	2.CD.150420	.CS	.CA	■
4.30		64.50	75.7	6	121.5	2.CD.150430	.CS	.CA	■
4.40		66.00	76.6	6	121.5	2.CD.150440	.CS	.CA	■
4.50		67.50	76.5	6	121.5	2.CD.150450	.CS	.CA	■
4.60		69.00	78.2	6	121.5	2.CD.150460	.CS	.CA	■
4.70		70.50	84.6	6	131.5	2.CD.150470	.CS	.CA	■

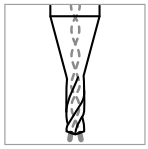
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
4.762	**3/16**	72.00	86.4	6	131.5	2.CD.150F316	.CS	-	◪
4.80		72.00	86.4	6	131.5	2.CD.150480	.CS	.CA	■
4.90		73.50	86.2	6	131.5	2.CD.150490	.CS	.CA	■
5.00		75.00	88.0	6	131.5	2.CD.150500	.CS	.CA	■
5.10		76.50	88.7	6	131.5	2.CD.150510	.CS	.CA	■
5.20		78.00	88.4	6	131.5	2.CD.150520	.CS	.CA	■
5.30		79.50	90.1	6	131.5	2.CD.150530	.CS	.CA	■
5.40		81.00	97.2	6	141.5	2.CD.150540	.CS	.CA	■
5.50		82.50	99.0	6	141.5	2.CD.150550	.CS	.CA	■
5.560	**7/32**	84.00	98.6	6	141.5	2.CD.150F732	.CS	-	◪
5.60		84.00	98.6	6	141.5	2.CD.150560	.CS	.CA	■
5.70		85.50	99.2	6	141.5	2.CD.150570	.CS	.CA	■
5.80		87.00	100.9	6	141.5	2.CD.150580	.CS	.CA	■
5.90		88.50	100.3	6	141.5	2.CD.150590	.CS	.CA	■
6.00		90.00	102.0	6	141.5	2.CD.150600	.CS	.CA	■

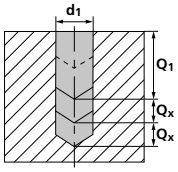
Complementary products	
CrazyDrill Pilot	p.134
CrazyDrill Crosspilot	p.146
CrazyDrill Coolpilot	p.156
CrazyDrill Pilot SST-Inox	p.122

CRAZYDRILL by Mikron Tool Cool

CrazyDrill Cool 15 x d - coated

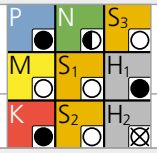
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	140	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	120	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	80	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	50	0.5xd1	0.25xd1
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	20	40	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	40	0.5xd1	0.25xd1
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	20	40	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	80	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	300	5xd1	1xd1
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100	200	5xd1	1xd1
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	100	200	1.5xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	140	1xd1	0.5xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	80	120	2xd1	1xd1
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80	150	10xd1	5xd1
		2.096	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	15	20	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	40	0.5xd1	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	0.5xd1	0.25xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	15	20	0.5xd1	0.25xd1
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	20	40	0.5xd1	0.25xd1
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

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



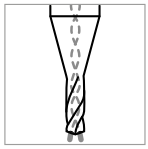
f [mm/rev]

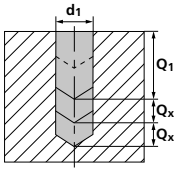
	Ød1									
	0.8 mm **1/32"** **f**	1.0 mm **f**	1.25 mm **f**	1.5 mm **1/16"** **f**	2.0 mm **f**	2.5 mm **3/32"** **f**	3.0 mm **1/8"** **f**	4.0 mm **5/32"** **f**	5.0 mm **3/16" - 7/32"** **f**	6.0 mm **f**
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.040	0.050	0.060	0.070	0.090	0.110	0.120	0.150	0.170	0.180
	0.030	0.040	0.050	0.060	0.070	0.090	0.100	0.120	0.150	0.170
	0.011	0.030	0.045	0.060	0.080	0.090	0.100	0.120	0.130	0.140
	0.020	0.050	0.065	0.080	0.110	0.130	0.150	0.180	0.200	0.220
	0.010	0.020	0.030	0.040	0.060	0.080	0.090	0.110	0.120	0.130
	0.010	0.020	0.030	0.040	0.060	0.080	0.090	0.110	0.120	0.130
	0.050	0.060	0.075	0.090	0.110	0.140	0.166	0.200	0.230	0.250
	0.040	0.050	0.060	0.070	0.100	0.110	0.130	0.160	0.190	0.210
	0.050	0.055	0.065	0.080	0.100	0.120	0.140	0.180	0.210	0.230
	0.040	0.050	0.060	0.070	0.090	0.110	0.130	0.160	0.190	0.210
	0.035	0.040	0.060	0.070	0.090	0.110	0.120	0.150	0.180	0.200
	0.050	0.055	0.065	0.080	0.100	0.120	0.140	0.180	0.210	0.230
	0.020	0.030	0.040	0.055	0.070	0.090	0.110	0.130	0.150	0.200
	0.007	0.010	0.012	0.015	0.018	0.020	0.022	0.032	0.037	0.042
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.007	0.010	0.012	0.017	0.022	0.027	0.032	0.037	0.042	0.052
	0.008	0.010	0.012	0.015	0.020	0.025	0.030	0.040	0.050	0.060

CRAZYDRILL by Mikron Tool Cool

CrazyDrill Cool 15 x d - uncoated

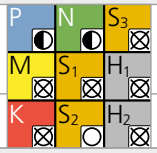
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	40	60	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	60	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	40	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	300	5xd1	1xd1
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100	200	5xd1	1xd1
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	100	200	1.5xd1	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	140	1xd1	0.5xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	80	120	2xd1	1xd1
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80	120	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	40	0.5xd1	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	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]									
	Ød1									
	0.8 mm	1.0 mm	1.25 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm	4.0 mm	5.0 mm	6.0 mm
	f	f	f	f	f	f	f	f	f	f
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.040	0.050	0.060	0.070	0.090	0.110	0.120	0.150	0.170	0.180
	0.030	0.040	0.050	0.060	0.070	0.090	0.100	0.120	0.150	0.170
	Recommended: CrazyDrill Cool - coated									
	Recommended: CrazyDrill Cool - coated									
	0.050	0.060	0.070	0.080	0.100	0.120	0.140	0.180	0.210	0.240
	0.060	0.070	0.090	0.100	0.130	0.150	0.170	0.210	0.250	0.300
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.055	0.065	0.080	0.090	0.100	0.110	0.130	0.140	0.170	0.200
	0.080	0.100	0.110	0.130	0.150	0.170	0.190	0.200	0.210	0.230
	0.020	0.030	0.040	0.055	0.070	0.090	0.110	0.130	0.150	0.200
	Recommended: CrazyDrill Cool - coated									
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.020	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	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 filter quality ≤ 0.010 mm.
- Drill with Ø < 3 mm filter quality ≤ 0.020 mm.
- Drill with Ø < 6 mm filter quality ≤ 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 [mm]	Minimal pressure [bar]
0.75	70
3.00	40
6.00	30

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

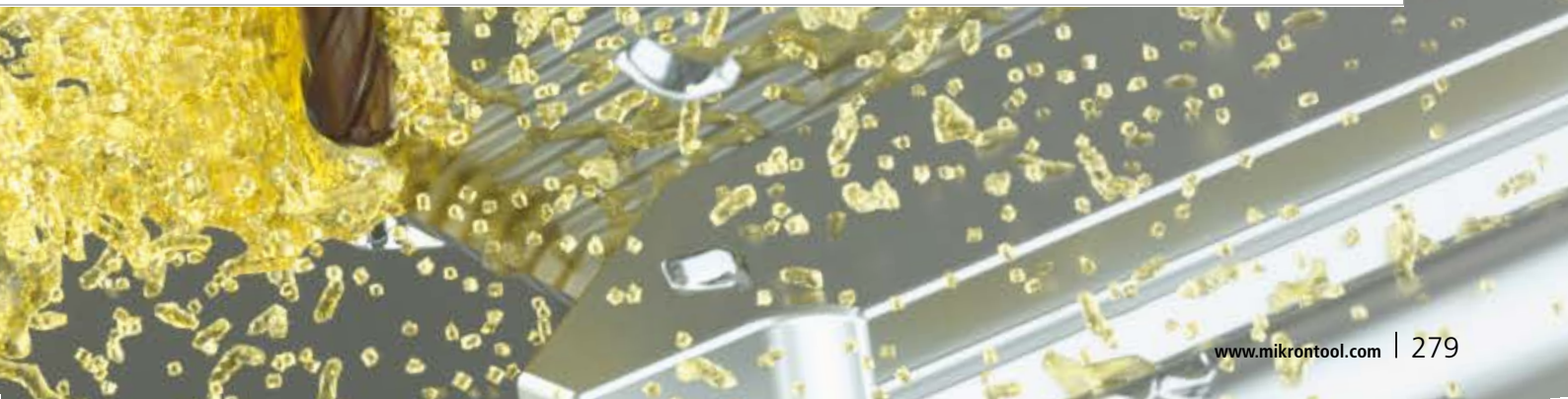
For these drilling depths Mikron Tool recommends pilot drilling for CrazyDrill Cool:

- **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.

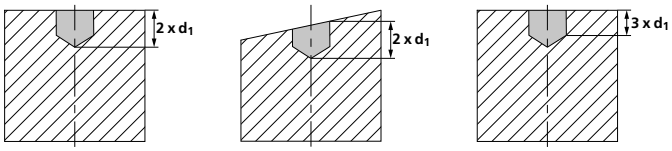


Drilling process CrazyDrill Cool

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

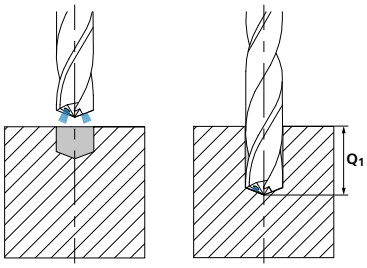
1 | PILOT DRILLING

- 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.



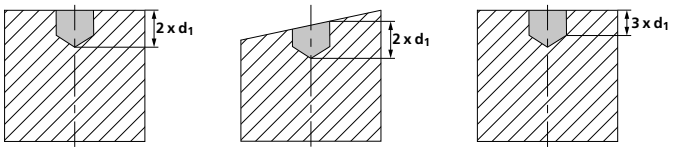
Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.

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

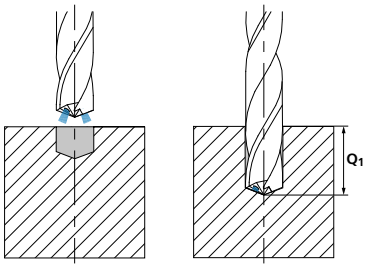
1 | PILOT DRILLING

- With CrazyDrill Pilot / CrazyDrill Coolpilot or CrazyDrill Pilot SST-Inox (straight surfaces) or CrazyDrill Crosspilot (inclined surfaces).

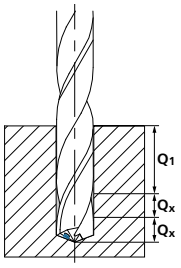


2 | DRILLING

- 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.

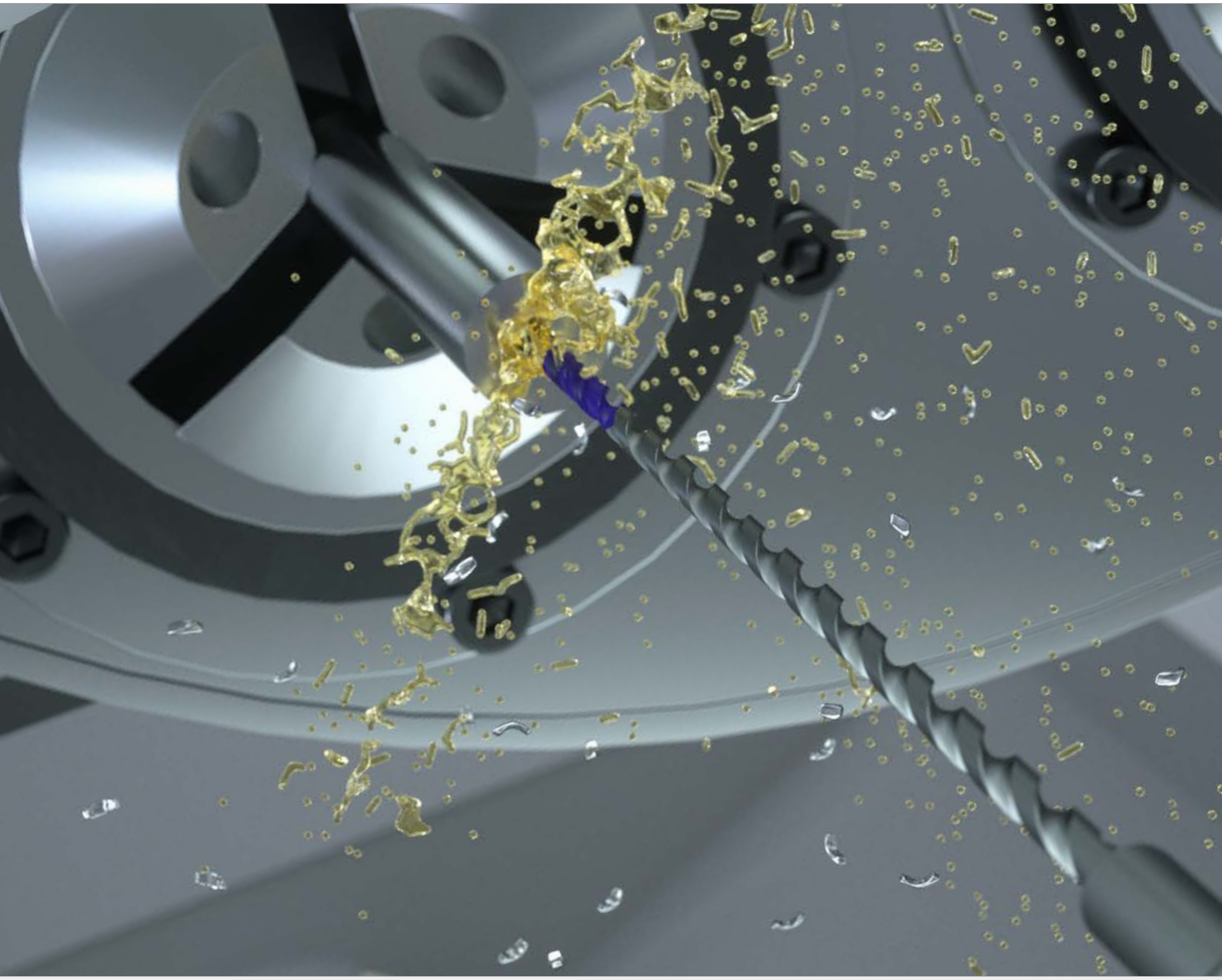


- Additional steps (Q_X) as per cutting data chart, followed by peck to remove chips.



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 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 1.45 mm.

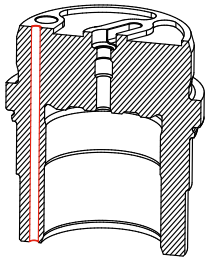
Please note: You couldn't find your suitable version of the CrazyDrill Cool XL (diameter, length, cutting direction…)? Ask us about our customized versions!

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
- Drilling depth 76 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Cool XL - 40 x d

DATA	MIKRON TOOL
Tool type	CrazyDrill Pilot CrazyDrill Cool XL - Carbide - Coated - Internal cooling
Item number	2.CD.400200.XL
Cutting data	v_c = 70 m/min f = 0.08 mm/rev Q_1 = 76 mm

15 x d	20 x d	30 x d	40 x d
■ Internal cooling ■ Coated	■ Internal cooling ■ Coated	■ Internal cooling ■ Coated	■ Internal cooling ■ Coated
■ Ø1.0 - 6.0 mm	■ Ø1.0 - 6.0 mm	■ Ø1.0 - 6.0 mm	■ 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.

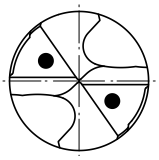
2 | CARBIDE GRADE
The use of latest generation carbide allows highest machining speed and feed.

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.

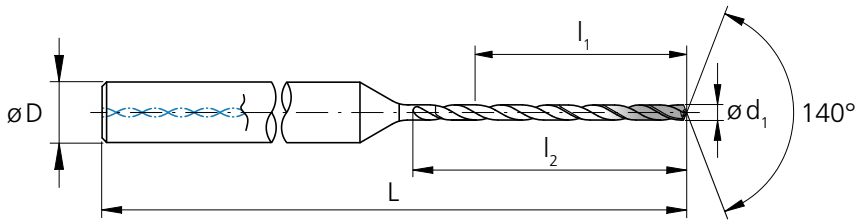
6 | CUTTING EDGE TREATMENT
The special cutting edge preparation reduces chipping risk and guarantees a consistent drilling process and extends tool life.

Drill tip 

CRAZYDRILL by Mikron Tool Cool XL

CrazyDrill Cool XL 15 x d

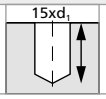
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		15.00	18.0	4	58	2.CD.150100.XL	■
1.05		15.75	18.9	4	59	2.CD.150105.XL	■
1.10		16.50	19.8	4	60	2.CD.150110.XL	■
1.15		17.25	20.7	4	61	2.CD.150115.XL	■
1.20		18.00	21.6	4	62	2.CD.150120.XL	■
1.25		18.75	22.5	4	62	2.CD.150125.XL	■
1.30		19.50	23.4	4	63	2.CD.150130.XL	■
1.35		20.25	24.3	4	64	2.CD.150135.XL	■
1.40		21.00	25.2	4	65	2.CD.150140.XL	■
1.45		21.75	26.1	4	66	2.CD.150145.XL	■
1.50		22.50	27.0	4	67	2.CD.150150.XL	■
1.55		23.25	27.9	4	68	2.CD.150155.XL	■
1.587	**1/16**	24.00	28.8	4	68	2.CD.150F116.XL	■
1.60		24.00	28.8	4	68	2.CD.150160.XL	■
1.65		24.75	29.7	4	69	2.CD.150165.XL	■
1.70		25.50	30.6	4	70	2.CD.150170.XL	■
1.75		26.25	31.5	4	71	2.CD.150175.XL	■
1.80		27.00	32.4	4	72	2.CD.150180.XL	■
1.85		27.75	33.3	4	73	2.CD.150185.XL	■
1.90		28.50	34.2	4	74	2.CD.150190.XL	■
1.95		29.25	35.1	4	74	2.CD.150195.XL	■
2.00		30.00	36.0	4	75	2.CD.150200.XL	■
2.05		30.75	36.9	4	76	2.CD.150205.XL	■
2.10		31.50	37.8	4	77	2.CD.150210.XL	■
2.15		32.25	38.7	4	78	2.CD.150215.XL	■
2.20		33.00	39.6	4	79	2.CD.150220.XL	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.25		33.75	40.5	4	80	2.CD.150225.XL	■
2.30		34.50	41.4	4	80	2.CD.150230.XL	■
2.35		35.25	42.3	4	81	2.CD.150235.XL	■
2.381	**3/32**	36.00	43.2	4	82	2.CD.150F332.XL	■
2.40		36.00	43.2	4	82	2.CD.150240.XL	■
2.45		36.75	44.1	4	83	2.CD.150245.XL	■
2.50		37.50	45.0	4	84	2.CD.150250.XL	■
2.55		38.25	45.9	4	85	2.CD.150255.XL	■
2.60		39.00	46.8	4	86	2.CD.150260.XL	■
2.65		39.75	47.7	4	86	2.CD.150265.XL	■
2.70		40.50	48.6	4	87	2.CD.150270.XL	■
2.75		41.25	49.5	4	88	2.CD.150275.XL	■
2.80		42.00	50.4	4	89	2.CD.150280.XL	■
2.85		42.75	51.3	4	90	2.CD.150285.XL	■
2.90		43.50	52.2	4	91	2.CD.150290.XL	■
2.95		44.25	53.1	4	92	2.CD.150295.XL	■
3.00		45.00	54.0	4	92	2.CD.150300.XL	■
3.05		45.75	54.9	6	99	2.CD.150305.XL	■
3.10		46.50	55.8	6	100	2.CD.150310.XL	■
3.15		47.25	56.7	6	101	2.CD.150315.XL	■
3.175	**1/8**	48.00	57.6	6	102	2.CD.150F18.XL	■
3.20		48.00	57.6	6	102	2.CD.150320.XL	■
3.25		48.75	58.5	6	102	2.CD.150325.XL	■
3.30		49.50	59.4	6	103	2.CD.150330.XL	■
3.35		50.25	60.3	6	104	2.CD.150335.XL	■
3.40		51.00	61.2	6	105	2.CD.150340.XL	■

■ Stock item

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.45		51.75	62.1	6	106	2.CD.150345.XL	■
3.50		52.50	63.0	6	107	2.CD.150350.XL	■
3.55		53.25	63.9	6	108	2.CD.150355.XL	■
3.60		54.00	64.8	6	108	2.CD.150360.XL	■
3.65		54.75	65.7	6	109	2.CD.150365.XL	■
3.70		55.50	66.6	6	110	2.CD.150370.XL	■
3.75		56.25	67.5	6	111	2.CD.150375.XL	■
3.80		57.00	68.4	6	112	2.CD.150380.XL	■
3.85		57.75	69.3	6	113	2.CD.150385.XL	■
3.90		58.50	70.2	6	114	2.CD.150390.XL	■
3.95		59.25	71.1	6	114	2.CD.150395.XL	■
3.968	**5/32**	60.00	72.0	6	115	2.CD.150F532.XL	■
4.00		60.00	72.0	6	115	2.CD.150400.XL	■
4.10		61.50	73.8	6	117	2.CD.150410.XL	■
4.20		63.00	75.6	6	119	2.CD.150420.XL	■
4.30		64.50	77.4	6	120	2.CD.150430.XL	■
4.40		66.00	79.2	6	122	2.CD.150440.XL	■
4.50		67.50	81.0	6	124	2.CD.150450.XL	■
4.60		69.00	82.8	6	126	2.CD.150460.XL	■
4.70		70.50	84.6	6	127	2.CD.150470.XL	■
4.762	**3/16**	72.00	86.4	6	129	2.CD.150F316.XL	■
4.80		72.00	86.4	6	129	2.CD.150480.XL	■
4.90		73.50	88.2	6	131	2.CD.150490.XL	■
5.00		75.00	90.0	6	133	2.CD.150500.XL	■
5.10		76.50	91.8	6	134	2.CD.150510.XL	■
5.20		78.00	93.6	6	136	2.CD.150520.XL	■

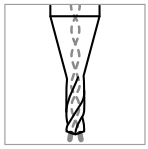
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
5.30		79.50	95.4	6	138	2.CD.150530.XL	■
5.40		81.00	97.2	6	139	2.CD.150540.XL	■
5.50		82.50	99.0	6	141	2.CD.150550.XL	■
5.560	**7/32**	84.00	100.8	6	143	2.CD.150F732.XL	■
5.60		84.00	100.8	6	143	2.CD.150560.XL	■
5.70		85.50	102.6	6	145	2.CD.150570.XL	■
5.80		87.00	104.4	6	146	2.CD.150580.XL	■
5.90		88.50	106.2	6	148	2.CD.150590.XL	■
6.00		90.00	108.0	6	150	2.CD.150600.XL	■

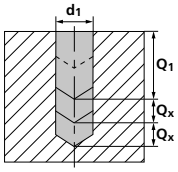
Complementary products	
CrazyDrill Pilot	p.134
CrazyDrill Coolpilot	p.156
CrazyDrill Crosspilot	p.146

CRAZYDRILL by Mikron Tool Cool XL

CrazyDrill Cool XL 15 x d

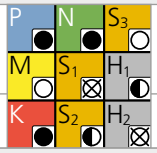
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	140	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	130	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	100	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	60	15xd1	–
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	40	80	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	60	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	150	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	200	15xd1	–
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	80	150	15xd1	–
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	40	80	2xd1	2xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40	80	2xd1	2xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	50	120	15xd1	–
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	40	80	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	50	3xd1	1xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	5xd1	1xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	20	40	5xd1	2xd1
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	20	40	5xd1	1xd1
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

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



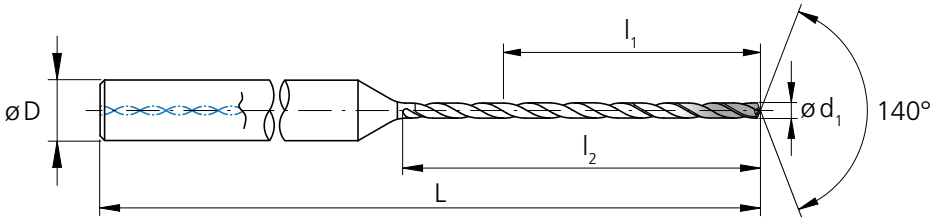
f [mm/rev]

Ød1	1.0 mm	1.25 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm	4.0 mm	5.0 mm	6.0 mm
			1/16"		3/32"	1/8"	5/32"	3/16" - 7/32"	
	f	f	f	f	f	f	f	f	f
	0.040	0.050	0.060	0.080	0.100	0.110	0.140	0.160	0.180
	0.040	0.050	0.060	0.080	0.090	0.100	0.130	0.150	0.170
	0.040	0.045	0.055	0.070	0.085	0.100	0.120	0.140	0.160
	0.025	0.030	0.035	0.045	0.055	0.065	0.080	0.095	0.100
	0.025	0.030	0.035	0.045	0.055	0.065	0.080	0.095	0.100
	0.025	0.030	0.035	0.045	0.055	0.065	0.080	0.095	0.100
	0.060	0.075	0.090	0.110	0.140	0.166	0.200	0.230	0.250
	0.050	0.060	0.070	0.100	0.110	0.130	0.160	0.190	0.210
	0.055	0.065	0.080	0.100	0.120	0.140	0.180	0.210	0.230
	0.050	0.060	0.070	0.090	0.110	0.130	0.160	0.190	0.210
	0.040	0.060	0.070	0.090	0.110	0.120	0.150	0.180	0.200
	0.055	0.065	0.080	0.100	0.120	0.140	0.180	0.210	0.230
	0.030	0.040	0.055	0.070	0.090	0.110	0.130	0.150	0.200
	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.010	0.020	0.030	0.040	0.050	0.065	0.080	0.100	0.120
	0.010	0.012	0.015	0.020	0.025	0.030	0.040	0.050	0.060

CRAZYDRILL by Mikron Tool Cool XL

CrazyDrill Cool XL 20 x d

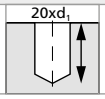
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		20.0	23.0	4	63	2.CD.200100.XL	■
1.05		21.0	24.2	4	64	2.CD.200105.XL	Δ
1.10		22.0	25.3	4	65	2.CD.200110.XL	■
1.15		23.0	26.5	4	66	2.CD.200115.XL	Δ
1.20		24.0	27.6	4	68	2.CD.200120.XL	■
1.25		25.0	28.8	4	69	2.CD.200125.XL	Δ
1.30		26.0	29.9	4	70	2.CD.200130.XL	■
1.35		27.0	31.1	4	71	2.CD.200135.XL	Δ
1.40		28.0	32.2	4	72	2.CD.200140.XL	■
1.45		29.0	33.4	4	73	2.CD.200145.XL	Δ
1.50		30.0	34.5	4	74	2.CD.200150.XL	■
1.55		31.0	35.7	4	75	2.CD.200155.XL	Δ
1.587	1/16	32.0	36.8	4	76	2.CD.200F116.XL	■
1.60		32.0	36.8	4	76	2.CD.200160.XL	■
1.65		33.0	38.0	4	78	2.CD.200165.XL	Δ
1.70		34.0	39.1	4	79	2.CD.200170.XL	■
1.75		35.0	40.3	4	80	2.CD.200175.XL	Δ
1.80		36.0	41.4	4	81	2.CD.200180.XL	■
1.85		37.0	42.6	4	82	2.CD.200185.XL	Δ
1.90		38.0	43.7	4	83	2.CD.200190.XL	■
1.95		39.0	44.9	4	84	2.CD.200195.XL	Δ
2.00		40.0	46.0	4	85	2.CD.200200.XL	■
2.05		41.0	47.2	4	86	2.CD.200205.XL	Δ
2.10		42.0	48.3	4	88	2.CD.200210.XL	■
2.15		43.0	49.5	4	89	2.CD.200215.XL	Δ
2.20		44.0	50.6	4	90	2.CD.200220.XL	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.25		45.0	51.8	4	91	2.CD.200225.XL	Δ
2.30		46.0	52.9	4	92	2.CD.200230.XL	■
2.35		47.0	54.1	4	93	2.CD.200235.XL	Δ
2.381	3/32	48.0	55.2	4	94	2.CD.200F332.XL	■
2.40		48.0	55.2	4	94	2.CD.200240.XL	■
2.45		49.0	56.4	4	95	2.CD.200245.XL	Δ
2.50		50.0	57.5	4	96	2.CD.200250.XL	■
2.55		51.0	58.7	4	97	2.CD.200255.XL	Δ
2.60		52.0	59.8	4	99	2.CD.200260.XL	■
2.65		53.0	61.0	4	100	2.CD.200265.XL	Δ
2.70		54.0	62.1	4	101	2.CD.200270.XL	■
2.75		55.0	63.3	4	102	2.CD.200275.XL	Δ
2.80		56.0	64.4	4	103	2.CD.200280.XL	■
2.85		57.0	65.6	4	104	2.CD.200285.XL	Δ
2.90		58.0	66.7	4	105	2.CD.200290.XL	■
2.95		59.0	67.9	4	106	2.CD.200295.XL	Δ
3.00		60.0	69.0	4	107	2.CD.200300.XL	■
3.05		61.0	70.2	6	114	2.CD.200305.XL	Δ
3.10		62.0	71.3	6	115	2.CD.200310.XL	■
3.15		63.0	72.5	6	117	2.CD.200315.XL	Δ
3.175	1/8	64.0	73.6	6	118	2.CD.200F18.XL	■
3.20		64.0	73.6	6	118	2.CD.200320.XL	■
3.25		65.0	74.8	6	119	2.CD.200325.XL	Δ
3.30		66.0	75.9	6	120	2.CD.200330.XL	■
3.35		67.0	77.1	6	121	2.CD.200335.XL	Δ
3.40		68.0	78.2	6	122	2.CD.200340.XL	■

■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm

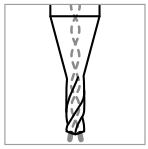
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.45		69.0	79.4	6	123	2.CD.200345.XL	Δ
3.50		70.0	80.5	6	124	2.CD.200350.XL	■
3.55		71.0	81.7	6	125	2.CD.200355.XL	Δ
3.60		72.0	82.8	6	126	2.CD.200360.XL	■
3.65		73.0	84.0	6	128	2.CD.200365.XL	Δ
3.70		74.0	85.1	6	129	2.CD.200370.XL	■
3.75		75.0	86.3	6	130	2.CD.200375.XL	Δ
3.80		76.0	87.4	6	131	2.CD.200380.XL	■
3.85		77.0	88.6	6	132	2.CD.200385.XL	Δ
3.90		78.0	89.7	6	133	2.CD.200390.XL	■
3.95		79.0	90.9	6	134	2.CD.200395.XL	Δ
3.968	**5/32**	80.0	92.0	6	135	2.CD.200F532.XL	■
4.00		80.0	92.0	6	135	2.CD.200400.XL	■
4.10		82.0	94.3	6	138	2.CD.200410.XL	■
4.20		84.0	96.6	6	140	2.CD.200420.XL	■
4.30		86.0	98.9	6	142	2.CD.200430.XL	■
4.40		88.0	101.2	6	144	2.CD.200440.XL	■
4.50		90.0	103.5	6	146	2.CD.200450.XL	■
4.60		92.0	105.8	6	149	2.CD.200460.XL	■
4.70		94.0	108.1	6	151	2.CD.200470.XL	■
4.762	**3/16**	96.0	110.4	6	153	2.CD.200F316.XL	■
4.80		96.0	110.4	6	153	2.CD.200480.XL	■
4.90		98.0	112.7	6	155	2.CD.200490.XL	■
5.00		100.0	115.0	6	158	2.CD.200500.XL	■
5.10		102.0	117.3	6	160	2.CD.200510.XL	■
5.20		104.0	119.6	6	162	2.CD.200520.XL	■

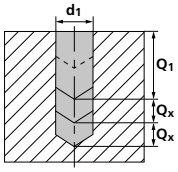
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
5.30		106.0	121.9	6	164	2.CD.200530.XL	■
5.40		108.0	124.2	6	166	2.CD.200540.XL	■
5.50		110.0	126.5	6	169	2.CD.200550.XL	■
5.560	**7/32**	112.0	128.8	6	171	2.CD.200F732.XL	■
5.60		112.0	128.8	6	171	2.CD.200560.XL	■
5.70		114.0	131.1	6	173	2.CD.200570.XL	■
5.80		116.0	133.4	6	175	2.CD.200580.XL	■
5.90		118.0	135.7	6	177	2.CD.200590.XL	■
6.00		120.0	138.0	6	180	2.CD.200600.XL	■

Complementary products	
CrazyDrill Pilot	p.134
CrazyDrill Coolpilot	p.156
CrazyDrill Crosspilot	p.146

CrazyDrill Cool XL 20 x d

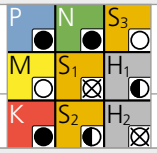
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	120	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	120	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	100	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	60	20xd1	–
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	40	80	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	60	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	150	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	200	20xd1	–
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	80	150	20xd1	–
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	40	80	2xd1	2xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40	80	2xd1	2xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	50	120	20xd1	–
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	40	80	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	50	3xd1	1xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	5xd1	1xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	20	40	5xd1	2xd1
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	20	40	5xd1	1xd1
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

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



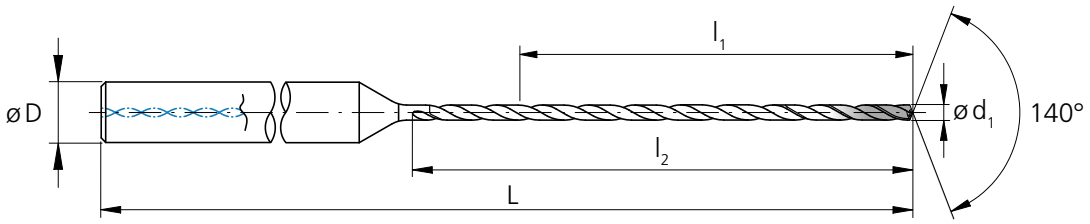
f [mm/rev]

Ød1	1.0 mm	1.25 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm	4.0 mm	5.0 mm	6.0 mm
			1/16"		3/32"	1/8"	5/32"	3/16" - 7/32"	
	f	f	f	f	f	f	f	f	f
	0.040	0.050	0.060	0.080	0.100	0.110	0.140	0.160	0.180
	0.040	0.050	0.060	0.080	0.090	0.100	0.130	0.150	0.170
	0.040	0.045	0.055	0.070	0.085	0.100	0.120	0.140	0.160
	0.025	0.030	0.035	0.045	0.055	0.065	0.080	0.095	0.100
	0.025	0.030	0.035	0.045	0.055	0.065	0.080	0.095	0.100
	0.025	0.030	0.035	0.045	0.055	0.065	0.080	0.095	0.100
	0.050	0.060	0.070	0.100	0.110	0.130	0.150	0.170	0.180
	0.050	0.060	0.070	0.100	0.110	0.130	0.160	0.190	0.210
	0.055	0.065	0.080	0.100	0.120	0.140	0.180	0.210	0.230
	0.050	0.060	0.070	0.090	0.110	0.130	0.160	0.190	0.210
	0.040	0.060	0.070	0.090	0.110	0.120	0.150	0.180	0.200
	0.055	0.065	0.080	0.100	0.120	0.140	0.180	0.210	0.230
	0.030	0.040	0.055	0.070	0.090	0.110	0.130	0.150	0.200
	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.020	0.030	0.035	0.040	0.050	0.060	0.065	0.070	0.075
	0.010	0.020	0.030	0.040	0.050	0.065	0.080	0.100	0.120
	0.010	0.012	0.015	0.020	0.025	0.030	0.040	0.050	0.060

CRAZYDRILL by Mikron Tool Cool XL

CrazyDrill Cool XL 30 x d

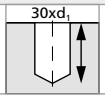
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		30.0	33.0	4	73	2.CD.300100.XL	■
1.05		31.5	34.7	4	75	2.CD.300105.XL	Δ
1.10		33.0	36.3	4	76	2.CD.300110.XL	■
1.15		34.5	38.0	4	78	2.CD.300115.XL	Δ
1.20		36.0	39.6	4	80	2.CD.300120.XL	■
1.25		37.5	41.3	4	81	2.CD.300125.XL	Δ
1.30		39.0	42.9	4	83	2.CD.300130.XL	■
1.35		40.5	44.6	4	84	2.CD.300135.XL	Δ
1.40		42.0	46.2	4	86	2.CD.300140.XL	■
1.45		43.5	47.9	4	88	2.CD.300145.XL	Δ
1.50		45.0	49.5	4	89	2.CD.300150.XL	■
1.55		46.5	51.2	4	91	2.CD.300155.XL	Δ
1.587	**1/16**	48.0	52.8	4	92	2.CD.300F116.XL	■
1.60		48.0	52.8	4	92	2.CD.300160.XL	■
1.65		49.5	54.5	4	94	2.CD.300165.XL	Δ
1.70		51.0	56.1	4	96	2.CD.300170.XL	■
1.75		52.5	57.8	4	97	2.CD.300175.XL	Δ
1.80		54.0	59.4	4	99	2.CD.300180.XL	■
1.85		55.5	61.1	4	100	2.CD.300185.XL	Δ
1.90		57.0	62.7	4	102	2.CD.300190.XL	■
1.95		58.5	64.4	4	104	2.CD.300195.XL	Δ
2.00		60.0	66.0	4	105	2.CD.300200.XL	■
2.05		61.5	67.7	4	107	2.CD.300205.XL	Δ
2.10		63.0	69.3	4	109	2.CD.300210.XL	■
2.15		64.5	71.0	4	110	2.CD.300215.XL	Δ
2.20		66.0	72.6	4	112	2.CD.300220.XL	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.25		67.5	74.3	4	113	2.CD.300225.XL	Δ
2.30		69.0	75.9	4	115	2.CD.300230.XL	■
2.35		70.5	77.6	4	117	2.CD.300235.XL	Δ
2.381	**3/32**	72.0	79.2	4	118	2.CD.300F332.XL	■
2.40		72.0	79.2	4	118	2.CD.300240.XL	■
2.45		73.5	80.9	4	120	2.CD.300245.XL	Δ
2.50		75.0	82.5	4	121	2.CD.300250.XL	■
2.55		76.5	84.2	4	123	2.CD.300255.XL	Δ
2.60		78.0	85.8	4	125	2.CD.300260.XL	■
2.65		79.5	87.5	4	126	2.CD.300265.XL	Δ
2.70		81.0	89.1	4	128	2.CD.300270.XL	■
2.75		82.5	90.8	4	129	2.CD.300275.XL	Δ
2.80		84.0	92.4	4	131	2.CD.300280.XL	■
2.85		85.5	94.1	4	133	2.CD.300285.XL	Δ
2.90		87.0	95.7	4	134	2.CD.300290.XL	■
2.95		88.5	97.4	4	136	2.CD.300295.XL	Δ
3.00		90.0	99.0	4	137	2.CD.300300.XL	■
3.05		91.5	100.7	6	145	2.CD.300305.XL	Δ
3.10		93.0	102.3	6	146	2.CD.300310.XL	■
3.15		94.5	104.0	6	148	2.CD.300315.XL	Δ
3.175	**1/8**	96.0	105.6	6	150	2.CD.300F18.XL	■
3.20		96.0	105.6	6	150	2.CD.300320.XL	■
3.25		97.5	107.3	6	151	2.CD.300325.XL	Δ
3.30		99.0	108.9	6	153	2.CD.300330.XL	■
3.35		100.5	110.6	6	154	2.CD.300335.XL	Δ
3.40		102.0	112.2	6	156	2.CD.300340.XL	■

■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide			Z2		

Ød_1	0.1 - 3.0 mm	3.05 - 6.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm

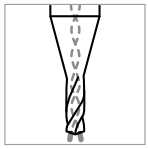
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.45		103.5	113.9	6	158	2.CD.300345.XL	Δ
3.50		105.0	115.5	6	159	2.CD.300350.XL	■
3.55		106.5	117.2	6	161	2.CD.300355.XL	Δ
3.60		108.0	118.8	6	162	2.CD.300360.XL	■
3.65		109.5	120.5	6	164	2.CD.300365.XL	Δ
3.70		111.0	122.1	6	166	2.CD.300370.XL	■
3.75		112.5	123.8	6	167	2.CD.300375.XL	Δ
3.80		114.0	125.4	6	169	2.CD.300380.XL	■
3.85		115.5	127.1	6	171	2.CD.300385.XL	Δ
3.90		117.0	128.7	6	172	2.CD.300390.XL	■
3.95		118.5	130.4	6	174	2.CD.300395.XL	Δ
3.968	**5/32**	120.0	132.0	6	175	2.CD.300F532.XL	■
4.00		120.0	132.0	6	175	2.CD.300400.XL	■
4.10		123.0	135.3	6	179	2.CD.300410.XL	■
4.20		126.0	138.6	6	182	2.CD.300420.XL	■
4.30		129.0	141.9	6	185	2.CD.300430.XL	■
4.40		132.0	145.2	6	188	2.CD.300440.XL	■
4.50		135.0	148.5	6	191	2.CD.300450.XL	■
4.60		138.0	151.8	6	195	2.CD.300460.XL	■
4.70		141.0	155.1	6	198	2.CD.300470.XL	■
4.762	**3/16**	144.0	158.4	6	201	2.CD.300F316.XL	■
4.80		144.0	158.4	6	201	2.CD.300480.XL	■
4.90		147.0	161.7	6	204	2.CD.300490.XL	■
5.00		150.0	165.0	6	208	2.CD.300500.XL	■
5.10		153.0	168.3	6	211	2.CD.300510.XL	■
5.20		156.0	171.6	6	214	2.CD.300520.XL	■

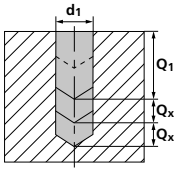
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
5.30		159.0	174.9	6	217	2.CD.300530.XL	■
5.40		162.0	178.2	6	220	2.CD.300540.XL	■
5.50		165.0	181.5	6	224	2.CD.300550.XL	■
5.560	**7/32**	168.0	184.8	6	227	2.CD.300F732.XL	■
5.60		168.0	184.8	6	227	2.CD.300560.XL	■
5.70		171.0	188.1	6	230	2.CD.300570.XL	■
5.80		174.0	191.4	6	233	2.CD.300580.XL	■
5.90		177.0	194.7	6	236	2.CD.300590.XL	■
6.00		180.0	198.0	6	240	2.CD.300600.XL	■

Complementary products	
CrazyDrill Pilot	p.134
CrazyDrill Coolpilot	p.156
CrazyDrill Crosspilot	p.146

CrazyDrill Cool XL 30 x d

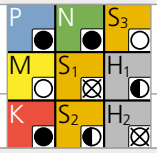
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	50	120	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	120	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	100	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	60	30xd1	–
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	40	80	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	60	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	150	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	200	30xd1	–
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	80	150	30xd1	–
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	40	80	2xd1	2xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40	80	2xd1	2xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	50	120	30xd1	–
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	40	80	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	50	3xd1	1xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	5xd1	1xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	20	40	5xd1	2xd1
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	20	40	5xd1	1xd1
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

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



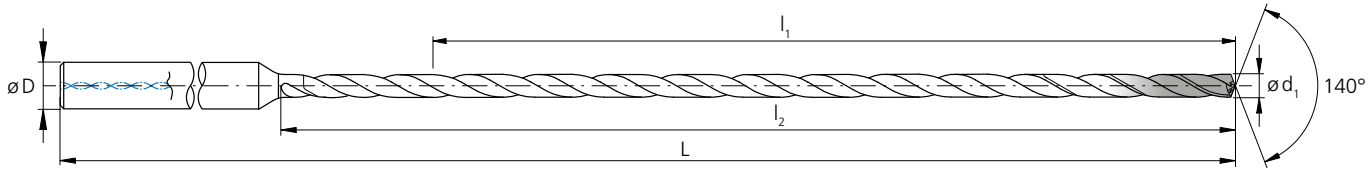
f [mm/rev]

Ød1	1.0 mm	1.25 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm	4.0 mm	5.0 mm	6.0 mm
			1/16"		3/32"	1/8"	5/32"	3/16" - 7/32"	
	f	f	f	f	f	f	f	f	f
	0.035	0.040	0.050	0.065	0.075	0.090	0.110	0.120	0.130
	0.035	0.040	0.050	0.065	0.075	0.090	0.110	0.120	0.130
	0.030	0.040	0.050	0.060	0.070	0.080	0.100	0.110	0.120
	0.025	0.030	0.035	0.045	0.055	0.065	0.080	0.095	0.100
	0.025	0.030	0.035	0.045	0.055	0.065	0.080	0.095	0.100
	0.025	0.030	0.035	0.045	0.055	0.065	0.080	0.095	0.100
	0.050	0.060	0.070	0.100	0.110	0.130	0.150	0.170	0.180
	0.050	0.060	0.070	0.100	0.110	0.130	0.160	0.190	0.210
	0.055	0.065	0.080	0.100	0.120	0.140	0.180	0.210	0.230
	0.050	0.060	0.070	0.090	0.110	0.130	0.160	0.190	0.210
	0.040	0.060	0.070	0.090	0.110	0.120	0.150	0.180	0.200
	0.055	0.065	0.080	0.100	0.120	0.140	0.180	0.210	0.230
	0.030	0.040	0.055	0.070	0.090	0.110	0.130	0.150	0.200
	0.005	0.010	0.020	0.030	0.040	0.055	0.070	0.080	0.100
	0.005	0.010	0.020	0.030	0.040	0.055	0.070	0.080	0.100
	0.005	0.010	0.020	0.030	0.040	0.055	0.070	0.080	0.100
	0.010	0.012	0.015	0.020	0.025	0.030	0.040	0.050	0.060

CRAZYDRILL by Mikron Tool Cool XL

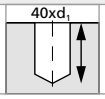
CrazyDrill Cool XL 40 x d

DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.00		80.0	86.0	4	125	2.CD.400200.XL	■
2.05		82.0	88.2	4	127	2.CD.400205.XL	Δ
2.10		84.0	90.3	4	130	2.CD.400210.XL	■
2.15		86.0	92.5	4	132	2.CD.400215.XL	Δ
2.20		88.0	94.6	4	134	2.CD.400220.XL	■
2.25		90.0	96.8	4	136	2.CD.400225.XL	Δ
2.30		92.0	98.9	4	138	2.CD.400230.XL	■
2.35		94.0	101.1	4	140	2.CD.400235.XL	Δ
2.381	**3/32**	96.0	103.2	4	142	2.CD.400F332.XL	■
2.40		96.0	103.2	4	142	2.CD.400240.XL	■
2.45		98.0	105.4	4	144	2.CD.400245.XL	Δ
2.50		100.0	107.5	4	146	2.CD.400250.XL	■
2.55		102.0	109.7	4	148	2.CD.400255.XL	Δ
2.60		104.0	111.8	4	151	2.CD.400260.XL	■
2.65		106.0	114.0	4	153	2.CD.400265.XL	Δ
2.70		108.0	116.1	4	155	2.CD.400270.XL	■
2.75		110.0	118.3	4	157	2.CD.400275.XL	Δ
2.80		112.0	120.4	4	159	2.CD.400280.XL	■
2.85		114.0	122.6	4	161	2.CD.400285.XL	Δ
2.90		116.0	124.7	4	163	2.CD.400290.XL	■
2.95		118.0	126.9	4	165	2.CD.400295.XL	Δ
3.00		120.0	129.0	4	167	2.CD.400300.XL	■
3.05		122.0	131.2	6	175	2.CD.400305.XL	Δ
3.10		124.0	133.3	6	177	2.CD.400310.XL	■
3.15		126.0	135.5	6	180	2.CD.400315.XL	Δ
3.175	**1/8**	128.0	137.6	6	182	2.CD.400F18.XL	■
3.20		128.0	137.6	6	182	2.CD.400320.XL	■
3.25		130.0	139.8	6	184	2.CD.400325.XL	Δ
3.30		132.0	141.9	6	186	2.CD.400330.XL	■
3.35		134.0	144.1	6	188	2.CD.400335.XL	Δ
3.40		136.0	146.2	6	190	2.CD.400340.XL	■
3.45		138.0	148.4	6	192	2.CD.400345.XL	Δ
3.50		140.0	150.5	6	194	2.CD.400350.XL	■

■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide			Z2		

Ød1	0.1 - 3.0 mm	3.05 - 6.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm

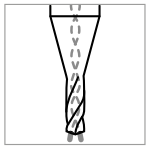
d1 [mm]	d1 [inch]	l1 [mm]	l2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.55		142.0	152.7	6	196	2.CD.400355.XL	Δ
3.60		144.0	154.8	6	198	2.CD.400360.XL	■
3.65		146.0	157.0	6	201	2.CD.400365.XL	Δ
3.70		148.0	159.1	6	203	2.CD.400370.XL	■
3.75		150.0	161.3	6	205	2.CD.400375.XL	Δ
3.80		152.0	163.4	6	207	2.CD.400380.XL	■
3.85		154.0	165.6	6	209	2.CD.400385.XL	Δ
3.90		156.0	167.7	6	211	2.CD.400390.XL	■
3.95		158.0	169.9	6	213	2.CD.400395.XL	Δ
3.968	**5/32**	160.0	172.0	6	215	2.CD.400F532.XL	■
4.00		160.0	172.0	6	215	2.CD.400400.XL	■
4.10		164.0	176.3	6	220	2.CD.400410.XL	■
4.20		168.0	180.6	6	224	2.CD.400420.XL	■
4.30		172.0	184.9	6	228	2.CD.400430.XL	■
4.40		176.0	189.2	6	232	2.CD.400440.XL	■
4.50		180.0	193.5	6	236	2.CD.400450.XL	■
4.60		184.0	197.8	6	241	2.CD.400460.XL	■
4.70		188.0	202.1	6	245	2.CD.400470.XL	■
4.762	**3/16**	192.0	206.4	6	249	2.CD.400F316.XL	■
4.80		192.0	206.4	6	249	2.CD.400480.XL	■
4.90		196.0	210.7	6	253	2.CD.400490.XL	■
5.00		200.0	215.0	6	258	2.CD.400500.XL	■
5.10		204.0	219.3	6	262	2.CD.400510.XL	■
5.20		208.0	223.6	6	266	2.CD.400520.XL	■
5.30		212.0	227.9	6	270	2.CD.400530.XL	■
5.40		216.0	232.2	6	274	2.CD.400540.XL	■
5.50		220.0	236.5	6	279	2.CD.400550.XL	■
5.560	**7/32**	224.0	240.8	6	283	2.CD.400F732.XL	■
5.60		224.0	240.8	6	283	2.CD.400560.XL	■
5.70		228.0	245.1	6	287	2.CD.400570.XL	■
5.80		232.0	249.4	6	291	2.CD.400580.XL	■
5.90		236.0	253.7	6	295	2.CD.400590.XL	■
6.00		240.0	258.0	6	300	2.CD.400600.XL	■

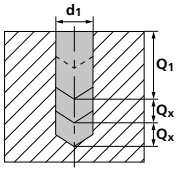
Complementary products	
CrazyDrill Pilot	p.134
CrazyDrill Coolpilot	p.156
CrazyDrill Crosspilot	p.146

CRAZYDRILL by Mikron Tool Cool XL

CrazyDrill Cool XL 40 x d

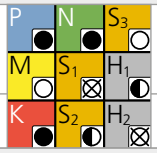
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_1	Q_x
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	50	120	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	120	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	100	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	60	40xd1	–
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	40	80	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	60	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	150	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	200	40xd1	–
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	80	150	40xd1	–
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.004	Cu-OF / CW008A	UNS C10100	40	80	2xd1	2xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40	80	2xd1	2xd1
		2.036	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	50	120	40xd1	–
		2.102	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	40	80	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	50	3xd1	1xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20	40	5xd1	1xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	20	40	5xd1	2xd1
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	20	40	5xd1	1xd1
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

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



f [mm/rev]

	Ød1					
	2.0 mm **f**	2.5 mm **3/32"** **f**	3.0 mm **1/8"** **f**	4.0 mm **5/32"** **f**	5.0 mm **3/16" - 7/32"** **f**	6.0 mm **f**
	0.060	0.075	0.090	0.110	0.120	0.130
	0.060	0.075	0.090	0.110	0.120	0.130
	0.050	0.060	0.075	0.095	0.110	0.120
	0.045	0.055	0.065	0.080	0.095	0.100
	0.045	0.055	0.065	0.080	0.095	0.100
	0.045	0.055	0.065	0.080	0.095	0.100
	0.100	0.110	0.130	0.150	0.170	0.180
	0.070	0.100	0.120	0.160	0.190	0.200
	0.060	0.080	0.100	0.120	0.150	0.200
	0.065	0.080	0.110	0.130	0.160	0.190
	0.065	0.080	0.110	0.130	0.160	0.190
	0.100	0.120	0.140	0.180	0.210	0.230
	0.065	0.090	0.110	0.130	0.150	0.190
	0.030	0.040	0.055	0.070	0.080	0.100
	0.030	0.040	0.055	0.070	0.080	0.100
	0.030	0.040	0.055	0.070	0.080	0.100
	0.020	0.025	0.030	0.040	0.050	0.060

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:

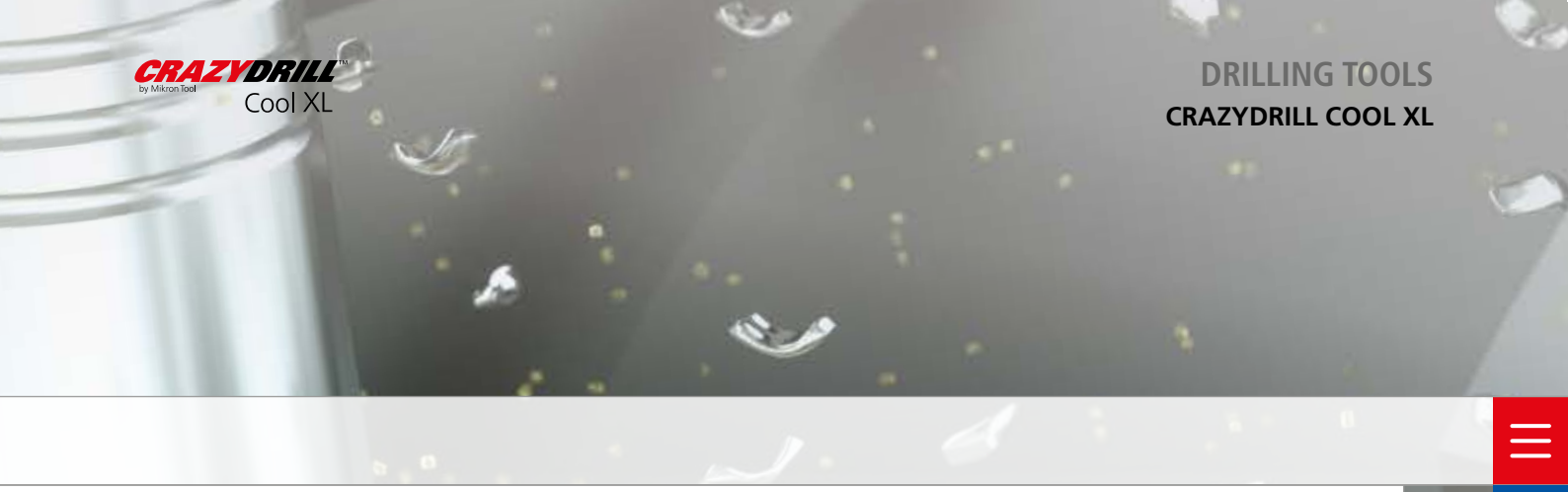
- Drill with Ø < 2 mm filter quality ≤ 0.010 mm.
- Drill with Ø < 3 mm filter quality ≤ 0.020 mm.
- Drill with Ø < 6 mm filter quality ≤ 0.050 mm.

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]	[bar]	[bar]
1.0	70	80
2.0	50	70
4.0	40	60
6.0	30	50

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.

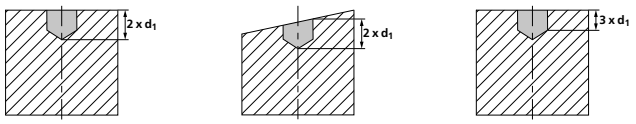
Note:
With a depth of 40 x d it might be advantageous to use after the pilot drill a 15 x d or 20 x d CrazyDrill Cool XL drill. With this the subsequent 40 x d drill gets even better guidance and protection against bending. Result: an improved tool life.

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).



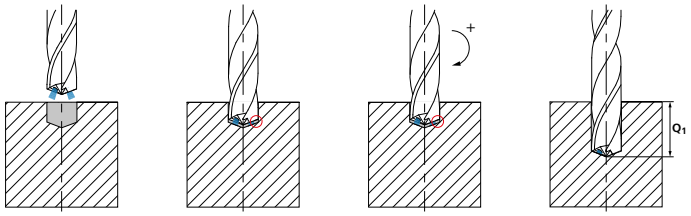
2 | DEEP HOLE DRILLING

Turn on coolant. Enter the hole at a maximum speed n = 500 rpm and v_f = 1'000 mm/min, 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.

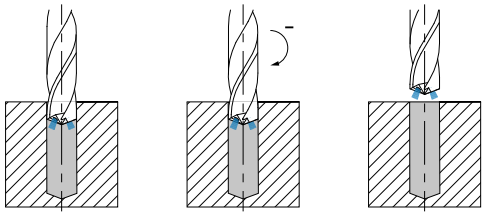


3 | EXIT FROM BORE

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.

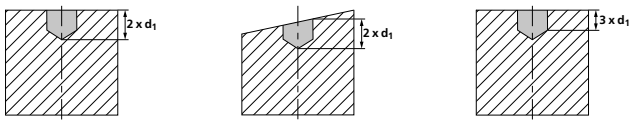
Exit the bore at speed n = 500 rpm and v_f = 1'000 mm/min.



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

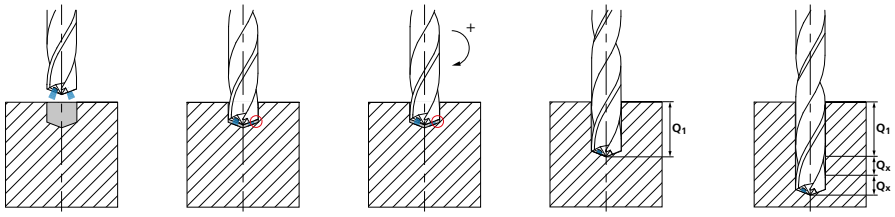
1 | PILOT DRILLING

- With CrazyDrill Pilot or Coolpilot (straight surfaces) or CrazyDrill Crosspilot (inclined surfaces).



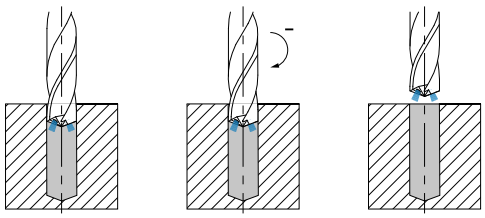
2 | DEEP HOLE DRILLING

- Turn on coolant. Enter the hole at a maximum speed n = 500 rpm and v_f = 1'000 mm/mim, 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.



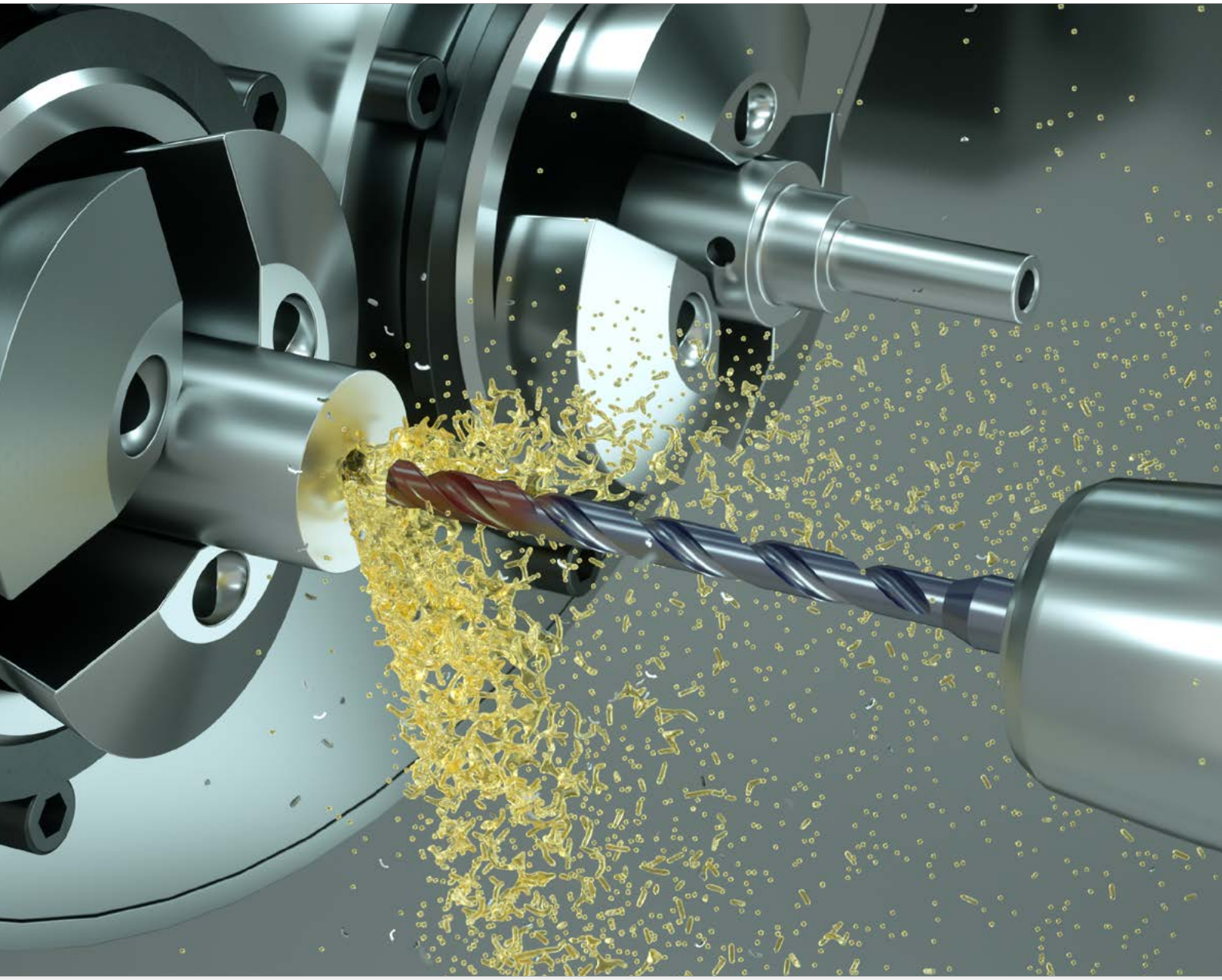
3 | EXIT FROM BORE

- 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 = 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 1.0 mm up 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 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 ■ Coated	■ Internal cooling ■ Coated	■ Internal cooling ■ Coated	■ Internal cooling ■ Coated	■ Internal cooling ■ Coated	■ Internal cooling ■ 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 2.95 mm.

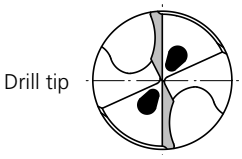
3 | CARBIDE
A specially developed micro-grain solid carbide allows machining at high speeds.

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.

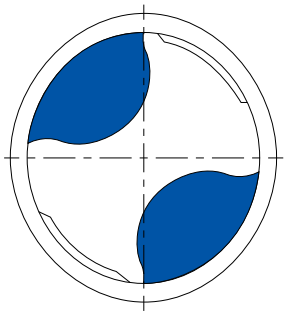


Important features

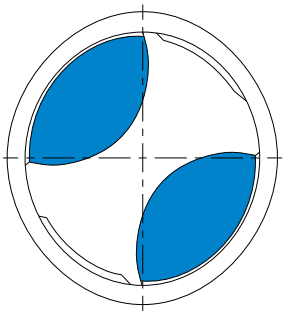
THE IMPORTANCE OF THE FLUTE PROFILE FOR BEST PERFORMANCE

■ **New flute profile for best chip control: CrazyDrill compared to Conventional drill**

CrazyDrill Cool SST-Inox

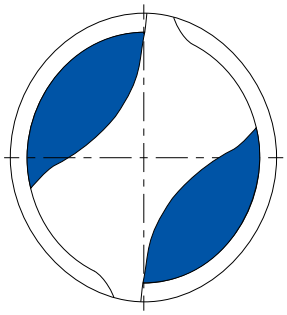


Front chip flute profile
A special chip breaker shape ensures compact, short and curved chips.



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

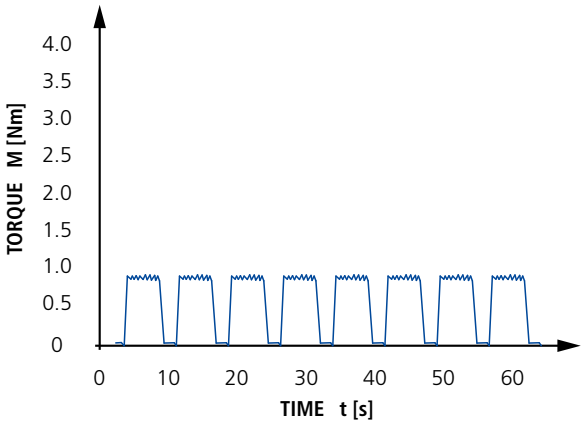
Compact, short and curved chips are easily evacuated and guarantee a long tool life as well as high process reliability.

Conventional drill

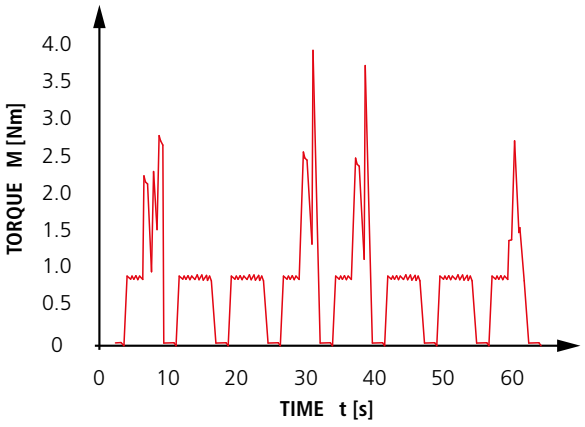
Long chips cause chip jamming and difficult evacuation. This leads to overheating with consequent build up edges. The result is a cutting edge breakout in short time.

■ Costant torque for a long tool life

CrazyDrill Cool SST-Inox



Conventional drill



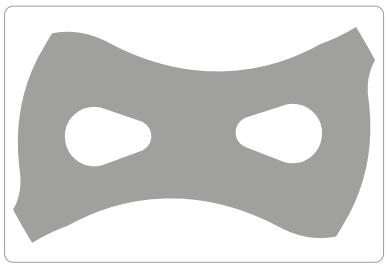
Due to the new flute profile combined with a newly designed shape of helical cooling channels, the torque is kept constant avoiding peaks that lead to unexpected tool breakage. The result is higher tool life.

Important features

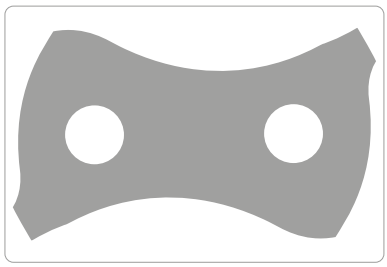
THE IMPORTANCE OF THE COOLING SYSTEM FOR BEST PERFORMANCE

■ Larger cooling channels to avoid overheating

CrazyDrill Cool SST-Inox



Conventional drill



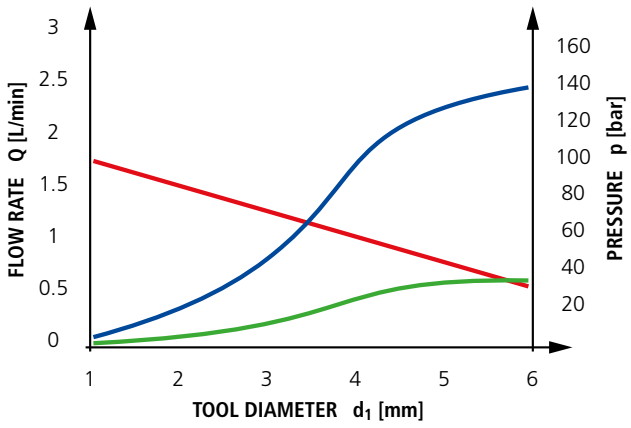
The development of a new design of helical cooling channels was carried out over a 2-stage design cycle: Flow rate analysis and coolant hole design. We enlarged the section of the cooling channels without affecting the mechanical strength of the drill. Up to four times more coolant volume is reached 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

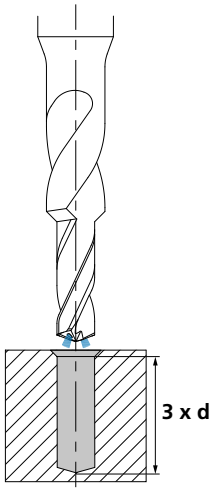
Average pressure needed for the new geometry



Due to the new geometry of the helical cooling channels, up to four times more coolant volume reaches the drill tip.

■ Pre-hole for a perfect alignment

CrazyDrill Coolpilot

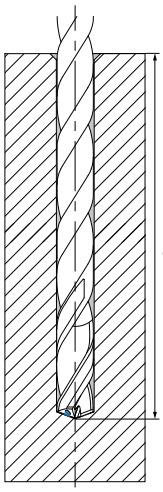


Pilot and short drilling
It is the ideal complement for deep hole drilling.

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.

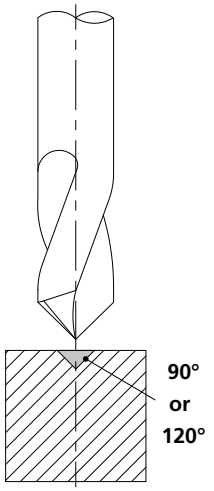
CrazyDrill Cool SST-Inox



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.

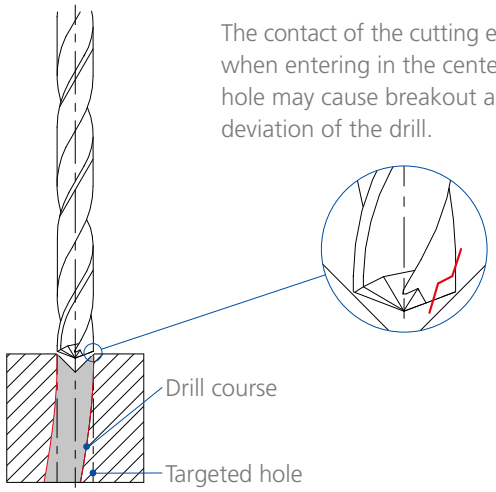
Due to the pre-hole machined with CrazyDrill Coolpilot a high position and alignment accuracy is reached as well as a stable machining process.

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 be cause a breakage of cutting edges, when not matching perfectly with deep hole drills.



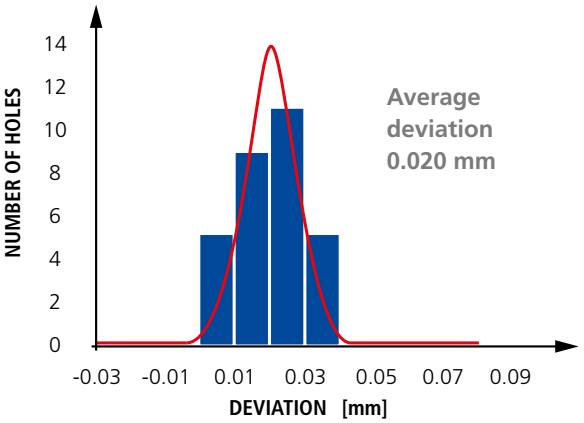
The contact of the cutting edges when entering in the center hole may cause breakout and deviation of the drill.

Important features and benefits

FOR MORE PERFORMANCE IN STAINLESS STEEL AND SUPERALLOYS

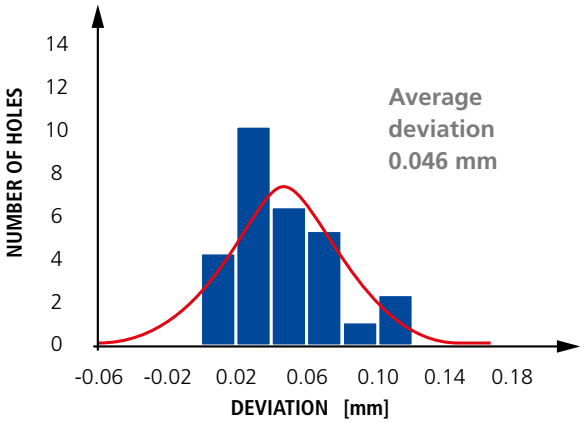
■ Deviation

CrazyDrill Cool SST-Inox 30 x d



Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: 2.7 mm; Drilling depth: 81 mm;
Step: 1; Coolant: oil; Number of holes: 3x30
Cutting data: v_C = 80 m/min; f = 0.081 mm/rev

CrazyDrill Cool SST-Inox 40 x d



Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: 2.7 mm; Drilling depth: 108 mm;
Step: 1; Coolant: oil; Number of holes: 3x30
Cutting data: v_C = 80 m/min; f = 0.081 mm/rev

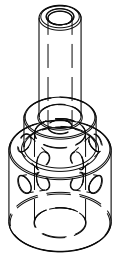
■ Surface roughness

CrazyDrill Cool SST-Inox 40 x d

f [mm/rev]	Ra exit [µm]	Rz exit [µm]
0.086	0.331	2.70
0.129	0.388	3.29

Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: 4.3 mm; Drilling depth: 172 mm; Step: 1; Coolant: oil; Pre-hole: CrazyDrill Coolpilot
Cutting data: v_C = 80 m/min; f_{mid} = 0.086 mm/rev and f_{high} = 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

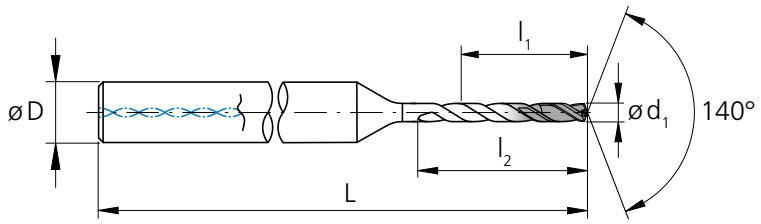
MACHINING
- Drilling
- d = 2.5 mm
- Drilling depth 26 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Cool SST-Inox - 15 x d

DATA	MIKRON TOOL
Tool type	CrazyDrill Cool SST-Inox - Carbide - Coated - Internal cooling
Item number	2.CD.150250.IC
Cutting data	v_c = 80 m/min f = 0.075 mm/rev Q_1 = 26 mm

CrazyDrill Cool SST-Inox 6 x d

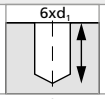
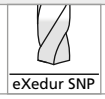
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		6.00	9.0	4	55	2.CD.060100.IC	■
1.05		6.30	9.5	4	55	2.CD.060105.IC	■
1.10		6.60	9.9	4	55	2.CD.060110.IC	■
1.15		6.90	10.4	4	55	2.CD.060115.IC	■
1.20		7.20	10.8	4	57	2.CD.060120.IC	■
1.25		7.50	11.3	4	57	2.CD.060125.IC	■
1.30		7.80	11.7	4	57	2.CD.060130.IC	■
1.35		8.10	12.2	4	57	2.CD.060135.IC	■
1.40		8.40	12.6	4	57	2.CD.060140.IC	■
1.45		8.70	13.1	4	58	2.CD.060145.IC	■
1.50		9.00	13.5	4	58	2.CD.060150.IC	■
1.55		9.30	14.0	4	58	2.CD.060155.IC	■
1.587	**1/16**	9.52	14.4	4	58	2.CD.060F116.IC	■
1.60		9.60	14.4	4	58	2.CD.060160.IC	■
1.65		9.90	14.9	4	58	2.CD.060165.IC	■
1.70		10.20	15.3	4	60	2.CD.060170.IC	■
1.75		10.50	15.8	4	60	2.CD.060175.IC	■
1.80		10.80	16.2	4	60	2.CD.060180.IC	■
1.85		11.10	16.7	4	60	2.CD.060185.IC	■
1.90		11.40	17.1	4	60	2.CD.060190.IC	■
1.95		11.70	17.6	4	60	2.CD.060195.IC	■
2.00		12.00	18.0	4	63	2.CD.060200.IC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.05		12.30	18.5	4	63	2.CD.060205.IC	■
2.10		12.60	18.9	4	63	2.CD.060210.IC	■
2.15		12.90	19.4	4	63	2.CD.060215.IC	■
2.20		13.20	19.8	4	63	2.CD.060220.IC	■
2.25		13.50	20.3	4	63	2.CD.060225.IC	■
2.30		13.80	20.7	4	65	2.CD.060230.IC	■
2.35		14.10	21.2	4	65	2.CD.060235.IC	■
2.381	**3/32**	14.29	21.6	4	65	2.CD.060F332.IC	■
2.40		14.40	21.6	4	65	2.CD.060240.IC	■
2.45		14.70	22.1	4	65	2.CD.060245.IC	■
2.50		15.00	22.5	4	65	2.CD.060250.IC	■
2.55		15.30	23.0	4	65	2.CD.060255.IC	■
2.60		15.60	23.4	4	68	2.CD.060260.IC	■
2.65		15.90	23.9	4	68	2.CD.060265.IC	■
2.70		16.20	24.3	4	68	2.CD.060270.IC	■
2.75		16.50	24.8	4	68	2.CD.060275.IC	■
2.80		16.80	25.2	4	68	2.CD.060280.IC	■
2.85		17.10	25.7	4	68	2.CD.060285.IC	■
2.90		17.40	26.1	4	68	2.CD.060290.IC	■
2.95		17.70	26.6	4	68	2.CD.060295.IC	■
3.00		18.00	27.0	6	74	2.CD.060300.IC	■
3.05		18.30	27.5	6	74	2.CD.060305.IC	■

■ Stock item

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm	+ 0.007 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.10		18.60	27.9	6	74	2.CD.060310.IC	■
3.15		18.90	28.4	6	74	2.CD.060315.IC	■
3.175	**1/8**	19.05	28.8	6	74	2.CD.060F18.IC	■
3.20		19.20	28.8	6	74	2.CD.060320.IC	■
3.25		19.50	29.3	6	74	2.CD.060325.IC	■
3.30		19.80	29.7	6	74	2.CD.060330.IC	■
3.35		20.10	30.2	6	74	2.CD.060335.IC	■
3.40		20.40	30.6	6	74	2.CD.060340.IC	■
3.45		20.70	31.1	6	74	2.CD.060345.IC	■
3.50		21.00	31.5	6	78	2.CD.060350.IC	■
3.55		21.30	32.0	6	78	2.CD.060355.IC	■
3.60		21.60	32.4	6	78	2.CD.060360.IC	■
3.65		21.90	32.9	6	78	2.CD.060365.IC	■
3.70		22.20	33.3	6	78	2.CD.060370.IC	■
3.75		22.50	33.8	6	78	2.CD.060375.IC	■
3.80		22.80	34.2	6	78	2.CD.060380.IC	■
3.85		23.10	34.7	6	78	2.CD.060385.IC	■
3.90		23.40	35.1	6	78	2.CD.060390.IC	■
3.95		23.70	35.6	6	78	2.CD.060395.IC	■
3.968	**5/32**	23.81	36.0	6	78	2.CD.060F532.IC	■
4.00		24.00	36.0	6	78	2.CD.060400.IC	■
4.10		24.60	36.9	6	80	2.CD.060410.IC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.20		25.20	37.8	6	80	2.CD.060420.IC	■
4.30		25.80	38.7	6	80	2.CD.060430.IC	■
4.40		26.40	39.6	6	80	2.CD.060440.IC	■
4.50		27.00	40.5	6	80	2.CD.060450.IC	■
4.60		27.60	41.4	6	80	2.CD.060460.IC	■
4.70		28.20	42.3	6	84	2.CD.060470.IC	■
4.762	**3/16**	28.57	43.2	6	84	2.CD.060F316.IC	■
4.80		28.80	43.2	6	84	2.CD.060480.IC	■
4.90		29.40	44.1	6	84	2.CD.060490.IC	■
5.00		30.00	45.0	6	84	2.CD.060500.IC	■
5.10		30.60	45.9	6	84	2.CD.060510.IC	■
5.20		31.20	46.8	6	84	2.CD.060520.IC	■
5.30		31.80	47.7	6	84	2.CD.060530.IC	■
5.40		32.40	48.6	6	88	2.CD.060540.IC	■
5.50		33.00	49.5	6	88	2.CD.060550.IC	■
5.560	**7/32**	33.36	50.4	6	88	2.CD.060F732.IC	■
5.60		33.60	50.4	6	88	2.CD.060560.IC	■
5.70		34.20	51.3	6	88	2.CD.060570.IC	■
5.80		34.80	52.2	6	88	2.CD.060580.IC	■
5.90		35.40	53.1	6	88	2.CD.060590.IC	■
6.00		36.00	54.0	6	88	2.CD.060600.IC	■
6.350	**1/4**	38.10	57.2	8	90	2.CD.060F14.IC	■

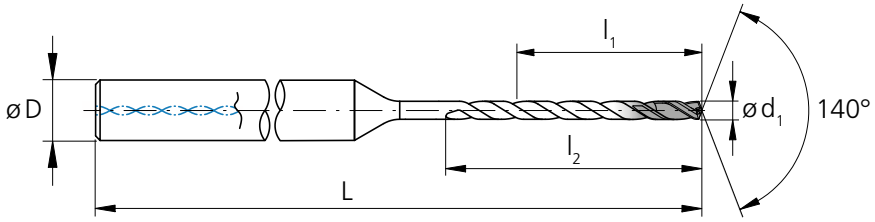
■ Stock item

Complementary products

CrazyDrill Coolpilot p.156
CrazyDrill Crosspilot p.146

CrazyDrill Cool SST-Inox 10 x d

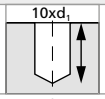
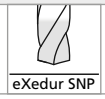
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		10.00	13.0	4	59	2.CD.100100.IC	■
1.05		10.50	13.7	4	59	2.CD.100105.IC	■
1.10		11.00	14.3	4	59	2.CD.100110.IC	■
1.15		11.50	15.0	4	59	2.CD.100115.IC	■
1.20		12.00	15.6	4	62	2.CD.100120.IC	■
1.25		12.50	16.3	4	62	2.CD.100125.IC	■
1.30		13.00	16.9	4	62	2.CD.100130.IC	■
1.35		13.50	17.6	4	62	2.CD.100135.IC	■
1.40		14.00	18.2	4	62	2.CD.100140.IC	■
1.45		14.50	18.9	4	65	2.CD.100145.IC	■
1.50		15.00	19.5	4	65	2.CD.100150.IC	■
1.55		15.50	20.2	4	65	2.CD.100155.IC	■
1.587	**1/16**	15.87	20.8	4	65	2.CD.100F116.IC	■
1.60		16.00	20.8	4	65	2.CD.100160.IC	■
1.65		16.50	21.5	4	65	2.CD.100165.IC	■
1.70		17.00	22.1	4	67	2.CD.100170.IC	■
1.75		17.50	22.8	4	67	2.CD.100175.IC	■
1.80		18.00	23.4	4	67	2.CD.100180.IC	■
1.85		18.50	24.1	4	67	2.CD.100185.IC	■
1.90		19.00	24.7	4	67	2.CD.100190.IC	■
1.95		19.50	25.4	4	67	2.CD.100195.IC	■
2.00		20.00	26.0	4	70	2.CD.100200.IC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.05		20.50	26.7	4	70	2.CD.100205.IC	■
2.10		21.00	27.3	4	70	2.CD.100210.IC	■
2.15		21.50	28.0	4	70	2.CD.100215.IC	■
2.20		22.00	28.6	4	70	2.CD.100220.IC	■
2.25		22.50	29.3	4	70	2.CD.100225.IC	■
2.30		23.00	29.9	4	75	2.CD.100230.IC	■
2.35		23.50	30.6	4	75	2.CD.100235.IC	■
2.381	**3/32**	23.81	31.2	4	75	2.CD.100F332.IC	■
2.40		24.00	31.2	4	75	2.CD.100240.IC	■
2.45		24.50	31.9	4	75	2.CD.100245.IC	■
2.50		25.00	32.5	4	75	2.CD.100250.IC	■
2.55		25.50	33.2	4	75	2.CD.100255.IC	■
2.60		26.00	33.8	4	80	2.CD.100260.IC	■
2.65		26.50	34.5	4	80	2.CD.100265.IC	■
2.70		27.00	35.1	4	80	2.CD.100270.IC	■
2.75		27.50	35.8	4	80	2.CD.100275.IC	■
2.80		28.00	36.4	4	80	2.CD.100280.IC	■
2.85		28.50	37.1	4	80	2.CD.100285.IC	■
2.90		29.00	37.7	4	80	2.CD.100290.IC	■
2.95		29.50	38.4	4	80	2.CD.100295.IC	■
3.00		30.00	39.0	6	87	2.CD.100300.IC	■
3.05		30.50	39.7	6	87	2.CD.100305.IC	■

■ Stock item

Carbide |  |  | Z2 |  | 

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm	+ 0.007 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.10		31.00	40.3	6	87	2.CD.100310.IC	■
3.15		31.50	41.0	6	87	2.CD.100315.IC	■
3.175	**1/8**	31.75	41.6	6	87	2.CD.100F18.IC	■
3.20		32.00	41.6	6	87	2.CD.100320.IC	■
3.25		32.50	42.3	6	87	2.CD.100325.IC	■
3.30		33.00	42.9	6	87	2.CD.100330.IC	■
3.35		33.50	43.6	6	87	2.CD.100335.IC	■
3.40		34.00	44.2	6	87	2.CD.100340.IC	■
3.45		34.50	44.9	6	87	2.CD.100345.IC	■
3.50		35.00	45.5	6	95	2.CD.100350.IC	■
3.55		35.50	46.2	6	95	2.CD.100355.IC	■
3.60		36.00	46.8	6	95	2.CD.100360.IC	■
3.65		36.50	47.5	6	95	2.CD.100365.IC	■
3.70		37.00	48.1	6	95	2.CD.100370.IC	■
3.75		37.50	48.8	6	95	2.CD.100375.IC	■
3.80		38.00	49.4	6	95	2.CD.100380.IC	■
3.85		38.50	50.1	6	95	2.CD.100385.IC	■
3.90		39.00	50.7	6	95	2.CD.100390.IC	■
3.95		39.50	51.4	6	95	2.CD.100395.IC	■
3.968	**5/32**	39.68	52.0	6	95	2.CD.100F532.IC	■
4.00		40.00	52.0	6	95	2.CD.100400.IC	■
4.10		41.00	53.3	6	100	2.CD.100410.IC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.20		42.00	54.6	6	100	2.CD.100420.IC	■
4.30		43.00	55.9	6	100	2.CD.100430.IC	■
4.40		44.00	57.2	6	100	2.CD.100440.IC	■
4.50		45.00	58.5	6	100	2.CD.100450.IC	■
4.60		46.00	59.8	6	100	2.CD.100460.IC	■
4.70		47.00	61.1	6	105	2.CD.100470.IC	■
4.762	**3/16**	47.62	62.4	6	105	2.CD.100F316.IC	■
4.80		48.00	62.4	6	105	2.CD.100480.IC	■
4.90		49.00	63.7	6	105	2.CD.100490.IC	■
5.00		50.00	65.0	6	105	2.CD.100500.IC	■
5.10		51.00	66.3	6	105	2.CD.100510.IC	■
5.20		52.00	67.6	6	105	2.CD.100520.IC	■
5.30		53.00	68.9	6	105	2.CD.100530.IC	■
5.40		54.00	70.2	6	112	2.CD.100540.IC	■
5.50		55.00	71.5	6	112	2.CD.100550.IC	■
5.560	**7/32**	55.60	72.8	6	112	2.CD.100F732.IC	■
5.60		56.00	72.8	6	112	2.CD.100560.IC	■
5.70		57.00	74.1	6	112	2.CD.100570.IC	■
5.80		58.00	75.4	6	112	2.CD.100580.IC	■
5.90		59.00	76.7	6	112	2.CD.100590.IC	■
6.00		60.00	78.0	6	112	2.CD.100600.IC	■
6.350	**1/4**	63.50	82.6	8	116	2.CD.100F14.IC	■

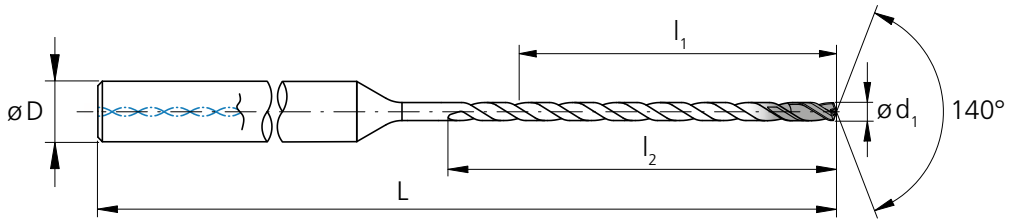
■ Stock item

Complementary products

CrazyDrill Coolpilot p.156
CrazyDrill Crosspilot p.146

CrazyDrill Cool SST-Inox 15 x d

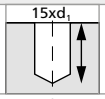
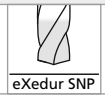
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		15.00	18.5	4	62	2.CD.150100.IC	■
1.05		15.75	19.4	4	62	2.CD.150105.IC	■
1.10		16.50	20.4	4	62	2.CD.150110.IC	■
1.15		17.25	21.3	4	62	2.CD.150115.IC	■
1.20		18.00	22.2	4	64	2.CD.150120.IC	■
1.25		18.75	23.1	4	64	2.CD.150125.IC	■
1.30		19.50	24.1	4	66	2.CD.150130.IC	■
1.35		20.25	25.0	4	66	2.CD.150135.IC	■
1.40		21.00	25.9	4	68	2.CD.150140.IC	■
1.45		21.75	26.8	4	70	2.CD.150145.IC	■
1.50		22.50	27.8	4	70	2.CD.150150.IC	■
1.55		23.25	28.7	4	75	2.CD.150155.IC	■
1.587	**1/16**	24.00	29.6	4	75	2.CD.150F116.IC	■
1.60		24.00	29.6	4	75	2.CD.150160.IC	■
1.65		24.75	30.5	4	75	2.CD.150165.IC	■
1.70		25.50	31.5	4	76	2.CD.150170.IC	■
1.75		26.25	32.4	4	76	2.CD.150175.IC	■
1.80		27.00	33.3	4	76	2.CD.150180.IC	■
1.85		27.75	34.2	4	76	2.CD.150185.IC	■
1.90		28.50	35.2	4	80	2.CD.150190.IC	■
1.95		29.25	36.1	4	80	2.CD.150195.IC	■
2.00		30.00	37.0	4	80	2.CD.150200.IC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.05		30.75	37.9	4	80	2.CD.150205.IC	■
2.10		31.50	38.9	4	80	2.CD.150210.IC	■
2.15		32.25	39.8	4	85	2.CD.150215.IC	■
2.20		33.00	40.7	4	85	2.CD.150220.IC	■
2.25		33.75	41.6	4	85	2.CD.150225.IC	■
2.30		34.50	42.6	4	86	2.CD.150230.IC	■
2.35		35.25	43.5	4	86	2.CD.150235.IC	■
2.381	**3/32**	36.00	44.4	4	86	2.CD.150F332.IC	■
2.40		36.00	44.4	4	86	2.CD.150240.IC	■
2.45		36.75	45.3	4	86	2.CD.150245.IC	■
2.50		37.50	46.3	4	90	2.CD.150250.IC	■
2.55		38.25	47.2	4	90	2.CD.150255.IC	■
2.60		39.00	48.1	4	90	2.CD.150260.IC	■
2.65		39.75	49.0	4	90	2.CD.150265.IC	■
2.70		40.50	50.0	4	92	2.CD.150270.IC	■
2.75		41.25	50.9	4	92	2.CD.150275.IC	■
2.80		42.00	51.8	4	94	2.CD.150280.IC	■
2.85		42.75	52.7	4	94	2.CD.150285.IC	■
2.90		43.50	53.7	4	98	2.CD.150290.IC	■
2.95		44.25	54.6	4	98	2.CD.150295.IC	■
3.00		45.00	55.5	6	100	2.CD.150300.IC	■
3.05		45.75	56.4	6	100	2.CD.150305.IC	■

■ Stock item

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm	+ 0.007 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.10		46.50	57.4	6	102	2.CD.150310.IC	■
3.15		47.25	58.3	6	102	2.CD.150315.IC	■
3.175	**1/8**	48.00	59.2	6	106	2.CD.150F18.IC	■
3.20		48.00	59.2	6	106	2.CD.150320.IC	■
3.25		48.75	60.1	6	106	2.CD.150325.IC	■
3.30		49.50	61.1	6	106	2.CD.150330.IC	■
3.35		50.25	62.0	6	106	2.CD.150335.IC	■
3.40		51.00	62.9	6	106	2.CD.150340.IC	■
3.45		51.75	63.8	6	106	2.CD.150345.IC	■
3.50		52.50	64.8	6	108	2.CD.150350.IC	■
3.55		53.25	65.7	6	108	2.CD.150355.IC	■
3.60		54.00	66.6	6	110	2.CD.150360.IC	■
3.65		54.75	67.5	6	110	2.CD.150365.IC	■
3.70		55.50	68.5	6	112	2.CD.150370.IC	■
3.75		56.25	69.4	6	112	2.CD.150375.IC	■
3.80		57.00	70.3	6	116	2.CD.150380.IC	■
3.85		57.75	71.2	6	116	2.CD.150385.IC	■
3.90		58.50	72.2	6	116	2.CD.150390.IC	■
3.95		59.25	73.1	6	116	2.CD.150395.IC	■
3.968	**5/32**	60.00	74.0	6	116	2.CD.150F532.IC	■
4.00		60.00	74.0	6	116	2.CD.150400.IC	■
4.10		61.50	75.9	6	118	2.CD.150410.IC	■

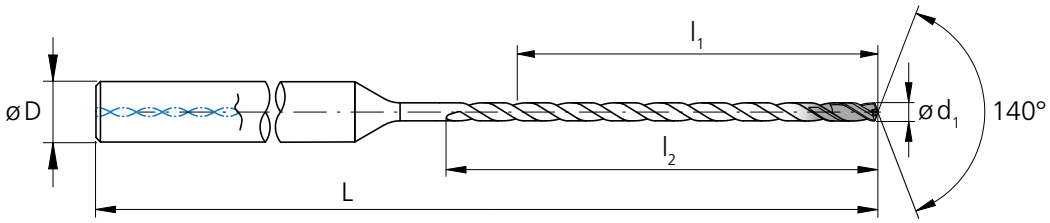
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.20		63.00	77.7	6	120	2.CD.150420.IC	■
4.30		64.50	79.6	6	122	2.CD.150430.IC	■
4.40		66.00	81.4	6	126	2.CD.150440.IC	■
4.50		67.50	83.3	6	126	2.CD.150450.IC	■
4.60		69.00	85.1	6	126	2.CD.150460.IC	■
4.70		70.50	87.0	6	129	2.CD.150470.IC	■
4.762	**3/16**	72.00	88.8	6	131	2.CD.150F316.IC	■
4.80		72.00	88.8	6	131	2.CD.150480.IC	■
4.90		73.50	90.7	6	133	2.CD.150490.IC	■
5.00		75.00	92.5	6	135	2.CD.150500.IC	■
5.10		76.50	94.4	6	137	2.CD.150510.IC	■
5.20		78.00	96.2	6	141	2.CD.150520.IC	■
5.30		79.50	98.1	6	141	2.CD.150530.IC	■
5.40		81.00	99.9	6	141	2.CD.150540.IC	■
5.50		82.50	101.8	6	143	2.CD.150550.IC	■
5.560	**7/32**	84.00	103.6	6	145	2.CD.150F732.IC	■
5.60		84.00	103.6	6	145	2.CD.150560.IC	■
5.70		85.50	105.5	6	147	2.CD.150570.IC	■
5.80		87.00	107.3	6	151	2.CD.150580.IC	■
5.90		88.50	109.2	6	151	2.CD.150590.IC	■
6.00		90.00	111.0	6	151	2.CD.150600.IC	■
6.350	**1/4**	95.30	117.5	8	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

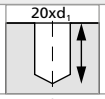
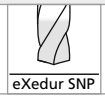


d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		20.0	23.5	4	70	2.CD.200100.IC	■
1.05		21.0	24.7	4	70	2.CD.200105.IC	Δ
1.10		22.0	25.9	4	70	2.CD.200110.IC	■
1.15		23.0	27.0	4	70	2.CD.200115.IC	Δ
1.20		24.0	28.2	4	70	2.CD.200120.IC	■
1.25		25.0	29.4	4	70	2.CD.200125.IC	Δ
1.30		26.0	30.6	4	75	2.CD.200130.IC	■
1.35		27.0	31.7	4	75	2.CD.200135.IC	Δ
1.40		28.0	32.9	4	75	2.CD.200140.IC	■
1.45		29.0	34.1	4	78	2.CD.200145.IC	Δ
1.50		30.0	35.3	4	78	2.CD.200150.IC	■
1.55		31.0	36.4	4	78	2.CD.200155.IC	Δ
1.587	**1/16**	32.0	37.6	4	82	2.CD.200F116.IC	■
1.60		32.0	37.6	4	82	2.CD.200160.IC	■
1.65		33.0	38.8	4	82	2.CD.200165.IC	Δ
1.70		34.0	40.0	4	85	2.CD.200170.IC	■
1.75		35.0	41.1	4	85	2.CD.200175.IC	Δ
1.80		36.0	42.3	4	85	2.CD.200180.IC	■
1.85		37.0	43.5	4	88	2.CD.200185.IC	Δ
1.90		38.0	44.7	4	88	2.CD.200190.IC	■
1.95		39.0	45.8	4	88	2.CD.200195.IC	Δ
2.00		40.0	47.0	4	90	2.CD.200200.IC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.05		41.0	48.2	4	90	2.CD.200205.IC	Δ
2.10		42.0	49.4	4	93	2.CD.200210.IC	■
2.15		43.0	50.5	4	93	2.CD.200215.IC	Δ
2.20		44.0	51.7	4	95	2.CD.200220.IC	■
2.25		45.0	52.9	4	95	2.CD.200225.IC	Δ
2.30		46.0	54.1	4	98	2.CD.200230.IC	■
2.35		47.0	55.2	4	98	2.CD.200235.IC	Δ
2.381	**3/32**	48.0	56.4	4	98	2.CD.200F332.IC	■
2.40		48.0	56.4	4	98	2.CD.200240.IC	■
2.45		49.0	57.6	4	100	2.CD.200245.IC	Δ
2.50		50.0	58.8	4	100	2.CD.200250.IC	■
2.55		51.0	59.9	4	102	2.CD.200255.IC	Δ
2.60		52.0	61.1	4	104	2.CD.200260.IC	■
2.65		53.0	62.3	4	104	2.CD.200265.IC	Δ
2.70		54.0	63.5	4	104	2.CD.200270.IC	■
2.75		55.0	64.6	4	106	2.CD.200275.IC	Δ
2.80		56.0	65.8	4	106	2.CD.200280.IC	■
2.85		57.0	67.0	4	108	2.CD.200285.IC	Δ
2.90		58.0	68.2	4	108	2.CD.200290.IC	■
2.95		59.0	69.3	4	110	2.CD.200295.IC	Δ
3.00		60.0	70.5	6	116	2.CD.200300.IC	■
3.05		61.0	71.7	6	116	2.CD.200305.IC	Δ

■ Stock item

Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm	+ 0.007 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.10		62.0	72.9	6	118	2.CD.200310.IC	■
3.15		63.0	74.0	6	118	2.CD.200315.IC	Δ
3.175	**1/8**	64.0	75.2	6	120	2.CD.200F18.IC	■
3.20		64.0	75.2	6	120	2.CD.200320.IC	■
3.25		65.0	76.4	6	120	2.CD.200325.IC	Δ
3.30		66.0	77.6	6	122	2.CD.200330.IC	■
3.35		67.0	78.7	6	122	2.CD.200335.IC	Δ
3.40		68.0	79.9	6	126	2.CD.200340.IC	■
3.45		69.0	81.1	6	126	2.CD.200345.IC	Δ
3.50		70.0	82.3	6	126	2.CD.200350.IC	■
3.55		71.0	83.4	6	126	2.CD.200355.IC	Δ
3.60		72.0	84.6	6	128	2.CD.200360.IC	■
3.65		73.0	85.8	6	128	2.CD.200365.IC	Δ
3.70		74.0	87.0	6	130	2.CD.200370.IC	■
3.75		75.0	88.1	6	130	2.CD.200375.IC	Δ
3.80		76.0	89.3	6	132	2.CD.200380.IC	■
3.85		77.0	90.5	6	132	2.CD.200385.IC	Δ
3.90		78.0	91.7	6	136	2.CD.200390.IC	■
3.95		79.0	92.8	6	136	2.CD.200395.IC	Δ
3.968	**5/32**	80.0	94.0	6	136	2.CD.200F532.IC	■
4.00		80.0	94.0	6	136	2.CD.200400.IC	■
4.10		82.0	96.4	6	141	2.CD.200410.IC	■

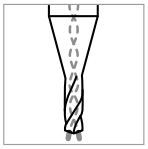
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.20		84.0	98.7	6	143	2.CD.200420.IC	■
4.30		86.0	101.1	6	145	2.CD.200430.IC	■
4.40		88.0	103.4	6	147	2.CD.200440.IC	■
4.50		90.0	105.8	6	151	2.CD.200450.IC	■
4.60		92.0	108.1	6	151	2.CD.200460.IC	■
4.70		94.0	110.5	6	154	2.CD.200470.IC	■
4.762	**3/16**	96.0	112.8	6	156	2.CD.200F316.IC	■
4.80		96.0	112.8	6	156	2.CD.200480.IC	■
4.90		98.0	115.2	6	158	2.CD.200490.IC	■
5.00		100.0	117.5	6	160	2.CD.200500.IC	■
5.10		102.0	119.9	6	162	2.CD.200510.IC	■
5.20		104.0	122.2	6	166	2.CD.200520.IC	■
5.30		106.0	124.6	6	166	2.CD.200530.IC	■
5.40		108.0	126.9	6	171	2.CD.200540.IC	■
5.50		110.0	129.3	6	173	2.CD.200550.IC	■
5.560	**7/32**	112.0	131.6	6	175	2.CD.200F732.IC	■
5.60		112.0	131.6	6	175	2.CD.200560.IC	■
5.70		114.0	134.0	6	177	2.CD.200570.IC	■
5.80		116.0	136.3	6	181	2.CD.200580.IC	■
5.90		118.0	138.7	6	181	2.CD.200590.IC	■
6.00		120.0	141.0	6	181	2.CD.200600.IC	■
6.350	**1/4**	127.0	149.2	8	188	2.CD.200F14.IC	■

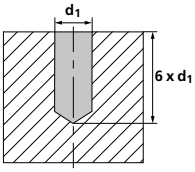
■ Stock item
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

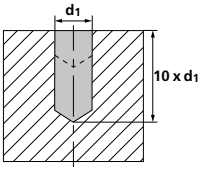
Complementary products	
CrazyDrill Coolpilot	p.156
CrazyDrill Crosspilot	p.146

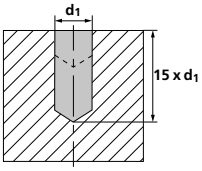
6 x d - 10 x d - 15 x d - 20 x d

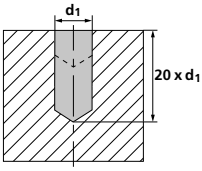
DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW





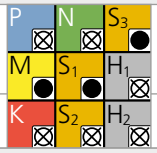






Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Low	Mid	High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010			
		1.0401	C15	AISI 1015			
		1.1191	C45E/CK45	AISI 1045			
		1.0044	S275JR	AISI 1020			
		1.0715	11SMn30	AISI 1215			
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	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	80	100
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	80	100
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	80	100
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	80	100
		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	40	50
		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	70	90
			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

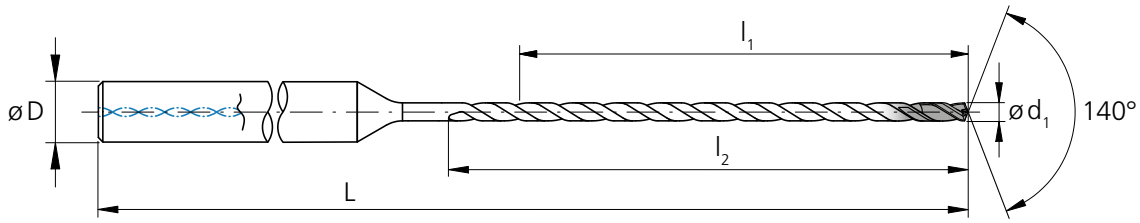


f [mm/rev]

Ød1	1.0 mm			1.25 mm			1.5 mm 1/16"			2.0 mm			2.5 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			5.0 mm 3/16" - 7/32"			6.0 mm 1/4"		
	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Tief	**Mid**	High
	0.010	0.020	0.030	0.013	0.025	0.038	0.015	0.030	0.045	0.020	0.040	0.060	0.025	0.050	0.075	0.030	0.060	0.090	0.040	0.080	0.120	0.050	0.100	0.150	0.060	0.120	0.180
	0.030	0.040	0.050	0.038	0.050	0.063	0.045	0.060	0.075	0.060	0.080	0.100	0.075	0.100	0.125	0.090	0.120	0.150	0.120	0.160	0.200	0.150	0.200	0.250	0.180	0.240	0.300
	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120	0.080	0.120	0.160	0.100	0.150	0.200	0.120	0.180	0.240
	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120	0.080	0.120	0.160	0.100	0.150	0.200	0.120	0.180	0.240
	0.010	0.015	0.020	0.013	0.019	0.025	0.015	0.023	0.030	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120
	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120	0.080	0.120	0.160	0.100	0.150	0.200	0.120	0.180	0.240

CrazyDrill Cool SST-Inox 30 x d

DRILLING WITH INTERNAL COOLING

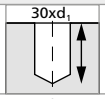
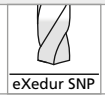


d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.45		43.5	48.6	4	95	2.CD.300145.IC	Δ
1.50		45.0	50.3	4	95	2.CD.300150.IC	■
1.55		46.5	51.9	4	95	2.CD.300155.IC	Δ
1.587	**1/16**	48.0	53.6	4	100	2.CD.300F116.IC	■
1.60		48.0	53.6	4	100	2.CD.300160.IC	■
1.65		49.5	55.3	4	100	2.CD.300165.IC	Δ
1.70		51.0	57.0	4	100	2.CD.300170.IC	■
1.75		52.5	58.6	4	105	2.CD.300175.IC	Δ
1.80		54.0	60.3	4	105	2.CD.300180.IC	■
1.85		55.5	62.0	4	105	2.CD.300185.IC	Δ
1.90		57.0	63.7	4	110	2.CD.300190.IC	■
1.95		58.5	65.3	4	110	2.CD.300195.IC	Δ
2.00		60.0	67.0	4	110	2.CD.300200.IC	■
2.05		61.5	68.7	4	115	2.CD.300205.IC	Δ
2.10		63.0	70.4	4	115	2.CD.300210.IC	■
2.15		64.5	72.0	4	115	2.CD.300215.IC	Δ
2.20		66.0	73.7	4	120	2.CD.300220.IC	■
2.25		67.5	75.4	4	120	2.CD.300225.IC	Δ
2.30		69.0	77.1	4	120	2.CD.300230.IC	■
2.35		70.5	78.7	4	125	2.CD.300235.IC	Δ

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.381	**3/32**	72.0	80.4	4	125	2.CD.300F332.IC	■
2.40		72.0	80.4	4	125	2.CD.300240.IC	■
2.45		73.5	82.1	4	125	2.CD.300245.IC	Δ
2.50		75.0	83.8	4	130	2.CD.300250.IC	■
2.55		76.5	85.4	4	130	2.CD.300255.IC	Δ
2.60		78.0	87.1	4	130	2.CD.300260.IC	■
2.65		79.5	88.8	4	135	2.CD.300265.IC	Δ
2.70		81.0	90.5	4	135	2.CD.300270.IC	■
2.75		82.5	92.1	4	138	2.CD.300275.IC	Δ
2.80		84.0	93.8	4	138	2.CD.300280.IC	■
2.85		85.5	95.5	4	138	2.CD.300285.IC	Δ
2.90		87.0	97.2	4	142	2.CD.300290.IC	■
2.95		88.5	98.8	4	142	2.CD.300295.IC	Δ
3.00		90.0	100.5	6	145	2.CD.300300.IC	■
3.05		91.5	102.2	6	148	2.CD.300305.IC	Δ
3.10		93.0	103.9	6	150	2.CD.300310.IC	■
3.15		94.5	105.5	6	150	2.CD.300315.IC	Δ
3.175	**1/8**	96.0	107.2	6	153	2.CD.300F18.IC	■
3.20		96.0	107.2	6	153	2.CD.300320.IC	■
3.25		97.5	108.9	6	153	2.CD.300325.IC	Δ

■ Stock item

Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm	+ 0.007 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.30		99.0	110.6	6	157	2.CD.300330.IC	■
3.35		100.5	112.2	6	157	2.CD.300335.IC	Δ
3.40		102.0	113.9	6	161	2.CD.300340.IC	■
3.45		103.5	115.6	6	161	2.CD.300345.IC	Δ
3.50		105.0	117.3	6	164	2.CD.300350.IC	■
3.55		106.5	118.9	6	164	2.CD.300355.IC	Δ
3.60		108.0	120.6	6	167	2.CD.300360.IC	■
3.65		109.5	122.3	6	167	2.CD.300365.IC	Δ
3.70		111.0	124.0	6	170	2.CD.300370.IC	■
3.75		112.5	125.6	6	170	2.CD.300375.IC	Δ
3.80		114.0	127.3	6	176	2.CD.300380.IC	■
3.85		115.5	129.0	6	176	2.CD.300385.IC	Δ
3.90		117.0	130.7	6	176	2.CD.300390.IC	■
3.95		118.5	132.3	6	176	2.CD.300395.IC	Δ
3.968	**5/32**	120.0	134.0	6	176	2.CD.300F532.IC	■
4.00		120.0	134.0	6	176	2.CD.300400.IC	■
4.10		123.0	137.4	6	181	2.CD.300410.IC	■
4.20		126.0	140.7	6	184	2.CD.300420.IC	■
4.30		129.0	144.1	6	188	2.CD.300430.IC	■
4.40		132.0	147.4	6	192	2.CD.300440.IC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.50		135.0	150.8	6	196	2.CD.300450.IC	■
4.60		138.0	154.1	6	196	2.CD.300460.IC	■
4.70		141.0	157.5	6	201	2.CD.300470.IC	■
4.762	**3/16**	144.0	160.8	6	205	2.CD.300F316.IC	■
4.80		144.0	160.8	6	205	2.CD.300480.IC	■
4.90		147.0	164.2	6	208	2.CD.300490.IC	■
5.00		150.0	167.5	6	211	2.CD.300500.IC	■
5.10		153.0	170.9	6	214	2.CD.300510.IC	■
5.20		156.0	174.2	6	221	2.CD.300520.IC	■
5.30		159.0	177.6	6	221	2.CD.300530.IC	■
5.40		162.0	180.9	6	223	2.CD.300540.IC	■
5.50		165.0	184.3	6	227	2.CD.300550.IC	■
5.560	**7/32**	168.0	187.6	6	230	2.CD.300F732.IC	■
5.60		168.0	187.6	6	230	2.CD.300560.IC	■
5.70		171.0	191.0	6	233	2.CD.300570.IC	■
5.80		174.0	194.3	6	236	2.CD.300580.IC	■
5.90		177.0	197.7	6	241	2.CD.300590.IC	■
6.00		180.0	201.0	6	241	2.CD.300600.IC	■
6.350	**1/4**	190.5	212.7	8	252	2.CD.300F14.IC	■

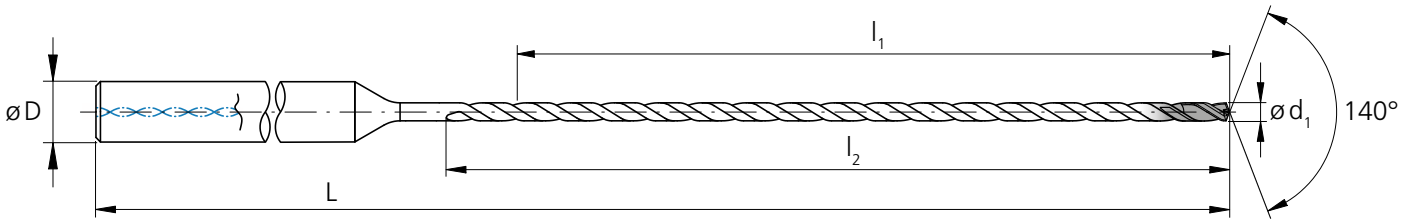
■ Stock item

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

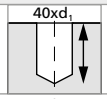
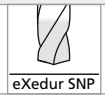


d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.00		80.0	87.0	4	132	2.CD.400200.IC	■
2.05		82.0	89.2	4	135	2.CD.400205.IC	Δ
2.10		84.0	91.4	4	135	2.CD.400210.IC	■
2.15		86.0	93.5	4	138	2.CD.400215.IC	Δ
2.20		88.0	95.7	4	143	2.CD.400220.IC	■
2.25		90.0	97.9	4	143	2.CD.400225.IC	Δ
2.30		92.0	100.1	4	145	2.CD.400230.IC	■
2.35		94.0	102.2	4	148	2.CD.400235.IC	Δ
2.381	**3/32**	96.0	104.4	4	148	2.CD.400F332.IC	■
2.40		96.0	104.4	4	148	2.CD.400240.IC	■
2.45		98.0	106.6	4	151	2.CD.400245.IC	Δ
2.50		100.0	108.8	4	156	2.CD.400250.IC	■
2.55		102.0	110.9	4	156	2.CD.400255.IC	Δ
2.60		104.0	113.1	4	158	2.CD.400260.IC	■
2.65		106.0	115.3	4	160	2.CD.400265.IC	Δ
2.70		108.0	117.5	4	162	2.CD.400270.IC	■
2.75		110.0	119.6	4	162	2.CD.400275.IC	Δ

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.80		112.0	121.8	4	165	2.CD.400280.IC	■
2.85		114.0	124.0	4	165	2.CD.400285.IC	Δ
2.90		116.0	126.2	4	172	2.CD.400290.IC	■
2.95		118.0	128.3	4	172	2.CD.400295.IC	Δ
3.00		120.0	130.5	6	178	2.CD.400300.IC	■
3.05		122.0	132.7	6	180	2.CD.400305.IC	Δ
3.10		124.0	134.9	6	182	2.CD.400310.IC	■
3.15		126.0	137.0	6	184	2.CD.400315.IC	Δ
3.175	**1/8**	128.0	139.2	6	186	2.CD.400F18.IC	■
3.20		128.0	139.2	6	186	2.CD.400320.IC	■
3.25		130.0	141.4	6	188	2.CD.400325.IC	Δ
3.30		132.0	143.6	6	190	2.CD.400330.IC	■
3.35		134.0	145.7	6	192	2.CD.400335.IC	Δ
3.40		136.0	147.9	6	196	2.CD.400340.IC	■
3.45		138.0	150.1	6	196	2.CD.400345.IC	Δ
3.50		140.0	152.3	6	199	2.CD.400350.IC	■
3.55		142.0	154.4	6	201	2.CD.400355.IC	Δ

■ Stock item

Δ Delivery term upon request,
minimum purchase order quantity 3 pcs.

Carbide |  |  | Z2 |  | 

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.004 mm 0	+ 0.006 mm + 0.001 mm	+ 0.007 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.60		144.0	156.6	6	203	2.CD.400360.IC	■
3.65		146.0	158.8	6	205	2.CD.400365.IC	Δ
3.70		148.0	161.0	6	207	2.CD.400370.IC	■
3.75		150.0	163.1	6	210	2.CD.400375.IC	Δ
3.80		152.0	165.3	6	212	2.CD.400380.IC	■
3.85		154.0	167.5	6	216	2.CD.400385.IC	Δ
3.90		156.0	169.7	6	216	2.CD.400390.IC	■
3.95		158.0	171.8	6	216	2.CD.400395.IC	Δ
3.968	**5/32**	160.0	174.0	6	216	2.CD.400F532.IC	■
4.00		160.0	174.0	6	216	2.CD.400400.IC	■
4.10		164.0	178.4	6	224	2.CD.400410.IC	■
4.20		168.0	182.7	6	228	2.CD.400420.IC	■
4.30		172.0	187.1	6	232	2.CD.400430.IC	■
4.40		176.0	191.4	6	236	2.CD.400440.IC	■
4.50		180.0	195.8	6	241	2.CD.400450.IC	■
4.60		184.0	200.1	6	241	2.CD.400460.IC	■
4.70		188.0	204.5	6	250	2.CD.400470.IC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.762	**3/16**	192.0	208.8	6	254	2.CD.400F316.IC	■
4.80		192.0	208.8	6	254	2.CD.400480.IC	■
4.90		196.0	213.2	6	258	2.CD.400490.IC	■
5.00		200.0	217.5	6	261	2.CD.400500.IC	■
5.10		204.0	221.9	6	267	2.CD.400510.IC	■
5.20		208.0	226.2	6	271	2.CD.400520.IC	■
5.30		212.0	230.6	6	271	2.CD.400530.IC	■
5.40		216.0	234.9	6	280	2.CD.400540.IC	■
5.50		220.0	239.3	6	284	2.CD.400550.IC	■
5.560	**7/32**	224.0	243.6	6	288	2.CD.400F732.IC	■
5.60		224.0	243.6	6	288	2.CD.400560.IC	■
5.70		228.0	248.0	6	292	2.CD.400570.IC	■
5.80		232.0	252.3	6	296	2.CD.400580.IC	■
5.90		236.0	256.7	6	301	2.CD.400590.IC	■
6.00		240.0	261.0	6	301	2.CD.400600.IC	■
6.350	**1/4**	254.0	276.2	8	315	2.CD.400F14.IC	■

■ Stock item

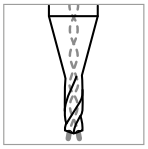
Δ Delivery term upon request, minimum purchase order quantity 3 pcs.

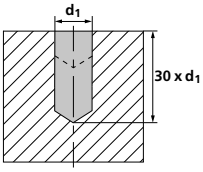
Complementary products

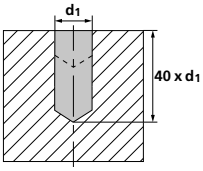
CrazyDrill Coolpilot p.156
CrazyDrill Crosspilot p.146

30 x d - 40 x d

DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW

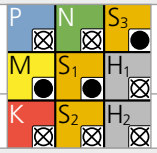






Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Low	Mid	High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010			
		1.0401	C15	AISI 1015			
		1.1191	C45E/CK45	AISI 1045			
		1.0044	S275JR	AISI 1020			
		1.0715	11SMn30	AISI 1215			
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	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	80	100
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	80	100
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	60	80	100
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	60	80	100
		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	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	2.0040	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	35	45
		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	70	90
			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]

Ød1	1.45 mm 1/16"			2.0 mm			2.5 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			5.0 mm 3/16" - 7/32"			6.0 mm 1/4"		
	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High	Low	**Mid**	High
	0.015	0.023	0.030	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120
	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120	0.080	0.120	0.160	0.100	0.150	0.200	0.120	0.180	0.240
	0.015	0.030	0.045	0.020	0.040	0.060	0.025	0.050	0.075	0.030	0.060	0.090	0.040	0.080	0.120	0.050	0.100	0.150	0.060	0.120	0.180
	0.015	0.030	0.045	0.020	0.040	0.060	0.025	0.050	0.075	0.030	0.060	0.090	0.040	0.080	0.120	0.050	0.100	0.150	0.060	0.120	0.180
	0.015	0.023	0.030	0.020	0.030	0.040	0.025	0.038	0.050	0.030	0.045	0.060	0.040	0.060	0.080	0.050	0.075	0.100	0.060	0.090	0.120
	0.015	0.030	0.045	0.020	0.040	0.060	0.025	0.050	0.075	0.030	0.060	0.090	0.040	0.080	0.120	0.050	0.100	0.150	0.060	0.120	0.180

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 < 2 mm filter quality ≤ 0.010 mm.
- Drill with Ø < 3 mm filter quality ≤ 0.020 mm.
- Drill with Ø < 6.35 mm filter quality ≤ 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, Tool	[mm]	1.0 mm - 2.0 mm		2.0 mm - 4.0 mm		4.0 mm - 6.35 mm	
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

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

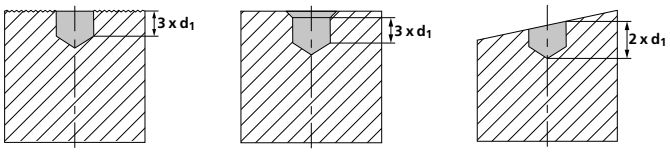
ACCURATE AND QUICK DRILLING UP TO 20 X D

1 | PILOT DRILLING

Turn on internal coolant.

With CrazyDrill Coolpilot (irregular or rough surfaces) up to 3 x d with simultaneous chamfer of 90°.

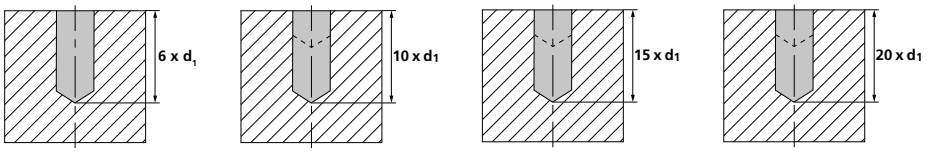
With CrazyDrill Crosspilot for all versions on inclined surfaces.



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 is possible immediately get into the material and drill using the recommended cutting speed and feed.

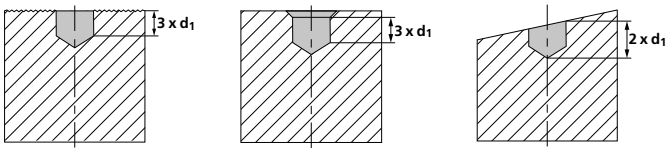
DRILLING IN ONE STEP 30 X D AND 40 X D

1 | PILOT DRILLING

Turn on internal coolant.

With CrazyDrill Coolpilot (irregular or rough surfaces) up to 3 x d with simultaneous chamfer of 90°.

With CrazyDrill Crosspilot for all versions on inclined surfaces.



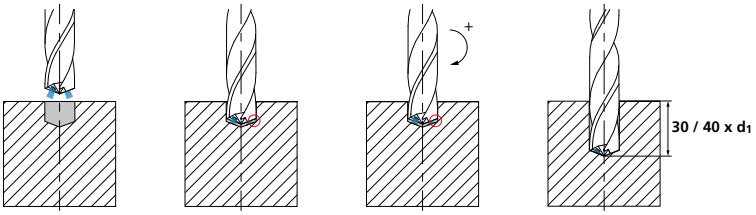
2 | DEEP HOLE DRILLING

Turn on coolant. Enter the hole at a maximum speed n = 500 rpm and v_f = 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.

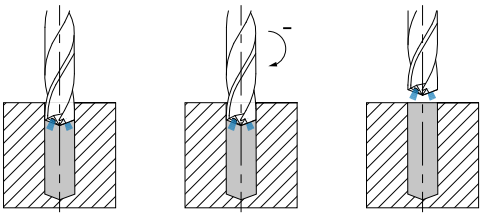


3 | EXIT FROM BORE

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 = 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 1.0 mm up 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 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

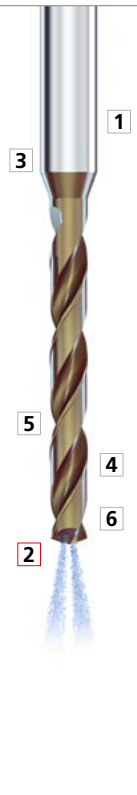
Geometry PTC

CRAZYDRILL by Mikron Tool Cool Titanium PTC

3 x d

page 352

6 x d



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NEW

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

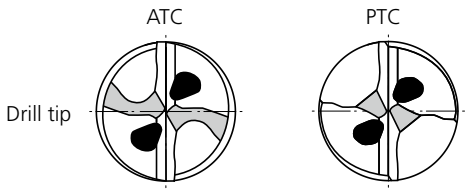
2 | NEW GENERATION OF COOLING CHANNELS
Due to a newly designed shape of helical cooling channels, up to four times more coolant volume reaches the drill tip. The result is continuous and efficient chip removal as well as constant and substantial cooling of cutting edges. A Powerchamber additionally guarantees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



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

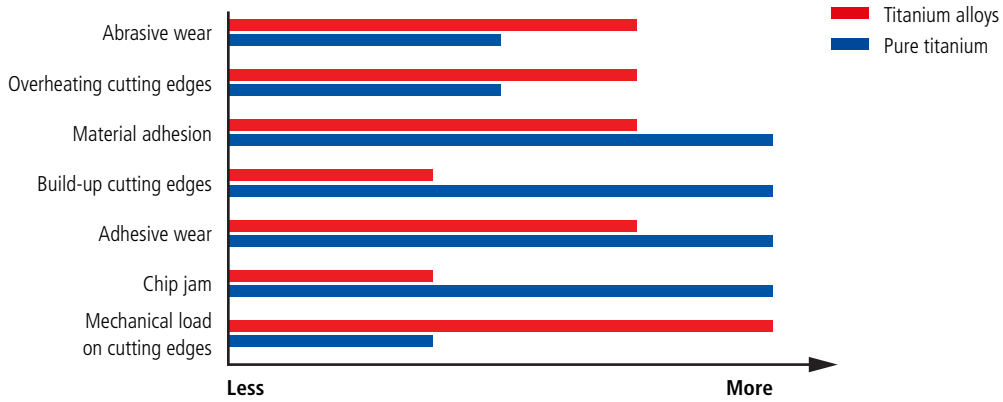
- Maximum drilling speed (e.g. 10 x d in one shot drilling with ATC)
- Excellent drilling quality
- Process reliability
- Up to 3 times longer tool life

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.

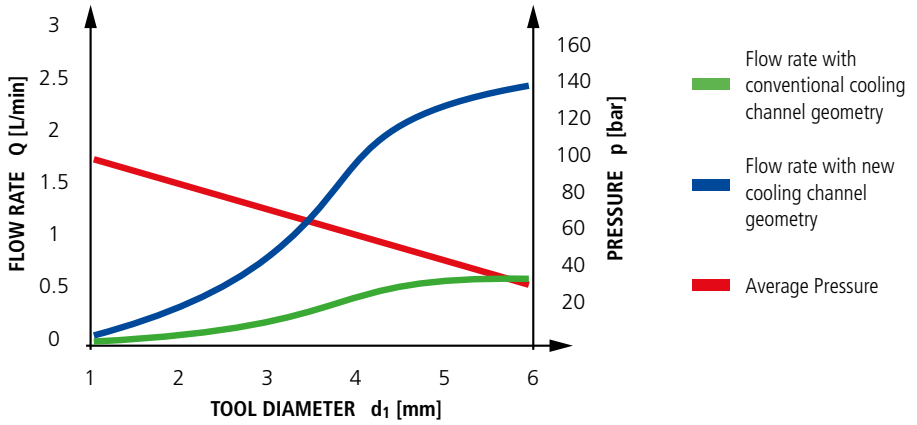
Material	Thermal conductivity
Aluminum	167 W/mK
Stainless steel	21 W/mK
Titanium alloy	**7 W/mK**

Solution

Innovative cooling concept

Conventional

New



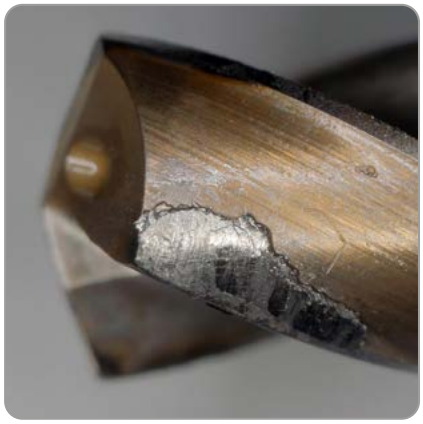
Two specially designed cooling channels with a very large cross-section guide massive amounts of cooling lubricant to the drill tip to avoid excessive thermal loads on the cutting edges. The patented special shape of the cooling channels allows up to 4 times more coolant (compared to conventional cooling 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

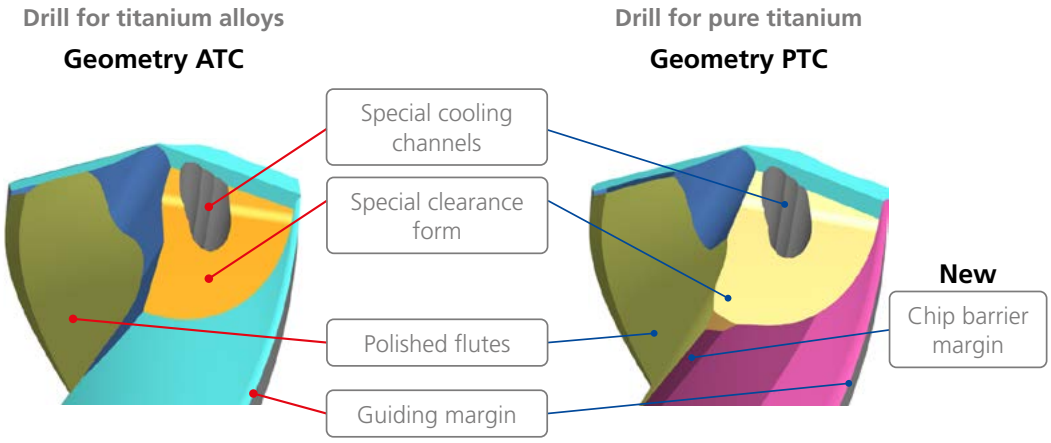
Material adhesion



Material adhesions on guiding margin and the secondary margin have a negative effect on the hole quality.

Solution

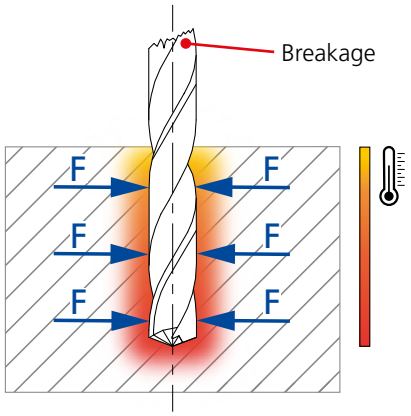
Guiding margin and the newly designed chip barrier margin



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	●	●

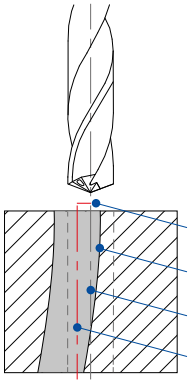
The solution is sharply ground cutting edges that must be stable at the same time - a contradiction in terms. A unique specific cutting edge geometry has been developed for titanium drills that masters this balance. As a result, cutting pressures and temperature are significantly reduced.

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.

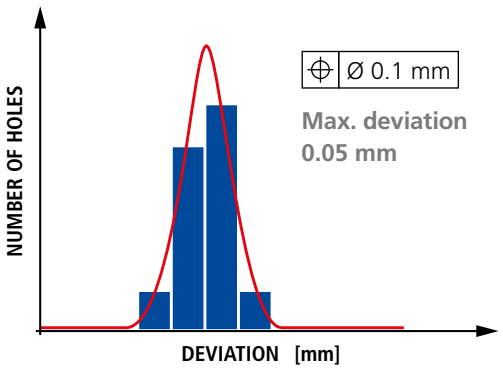
Solution

Specific pilot drill

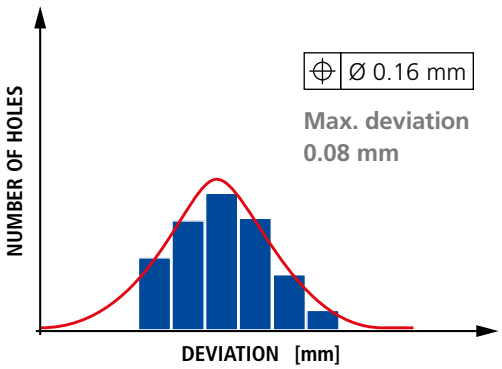
To achieve high position accuracy, the new pilot drill (with 90° chamfer) CrazyDrill Coolpilot Titanium ATC can be used.

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 = 60 m/min; f = 0.08 mm/rev

Maximum performance guaranteed

EXAMPLE IN TITANIUM MACHINING IN COMPARISON

■ Example

Longer tool life

Machining: Drilling in one shot
Drilling depth: 10 mm;
Coolant: Emulsion 8%

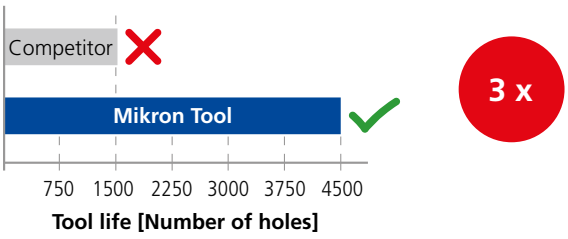
Titanium alloy: Ti Gr.5 / 3.7165 / TiAl6V4 / ASTM B348 S2

Tool: CrazyDrill Cool Titanium ATC
Diameter: 1.0 mm

Cutting data:

Conventional titanium drill		**CrazyDrill Cool Titanium ATC**	
v_c = 60 m/min	f = 0.020 mm/rev	v_c = 60 m/min	f = 0.020 mm/rev

Results:

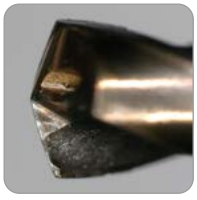


Competitor

Breakage

Mikron Tool

Front view

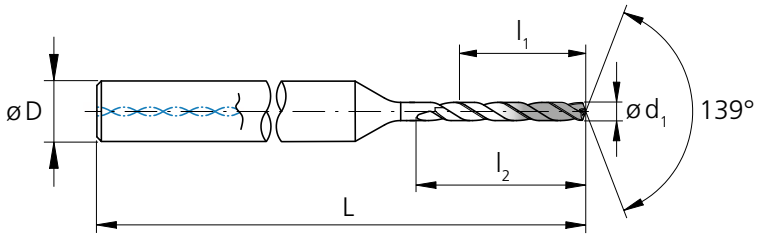


Flute view

Guiding margin view

NEW CrazyDrill Cool Titanium ATC - 6 x d

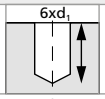
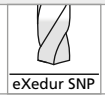
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		6.0	9.0	4	55	2.CD.060100.ATC	■
1.05		6.3	9.5	4	55	2.CD.060105.ATC	■
1.10		6.6	9.9	4	55	2.CD.060110.ATC	■
1.15		6.9	10.4	4	55	2.CD.060115.ATC	■
1.20		7.2	10.8	4	57	2.CD.060120.ATC	■
1.25		7.5	11.3	4	57	2.CD.060125.ATC	■
1.30		7.8	11.7	4	57	2.CD.060130.ATC	■
1.35		8.1	12.2	4	57	2.CD.060135.ATC	■
1.40		8.4	12.6	4	57	2.CD.060140.ATC	■
1.45		8.7	13.1	4	58	2.CD.060145.ATC	■
1.50		9.0	13.5	4	58	2.CD.060150.ATC	■
1.55		9.3	14.0	4	58	2.CD.060155.ATC	■
1.587	**1/16**	9.5	14.3	4	58	2.CD.060F116.ATC	■
1.60		9.6	14.4	4	58	2.CD.060160.ATC	■
1.65		9.9	14.9	4	58	2.CD.060165.ATC	■
1.70		10.2	15.3	4	60	2.CD.060170.ATC	■
1.75		10.5	15.8	4	60	2.CD.060175.ATC	■
1.80		10.8	16.2	4	60	2.CD.060180.ATC	■
1.85		11.1	16.7	4	60	2.CD.060185.ATC	■
1.90		11.4	17.1	4	60	2.CD.060190.ATC	■
1.95		11.7	17.6	4	60	2.CD.060195.ATC	■
2.00		12.0	18.0	4	63	2.CD.060200.ATC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.05		12.3	18.5	4	63	2.CD.060205.ATC	■
2.10		12.6	18.9	4	63	2.CD.060210.ATC	■
2.15		12.9	19.4	4	63	2.CD.060215.ATC	■
2.20		13.2	19.8	4	63	2.CD.060220.ATC	■
2.25		13.5	20.3	4	63	2.CD.060225.ATC	■
2.30		13.8	20.7	4	65	2.CD.060230.ATC	■
2.35		14.1	21.2	4	65	2.CD.060235.ATC	■
2.381	**3/32**	14.3	21.4	4	65	2.CD.060F332.ATC	■
2.40		14.4	21.6	4	65	2.CD.060240.ATC	■
2.45		14.7	22.1	4	65	2.CD.060245.ATC	■
2.50		15.0	22.5	4	65	2.CD.060250.ATC	■
2.55		15.3	23.0	4	65	2.CD.060255.ATC	■
2.60		15.6	23.4	4	68	2.CD.060260.ATC	■
2.65		15.9	23.9	4	68	2.CD.060265.ATC	■
2.70		16.2	24.3	4	68	2.CD.060270.ATC	■
2.75		16.5	24.8	4	68	2.CD.060275.ATC	■
2.80		16.8	25.2	4	68	2.CD.060280.ATC	■
2.85		17.1	25.7	4	68	2.CD.060285.ATC	■
2.90		17.4	26.1	4	68	2.CD.060290.ATC	■
2.95		17.7	26.6	4	68	2.CD.060295.ATC	■
3.00		18.0	27.0	6	74	2.CD.060300.ATC	■
3.05		18.3	27.5	6	74	2.CD.060305.ATC	■

■ Stock item

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm	+ 0.010 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.10		18.6	27.9	6	74	2.CD.060310.ATC	■
3.15		18.9	28.4	6	74	2.CD.060315.ATC	■
3.175	**1/8**	19.1	28.6	6	74	2.CD.060F18.ATC	■
3.20		19.2	28.8	6	74	2.CD.060320.ATC	■
3.25		19.5	29.3	6	74	2.CD.060325.ATC	■
3.30		19.8	29.7	6	74	2.CD.060330.ATC	■
3.35		20.1	30.2	6	74	2.CD.060335.ATC	■
3.40		20.4	30.6	6	74	2.CD.060340.ATC	■
3.45		20.7	31.1	6	74	2.CD.060345.ATC	■
3.50		21.0	31.5	6	78	2.CD.060350.ATC	■
3.55		21.3	32.0	6	78	2.CD.060355.ATC	■
3.60		21.6	32.4	6	78	2.CD.060360.ATC	■
3.65		21.9	32.9	6	78	2.CD.060365.ATC	■
3.70		22.2	33.3	6	78	2.CD.060370.ATC	■
3.75		22.5	33.8	6	78	2.CD.060375.ATC	■
3.80		22.8	34.2	6	78	2.CD.060380.ATC	■
3.85		23.1	34.7	6	78	2.CD.060385.ATC	■
3.90		23.4	35.1	6	78	2.CD.060390.ATC	■
3.95		23.7	35.6	6	78	2.CD.060395.ATC	■
3.968	**5/32**	23.8	35.7	6	78	2.CD.060F532.ATC	■
4.00		24.0	36.0	6	78	2.CD.060400.ATC	■
4.10		24.6	36.9	6	80	2.CD.060410.ATC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.20		25.2	37.8	6	80	2.CD.060420.ATC	■
4.30		25.8	38.7	6	80	2.CD.060430.ATC	■
4.40		26.4	39.6	6	80	2.CD.060440.ATC	■
4.50		27.0	40.5	6	80	2.CD.060450.ATC	■
4.60		27.6	41.4	6	80	2.CD.060460.ATC	■
4.70		28.2	42.3	6	84	2.CD.060470.ATC	■
4.762	**3/16**	28.6	42.9	6	84	2.CD.060F316.ATC	■
4.80		28.8	43.2	6	84	2.CD.060480.ATC	■
4.90		29.4	44.1	6	84	2.CD.060490.ATC	■
5.00		30.0	45.0	6	84	2.CD.060500.ATC	■
5.10		30.6	45.9	6	84	2.CD.060510.ATC	■
5.20		31.2	46.8	6	84	2.CD.060520.ATC	■
5.30		31.8	47.7	6	84	2.CD.060530.ATC	■
5.40		32.4	48.6	6	88	2.CD.060540.ATC	■
5.50		33.0	49.5	6	88	2.CD.060550.ATC	■
5.560	**7/32**	33.4	50.0	6	88	2.CD.060F732.ATC	■
5.60		33.6	50.4	6	88	2.CD.060560.ATC	■
5.70		34.2	51.3	6	88	2.CD.060570.ATC	■
5.80		34.8	52.2	6	88	2.CD.060580.ATC	■
5.90		35.4	53.1	6	88	2.CD.060590.ATC	■
6.00		36.0	54.0	6	88	2.CD.060600.ATC	■
6.350	**1/4**	38.1	57.2	8	98	2.CD.060F14.ATC	■

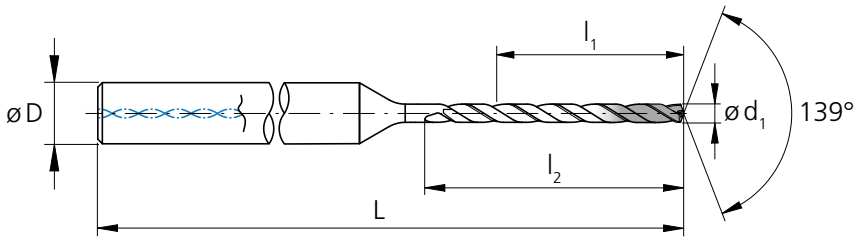
■ Stock item

Complementary products

CrazyDrill Coolpilot Titanium p.166
CrazyDrill Crosspilot p.146

NEW CrazyDrill Cool Titanium ATC - 10 x d

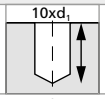
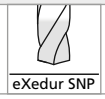
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		10.0	13.0	4	59	2.CD.100100.ATC	■
1.05		10.5	13.7	4	59	2.CD.100105.ATC	■
1.10		11.0	14.3	4	59	2.CD.100110.ATC	■
1.15		11.5	15.0	4	59	2.CD.100115.ATC	■
1.20		12.0	15.6	4	62	2.CD.100120.ATC	■
1.25		12.5	16.3	4	62	2.CD.100125.ATC	■
1.30		13.0	16.9	4	62	2.CD.100130.ATC	■
1.35		13.5	17.6	4	62	2.CD.100135.ATC	■
1.40		14.0	18.2	4	62	2.CD.100140.ATC	■
1.45		14.5	18.9	4	65	2.CD.100145.ATC	■
1.50		15.0	19.5	4	65	2.CD.100150.ATC	■
1.55		15.5	20.2	4	65	2.CD.100155.ATC	■
1.587	**1/16**	15.9	20.6	4	65	2.CD.100F116.ATC	■
1.60		16.0	20.8	4	65	2.CD.100160.ATC	■
1.65		16.5	21.5	4	65	2.CD.100165.ATC	■
1.70		17.0	22.1	4	67	2.CD.100170.ATC	■
1.75		17.5	22.8	4	67	2.CD.100175.ATC	■
1.80		18.0	23.4	4	67	2.CD.100180.ATC	■
1.85		18.5	24.1	4	67	2.CD.100185.ATC	■
1.90		19.0	24.7	4	67	2.CD.100190.ATC	■
1.95		19.5	25.4	4	67	2.CD.100195.ATC	■
2.00		20.0	26.0	4	70	2.CD.100200.ATC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.05		20.5	26.7	4	70	2.CD.100205.ATC	■
2.10		21.0	27.3	4	70	2.CD.100210.ATC	■
2.15		21.5	28.0	4	70	2.CD.100215.ATC	■
2.20		22.0	28.6	4	70	2.CD.100220.ATC	■
2.25		22.5	29.3	4	70	2.CD.100225.ATC	■
2.30		23.0	29.9	4	75	2.CD.100230.ATC	■
2.35		23.5	30.6	4	75	2.CD.100235.ATC	■
2.381	**3/32**	23.8	31.0	4	75	2.CD.100F332.ATC	■
2.40		24.0	31.2	4	75	2.CD.100240.ATC	■
2.45		24.5	31.9	4	75	2.CD.100245.ATC	■
2.50		25.0	32.5	4	75	2.CD.100250.ATC	■
2.55		25.5	33.2	4	75	2.CD.100255.ATC	■
2.60		26.0	33.8	4	80	2.CD.100260.ATC	■
2.65		26.5	34.5	4	80	2.CD.100265.ATC	■
2.70		27.0	35.1	4	80	2.CD.100270.ATC	■
2.75		27.5	35.8	4	80	2.CD.100275.ATC	■
2.80		28.0	36.4	4	80	2.CD.100280.ATC	■
2.85		28.5	37.1	4	80	2.CD.100285.ATC	■
2.90		29.0	37.7	4	80	2.CD.100290.ATC	■
2.95		29.5	38.4	4	80	2.CD.100295.ATC	■
3.00		30.0	39.0	6	87	2.CD.100300.ATC	■
3.05		30.5	39.7	6	87	2.CD.100305.ATC	■

■ Stock item

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm	+ 0.010 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.10		31.0	40.3	6	87	2.CD.100310.ATC	■
3.15		31.5	41.0	6	87	2.CD.100315.ATC	■
3.175	**1/8**	32.0	41.3	6	87	2.CD.100F18.ATC	■
3.20		32.0	41.6	6	87	2.CD.100320.ATC	■
3.25		32.5	42.3	6	87	2.CD.100325.ATC	■
3.30		33.0	42.9	6	87	2.CD.100330.ATC	■
3.35		33.5	43.6	6	87	2.CD.100335.ATC	■
3.40		34.0	44.2	6	87	2.CD.100340.ATC	■
3.45		34.5	44.9	6	87	2.CD.100345.ATC	■
3.50		35.0	45.5	6	95	2.CD.100350.ATC	■
3.55		35.5	46.2	6	95	2.CD.100355.ATC	■
3.60		36.0	46.8	6	95	2.CD.100360.ATC	■
3.65		36.5	47.5	6	95	2.CD.100365.ATC	■
3.70		37.0	48.1	6	95	2.CD.100370.ATC	■
3.75		37.5	48.8	6	95	2.CD.100375.ATC	■
3.80		38.0	49.4	6	95	2.CD.100380.ATC	■
3.85		38.5	50.1	6	95	2.CD.100385.ATC	■
3.90		39.0	50.7	6	95	2.CD.100390.ATC	■
3.95		39.5	51.4	6	95	2.CD.100395.ATC	■
3.968	**5/32**	40.0	51.6	6	95	2.CD.100F532.ATC	■
4.00		40.0	52.0	6	95	2.CD.100400.ATC	■
4.10		41.0	53.3	6	100	2.CD.100410.ATC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.20		42.0	54.6	6	100	2.CD.100420.ATC	■
4.30		43.0	55.9	6	100	2.CD.100430.ATC	■
4.40		44.0	57.2	6	100	2.CD.100440.ATC	■
4.50		45.0	58.5	6	100	2.CD.100450.ATC	■
4.60		46.0	59.8	6	100	2.CD.100460.ATC	■
4.70		47.0	61.1	6	105	2.CD.100470.ATC	■
4.762	**3/16**	48.0	61.9	6	105	2.CD.100F316.ATC	■
4.80		48.0	62.4	6	105	2.CD.100480.ATC	■
4.90		49.0	63.7	6	105	2.CD.100490.ATC	■
5.00		50.0	65.0	6	105	2.CD.100500.ATC	■
5.10		51.0	66.3	6	105	2.CD.100510.ATC	■
5.20		52.0	67.6	6	105	2.CD.100520.ATC	■
5.30		53.0	68.9	6	105	2.CD.100530.ATC	■
5.40		54.0	70.2	6	112	2.CD.100540.ATC	■
5.50		55.0	71.5	6	112	2.CD.100550.ATC	■
5.560	**7/32**	56.0	72.3	6	112	2.CD.100F732.ATC	■
5.60		56.0	72.8	6	112	2.CD.100560.ATC	■
5.70		57.0	74.1	6	112	2.CD.100570.ATC	■
5.80		58.0	75.4	6	112	2.CD.100580.ATC	■
5.90		59.0	76.7	6	112	2.CD.100590.ATC	■
6.00		60.0	78.0	6	112	2.CD.100600.ATC	■
6.350	**1/4**	63.5	82.6	8	125	2.CD.100F14.ATC	■

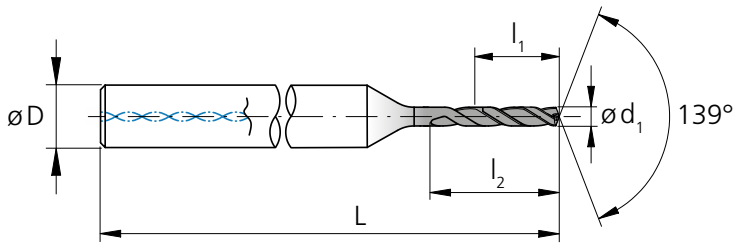
■ Stock item

Complementary products

CrazyDrill Coolpilot Titanium p.166
CrazyDrill Crosspilot p.146

NEW CrazyDrill Cool Titanium PTC - 3 x d

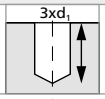
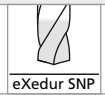
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		3.00	6.0	4	50	2.CD.030100.PTC	■
1.05		3.15	6.3	4	50	2.CD.030105.PTC	■
1.10		3.30	6.6	4	50	2.CD.030110.PTC	■
1.15		3.45	6.9	4	50	2.CD.030115.PTC	■
1.20		3.60	7.2	4	50	2.CD.030120.PTC	■
1.25		3.75	7.5	4	50	2.CD.030125.PTC	■
1.30		3.90	7.8	4	50	2.CD.030130.PTC	■
1.35		4.05	8.1	4	50	2.CD.030135.PTC	■
1.40		4.20	8.4	4	50	2.CD.030140.PTC	■
1.45		4.35	8.7	4	50	2.CD.030145.PTC	■
1.50		4.50	9.0	4	50	2.CD.030150.PTC	■
1.55		4.65	9.3	4	50	2.CD.030155.PTC	■
1.587	**1/16**	4.76	9.5	4	50	2.CD.030F116.PTC	■
1.60		4.80	9.6	4	50	2.CD.030160.PTC	■
1.65		4.95	9.9	4	50	2.CD.030165.PTC	■
1.70		5.10	10.2	4	53	2.CD.030170.PTC	■
1.75		5.25	10.5	4	53	2.CD.030175.PTC	■
1.80		5.40	10.8	4	53	2.CD.030180.PTC	■
1.85		5.55	11.1	4	53	2.CD.030185.PTC	■
1.90		5.70	11.4	4	53	2.CD.030190.PTC	■
1.95		5.85	11.7	4	53	2.CD.030195.PTC	■
2.00		6.00	12.0	4	55	2.CD.030200.PTC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.05		6.15	12.3	4	55	2.CD.030205.PTC	■
2.10		6.30	12.6	4	55	2.CD.030210.PTC	■
2.15		6.45	12.9	4	55	2.CD.030215.PTC	■
2.20		6.60	13.2	4	55	2.CD.030220.PTC	■
2.25		6.75	13.5	4	55	2.CD.030225.PTC	■
2.30		6.90	13.8	4	57	2.CD.030230.PTC	■
2.35		7.05	14.1	4	57	2.CD.030235.PTC	■
2.381	**3/32**	7.14	14.3	4	57	2.CD.030F332.PTC	■
2.40		7.20	14.4	4	57	2.CD.030240.PTC	■
2.45		7.35	14.7	4	57	2.CD.030245.PTC	■
2.50		7.50	15.0	4	57	2.CD.030250.PTC	■
2.55		7.65	15.3	4	57	2.CD.030255.PTC	■
2.60		7.80	15.6	4	57	2.CD.030260.PTC	■
2.65		7.95	15.9	4	57	2.CD.030265.PTC	■
2.70		8.10	16.2	4	57	2.CD.030270.PTC	■
2.75		8.25	16.5	4	57	2.CD.030275.PTC	■
2.80		8.40	16.8	4	57	2.CD.030280.PTC	■
2.85		8.55	17.1	4	57	2.CD.030285.PTC	■
2.90		8.70	17.4	4	57	2.CD.030290.PTC	■
2.95		8.85	17.7	4	57	2.CD.030295.PTC	■
3.00		9.00	18.0	6	65	2.CD.030300.PTC	■
3.05		9.15	18.3	6	65	2.CD.030305.PTC	■

■ Stock item

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm	+ 0.010 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.10		9.30	18.6	6	65	2.CD.030310.PTC	■
3.15		9.45	18.9	6	65	2.CD.030315.PTC	■
3.175	**1/8**	9.53	19.1	6	65	2.CD.030F18.PTC	■
3.20		9.60	19.2	6	65	2.CD.030320.PTC	■
3.25		9.75	19.5	6	65	2.CD.030325.PTC	■
3.30		9.90	19.8	6	65	2.CD.030330.PTC	■
3.35		10.05	20.1	6	65	2.CD.030335.PTC	■
3.40		10.20	20.4	6	65	2.CD.030340.PTC	■
3.45		10.35	20.7	6	65	2.CD.030345.PTC	■
3.50		10.50	21.0	6	68	2.CD.030350.PTC	■
3.55		10.65	21.3	6	68	2.CD.030355.PTC	■
3.60		10.80	21.6	6	68	2.CD.030360.PTC	■
3.65		10.95	21.9	6	68	2.CD.030365.PTC	■
3.70		11.10	22.2	6	68	2.CD.030370.PTC	■
3.75		11.25	22.5	6	68	2.CD.030375.PTC	■
3.80		11.40	22.8	6	68	2.CD.030380.PTC	■
3.85		11.55	23.1	6	68	2.CD.030385.PTC	■
3.90		11.70	23.4	6	68	2.CD.030390.PTC	■
3.95		11.85	23.7	6	68	2.CD.030395.PTC	■
3.968	**5/32**	11.90	23.8	6	68	2.CD.030F532.PTC	■
4.00		12.00	24.0	6	68	2.CD.030400.PTC	■
4.10		12.30	24.6	6	72	2.CD.030410.PTC	■

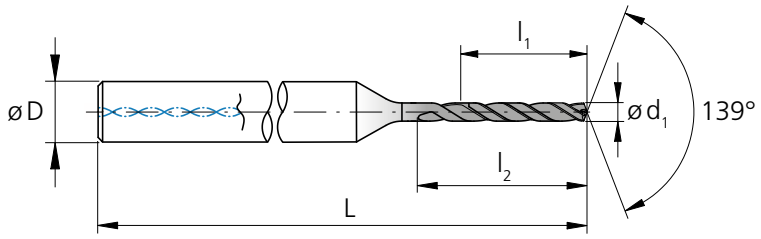
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.20		12.60	25.2	6	72	2.CD.030420.PTC	■
4.30		12.90	25.8	6	72	2.CD.030430.PTC	■
4.40		13.20	26.4	6	72	2.CD.030440.PTC	■
4.50		13.50	27.0	6	72	2.CD.030450.PTC	■
4.60		13.80	27.6	6	72	2.CD.030460.PTC	■
4.70		14.10	28.2	6	75	2.CD.030470.PTC	■
4.762	**3/16**	14.29	28.6	6	75	2.CD.030F316.PTC	■
4.80		14.40	28.8	6	75	2.CD.030480.PTC	■
4.90		14.70	29.4	6	75	2.CD.030490.PTC	■
5.00		15.00	30.0	6	75	2.CD.030500.PTC	■
5.10		15.30	30.6	6	75	2.CD.030510.PTC	■
5.20		15.60	31.2	6	75	2.CD.030520.PTC	■
5.30		15.90	31.8	6	75	2.CD.030530.PTC	■
5.40		16.20	32.4	6	80	2.CD.030540.PTC	■
5.50		16.50	33.0	6	80	2.CD.030550.PTC	■
5.560	**7/32**	16.68	33.4	6	80	2.CD.030F732.PTC	■
5.60		16.80	33.6	6	80	2.CD.030560.PTC	■
5.70		17.10	34.2	6	80	2.CD.030570.PTC	■
5.80		17.40	34.8	6	80	2.CD.030580.PTC	■
5.90		17.70	35.4	6	80	2.CD.030590.PTC	■
6.00		18.00	36.0	6	80	2.CD.030600.PTC	■
6.350	**1/4**	19.05	38.1	8	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

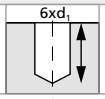
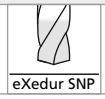
DRILLING WITH INTERNAL COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.00		6.0	9.0	4	55	2.CD.060100.PTC	■
1.05		6.3	9.5	4	55	2.CD.060105.PTC	■
1.10		6.6	9.9	4	55	2.CD.060110.PTC	■
1.15		6.9	10.4	4	55	2.CD.060115.PTC	■
1.20		7.2	10.8	4	57	2.CD.060120.PTC	■
1.25		7.5	11.3	4	57	2.CD.060125.PTC	■
1.30		7.8	11.7	4	57	2.CD.060130.PTC	■
1.35		8.1	12.2	4	57	2.CD.060135.PTC	■
1.40		8.4	12.6	4	57	2.CD.060140.PTC	■
1.45		8.7	13.1	4	58	2.CD.060145.PTC	■
1.50		9.0	13.5	4	58	2.CD.060150.PTC	■
1.55		9.3	14.0	4	58	2.CD.060155.PTC	■
1.587	**1/16**	9.5	14.3	4	58	2.CD.060F116.PTC	■
1.60		9.6	14.4	4	58	2.CD.060160.PTC	■
1.65		9.9	14.9	4	58	2.CD.060165.PTC	■
1.70		10.2	15.3	4	60	2.CD.060170.PTC	■
1.75		10.5	15.8	4	60	2.CD.060175.PTC	■
1.80		10.8	16.2	4	60	2.CD.060180.PTC	■
1.85		11.1	16.7	4	60	2.CD.060185.PTC	■
1.90		11.4	17.1	4	60	2.CD.060190.PTC	■
1.95		11.7	17.6	4	60	2.CD.060195.PTC	■
2.00		12.0	18.0	4	63	2.CD.060200.PTC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.05		12.3	18.5	4	63	2.CD.060205.PTC	■
2.10		12.6	18.9	4	63	2.CD.060210.PTC	■
2.15		12.9	19.4	4	63	2.CD.060215.PTC	■
2.20		13.2	19.8	4	63	2.CD.060220.PTC	■
2.25		13.5	20.3	4	63	2.CD.060225.PTC	■
2.30		13.8	20.7	4	65	2.CD.060230.PTC	■
2.35		14.1	21.2	4	65	2.CD.060235.PTC	■
2.381	**3/32**	14.3	21.4	4	65	2.CD.060F332.PTC	■
2.40		14.4	21.6	4	65	2.CD.060240.PTC	■
2.45		14.7	22.1	4	65	2.CD.060245.PTC	■
2.50		15.0	22.5	4	65	2.CD.060250.PTC	■
2.55		15.3	23.0	4	65	2.CD.060255.PTC	■
2.60		15.6	23.4	4	68	2.CD.060260.PTC	■
2.65		15.9	23.9	4	68	2.CD.060265.PTC	■
2.70		16.2	24.3	4	68	2.CD.060270.PTC	■
2.75		16.5	24.8	4	68	2.CD.060275.PTC	■
2.80		16.8	25.2	4	68	2.CD.060280.PTC	■
2.85		17.1	25.7	4	68	2.CD.060285.PTC	■
2.90		17.4	26.1	4	68	2.CD.060290.PTC	■
2.95		17.7	26.6	4	68	2.CD.060295.PTC	■
3.00		18.0	27.0	6	74	2.CD.060300.PTC	■
3.05		18.3	27.5	6	74	2.CD.060305.PTC	■

■ Stock item

Carbide			Z2		

Ø d_1	0.1 - 3.0 mm	3.05 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm	+ 0.010 mm + 0.001 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.10		18.6	27.9	6	74	2.CD.060310.PTC	■
3.15		18.9	28.4	6	74	2.CD.060315.PTC	■
3.175	**1/8**	19.1	28.6	6	74	2.CD.060F18.PTC	■
3.20		19.2	28.8	6	74	2.CD.060320.PTC	■
3.25		19.5	29.3	6	74	2.CD.060325.PTC	■
3.30		19.8	29.7	6	74	2.CD.060330.PTC	■
3.35		20.1	30.2	6	74	2.CD.060335.PTC	■
3.40		20.4	30.6	6	74	2.CD.060340.PTC	■
3.45		20.7	31.1	6	74	2.CD.060345.PTC	■
3.50		21.0	31.5	6	78	2.CD.060350.PTC	■
3.55		21.3	32.0	6	78	2.CD.060355.PTC	■
3.60		21.6	32.4	6	78	2.CD.060360.PTC	■
3.65		21.9	32.9	6	78	2.CD.060365.PTC	■
3.70		22.2	33.3	6	78	2.CD.060370.PTC	■
3.75		22.5	33.8	6	78	2.CD.060375.PTC	■
3.80		22.8	34.2	6	78	2.CD.060380.PTC	■
3.85		23.1	34.7	6	78	2.CD.060385.PTC	■
3.90		23.4	35.1	6	78	2.CD.060390.PTC	■
3.95		23.7	35.6	6	78	2.CD.060395.PTC	■
3.968	**5/32**	23.8	35.7	6	78	2.CD.060F532.PTC	■
4.00		24.0	36.0	6	78	2.CD.060400.PTC	■
4.10		24.6	36.9	6	80	2.CD.060410.PTC	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
4.20		25.2	37.8	6	80	2.CD.060420.PTC	■
4.30		25.8	38.7	6	80	2.CD.060430.PTC	■
4.40		26.4	39.6	6	80	2.CD.060440.PTC	■
4.50		27.0	40.5	6	80	2.CD.060450.PTC	■
4.60		27.6	41.4	6	80	2.CD.060460.PTC	■
4.70		28.2	42.3	6	84	2.CD.060470.PTC	■
4.762	**3/16**	28.6	42.9	6	84	2.CD.060F316.PTC	■
4.80		28.8	43.2	6	84	2.CD.060480.PTC	■
4.90		29.4	44.1	6	84	2.CD.060490.PTC	■
5.00		30.0	45.0	6	84	2.CD.060500.PTC	■
5.10		30.6	45.9	6	84	2.CD.060510.PTC	■
5.20		31.2	46.8	6	84	2.CD.060520.PTC	■
5.30		31.8	47.7	6	84	2.CD.060530.PTC	■
5.40		32.4	48.6	6	88	2.CD.060540.PTC	■
5.50		33.0	49.5	6	88	2.CD.060550.PTC	■
5.560	**7/32**	33.4	50.0	6	88	2.CD.060F732.PTC	■
5.60		33.6	50.4	6	88	2.CD.060560.PTC	■
5.70		34.2	51.3	6	88	2.CD.060570.PTC	■
5.80		34.8	52.2	6	88	2.CD.060580.PTC	■
5.90		35.4	53.1	6	88	2.CD.060590.PTC	■
6.00		36.0	54.0	6	88	2.CD.060600.PTC	■
6.350	**1/4**	38.1	57.2	8	98	2.CD.060F14.PTC	■

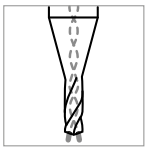
■ Stock item

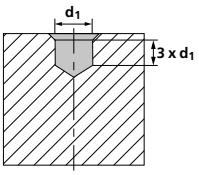
Complementary products

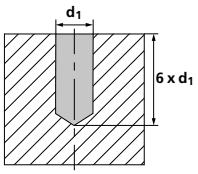
CrazyDrill Cool Titanium PTC p.352
CrazyDrill Crosspilot p.146

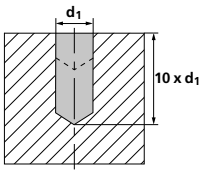
NEW ATC - 6 x d - 10 x d

DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW

	Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High
	S_2	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	40	60
			9.9367	TiAl6Nb7	ASTM F1295		

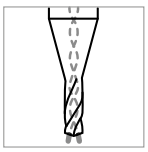




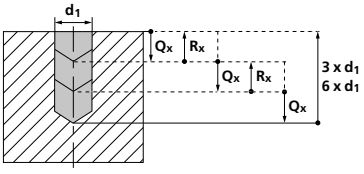


NEW PTC - 3 x d - 6 x d

DRILLING WITH INTERNAL COOLING | CUTTING DATA OVERVIEW

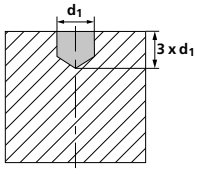
	Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Mid	v_c [m/min] High	Q_x [mm]	R_x [mm]
	S_2	Pure titanium	3.7035	Ti Gr.2	ASTM B348 / F67	30	60	0.2 - 0.5 x d1	0.2 - 0.5 x d1
			3.7065	Ti Gr.4	ASTM B348 / F68			-	-

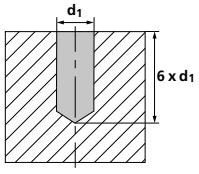
For Ti Gr.2



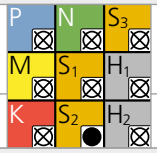
Chip breaking cycle (e.g.: G73)

For Ti Gr.4





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



f [mm/rev]

Ød1	1.0 mm		1.25 mm		1.5 mm 1/16"		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"	
	Mid	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High
	0.020	0.025	0.025	0.030	0.030	0.035	0.035	0.045	0.045	0.055	0.050	0.065	0.060	0.075	0.070	0.085	0.075	0.090

06

f [mm/rev]

Ød1	1.0 mm		1.25 mm		1.5 mm 1/16"		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"	
	Mid	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High	**Mid**	High
	0.010	0.020	0.013	0.025	0.015	0.030	0.020	0.040	0.025	0.050	0.030	0.055	0.040	0.070	0.050	0.080	0.060	0.090

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 < 2 mm filter quality ≤ 0.010 mm.
- Drill with Ø < 3 mm filter quality ≤ 0.020 mm.
- Drill with Ø < 6 mm filter quality ≤ 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]	1.0 mm - 2.0 mm	2.0 mm - 4.0 mm	4.0 mm - 6.35 mm
Version	**3 - 6 - 10 x d**	**3 - 6 - 10 x d**	**3 - 6 - 10 x d**
Minimal pressure [bar]	40	30	30

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

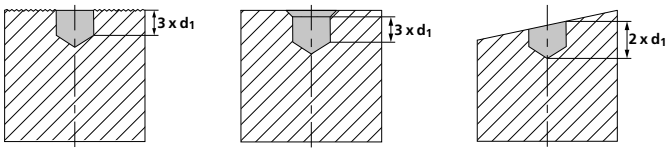
Pilot drilling and drilling

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.

NEW Drilling process of titanium alloy Gr.5 / Gr.Nb

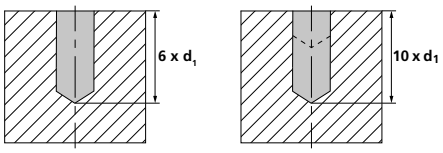
1 | PILOT DRILLING

- 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

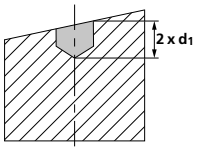
G73 chip breaking drilling cycle

Q_X = depth of the respective peck

R_X = retract value

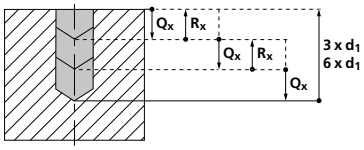
1 | PILOT DRILLING (ONLY ON INCLINED SURFACES)

- 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).



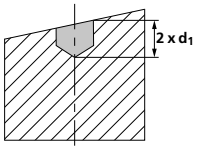
Note:

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

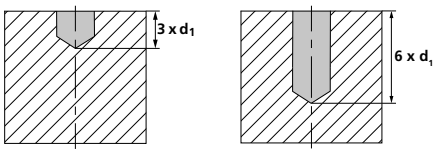
1 | PILOT DRILLING (ONLY ON INCLINED SURFACES)

- Drill with CrazyDrill Crosspilot on inclined surfaces.



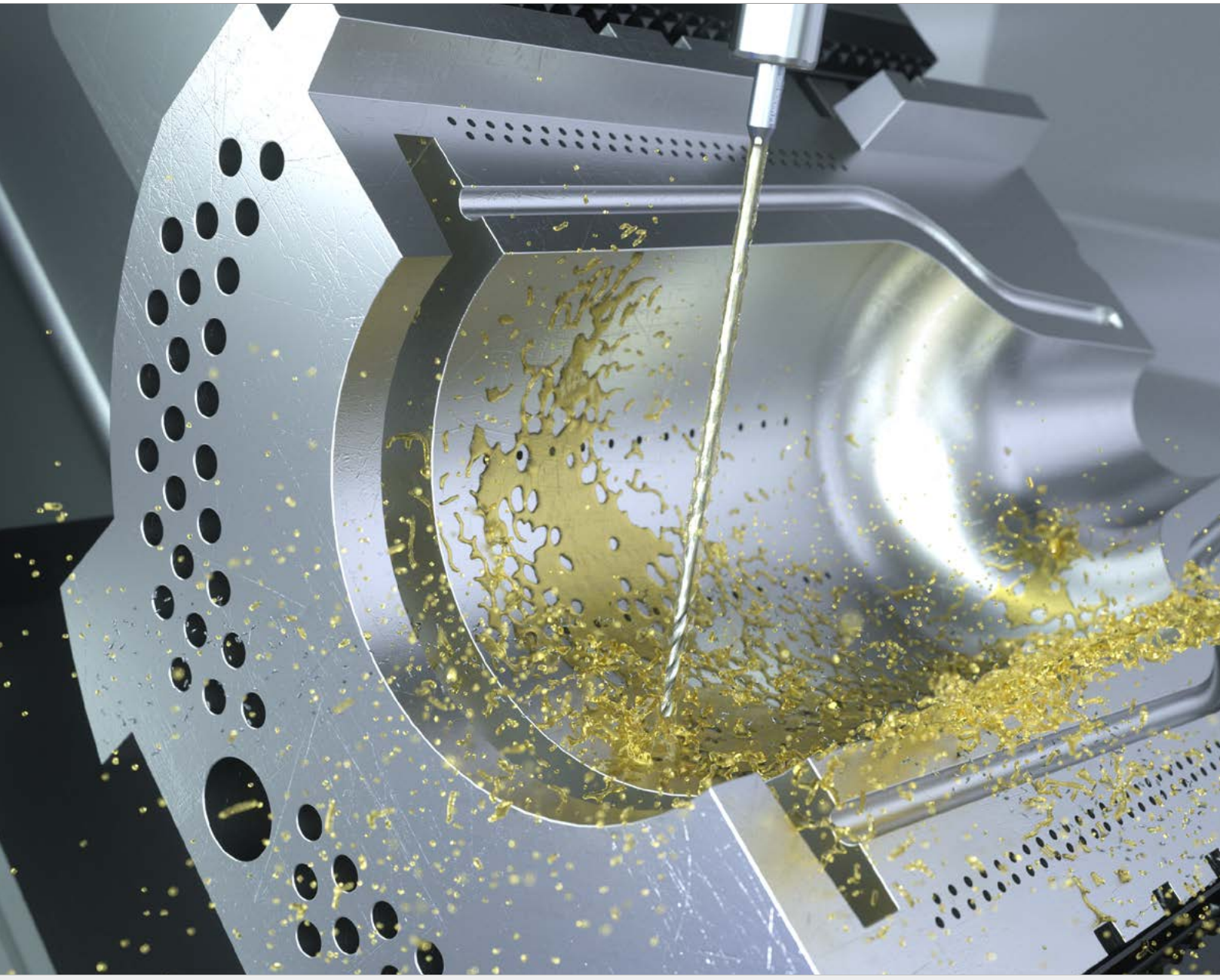
2 | DRILLING

- 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 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
- Ø0.2 - 2.0 mm with coating
  Ø0.1 - 1.2 mm without coating

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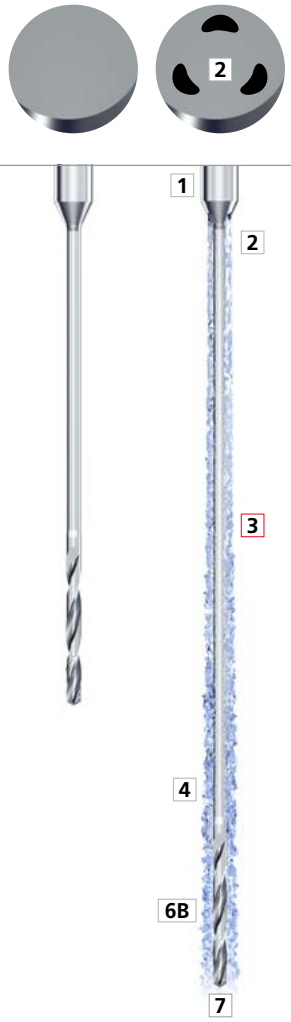
Titanium

30 / 50 x d

- Integrated / External cooling
- Uncoated
- Ø0.1 - 1.2 mm



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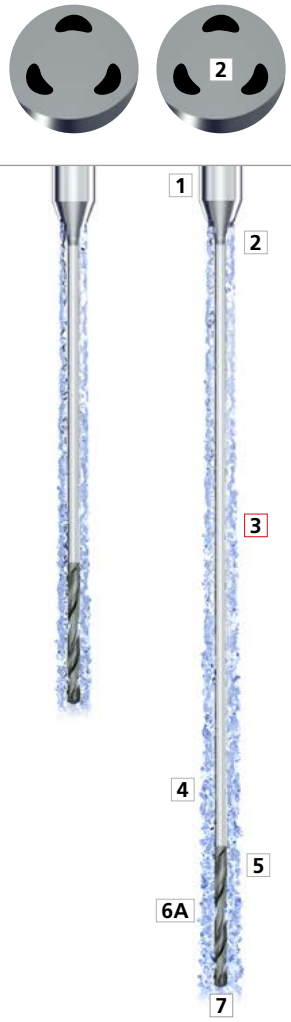
SST-Inox

30 / 50 x d

- Integrated cooling
- Coated
- Ø0.2 - 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. 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.

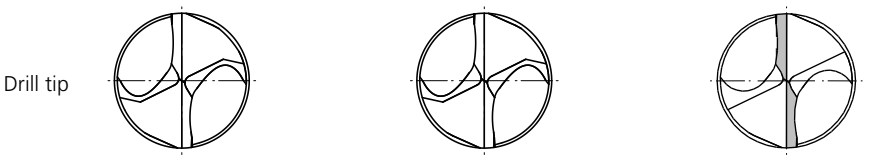
4 | SOLID CARBIDE
The fine grained solid carbide developed for the CrazyDrill Flex is very tough and resistant to heat shock, thus easily meeting the requirements for the machining of steels, titanium, and non-corrosive and heat-resistant alloys.

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.



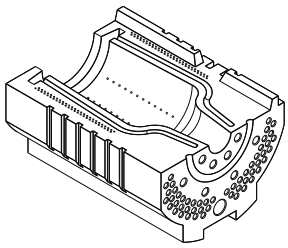
CrazyDrill Flex Steel | CrazyDrill Flex Titanium | CrazyDrill Flex SST-Inox

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
- Drilling depth 15 mm

DRILLING TOOL
Mikron Tool - CrazyDrill Flex Steel - 30 x d

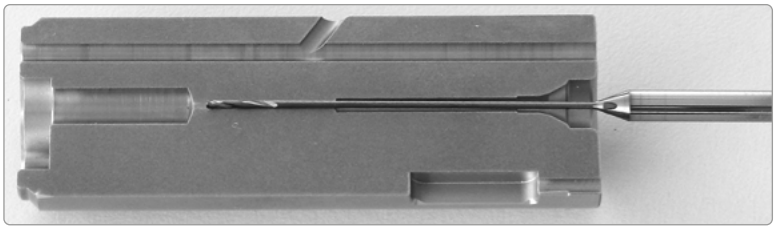
DATA	MIKRON TOOL
Tool type	CrazyDrill Flex Steel - Carbide - Coated - External cooling
Item number	2.CFS.30050.1
Cutting data	v_c = 40 m/min f = 0.012 mm/rev Q_1 = 1.25 mm Q_x = 0.25 mm
Machining time	30 min

■ 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.



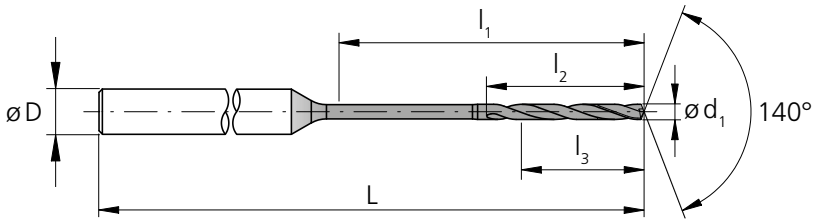
CRAZYDRILL™ by Mikron Tool Flex STEEL

Steel - 20 x d - coated / uncoated

DRILLING WITH EXTERNAL COOLING

.1 eXedur RIP

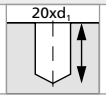
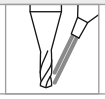
.0 Uncoated



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.10		2.0	1.1	0.8	3	40	2.CFS.20010	-	.0	◪
0.11		2.2	1.2	0.9	3	40	2.CFS.20011	-	.0	Δ
0.12		2.4	1.3	1.0	3	40	2.CFS.20012	-	.0	Δ
0.13		2.6	1.4	1.0	3	40	2.CFS.20013	-	.0	Δ
0.14		2.8	1.5	1.1	3	40	2.CFS.20014	-	.0	Δ
0.15		3.0	1.6	1.2	3	40	2.CFS.20015	-	.0	◪
0.16		3.2	1.7	1.3	3	40	2.CFS.20016	-	.0	Δ
0.17		3.4	1.8	1.4	3	40	2.CFS.20017	-	.0	Δ
0.18		3.6	1.9	1.4	3	40	2.CFS.20018	-	.0	Δ
0.19		3.8	2.0	1.5	3	40	2.CFS.20019	-	.0	Δ
0.20		4.0	2.1	1.6	3	45	2.CFS.20020	.1	.0	■
0.21		4.2	2.2	1.7	3	45	2.CFS.20021	.1	.0	Δ
0.22		4.4	2.3	1.8	3	45	2.CFS.20022	.1	.0	Δ
0.23		4.6	2.4	1.8	3	45	2.CFS.20023	.1	.0	Δ
0.24		4.8	2.5	1.9	3	45	2.CFS.20024	.1	.0	Δ
0.25		5.0	2.6	2.0	3	45	2.CFS.20025	.1	.0	■
0.26		5.2	2.7	2.1	3	45	2.CFS.20026	.1	.0	Δ
0.27		5.4	2.8	2.2	3	45	2.CFS.20027	.1	.0	Δ
0.28		5.6	2.9	2.2	3	45	2.CFS.20028	.1	.0	Δ
0.29		5.8	3.0	2.3	3	45	2.CFS.20029	.1	.0	Δ
0.30		6.0	3.2	2.4	3	45	2.CFS.20030	.1	.0	■
0.31		6.2	3.3	2.5	3	45	2.CFS.20031	.1	.0	Δ
0.32		6.4	3.4	2.6	3	45	2.CFS.20032	.1	.0	Δ
0.33		6.6	3.5	2.6	3	45	2.CFS.20033	.1	.0	Δ
0.34		6.8	3.6	2.7	3	45	2.CFS.20034	.1	.0	Δ
0.35		7.0	3.7	2.8	3	45	2.CFS.20035	.1	.0	■
0.36		7.2	3.8	2.9	3	45	2.CFS.20036	.1	.0	Δ
0.37		7.4	3.9	3.0	3	45	2.CFS.20037	.1	.0	Δ
0.38		7.6	4.0	3.0	3	45	2.CFS.20038	.1	.0	Δ

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.39		7.8	4.1	3.1	3	45	2.CFS.20039	.1	.0	Δ
0.396	1/64	8.0	4.2	3.2	3	45	2.CFS.20F164	.1	-	◪
0.40		8.0	4.2	3.2	3	45	2.CFS.20040	.1	.0	■
0.41		8.2	4.3	3.3	3	45	2.CFS.20041	.1	.0	Δ
0.42		8.4	4.4	3.4	3	45	2.CFS.20042	.1	.0	Δ
0.43		8.6	4.5	3.4	3	45	2.CFS.20043	.1	.0	Δ
0.44		8.8	4.6	3.5	3	45	2.CFS.20044	.1	.0	Δ
0.45		9.0	4.7	3.6	3	45	2.CFS.20045	.1	.0	■
0.46		9.2	4.8	3.7	3	45	2.CFS.20046	.1	.0	Δ
0.47		9.4	4.9	3.8	3	45	2.CFS.20047	.1	.0	Δ
0.48		9.6	5.0	3.8	3	45	2.CFS.20048	.1	.0	Δ
0.49		9.8	5.1	3.9	3	45	2.CFS.20049	.1	.0	Δ
0.50		10.0	5.3	4.0	3	50	2.CFS.20050	.1	.0	■
0.51		10.2	5.4	4.1	3	50	2.CFS.20051	.1	.0	Δ
0.52		10.4	5.5	4.2	3	50	2.CFS.20052	.1	.0	Δ
0.53		10.6	5.6	4.2	3	50	2.CFS.20053	.1	.0	Δ
0.54		10.8	5.7	4.3	3	50	2.CFS.20054	.1	.0	Δ
0.55		11.0	5.8	4.4	3	50	2.CFS.20055	.1	.0	■
0.56		11.2	5.9	4.5	3	50	2.CFS.20056	.1	.0	Δ
0.57		11.4	6.0	4.6	3	50	2.CFS.20057	.1	.0	Δ
0.58		11.6	6.1	4.6	3	50	2.CFS.20058	.1	.0	Δ
0.59		11.8	6.2	4.7	3	50	2.CFS.20059	.1	.0	Δ
0.60		12.0	6.3	4.8	3	50	2.CFS.20060	.1	.0	■
0.61		12.2	6.4	4.9	3	50	2.CFS.20061	.1	.0	Δ
0.62		12.4	6.5	5.0	3	50	2.CFS.20062	.1	.0	Δ
0.63		12.6	6.6	5.0	3	50	2.CFS.20063	.1	.0	Δ
0.64		12.8	6.7	5.1	3	50	2.CFS.20064	.1	.0	Δ
0.65		13.0	6.8	5.2	3	50	2.CFS.20065	.1	.0	■
0.66		13.2	6.9	5.3	3	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			Z2	

Ø d_1	0.1 - 1.2 mm
Tolerance	- 0.003 mm - 0.006 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.67		13.4	7.0	5.4	3	50	2.CFS.20067	.1	.0	Δ
0.68		13.6	7.1	5.4	3	50	2.CFS.20068	.1	.0	Δ
0.69		13.8	7.2	5.5	3	50	2.CFS.20069	.1	.0	Δ
0.70		14.0	7.4	5.6	3	53	2.CFS.20070	.1	.0	■
0.71		14.2	7.5	5.7	3	53	2.CFS.20071	.1	.0	Δ
0.72		14.4	7.6	5.8	3	53	2.CFS.20072	.1	.0	Δ
0.73		14.6	7.7	5.8	3	53	2.CFS.20073	.1	.0	Δ
0.74		14.8	7.8	5.9	3	53	2.CFS.20074	.1	.0	Δ
0.75		15.0	7.9	6.0	3	53	2.CFS.20075	.1	.0	■
0.76		15.2	8.0	6.1	3	53	2.CFS.20076	.1	.0	Δ
0.77		15.4	8.1	6.2	3	53	2.CFS.20077	.1	.0	Δ
0.78		15.6	8.2	6.2	3	53	2.CFS.20078	.1	.0	Δ
0.79		15.8	8.3	6.3	3	53	2.CFS.20079	.1	.0	Δ
0.793	1/32	16.0	8.4	6.4	3	53	2.CFS.20F132	.1	-	◪
0.80		16.0	8.4	6.4	3	53	2.CFS.20080	.1	.0	■
0.81		16.2	8.5	6.5	3	53	2.CFS.20081	.1	.0	Δ
0.82		16.4	8.6	6.6	3	53	2.CFS.20082	.1	.0	Δ
0.83		16.6	8.7	6.6	3	53	2.CFS.20083	.1	.0	Δ
0.84		16.8	8.8	6.7	3	53	2.CFS.20084	.1	.0	Δ
0.85		17.0	8.9	6.8	3	54	2.CFS.20085	.1	.0	■
0.86		17.2	9.0	6.9	3	54	2.CFS.20086	.1	.0	Δ
0.87		17.4	9.1	7.0	3	53	2.CFS.20087	.1	.0	Δ
0.88		17.6	9.2	7.0	3	53	2.CFS.20088	.1	.0	Δ
0.89		17.8	9.3	7.1	3	53	2.CFS.20089	.1	.0	Δ
0.90		18.0	9.5	7.2	3	53	2.CFS.20090	.1	.0	■
0.91		18.2	9.6	7.3	3	53	2.CFS.20091	.1	.0	Δ
0.92		18.4	9.7	7.4	3	53	2.CFS.20092	.1	.0	Δ
0.93		18.6	9.8	7.4	3	53	2.CFS.20093	.1	.0	Δ
0.94		18.8	9.9	7.5	3	53	2.CFS.20094	.1	.0	Δ

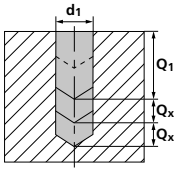
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.95		19.0	10.0	7.6	3	53	2.CFS.20095	.1	.0	■
0.96		19.2	10.1	7.7	3	53	2.CFS.20096	.1	.0	Δ
0.97		19.4	10.2	7.8	3	53	2.CFS.20097	.1	.0	Δ
0.98		19.6	10.3	7.8	3	53	2.CFS.20098	.1	.0	Δ
0.99		19.8	10.4	7.9	3	53	2.CFS.20099	.1	.0	Δ
1.00		20.0	10.5	8.0	3	60	2.CFS.20100	.1	.0	■
1.01		20.2	10.6	8.1	3	60	2.CFS.20101	.1	.0	Δ
1.02		20.4	10.7	8.2	3	60	2.CFS.20102	.1	.0	Δ
1.03		20.6	10.8	8.2	3	60	2.CFS.20103	.1	.0	Δ
1.04		20.8	10.9	8.3	3	60	2.CFS.20104	.1	.0	Δ
1.05		21.0	11.0	8.4	3	60	2.CFS.20105	.1	.0	■
1.06		21.2	11.1	8.5	3	60	2.CFS.20106	.1	.0	Δ
1.07		21.4	11.2	8.6	3	60	2.CFS.20107	.1	.0	Δ
1.08		21.6	11.3	8.6	3	60	2.CFS.20108	.1	.0	Δ
1.09		21.8	11.4	8.7	3	60	2.CFS.20109	.1	.0	Δ
1.10		22.0	11.6	8.8	3	60	2.CFS.20110	.1	.0	■
1.11		22.2	11.7	8.9	3	60	2.CFS.20111	.1	.0	Δ
1.12		22.4	11.8	9.0	3	60	2.CFS.20112	.1	.0	Δ
1.13		22.6	11.9	9.0	3	60	2.CFS.20113	.1	.0	Δ
1.14		22.8	12.0	9.1	3	60	2.CFS.20114	.1	.0	Δ
1.15		23.0	12.1	9.2	3	60	2.CFS.20115	.1	.0	■
1.16		23.2	12.2	9.3	3	60	2.CFS.20116	.1	.0	Δ
1.17		23.4	12.3	9.4	3	60	2.CFS.20117	.1	.0	Δ
1.18		23.6	12.4	9.4	3	60	2.CFS.20118	.1	.0	Δ
1.19		23.8	12.5	9.5	3	60	2.CFS.20119	.1	.0	Δ
1.20		24.0	12.6	9.6	3	60	2.CFS.20120	.1	.0	■

Complementary products	
CrazyDrill Flexpilot Steel	p.108
CrazyDrill Crosspilot	p.146

CRAZYDRILL™ by Mikron Tool Flex STEEL

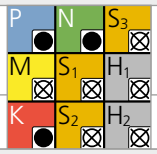
Steel - 20 x d - coated

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	5	40	40	60
		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	25	25	50
		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	20	20	35
		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	40	50	100
		0.6030	GG30	ASTM 40B				
		0.7040	GGG40	ASTM 60-40-18			40	80
		0.7060	GGG60	ASTM 80-60-03				
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	5	40	60	120
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	5	40	50	80
		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	40	60	100
		2.102	CuSn6	UNS C51900			40	60
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	5	20	20	40
		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

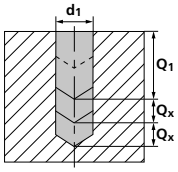


			f [mm/rev]					
	Q_1	Q_x	Ød1 0.2 mm f	0.3 mm f	0.4 mm 1/64" f	0.6 mm f	0.8 mm 1/32" f	1.0 mm – 1.2 mm f
	2xd1	0.5xd1	0.005	0.010	0.015	0.030	0.040	0.060
	2xd1	0.5xd1	0.003 – 0.005	0.008 – 0.010	0.012 – 0.015	0.020 – 0.025	0.035	0.050
	2xd1	1xd1	0.004	0.008	0.010	0.015	0.025	0.040
			Recommended: CrazyDrill Flex SST-Inox 30 x d1					
	2xd1	1xd1	0.005	0.010	0.015	0.020	0.035	0.050
	2xd1	1xd1	0.015	0.040	0.050	0.080	0.100	0.120
	2xd1	1xd1	0.015	0.040	0.050	0.080	0.100	0.120
			Recommended: CrazyDrill Flex Titanium 30 x d1					
			Recommended: CrazyDrill Flex SST-Inox 30 x d1					
	2xd1	1xd1	0.010	0.030	0.040	0.060	0.080	0.100
	2xd1	0.5xd1	0.004	0.006	0.010	0.015	0.025	0.040
			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

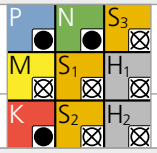
Steel - 20 x d - uncoated

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	5	40	40	60
		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	25	25	50
		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	20	20	35
		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	40	50	100
		0.6030	GG30	ASTM 40B				
		0.7040	GGG40	ASTM 60-40-18			40	80
		0.7060	GGG60	ASTM 80-60-03				
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	5	40	60	120
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	5	40	50	80
		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	40	60	100
		2.102	CuSn6	UNS C51900			40	60
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	5	20	20	40
		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]						
	Q_1	Q_x	Ød1						
			0.1 mm	0.2 mm	0.3 mm	0.4 mm	0.6 mm	0.8 mm	1.0 mm–1.2 mm
			f	f	f	f	f	f	f
	2xd1	0.5xd1	0.002	0.005	0.010	0.015	0.030	0.040	0.060
	2xd1	0.5xd1	0.002	0.003 – 0.005	0.008 – 0.010	0.012 – 0.015	0.020 – 0.025	0.035	0.050
	2xd1	1xd1	0.0005	0.004	0.008	0.010	0.015	0.025	0.040
			Recommended: CrazyDrill Flex SST-Inox 30 x d1						
	2xd1	1xd1	0.002	0.005	0.010	0.015	0.020	0.035	0.050
	2xd1	1xd1	0.003	0.015	0.040	0.050	0.080	0.100	0.120
	2xd1	1xd1	0.003	0.015	0.040	0.050	0.080	0.100	0.120
			Recommended: CrazyDrill Flex Titanium 30 x d1						
			Recommended: CrazyDrill Flex SST-Inox 30 x d1						
	2xd1	1xd1	0.004	0.010	0.030	0.040	0.060	0.080	0.100
	2xd1	0.5xd1	0.002	0.004	0.006	0.010	0.015	0.025	0.040
			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						

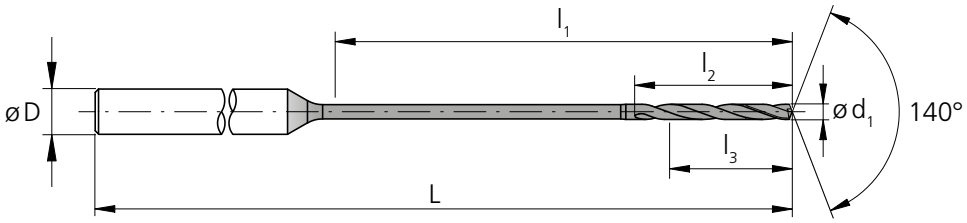
CRAZYDRILL™ by Mikron Tool Flex STEEL

Steel - 30 x d - coated / uncoated

DRILLING WITH EXTERNAL COOLING

.1 eXedur RIP

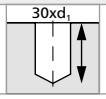
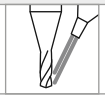
.0 Uncoated



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.10		3.0	1.1	0.8	3	45	2.CFS.30010	-	.0	◪
0.11		3.3	1.2	0.9	3	45	2.CFS.30011	-	.0	Δ
0.12		3.6	1.3	1.0	3	45	2.CFS.30012	-	.0	Δ
0.13		3.9	1.4	1.0	3	45	2.CFS.30013	-	.0	Δ
0.14		4.2	1.5	1.1	3	45	2.CFS.30014	-	.0	Δ
0.15		4.5	1.6	1.2	3	45	2.CFS.30015	-	.0	◪
0.16		4.8	1.7	1.3	3	45	2.CFS.30016	-	.0	Δ
0.17		5.1	1.8	1.4	3	45	2.CFS.30017	-	.0	Δ
0.18		5.4	1.9	1.4	3	45	2.CFS.30018	-	.0	Δ
0.19		5.7	2.0	1.5	3	45	2.CFS.30019	-	.0	Δ
0.20		6.0	2.1	1.6	3	45	2.CFS.30020	.1	.0	■
0.21		6.3	2.2	1.7	3	45	2.CFS.30021	.1	.0	Δ
0.22		6.6	2.3	1.8	3	45	2.CFS.30022	.1	.0	Δ
0.23		6.9	2.4	1.8	3	45	2.CFS.30023	.1	.0	Δ
0.24		7.2	2.5	1.9	3	45	2.CFS.30024	.1	.0	Δ
0.25		7.5	2.6	2.0	3	45	2.CFS.30025	.1	.0	■
0.26		7.8	2.7	2.1	3	45	2.CFS.30026	.1	.0	Δ
0.27		8.1	2.8	2.2	3	45	2.CFS.30027	.1	.0	Δ
0.28		8.4	2.9	2.2	3	45	2.CFS.30028	.1	.0	Δ
0.29		8.7	3.0	2.3	3	45	2.CFS.30029	.1	.0	Δ
0.30		9.0	3.2	2.4	3	50	2.CFS.30030	.1	.0	■
0.31		9.3	3.3	2.5	3	50	2.CFS.30031	.1	.0	Δ
0.32		9.6	3.4	2.6	3	50	2.CFS.30032	.1	.0	Δ
0.33		9.9	3.5	2.6	3	50	2.CFS.30033	.1	.0	Δ
0.34		10.2	3.6	2.7	3	50	2.CFS.30034	.1	.0	Δ
0.35		10.5	3.7	2.8	3	50	2.CFS.30035	.1	.0	■
0.36		10.8	3.8	2.9	3	50	2.CFS.30036	.1	.0	Δ
0.37		11.1	3.9	3.0	3	50	2.CFS.30037	.1	.0	Δ
0.38		11.4	4.0	3.0	3	50	2.CFS.30038	.1	.0	Δ

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.39		11.7	4.1	3.1	3	50	2.CFS.30039	.1	.0	Δ
0.396	1/64	12.0	4.2	3.2	3	50	2.CFS.30F164	.1	-	◪
0.40		12.0	4.2	3.2	3	50	2.CFS.30040	.1	.0	■
0.41		12.3	4.3	3.3	3	50	2.CFS.30041	.1	.0	Δ
0.42		12.6	4.4	3.4	3	50	2.CFS.30042	.1	.0	Δ
0.43		12.9	4.5	3.4	3	50	2.CFS.30043	.1	.0	Δ
0.44		13.2	4.6	3.5	3	50	2.CFS.30044	.1	.0	Δ
0.45		13.5	4.7	3.6	3	50	2.CFS.30045	.1	.0	■
0.46		13.8	4.8	3.7	3	50	2.CFS.30046	.1	.0	Δ
0.47		14.1	4.9	3.8	3	50	2.CFS.30047	.1	.0	Δ
0.48		14.4	5.0	3.8	3	50	2.CFS.30048	.1	.0	Δ
0.49		14.7	5.1	3.9	3	50	2.CFS.30049	.1	.0	Δ
0.50		15.0	5.3	4.0	3	53	2.CFS.30050	.1	.0	■
0.51		15.3	5.4	4.1	3	53	2.CFS.30051	.1	.0	Δ
0.52		15.6	5.5	4.2	3	53	2.CFS.30052	.1	.0	Δ
0.53		15.9	5.6	4.2	3	53	2.CFS.30053	.1	.0	Δ
0.54		16.2	5.7	4.3	3	53	2.CFS.30054	.1	.0	Δ
0.55		16.5	5.8	4.4	3	53	2.CFS.30055	.1	.0	■
0.56		16.8	5.9	4.5	3	53	2.CFS.30056	.1	.0	Δ
0.57		17.1	6.0	4.6	3	53	2.CFS.30057	.1	.0	Δ
0.58		17.4	6.1	4.6	3	53	2.CFS.30058	.1	.0	Δ
0.59		17.7	6.2	4.7	3	53	2.CFS.30059	.1	.0	Δ
0.60		18.0	6.3	4.8	3	53	2.CFS.30060	.1	.0	■
0.61		18.3	6.4	4.9	3	53	2.CFS.30061	.1	.0	Δ
0.62		18.6	6.5	5.0	3	53	2.CFS.30062	.1	.0	Δ
0.63		18.9	6.6	5.0	3	53	2.CFS.30063	.1	.0	Δ
0.64		19.2	6.7	5.1	3	53	2.CFS.30064	.1	.0	Δ
0.65		19.5	6.8	5.2	3	53	2.CFS.30065	.1	.0	■
0.66		19.8	6.9	5.3	3	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			Z2	

Ø d_1	0.1 - 1.2 mm
Tolerance	- 0.003 mm - 0.006 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.67		20.1	7.0	5.4	3	53	2.CFS.30067	.1	.0	Δ
0.68		20.4	7.1	5.4	3	53	2.CFS.30068	.1	.0	Δ
0.69		20.7	7.2	5.5	3	53	2.CFS.30069	.1	.0	Δ
0.70		21.0	7.4	5.6	3	60	2.CFS.30070	.1	.0	■
0.71		21.3	7.5	5.7	3	60	2.CFS.30071	.1	.0	Δ
0.72		21.6	7.6	5.8	3	60	2.CFS.30072	.1	.0	Δ
0.73		21.9	7.7	5.8	3	60	2.CFS.30073	.1	.0	Δ
0.74		22.2	7.8	5.9	3	60	2.CFS.30074	.1	.0	Δ
0.75		22.5	7.9	6.0	3	60	2.CFS.30075	.1	.0	■
0.76		22.8	8.0	6.1	3	60	2.CFS.30076	.1	.0	Δ
0.77		23.1	8.1	6.2	3	60	2.CFS.30077	.1	.0	Δ
0.78		23.4	8.2	6.2	3	60	2.CFS.30078	.1	.0	Δ
0.79		23.7	8.3	6.3	3	60	2.CFS.30079	.1	.0	Δ
0.793	**1/32**	24.0	8.4	6.4	3	60	2.CFS.30F132	.1	-	◪
0.80		24.0	8.4	6.4	3	60	2.CFS.30080	.1	.0	■
0.81		24.3	8.5	6.5	3	60	2.CFS.30081	.1	.0	Δ
0.82		24.6	8.6	6.6	3	60	2.CFS.30082	.1	.0	Δ
0.83		24.9	8.7	6.6	3	60	2.CFS.30083	.1	.0	Δ
0.84		25.2	8.8	6.7	3	60	2.CFS.30084	.1	.0	Δ
0.85		25.5	8.9	6.8	3	64	2.CFS.30085	.1	.0	■
0.86		25.8	9.0	6.9	3	64	2.CFS.30086	.1	.0	Δ
0.87		26.1	9.1	7.0	3	64	2.CFS.30087	.1	.0	Δ
0.88		26.4	9.2	7.0	3	64	2.CFS.30088	.1	.0	Δ
0.89		26.7	9.3	7.1	3	64	2.CFS.30089	.1	.0	Δ
0.90		27.0	9.5	7.2	3	64	2.CFS.30090	.1	.0	■
0.91		27.3	9.6	7.3	3	64	2.CFS.30091	.1	.0	Δ
0.92		27.6	9.7	7.4	3	64	2.CFS.30092	.1	.0	Δ
0.93		27.9	9.8	7.4	3	64	2.CFS.30093	.1	.0	Δ
0.94		28.2	9.9	7.5	3	64	2.CFS.30094	.1	.0	Δ

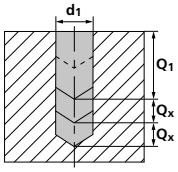
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.95		28.5	10.0	7.6	3	64	2.CFS.30095	.1	.0	■
0.96		28.8	10.1	7.7	3	64	2.CFS.30096	.1	.0	Δ
0.97		29.1	10.2	7.8	3	64	2.CFS.30097	.1	.0	Δ
0.98		29.4	10.3	7.8	3	64	2.CFS.30098	.1	.0	Δ
0.99		29.7	10.4	7.9	3	64	2.CFS.30099	.1	.0	Δ
1.00		30.0	10.5	8.0	3	70	2.CFS.30100	.1	.0	■
1.01		30.3	10.6	8.1	3	70	2.CFS.30101	.1	.0	Δ
1.02		30.6	10.7	8.2	3	70	2.CFS.30102	.1	.0	Δ
1.03		30.9	10.8	8.2	3	70	2.CFS.30103	.1	.0	Δ
1.04		31.2	10.9	8.3	3	70	2.CFS.30104	.1	.0	Δ
1.05		31.5	11.0	8.4	3	70	2.CFS.30105	.1	.0	■
1.06		31.8	11.1	8.5	3	70	2.CFS.30106	.1	.0	Δ
1.07		32.1	11.2	8.6	3	70	2.CFS.30107	.1	.0	Δ
1.08		32.4	11.3	8.6	3	70	2.CFS.30108	.1	.0	Δ
1.09		32.7	11.4	8.7	3	70	2.CFS.30109	.1	.0	Δ
1.10		33.0	11.6	8.8	3	70	2.CFS.30110	.1	.0	■
1.11		33.3	11.7	8.9	3	70	2.CFS.30111	.1	.0	Δ
1.12		33.6	11.8	9.0	3	70	2.CFS.30112	.1	.0	Δ
1.13		33.9	11.9	9.0	3	70	2.CFS.30113	.1	.0	Δ
1.14		34.2	12.0	9.1	3	70	2.CFS.30114	.1	.0	Δ
1.15		34.5	12.1	9.2	3	70	2.CFS.30115	.1	.0	■
1.16		34.8	12.2	9.3	3	70	2.CFS.30116	.1	.0	Δ
1.17		35.1	12.3	9.4	3	70	2.CFS.30117	.1	.0	Δ
1.18		35.4	12.4	9.4	3	70	2.CFS.30118	.1	.0	Δ
1.19		35.7	12.5	9.5	3	70	2.CFS.30119	.1	.0	Δ
1.20		36.0	12.6	9.6	3	70	2.CFS.30120	.1	.0	■

Complementary products	
CrazyDrill Flexpilot Steel	p.108
CrazyDrill Crosspilot	p.146

CRAZYDRILL™ by Mikron Tool Flex STEEL

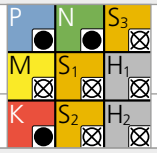
Steel - 30 x d - coated

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	5	40	40	60
		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	25	25	50
		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	20	20	35
		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	40	50	100
		0.6030	GG30	ASTM 40B				
		0.7040	GGG40	ASTM 60-40-18			40	80
		0.7060	GGG60	ASTM 80-60-03				
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	5	40	60	120
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	5	40	50	80
		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	40	60	100
		2.102	CuSn6	UNS C51900			40	60
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	5	20	20	40
		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

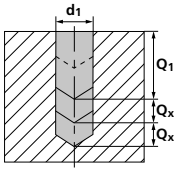


			f [mm/rev]					
	Q_1	Q_x	Ød1 0.2 mm f	0.3 mm f	0.4 mm 1/64" f	0.6 mm f	0.8 mm 1/32" f	1.0 mm – 1.2 mm f
	2xd1	0.5xd1	0.005	0.010	0.015	0.030	0.040	0.060
	2xd1	0.5xd1	0.003 – 0.005	0.008 – 0.010	0.012 – 0.015	0.020 – 0.025	0.035	0.050
	2xd1	1xd1	0.004	0.008	0.010	0.015	0.025	0.040
			Recommended: CrazyDrill Flex SST-Inox 30 x d1					
	2xd1	1xd1	0.005	0.010	0.015	0.020	0.035	0.050
	2xd1	1xd1	0.015	0.040	0.050	0.080	0.100	0.120
	2xd1	1xd1	0.015	0.040	0.050	0.080	0.100	0.120
			Recommended: CrazyDrill Flex Titanium 30 x d1					
			Recommended: CrazyDrill Flex SST-Inox 30 x d1					
	2xd1	1xd1	0.010	0.030	0.040	0.060	0.080	0.100
	2xd1	0.5xd1	0.004	0.006	0.010	0.015	0.025	0.040
			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

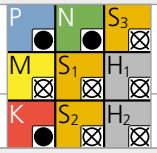
Steel - 30 x d - uncoated

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	5	40	40	60
		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	25	25	50
		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	20	20	35
		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	40	50	100
		0.6030	GG30	ASTM 40B				
		0.7040	GGG40	ASTM 60-40-18			40	80
		0.7060	GGG60	ASTM 80-60-03				
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	5	40	60	120
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	5	40	50	80
		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	40	60	100
		2.102	CuSn6	UNS C51900			40	60
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	5	20	20	40
		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]						
	Q_1	Q_x	Ød1						
			0.1 mm	0.2 mm	0.3 mm	0.4 mm	0.6 mm	0.8 mm	1.0 mm–1.2 mm
			f	f	f	f	f	f	f
	2xd1	0.5xd1	0.002	0.005	0.010	0.015	0.030	0.040	0.060
	2xd1	0.5xd1	0.002	0.003 – 0.005	0.008 – 0.010	0.012 – 0.015	0.020 – 0.025	0.035	0.050
	2xd1	1xd1	0.0005	0.004	0.008	0.010	0.015	0.025	0.040
			Recommended: CrazyDrill Flex SST-Inox 30 x d1						
	2xd1	1xd1	0.002	0.005	0.010	0.015	0.020	0.035	0.050
	2xd1	1xd1	0.003	0.015	0.040	0.050	0.080	0.100	0.120
	2xd1	1xd1	0.003	0.015	0.040	0.050	0.080	0.100	0.120
			Recommended: CrazyDrill Flex Titanium 30 x d1						
			Recommended: CrazyDrill Flex SST-Inox 30 x d1						
	2xd1	1xd1	0.004	0.010	0.030	0.040	0.060	0.080	0.100
	2xd1	0.5xd1	0.002	0.004	0.006	0.010	0.015	0.025	0.040
			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						

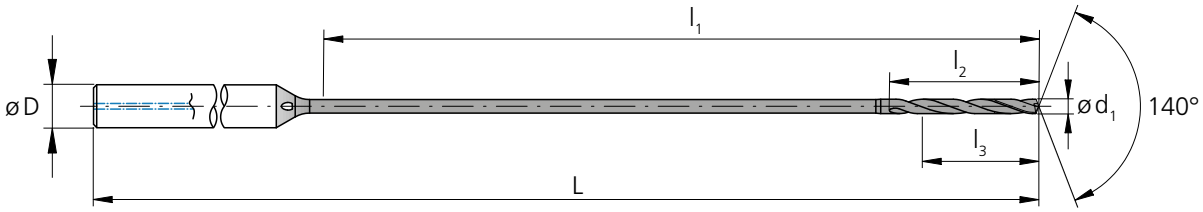
CRAZYDRILL by Mikron Tool Flex STEEL

Steel - 50 x d - coated / uncoated

DRILLING WITH INTEGRATED COOLING

.1 eXedur RIP

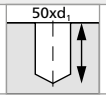
.0 Uncoated



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.30		15.0	3.2	2.4	3	53	2.CFS.50030.IK	.1	.0	■
0.31		15.5	3.3	2.5	3	53	2.CFS.50031.IK	.1	.0	Δ
0.32		16.0	3.4	2.6	3	53	2.CFS.50032.IK	.1	.0	Δ
0.33		16.5	3.5	2.6	3	53	2.CFS.50033.IK	.1	.0	Δ
0.34		17.0	3.6	2.7	3	53	2.CFS.50034.IK	.1	.0	Δ
0.35		17.5	3.7	2.8	3	60	2.CFS.50035.IK	.1	.0	■
0.36		18.0	3.8	2.9	3	60	2.CFS.50036.IK	.1	.0	Δ
0.37		18.5	3.9	3.0	3	60	2.CFS.50037.IK	.1	.0	Δ
0.38		19.0	4.0	3.0	3	60	2.CFS.50038.IK	.1	.0	Δ
0.39		19.5	4.1	3.1	3	60	2.CFS.50039.IK	.1	.0	Δ
0.396	1/64	20.0	4.2	3.2	3	60	2.CFS.50F164.IK	.1	-	◪
0.40		20.0	4.2	3.2	3	60	2.CFS.50040.IK	.1	.0	■
0.41		20.5	4.3	3.3	3	60	2.CFS.50041.IK	.1	.0	Δ
0.42		21.0	4.4	3.4	3	60	2.CFS.50042.IK	.1	.0	Δ
0.43		21.5	4.5	3.4	3	60	2.CFS.50043.IK	.1	.0	Δ
0.44		22.0	4.6	3.5	3	60	2.CFS.50044.IK	.1	.0	Δ
0.45		22.5	4.7	3.6	3	60	2.CFS.50045.IK	.1	.0	■
0.46		23.0	4.8	3.7	3	60	2.CFS.50046.IK	.1	.0	Δ
0.47		23.5	4.9	3.8	3	60	2.CFS.50047.IK	.1	.0	Δ
0.48		24.0	5.0	3.8	3	60	2.CFS.50048.IK	.1	.0	Δ
0.49		24.5	5.1	3.9	3	60	2.CFS.50049.IK	.1	.0	Δ
0.50		25.0	5.3	4.0	3	64	2.CFS.50050.IK	.1	.0	■
0.51		25.5	5.4	4.1	3	64	2.CFS.50051.IK	.1	.0	Δ
0.52		26.0	5.5	4.2	3	64	2.CFS.50052.IK	.1	.0	Δ
0.53		26.5	5.6	4.2	3	64	2.CFS.50053.IK	.1	.0	Δ
0.54		27.0	5.7	4.3	3	64	2.CFS.50054.IK	.1	.0	Δ
0.55		27.5	5.8	4.4	3	64	2.CFS.50055.IK	.1	.0	■
0.56		28.0	5.9	4.5	3	64	2.CFS.50056.IK	.1	.0	Δ
0.57		28.5	6.0	4.6	3	64	2.CFS.50057.IK	.1	.0	Δ

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.58		29.0	6.1	4.6	3	64	2.CFS.50058.IK	.1	.0	Δ
0.59		29.5	6.2	4.7	3	64	2.CFS.50059.IK	.1	.0	Δ
0.60		30.0	6.3	4.8	3	70	2.CFS.50060.IK	.1	.0	■
0.61		30.5	6.4	4.9	3	70	2.CFS.50061.IK	.1	.0	Δ
0.62		31.0	6.5	5.0	3	70	2.CFS.50062.IK	.1	.0	Δ
0.63		31.5	6.6	5.0	3	70	2.CFS.50063.IK	.1	.0	Δ
0.64		32.0	6.7	5.1	3	70	2.CFS.50064.IK	.1	.0	Δ
0.65		32.5	6.8	5.2	3	70	2.CFS.50065.IK	.1	.0	■
0.66		33.0	6.9	5.3	3	70	2.CFS.50066.IK	.1	.0	Δ
0.67		33.5	7.0	5.4	3	70	2.CFS.50067.IK	.1	.0	Δ
0.68		34.0	7.1	5.4	3	70	2.CFS.50068.IK	.1	.0	Δ
0.69		34.5	7.2	5.5	3	70	2.CFS.50069.IK	.1	.0	Δ
0.70		35.0	7.4	5.6	3	75	2.CFS.50070.IK	.1	.0	■
0.71		35.5	7.5	5.7	3	75	2.CFS.50071.IK	.1	.0	Δ
0.72		36.0	7.6	5.8	3	75	2.CFS.50072.IK	.1	.0	Δ
0.73		36.5	7.7	5.8	3	75	2.CFS.50073.IK	.1	.0	Δ
0.74		37.0	7.8	5.9	3	75	2.CFS.50074.IK	.1	.0	Δ
0.75		37.5	7.9	6.0	3	75	2.CFS.50075.IK	.1	.0	■
0.76		38.0	8.0	6.1	3	75	2.CFS.50076.IK	.1	.0	Δ
0.77		38.5	8.1	6.2	3	75	2.CFS.50077.IK	.1	.0	Δ
0.78		39.0	8.2	6.2	3	75	2.CFS.50078.IK	.1	.0	Δ
0.79		39.5	8.3	6.3	3	75	2.CFS.50079.IK	.1	.0	Δ
0.793	1/32	40.0	8.4	6.4	3	80	2.CFS.50F132.IK	.1	-	◪
0.80		40.0	8.4	6.4	3	80	2.CFS.50080.IK	.1	.0	■
0.81		40.5	8.5	6.5	3	80	2.CFS.50081.IK	.1	.0	Δ
0.82		41.0	8.6	6.6	3	80	2.CFS.50082.IK	.1	.0	Δ
0.83		41.5	8.7	6.6	3	80	2.CFS.50083.IK	.1	.0	Δ
0.84		42.0	8.8	6.7	3	80	2.CFS.50084.IK	.1	.0	Δ
0.85		42.5	8.9	6.8	3	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	0.3 - 2.0 mm
Tolerance	- 0.003 mm - 0.006 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
0.86		43.0	9.0	6.9	3	80	2.CFS.50086.IK	.1	.0	Δ
0.87		43.5	9.1	7.0	3	80	2.CFS.50087.IK	.1	.0	Δ
0.88		44.0	9.2	7.0	3	80	2.CFS.50088.IK	.1	.0	Δ
0.89		44.5	9.3	7.1	3	80	2.CFS.50089.IK	.1	.0	Δ
0.90		45.0	9.5	7.2	3	85	2.CFS.50090.IK	.1	.0	■
0.91		45.5	9.6	7.3	3	80	2.CFS.50091.IK	.1	.0	Δ
0.92		46.0	9.7	7.4	3	80	2.CFS.50092.IK	.1	.0	Δ
0.93		46.5	9.8	7.4	3	85	2.CFS.50093.IK	.1	.0	Δ
0.94		47.0	9.9	7.5	3	70	2.CFS.50094.IK	.1	.0	Δ
0.95		47.5	10.0	7.6	3	70	2.CFS.50095.IK	.1	.0	■
0.96		48.0	10.1	7.7	3	70	2.CFS.50096.IK	.1	.0	Δ
0.97		48.5	10.2	7.8	3	85	2.CFS.50097.IK	.1	.0	Δ
0.98		49.0	10.3	7.8	3	85	2.CFS.50098.IK	.1	.0	Δ
0.99		49.5	10.4	7.9	3	85	2.CFS.50099.IK	.1	.0	Δ
1.00		50.0	10.5	8.0	3	90	2.CFS.50100.IK	.1	.0	■
1.01		50.5	10.6	8.1	3	90	2.CFS.50101.IK	.1	.0	Δ
1.02		51.0	10.7	8.2	3	90	2.CFS.50102.IK	.1	.0	Δ
1.03		51.5	10.8	8.2	3	90	2.CFS.50103.IK	.1	.0	Δ
1.04		52.0	10.9	8.3	3	90	2.CFS.50104.IK	.1	.0	Δ
1.05		52.5	11.0	8.4	3	90	2.CFS.50105.IK	.1	.0	■
1.06		53.0	11.1	8.5	3	90	2.CFS.50106.IK	.1	.0	Δ
1.07		53.5	11.2	8.6	3	90	2.CFS.50107.IK	.1	.0	Δ
1.08		54.0	11.3	8.6	3	90	2.CFS.50108.IK	.1	.0	Δ
1.09		54.5	11.4	8.7	3	90	2.CFS.50109.IK	.1	.0	Δ
1.10		55.0	11.6	8.8	3	95	2.CFS.50110.IK	.1	.0	■
1.11		55.5	11.7	8.9	3	95	2.CFS.50111.IK	.1	.0	Δ
1.12		56.0	11.8	9.0	3	95	2.CFS.50112.IK	.1	.0	Δ
1.13		56.5	11.9	9.0	3	95	2.CFS.50113.IK	.1	.0	Δ
1.14		57.0	12.0	9.1	3	95	2.CFS.50114.IK	.1	.0	Δ

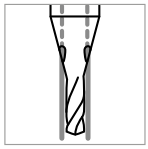
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
1.15		57.5	12.1	9.2	3	95	2.CFS.50115.IK	.1	.0	■
1.16		58.0	12.2	9.3	3	95	2.CFS.50116.IK	.1	.0	Δ
1.17		58.5	12.3	9.4	3	95	2.CFS.50117.IK	.1	.0	Δ
1.18		59.0	12.4	9.4	3	95	2.CFS.50118.IK	.1	.0	Δ
1.19		59.5	12.5	9.5	3	95	2.CFS.50119.IK	.1	.0	Δ
1.20		60.0	12.6	9.6	3	95	2.CFS.50120.IK	.1	.0	■
1.25		62.5	13.1	10.0	4	105	2.CFS.50125.IK	.1	-	◪
1.30		65.0	13.7	10.4	4	105	2.CFS.50130.IK	.1	-	◪
1.35		67.5	14.2	10.8	4	105	2.CFS.50135.IK	.1	-	◪
1.40		70.0	14.7	11.2	4	110	2.CFS.50140.IK	.1	-	◪
1.45		72.5	15.2	11.6	4	115	2.CFS.50145.IK	.1	-	◪
1.50		75.0	15.8	12.0	4	115	2.CFS.50150.IK	.1	-	◪
1.55		77.5	16.3	12.4	4	115	2.CFS.50155.IK	.1	-	◪
1.587	1/16	80.0	16.8	12.8	4	115	2.CFS.50F116.IK	.1	-	◪
1.60		80.0	16.8	12.8	4	120	2.CFS.50160.IK	.1	-	◪
1.65		82.5	17.3	13.2	4	120	2.CFS.50165.IK	.1	-	◪
1.70		85.0	17.9	13.6	4	125	2.CFS.50170.IK	.1	-	◪
1.75		87.5	18.4	14.0	4	130	2.CFS.50175.IK	.1	-	◪
1.80		90.0	18.9	14.4	4	130	2.CFS.50180.IK	.1	-	◪
1.85		92.5	19.4	14.8	4	135	2.CFS.50185.IK	.1	-	◪
1.90		95.0	20.0	15.2	4	135	2.CFS.50190.IK	.1	-	◪
1.95		97.5	20.5	15.6	4	140	2.CFS.50195.IK	.1	-	◪
2.00		100.0	21.0	16.0	4	140	2.CFS.50200.IK	.1	-	◪

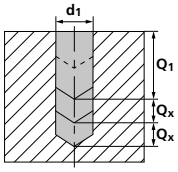
Complementary products	
CrazyDrill Flexpilot Steel	p.108
CrazyDrill Crosspilot	p.146

CRAZYDRILL™ by Mikron Tool Flex STEEL

Steel - 50 x d - coated

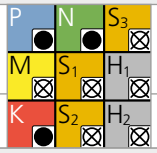
DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	5	40	40	60
		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	25	25	50
		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	20	20	35
		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	40	50	100
		0.6030	GG30	ASTM 40B				
		0.7040	GGG40	ASTM 60-40-18			40	80
		0.7060	GGG60	ASTM 80-60-03				
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	5	40	60	120
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	5	40	50	80
		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	40	60	100
		2.102	CuSn6	UNS C51900			40	60
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	5	20	20	40
		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

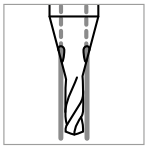


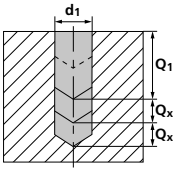
			f [mm/rev]						
	Q_1	Q_x	Ød1 0.2 mm	0.3 mm	0.4 mm 1/64"	0.6 mm	0.8 mm 1/32"	1.0 mm	1.5 mm – 2.0 mm 1/16"
			f	f	f	f	f	f	f
	2xd1	0.5xd1	0.005	0.010	0.015	0.030	0.040	0.060	0.080
	2xd1	0.5xd1	0.003 – 0.005	0.008 – 0.010	0.012 – 0.015	0.020 – 0.025	0.035	0.050	0.070
	2xd1	1xd1	0.004	0.008	0.010	0.015	0.025	0.040	0.060
			Recommended: CrazyDrill Flex SST-Inox 50 x d1						
	2xd1	1xd1	0.005	0.010	0.015	0.020	0.035	0.050	0.070
	2xd1	1xd1	0.015	0.040	0.050	0.080	0.100	0.120	0.150
	2xd1	1xd1	0.015	0.040	0.050	0.080	0.100	0.120	0.150
			Recommended: CrazyDrill Flex Titanium 50 x d1						
			Recommended: CrazyDrill Flex SST-Inox 50 x d1						
	2xd1	1xd1	0.010	0.030	0.040	0.060	0.080	0.100	0.120
	2xd1	0.5xd1	0.004	0.006	0.010	0.015	0.025	0.040	0.060
			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

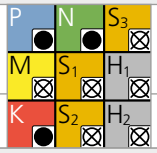
DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 High
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	5	40	40	60
		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	25	25	50
		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	20	20	35
		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	40	50	100
		0.6030	GG30	ASTM 40B				
		0.7040	GGG40	ASTM 60-40-18			40	80
		0.7060	GGG60	ASTM 80-60-03				
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	5	40	60	120
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	5	40	50	80
		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	40	60	100
		2.102	CuSn6	UNS C51900			40	60
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	5	20	20	40
		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

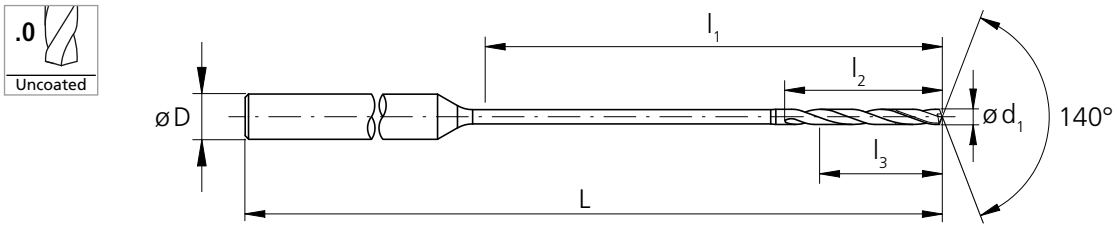


			f [mm/rev]				
	Q_1	Q_x	Ød1				
			0.3 mm	0.4 mm	0.6 mm	0.8 mm	1.0 mm – 1.2 mm
			f	f	f	f	f
	2xd1	0.5xd1	0.010	0.015	0.030	0.040	0.060
	2xd1	0.5xd1	0.008 – 0.010	0.012 – 0.015	0.020 – 0.025	0.035	0.050
	2xd1	1xd1	0.008	0.010	0.015	0.025	0.040
			Recommended: CrazyDrill Flex SST-Inox 50 x d1				
	2xd1	1xd1	0.010	0.015	0.020	0.035	0.050
	2xd1	1xd1	0.040	0.050	0.080	0.100	0.120
	2xd1	1xd1	0.040	0.050	0.080	0.100	0.120
			Recommended: CrazyDrill Flex Titanium 50 x d1				
			Recommended: CrazyDrill Flex SST-Inox 50 x d1				
	2xd1	1xd1	0.030	0.040	0.060	0.080	0.100
	2xd1	0.5xd1	0.006	0.010	0.015	0.025	0.040
			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

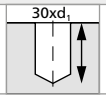
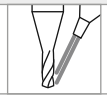
DRILLING WITH EXTERNAL COOLING



d_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.10	3.0	1.1	0.8	3	45	2.CFT.30010.0	■
0.11	3.3	1.2	0.9	3	45	2.CFT.30011.0	Δ
0.12	3.6	1.3	1.0	3	45	2.CFT.30012.0	Δ
0.13	3.9	1.4	1.0	3	45	2.CFT.30013.0	Δ
0.14	4.2	1.5	1.1	3	45	2.CFT.30014.0	Δ
0.15	4.5	1.6	1.2	3	45	2.CFT.30015.0	■
0.16	4.8	1.7	1.3	3	45	2.CFT.30016.0	Δ
0.17	5.1	1.8	1.4	3	45	2.CFT.30017.0	Δ
0.18	5.4	1.9	1.4	3	45	2.CFT.30018.0	Δ
0.19	5.7	2.0	1.5	3	45	2.CFT.30019.0	Δ
0.20	6.0	2.1	1.6	3	45	2.CFT.30020.0	■
0.21	6.3	2.2	1.7	3	45	2.CFT.30021.0	Δ
0.22	6.6	2.3	1.8	3	45	2.CFT.30022.0	Δ
0.23	6.9	2.4	1.8	3	45	2.CFT.30023.0	Δ
0.24	7.2	2.5	1.9	3	45	2.CFT.30024.0	Δ
0.25	7.5	2.6	2.0	3	45	2.CFT.30025.0	■
0.26	7.8	2.7	2.1	3	45	2.CFT.30026.0	Δ
0.27	8.1	2.8	2.2	3	45	2.CFT.30027.0	Δ
0.28	8.4	2.9	2.2	3	45	2.CFT.30028.0	Δ
0.29	8.7	3.0	2.3	3	45	2.CFT.30029.0	Δ
0.30	9.0	3.2	2.4	3	50	2.CFT.30030.0	■
0.31	9.3	3.3	2.5	3	50	2.CFT.30031.0	Δ
0.32	9.6	3.4	2.6	3	50	2.CFT.30032.0	Δ
0.33	9.9	3.5	2.6	3	50	2.CFT.30033.0	Δ
0.34	10.2	3.6	2.7	3	50	2.CFT.30034.0	Δ
0.35	10.5	3.7	2.8	3	50	2.CFT.30035.0	■
0.36	10.8	3.8	2.9	3	50	2.CFT.30036.0	Δ
0.37	11.1	3.9	3.0	3	50	2.CFT.30037.0	Δ
0.38	11.4	4.0	3.0	3	50	2.CFT.30038.0	Δ

d_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.39	11.7	4.1	3.1	3	50	2.CFT.30039.0	Δ
0.40	12.0	4.2	3.2	3	50	2.CFT.30040.0	■
0.41	12.3	4.3	3.3	3	50	2.CFT.30041.0	Δ
0.42	12.6	4.4	3.4	3	50	2.CFT.30042.0	Δ
0.43	12.9	4.5	3.4	3	50	2.CFT.30043.0	Δ
0.44	13.2	4.6	3.5	3	50	2.CFT.30044.0	Δ
0.45	13.5	4.7	3.6	3	50	2.CFT.30045.0	■
0.46	13.8	4.8	3.7	3	50	2.CFT.30046.0	Δ
0.47	14.1	4.9	3.8	3	50	2.CFT.30047.0	Δ
0.48	14.4	5.0	3.8	3	50	2.CFT.30048.0	Δ
0.49	14.7	5.1	3.9	3	50	2.CFT.30049.0	Δ
0.50	15.0	5.3	4.0	3	53	2.CFT.30050.0	■
0.51	15.3	5.4	4.1	3	53	2.CFT.30051.0	Δ
0.52	15.6	5.5	4.2	3	53	2.CFT.30052.0	Δ
0.53	15.9	5.6	4.2	3	53	2.CFT.30053.0	Δ
0.54	16.2	5.7	4.3	3	53	2.CFT.30054.0	Δ
0.55	16.5	5.8	4.4	3	53	2.CFT.30055.0	■
0.56	16.8	5.9	4.5	3	53	2.CFT.30056.0	Δ
0.57	17.1	6.0	4.6	3	53	2.CFT.30057.0	Δ
0.58	17.4	6.1	4.6	3	53	2.CFT.30058.0	Δ
0.59	17.7	6.2	4.7	3	53	2.CFT.30059.0	Δ
0.60	18.0	6.3	4.8	3	53	2.CFT.30060.0	■
0.61	18.3	6.4	4.9	3	53	2.CFT.30061.0	Δ
0.62	18.6	6.5	5.0	3	53	2.CFT.30062.0	Δ
0.63	18.9	6.6	5.0	3	53	2.CFT.30063.0	Δ
0.64	19.2	6.7	5.1	3	53	2.CFT.30064.0	Δ
0.65	19.5	6.8	5.2	3	53	2.CFT.30065.0	■
0.66	19.8	6.9	5.3	3	53	2.CFT.30066.0	Δ
0.67	20.1	7.0	5.4	3	53	2.CFT.30067.0	Δ

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

Carbide			Z2	

Ø d_1	0.1 - 1.2 mm
Tolerance	- 0.003 mm - 0.006 mm

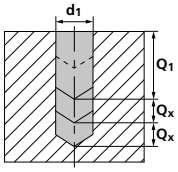
d_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.68	20.4	7.1	5.4	3	53	2.CFT.30068.0	Δ
0.69	20.7	7.2	5.5	3	53	2.CFT.30069.0	Δ
0.70	21.0	7.4	5.6	3	60	2.CFT.30070.0	■
0.71	21.3	7.5	5.7	3	60	2.CFT.30071.0	Δ
0.72	21.6	7.6	5.8	3	60	2.CFT.30072.0	Δ
0.73	21.9	7.7	5.8	3	60	2.CFT.30073.0	Δ
0.74	22.2	7.8	5.9	3	60	2.CFT.30074.0	Δ
0.75	22.5	7.9	6.0	3	60	2.CFT.30075.0	■
0.76	22.8	8.0	6.1	3	60	2.CFT.30076.0	Δ
0.77	23.1	8.1	6.2	3	60	2.CFT.30077.0	Δ
0.78	23.4	8.2	6.2	3	60	2.CFT.30078.0	Δ
0.79	23.7	8.3	6.3	3	60	2.CFT.30079.0	Δ
0.80	24.0	8.4	6.4	3	60	2.CFT.30080.0	■
0.81	24.3	8.5	6.5	3	60	2.CFT.30081.0	Δ
0.82	24.6	8.6	6.6	3	60	2.CFT.30082.0	Δ
0.83	24.9	8.7	6.6	3	60	2.CFT.30083.0	Δ
0.84	25.2	8.8	6.7	3	60	2.CFT.30084.0	Δ
0.85	25.5	8.9	6.8	3	64	2.CFT.30085.0	■
0.86	25.8	9.0	6.9	3	64	2.CFT.30086.0	Δ
0.87	26.1	9.1	7.0	3	64	2.CFT.30087.0	Δ
0.88	26.4	9.2	7.0	3	64	2.CFT.30088.0	Δ
0.89	26.7	9.3	7.1	3	64	2.CFT.30089.0	Δ
0.90	27.0	9.5	7.2	3	64	2.CFT.30090.0	■
0.91	27.3	9.6	7.3	3	64	2.CFT.30091.0	Δ
0.92	27.6	9.7	7.4	3	64	2.CFT.30092.0	Δ
0.93	27.9	9.8	7.4	3	64	2.CFT.30093.0	Δ
0.94	28.2	9.9	7.5	3	64	2.CFT.30094.0	Δ
0.95	28.5	10.0	7.6	3	64	2.CFT.30095.0	■
0.96	28.8	10.1	7.7	3	64	2.CFT.30096.0	Δ

d_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.97	29.1	10.2	7.8	3	64	2.CFT.30097.0	Δ
0.98	29.4	10.3	7.8	3	64	2.CFT.30098.0	Δ
0.99	29.7	10.4	7.9	3	64	2.CFT.30099.0	Δ
1.00	30.0	10.5	8.0	3	70	2.CFT.30100.0	■
1.01	30.3	10.6	8.1	3	70	2.CFT.30101.0	Δ
1.02	30.6	10.7	8.2	3	70	2.CFT.30102.0	Δ
1.03	30.9	10.8	8.2	3	70	2.CFT.30103.0	Δ
1.04	31.2	10.9	8.3	3	70	2.CFT.30104.0	Δ
1.05	31.5	11.0	8.4	3	70	2.CFT.30105.0	■
1.06	31.8	11.1	8.5	3	70	2.CFT.30106.0	Δ
1.07	32.1	11.2	8.6	3	70	2.CFT.30107.0	Δ
1.08	32.4	11.3	8.6	3	70	2.CFT.30108.0	Δ
1.09	32.7	11.4	8.7	3	70	2.CFT.30109.0	Δ
1.10	33.0	11.6	8.8	3	70	2.CFT.30110.0	■
1.11	33.3	11.7	8.9	3	70	2.CFT.30111.0	Δ
1.12	33.6	11.8	9.0	3	70	2.CFT.30112.0	Δ
1.13	33.9	11.9	9.0	3	70	2.CFT.30113.0	Δ
1.14	34.2	12.0	9.1	3	70	2.CFT.30114.0	Δ
1.15	34.5	12.1	9.2	3	70	2.CFT.30115.0	■
1.16	34.8	12.2	9.3	3	70	2.CFT.30116.0	Δ
1.17	35.1	12.3	9.4	3	70	2.CFT.30117.0	Δ
1.18	35.4	12.4	9.4	3	70	2.CFT.30118.0	Δ
1.19	35.7	12.5	9.5	3	70	2.CFT.30119.0	Δ
1.20	36.0	12.6	9.6	3	70	2.CFT.30120.0	■

Complementary products	
CrazyDrill Flexpilot Titanium	p.112
CrazyDrill Crosspilot	p.146

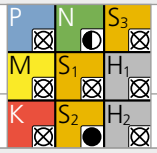
Titanium - 30 x d

DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 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	2.0040	Cu-OF / CW008A	UNS C10100	5	40	20	40
		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				
		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	20	20	30
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	5	20	20	40
		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

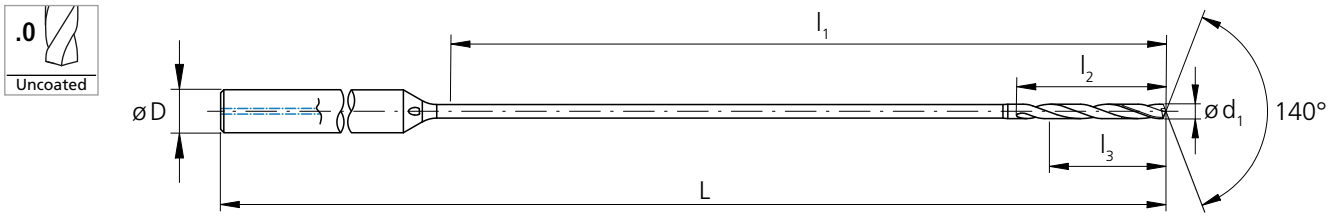


			f [mm/rev]						
	Q_1	Q_x	Ød1						
			0.1 mm	0.2 mm	0.3 mm	0.4 mm	0.6 mm	0.8 mm	1.0 mm – 1.2 mm
			f	f	f	f	f	f	f
			Recommended: CrazyDrill Flex Steel 30 x d1						
			Recommended: CrazyDrill Flex SST-Inox 30 x d1						
			Recommended: CrazyDrill Flex Steel 30 x d1						
			Recommended: CrazyDrill Flex Steel 30 x d1						
	2xd1	0.5xd1	0.005	0.010	0.015	0.020	0.030	0.040	0.060
			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	0.002	0.003	0.004	0.006	0.008	0.012
	2xd1	0.25xd1	0.002	0.003	0.005	0.006	0.009	0.012	0.018
			Recommended: CrazyDrill Flex SST-Inox 30 x d1						

CRAZYDRILL™ by Mikron Tool Flex TITANIUM

Titanium - 50 x d

DRILLING WITH INTEGRATED COOLING

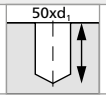


d_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.30	15.0	3.2	2.4	3	53	2.CFT.50030.IK.0	■
0.31	15.5	3.3	2.5	3	53	2.CFT.50031.IK.0	Δ
0.32	16.0	3.4	2.6	3	53	2.CFT.50032.IK.0	Δ
0.33	16.5	3.5	2.6	3	53	2.CFT.50033.IK.0	Δ
0.34	17.0	3.6	2.7	3	53	2.CFT.50034.IK.0	Δ
0.35	17.5	3.7	2.8	3	60	2.CFT.50035.IK.0	■
0.36	18.0	3.8	2.9	3	60	2.CFT.50036.IK.0	Δ
0.37	18.5	3.9	3.0	3	60	2.CFT.50037.IK.0	Δ
0.38	19.0	4.0	3.0	3	60	2.CFT.50038.IK.0	Δ
0.39	19.5	4.1	3.1	3	60	2.CFT.50039.IK.0	Δ
0.40	20.0	4.2	3.2	3	60	2.CFT.50040.IK.0	■
0.41	20.5	4.3	3.3	3	60	2.CFT.50041.IK.0	Δ
0.42	21.0	4.4	3.4	3	60	2.CFT.50042.IK.0	Δ
0.43	21.5	4.5	3.4	3	60	2.CFT.50043.IK.0	Δ
0.44	22.0	4.6	3.5	3	60	2.CFT.50044.IK.0	Δ
0.45	22.5	4.7	3.6	3	60	2.CFT.50045.IK.0	■
0.46	23.0	4.8	3.7	3	60	2.CFT.50046.IK.0	Δ
0.47	23.5	4.9	3.8	3	60	2.CFT.50047.IK.0	Δ
0.48	24.0	5.0	3.8	3	60	2.CFT.50048.IK.0	Δ
0.49	24.5	5.1	3.9	3	60	2.CFT.50049.IK.0	Δ
0.50	25.0	5.3	4.0	3	64	2.CFT.50050.IK.0	■
0.51	25.5	5.4	4.1	3	64	2.CFT.50051.IK.0	Δ
0.52	26.0	5.5	4.2	3	64	2.CFT.50052.IK.0	Δ
0.53	26.5	5.6	4.2	3	64	2.CFT.50053.IK.0	Δ

d_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.54	27.0	5.7	4.3	3	64	2.CFT.50054.IK.0	Δ
0.55	27.5	5.8	4.4	3	64	2.CFT.50055.IK.0	■
0.56	28.0	5.9	4.5	3	64	2.CFT.50056.IK.0	Δ
0.57	28.5	6.0	4.6	3	64	2.CFT.50057.IK.0	Δ
0.58	29.0	6.1	4.6	3	64	2.CFT.50058.IK.0	Δ
0.59	29.5	6.2	4.7	3	64	2.CFT.50059.IK.0	Δ
0.60	30.0	6.3	4.8	3	70	2.CFT.50060.IK.0	■
0.61	30.5	6.4	4.9	3	70	2.CFT.50061.IK.0	Δ
0.62	31.0	6.5	5.0	3	70	2.CFT.50062.IK.0	Δ
0.63	31.5	6.6	5.0	3	70	2.CFT.50063.IK.0	Δ
0.64	32.0	6.7	5.1	3	70	2.CFT.50064.IK.0	Δ
0.65	32.5	6.8	5.2	3	70	2.CFT.50065.IK.0	■
0.66	33.0	6.9	5.3	3	70	2.CFT.50066.IK.0	Δ
0.67	33.5	7.0	5.4	3	70	2.CFT.50067.IK.0	Δ
0.68	34.0	7.1	5.4	3	70	2.CFT.50068.IK.0	Δ
0.69	34.5	7.2	5.5	3	70	2.CFT.50069.IK.0	Δ
0.70	35.0	7.4	5.6	3	75	2.CFT.50070.IK.0	■
0.71	35.5	7.5	5.7	3	75	2.CFT.50071.IK.0	Δ
0.72	36.0	7.6	5.8	3	75	2.CFT.50072.IK.0	Δ
0.73	36.5	7.7	5.8	3	75	2.CFT.50073.IK.0	Δ
0.74	37.0	7.8	5.9	3	75	2.CFT.50074.IK.0	Δ
0.75	37.5	7.9	6.0	3	75	2.CFT.50075.IK.0	■
0.76	38.0	8.0	6.1	3	75	2.CFT.50076.IK.0	Δ
0.77	38.5	8.1	6.2	3	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	0.3 - 1.2 mm
Tolerance	- 0.003 mm - 0.006 mm

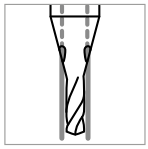
d_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.78	39.0	8.2	6.2	3	75	2.CFT.50078.IK.0	Δ
0.79	39.5	8.3	6.3	3	75	2.CFT.50079.IK.0	Δ
0.80	40.0	8.4	6.4	3	80	2.CFT.50080.IK.0	■
0.81	40.5	8.5	6.5	3	80	2.CFT.50081.IK.0	Δ
0.82	41.0	8.6	6.6	3	80	2.CFT.50082.IK.0	Δ
0.83	41.5	8.7	6.6	3	80	2.CFT.50083.IK.0	Δ
0.84	42.0	8.8	6.7	3	80	2.CFT.50084.IK.0	Δ
0.85	42.5	8.9	6.8	3	80	2.CFT.50085.IK.0	■
0.86	43.0	9.0	6.9	3	80	2.CFT.50086.IK.0	Δ
0.87	43.5	9.1	7.0	3	80	2.CFT.50087.IK.0	Δ
0.88	44.0	9.2	7.0	3	80	2.CFT.50088.IK.0	Δ
0.89	44.5	9.3	7.1	3	80	2.CFT.50089.IK.0	Δ
0.90	45.0	9.5	7.2	3	85	2.CFT.50090.IK.0	■
0.91	45.5	9.6	7.3	3	80	2.CFT.50091.IK.0	Δ
0.92	46.0	9.7	7.4	3	80	2.CFT.50092.IK.0	Δ
0.93	46.5	9.8	7.4	3	85	2.CFT.50093.IK.0	Δ
0.94	47.0	9.9	7.5	3	70	2.CFT.50094.IK.0	Δ
0.95	47.5	10.0	7.6	3	70	2.CFT.50095.IK.0	■
0.96	48.0	10.1	7.7	3	70	2.CFT.50096.IK.0	Δ
0.97	48.5	10.2	7.8	3	85	2.CFT.50097.IK.0	Δ
0.98	49.0	10.3	7.8	3	85	2.CFT.50098.IK.0	Δ
0.99	49.5	10.4	7.9	3	85	2.CFT.50099.IK.0	Δ
1.00	50.0	10.5	8.0	3	90	2.CFT.50100.IK.0	■
1.01	50.5	10.6	8.1	3	90	2.CFT.50101.IK.0	Δ

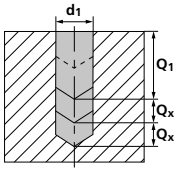
d_1 [mm]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.02	51.0	10.7	8.2	3	90	2.CFT.50102.IK.0	Δ
1.03	51.5	10.8	8.2	3	90	2.CFT.50103.IK.0	Δ
1.04	52.0	10.9	8.3	3	90	2.CFT.50104.IK.0	Δ
1.05	52.5	11.0	8.4	3	90	2.CFT.50105.IK.0	■
1.06	53.0	11.1	8.5	3	90	2.CFT.50106.IK.0	Δ
1.07	53.5	11.2	8.6	3	90	2.CFT.50107.IK.0	Δ
1.08	54.0	11.3	8.6	3	90	2.CFT.50108.IK.0	Δ
1.09	54.5	11.4	8.7	3	90	2.CFT.50109.IK.0	Δ
1.10	55.0	11.6	8.8	3	95	2.CFT.50110.IK.0	■
1.11	55.5	11.7	8.9	3	95	2.CFT.50111.IK.0	Δ
1.12	56.0	11.8	9.0	3	95	2.CFT.50112.IK.0	Δ
1.13	56.5	11.9	9.0	3	95	2.CFT.50113.IK.0	Δ
1.14	57.0	12.0	9.1	3	95	2.CFT.50114.IK.0	Δ
1.15	57.5	12.1	9.2	3	95	2.CFT.50115.IK.0	■
1.16	58.0	12.2	9.3	3	95	2.CFT.50116.IK.0	Δ
1.17	58.5	12.3	9.4	3	95	2.CFT.50117.IK.0	Δ
1.18	59.0	12.4	9.4	3	95	2.CFT.50118.IK.0	Δ
1.19	59.5	12.5	9.5	3	95	2.CFT.50119.IK.0	Δ
1.20	60.0	12.6	9.6	3	95	2.CFT.50120.IK.0	■

Complementary products	
CrazyDrill Flexpilot Titanium	p.112
CrazyDrill Crosspilot	p.146

Titanium - 50 x d

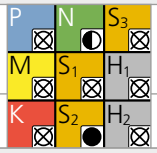
DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 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	2.0040	Cu-OF / CW008A	UNS C10100	5	40	20	40
		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				
		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	20	20	30
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	5	20	20	40
		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



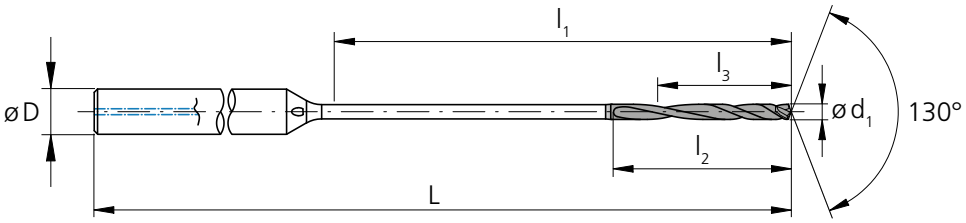
			f [mm/rev]				
	Q_1	Q_x	Ød1				
			0.3 mm	0.4 mm	0.6 mm	0.8 mm	1.0 mm – 1.2 mm
			f	f	f	f	f
			Recommended: CrazyDrill Flex Steel 50 x d1				
			Recommended: CrazyDrill Flex SST-Inox 50 x d1				
			Recommended: CrazyDrill Flex Steel 50 x d1				
			Recommended: CrazyDrill Flex Steel 50 x d1				
	2xd1	0.5xd1	0.015	0.020	0.030	0.040	0.060
			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	0.004	0.006	0.008	0.012
	2xd1	0.25xd1	0.005	0.006	0.009	0.012	0.018
			Recommended: CrazyDrill Flex SST-Inox 50 x d1				

CRAZYDRILL™ by Mikron Tool Flex SST-INOX

SST-Inox - 30 x d

DRILLING WITH INTEGRATED COOLING

.1 eXedur RIP



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.20		6.0	2.0	1.6	3	50	2.CFI.30020.IK.1	■
0.21		6.3	2.1	1.7	3	50	2.CFI.30021.IK.1	Δ
0.22		6.6	2.2	1.8	3	50	2.CFI.30022.IK.1	Δ
0.23		6.9	2.3	1.8	3	50	2.CFI.30023.IK.1	Δ
0.24		7.2	2.4	1.9	3	50	2.CFI.30024.IK.1	Δ
0.25		7.5	2.5	2.0	3	50	2.CFI.30025.IK.1	■
0.26		7.8	2.5	2.1	3	50	2.CFI.30026.IK.1	Δ
0.27		8.1	2.6	2.2	3	50	2.CFI.30027.IK.1	Δ
0.28		8.4	2.7	2.2	3	50	2.CFI.30028.IK.1	Δ
0.29		8.7	2.8	2.3	3	50	2.CFI.30029.IK.1	Δ
0.30		9.0	2.9	2.4	3	50	2.CFI.30030.IK.1	■
0.31		9.3	3.0	2.5	3	50	2.CFI.30031.IK.1	Δ
0.32		9.6	3.1	2.6	3	50	2.CFI.30032.IK.1	Δ
0.33		9.9	3.2	2.6	3	50	2.CFI.30033.IK.1	Δ
0.34		10.2	3.3	2.7	3	50	2.CFI.30034.IK.1	Δ
0.35		10.5	3.4	2.8	3	50	2.CFI.30035.IK.1	■
0.36		10.8	3.5	2.9	3	50	2.CFI.30036.IK.1	Δ
0.37		11.1	3.6	3.0	3	50	2.CFI.30037.IK.1	Δ
0.38		11.4	3.7	3.0	3	50	2.CFI.30038.IK.1	Δ
0.39		11.7	3.8	3.1	3	50	2.CFI.30039.IK.1	Δ
0.396	**1/64**	12.0	3.9	3.2	3	50	2.CFI.30F164.IK.1	■
0.40		12.0	3.9	3.2	3	50	2.CFI.30040.IK.1	■
0.41		12.3	4.0	3.3	3	50	2.CFI.30041.IK.1	Δ
0.42		12.6	4.1	3.4	3	50	2.CFI.30042.IK.1	Δ
0.43		12.9	4.2	3.4	3	50	2.CFI.30043.IK.1	Δ
0.44		13.2	4.3	3.5	3	50	2.CFI.30044.IK.1	Δ
0.45		13.5	4.4	3.6	3	50	2.CFI.30045.IK.1	■
0.46		13.8	4.5	3.7	3	50	2.CFI.30046.IK.1	Δ
0.47		14.1	4.6	3.8	3	50	2.CFI.30047.IK.1	Δ
0.48		14.4	4.7	3.8	3	50	2.CFI.30048.IK.1	Δ
0.49		14.7	4.8	3.9	3	50	2.CFI.30049.IK.1	Δ
0.50		15.0	4.9	4.0	3	53	2.CFI.30050.IK.1	■

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.51		15.3	5.0	4.1	3	53	2.CFI.30051.IK.1	Δ
0.52		15.6	5.1	4.2	3	53	2.CFI.30052.IK.1	Δ
0.53		15.9	5.2	4.2	3	53	2.CFI.30053.IK.1	Δ
0.54		16.2	5.3	4.3	3	53	2.CFI.30054.IK.1	Δ
0.55		16.5	5.4	4.4	3	53	2.CFI.30055.IK.1	■
0.56		16.8	5.5	4.5	3	53	2.CFI.30056.IK.1	Δ
0.57		17.1	5.6	4.6	3	53	2.CFI.30057.IK.1	Δ
0.58		17.4	5.7	4.6	3	53	2.CFI.30058.IK.1	Δ
0.59		17.7	5.8	4.7	3	53	2.CFI.30059.IK.1	Δ
0.60		18.0	5.9	4.8	3	53	2.CFI.30060.IK.1	■
0.61		18.3	6.0	4.9	3	53	2.CFI.30061.IK.1	Δ
0.62		18.6	6.1	5.0	3	53	2.CFI.30062.IK.1	Δ
0.63		18.9	6.2	5.0	3	53	2.CFI.30063.IK.1	Δ
0.64		19.2	6.3	5.1	3	53	2.CFI.30064.IK.1	Δ
0.65		19.5	6.4	5.2	3	53	2.CFI.30065.IK.1	■
0.66		19.8	6.5	5.3	3	53	2.CFI.30066.IK.1	Δ
0.67		20.1	6.6	5.4	3	53	2.CFI.30067.IK.1	Δ
0.68		20.4	6.7	5.4	3	53	2.CFI.30068.IK.1	Δ
0.69		20.7	6.8	5.5	3	53	2.CFI.30069.IK.1	Δ
0.70		21.0	6.9	5.6	3	60	2.CFI.30070.IK.1	■
0.71		21.3	7.0	5.7	3	60	2.CFI.30071.IK.1	Δ
0.72		21.6	7.1	5.8	3	60	2.CFI.30072.IK.1	Δ
0.73		21.9	7.2	5.8	3	60	2.CFI.30073.IK.1	Δ
0.74		22.2	7.3	5.9	3	60	2.CFI.30074.IK.1	Δ
0.75		22.5	7.4	6.0	3	60	2.CFI.30075.IK.1	■
0.76		22.8	7.4	6.1	3	60	2.CFI.30076.IK.1	Δ
0.77		23.1	7.5	6.2	3	60	2.CFI.30077.IK.1	Δ
0.78		23.4	7.6	6.2	3	60	2.CFI.30078.IK.1	Δ
0.79		23.7	7.7	6.3	3	60	2.CFI.30079.IK.1	Δ
0.793	**1/32**	24.0	7.8	6.4	3	60	2.CFI.30F132.IK.1	■
0.80		24.0	7.8	6.4	3	60	2.CFI.30080.IK.1	■
0.81		24.3	7.9	6.5	3	60	2.CFI.30081.IK.1	Δ

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

Carbide | 30xd1 | 140° | Z2

Ø d_1	0.2 - 2.0 mm
Tolerance	- 0.003 mm - 0.006 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.82		24.6	8.0	6.6	3	60	2.CFI.30082.IK.1	Δ
0.83		24.9	8.1	6.6	3	60	2.CFI.30083.IK.1	Δ
0.84		25.2	8.2	6.7	3	60	2.CFI.30084.IK.1	Δ
0.85		25.5	8.3	6.8	3	64	2.CFI.30085.IK.1	■
0.86		25.8	8.4	6.9	3	64	2.CFI.30086.IK.1	Δ
0.87		26.1	8.5	7.0	3	64	2.CFI.30087.IK.1	Δ
0.88		26.4	8.6	7.0	3	64	2.CFI.30088.IK.1	Δ
0.89		26.7	8.7	7.1	3	64	2.CFI.30089.IK.1	Δ
0.90		27.0	8.8	7.2	3	64	2.CFI.30090.IK.1	■
0.91		27.3	8.9	7.3	3	64	2.CFI.30091.IK.1	Δ
0.92		27.6	9.0	7.4	3	64	2.CFI.30092.IK.1	Δ
0.93		27.9	9.1	7.4	3	64	2.CFI.30093.IK.1	Δ
0.94		28.2	9.2	7.5	3	64	2.CFI.30094.IK.1	Δ
0.95		28.5	9.3	7.6	3	64	2.CFI.30095.IK.1	■
0.96		28.8	9.4	7.7	3	64	2.CFI.30096.IK.1	Δ
0.97		29.1	9.5	7.8	3	64	2.CFI.30097.IK.1	Δ
0.98		29.4	9.6	7.8	3	64	2.CFI.30098.IK.1	Δ
0.99		29.7	9.7	7.9	3	64	2.CFI.30099.IK.1	Δ
1.00		30.0	9.8	8.0	3	70	2.CFI.30100.IK.1	■
1.01		30.3	9.9	8.1	3	70	2.CFI.30101.IK.1	Δ
1.02		30.6	10.0	8.2	3	70	2.CFI.30102.IK.1	Δ
1.03		30.9	10.1	8.2	3	70	2.CFI.30103.IK.1	Δ
1.04		31.2	10.2	8.3	3	70	2.CFI.30104.IK.1	Δ
1.05		31.5	10.3	8.4	3	70	2.CFI.30105.IK.1	■
1.06		31.8	10.4	8.5	3	70	2.CFI.30106.IK.1	Δ
1.07		32.1	10.5	8.6	3	70	2.CFI.30107.IK.1	Δ
1.08		32.4	10.6	8.6	3	70	2.CFI.30108.IK.1	Δ
1.09		32.7	10.7	8.7	3	70	2.CFI.30109.IK.1	Δ
1.10		33.0	10.8	8.8	3	70	2.CFI.30110.IK.1	■
1.11		33.3	10.9	8.9	3	70	2.CFI.30111.IK.1	Δ
1.12		33.6	11.0	9.0	3	70	2.CFI.30112.IK.1	Δ
1.13		33.9	11.1	9.0	3	70	2.CFI.30113.IK.1	Δ

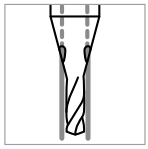
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.14		34.2	11.2	9.1	3	70	2.CFI.30114.IK.1	Δ
1.15		34.5	11.3	9.2	3	70	2.CFI.30115.IK.1	■
1.16		34.8	11.4	9.3	3	70	2.CFI.30116.IK.1	Δ
1.17		35.1	11.5	9.4	3	70	2.CFI.30117.IK.1	Δ
1.18		35.4	11.6	9.4	3	70	2.CFI.30118.IK.1	Δ
1.19		35.7	11.7	9.5	3	70	2.CFI.30119.IK.1	Δ
1.20		36.0	11.8	9.6	3	70	2.CFI.30120.IK.1	■
1.25		37.5	12.3	10.0	4	75	2.CFI.30125.IK.1	■
1.30		39.0	12.7	10.4	4	75	2.CFI.30130.IK.1	■
1.35		40.5	13.2	10.8	4	75	2.CFI.30135.IK.1	■
1.40		42.0	13.7	11.2	4	80	2.CFI.30140.IK.1	■
1.45		43.5	14.2	11.6	4	85	2.CFI.30145.IK.1	■
1.50		45.0	14.7	12.0	4	85	2.CFI.30150.IK.1	■
1.55		46.5	15.2	12.4	4	85	2.CFI.30155.IK.1	■
1.587	1/16	48.0	15.7	12.8	4	85	2.CFI.30F116.IK.1	■
1.60		48.0	15.7	12.8	4	85	2.CFI.30160.IK.1	■
1.65		49.5	16.2	13.2	4	85	2.CFI.30165.IK.1	■
1.70		51.0	16.7	13.6	4	90	2.CFI.30170.IK.1	■
1.75		52.5	17.2	14.0	4	90	2.CFI.30175.IK.1	■
1.80		54.0	17.6	14.4	4	90	2.CFI.30180.IK.1	■
1.85		55.5	18.1	14.8	4	95	2.CFI.30185.IK.1	■
1.90		57.0	18.6	15.2	4	95	2.CFI.30190.IK.1	■
1.95		58.5	19.1	15.6	4	100	2.CFI.30195.IK.1	■
2.00		60.0	19.6	16.0	4	100	2.CFI.30200.IK.1	■

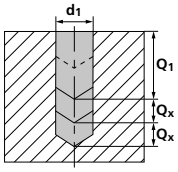
Complementary products

CrazyDrill Pilot SST-Inox p.122
CrazyDrill Crosspilot p.146

SST-Inox - 30 x d

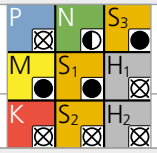
DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 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	35	35	40
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	15	30	35	40
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	15	30	35	40
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	15	30	35	40
		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	30	35	60
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	15	30	35	60
		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	20	20	30
		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	30	30	40
			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

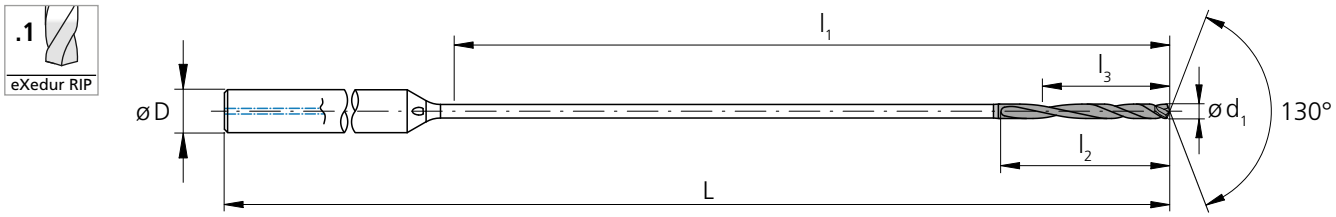


			f [mm/rev]						
	Q1	Qx	0.2 mm f	0.4 mm 1/64" f	0.6 mm f	Ød1 0.8 mm 1/32" f	1.0 mm f	1.5 mm 1/16" f	2.0 mm f
			Recommended: CrazyDrill Flex Steel 30 x d1						
	2xd1	0.5xd1	0.015	0.020	0.025	0.030	0.040	0.050	0.060
	2xd1	0.5xd1	0.015	0.020	0.025	0.030	0.040	0.050	0.060
	2xd1	0.5xd1	0.015	0.020	0.025	0.030	0.040	0.050	0.060
	2xd1	0.5xd1	0.010	0.015	0.020	0.025	0.030	0.040	0.050
			Recommended: CrazyDrill Flex Steel 30 x d1						
			Recommended: CrazyDrill Flex Steel 30 x d1						
	2xd1	0.5xd1	0.040	0.045	0.050	0.060	0.070	0.080	0.100
	2xd1	0.5xd1	0.040	0.045	0.050	0.060	0.070	0.080	0.100
			Recommended: CrazyDrill Flex Steel 30 x d1						
	2xd1	0.2xd1	0.010	0.015	0.020	0.025	0.030	0.040	0.050
			Recommended: CrazyDrill Flex Titanium 30 x d1						
	2xd1	0.5xd1	0.010	0.015	0.020	0.025	0.030	0.040	0.050

CRAZYDRILL™ by Mikron Tool Flex SST-INOX

SST-Inox - 50 x d

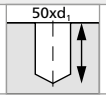
DRILLING WITH INTEGRATED COOLING



d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.30		15.0	2.9	2.4	3	53	2.CFI.50030.IK.1	■
0.31		15.5	3.0	2.5	3	53	2.CFI.50031.IK.1	Δ
0.32		16.0	3.1	2.6	3	53	2.CFI.50032.IK.1	Δ
0.33		16.5	3.2	2.6	3	53	2.CFI.50033.IK.1	Δ
0.34		17.0	3.3	2.7	3	53	2.CFI.50034.IK.1	Δ
0.35		17.5	3.4	2.8	3	53	2.CFI.50035.IK.1	■
0.36		18.0	3.5	2.9	3	53	2.CFI.50036.IK.1	Δ
0.37		18.5	3.6	3.0	3	53	2.CFI.50037.IK.1	Δ
0.38		19.0	3.7	3.0	3	53	2.CFI.50038.IK.1	Δ
0.39		19.5	3.8	3.1	3	53	2.CFI.50039.IK.1	Δ
0.396	1/64	20.0	3.9	3.2	3	53	2.CFI.50F164.IK.1	■
0.40		20.0	3.9	3.2	3	53	2.CFI.50040.IK.1	■
0.41		20.5	4.0	3.3	3	60	2.CFI.50041.IK.1	Δ
0.42		21.0	4.1	3.4	3	60	2.CFI.50042.IK.1	Δ
0.43		21.5	4.2	3.4	3	60	2.CFI.50043.IK.1	Δ
0.44		22.0	4.3	3.5	3	60	2.CFI.50044.IK.1	Δ
0.45		22.5	4.4	3.6	3	60	2.CFI.50045.IK.1	■
0.46		23.0	4.5	3.7	3	60	2.CFI.50046.IK.1	Δ
0.47		23.5	4.6	3.8	3	60	2.CFI.50047.IK.1	Δ
0.48		24.0	4.7	3.8	3	60	2.CFI.50048.IK.1	Δ
0.49		24.5	4.8	3.9	3	60	2.CFI.50049.IK.1	Δ
0.50		25.0	4.9	4.0	3	60	2.CFI.50050.IK.1	■
0.51		25.5	5.0	4.1	3	64	2.CFI.50051.IK.1	Δ
0.52		26.0	5.1	4.2	3	64	2.CFI.50052.IK.1	Δ
0.53		26.5	5.2	4.2	3	64	2.CFI.50053.IK.1	Δ
0.54		27.0	5.3	4.3	3	64	2.CFI.50054.IK.1	Δ
0.55		27.5	5.4	4.4	3	64	2.CFI.50055.IK.1	■
0.56		28.0	5.5	4.5	3	64	2.CFI.50056.IK.1	Δ
0.57		28.5	5.6	4.6	3	64	2.CFI.50057.IK.1	Δ

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.58		29.0	5.7	4.6	3	64	2.CFI.50058.IK.1	Δ
0.59		29.5	5.8	4.7	3	64	2.CFI.50059.IK.1	Δ
0.60		30.0	5.9	4.8	3	64	2.CFI.50060.IK.1	■
0.61		30.5	6.0	4.9	3	70	2.CFI.50061.IK.1	Δ
0.62		31.0	6.1	5.0	3	70	2.CFI.50062.IK.1	Δ
0.63		31.5	6.2	5.0	3	70	2.CFI.50063.IK.1	Δ
0.64		32.0	6.3	5.1	3	70	2.CFI.50064.IK.1	Δ
0.65		32.5	6.4	5.2	3	70	2.CFI.50065.IK.1	■
0.66		33.0	6.5	5.3	3	70	2.CFI.50066.IK.1	Δ
0.67		33.5	6.6	5.4	3	70	2.CFI.50067.IK.1	Δ
0.68		34.0	6.7	5.4	3	70	2.CFI.50068.IK.1	Δ
0.69		34.5	6.8	5.5	3	70	2.CFI.50069.IK.1	Δ
0.70		35.0	6.9	5.6	3	70	2.CFI.50070.IK.1	■
0.71		35.5	7.0	5.7	3	75	2.CFI.50071.IK.1	Δ
0.72		36.0	7.1	5.8	3	75	2.CFI.50072.IK.1	Δ
0.73		36.5	7.2	5.8	3	75	2.CFI.50073.IK.1	Δ
0.74		37.0	7.3	5.9	3	75	2.CFI.50074.IK.1	Δ
0.75		37.5	7.4	6.0	3	75	2.CFI.50075.IK.1	■
0.76		38.0	7.4	6.1	3	75	2.CFI.50076.IK.1	Δ
0.77		38.5	7.5	6.2	3	75	2.CFI.50077.IK.1	Δ
0.78		39.0	7.6	6.2	3	75	2.CFI.50078.IK.1	Δ
0.79		39.5	7.7	6.3	3	75	2.CFI.50079.IK.1	Δ
0.793	1/32	40.0	7.8	6.4	3	75	2.CFI.50F132.IK.1	■
0.80		40.0	7.8	6.4	3	75	2.CFI.50080.IK.1	■
0.81		40.5	7.9	6.5	3	80	2.CFI.50081.IK.1	Δ
0.82		41.0	8.0	6.6	3	80	2.CFI.50082.IK.1	Δ
0.83		41.5	8.1	6.6	3	80	2.CFI.50083.IK.1	Δ
0.84		42.0	8.2	6.7	3	80	2.CFI.50084.IK.1	Δ
0.85		42.5	8.3	6.8	3	80	2.CFI.50085.IK.1	■

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

Carbide			Z2	

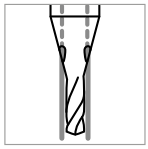
Ø d_1	0.3 - 2.0 mm
Tolerance	- 0.003 mm - 0.006 mm

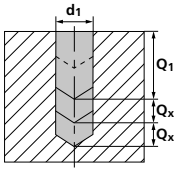
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	l_3 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.86		43.0	8.4	6.9	3	80	2.CFI.50086.IK.1	Δ
0.87		43.5	8.5	7.0	3	80	2.CFI.50087.IK.1	Δ
0.88		44.0	8.6	7.0	3	80	2.CFI.50088.IK.1	Δ
0.89		44.5	8.7	7.1	3	80	2.CFI.50089.IK.1	Δ
0.90		45.0	8.8	7.2	3	80	2.CFI.50090.IK.1	■
0.91		45.5	8.9	7.3	3	85	2.CFI.50091.IK.1	Δ
0.92		46.0	9.0	7.4	3	85	2.CFI.50092.IK.1	Δ
0.93		46.5	9.1	7.4	3	85	2.CFI.50093.IK.1	Δ
0.94		47.0	9.2	7.5	3	85	2.CFI.50094.IK.1	Δ
0.95		47.5	9.3	7.6	3	85	2.CFI.50095.IK.1	■
0.96		48.0	9.4	7.7	3	85	2.CFI.50096.IK.1	Δ
0.97		48.5	9.5	7.8	3	85	2.CFI.50097.IK.1	Δ
0.98		49.0	9.6	7.8	3	85	2.CFI.50098.IK.1	Δ
0.99		49.5	9.7	7.9	3	85	2.CFI.50099.IK.1	Δ
1.00		50.0	9.8	8.0	3	85	2.CFI.50100.IK.1	■
1.01		50.5	9.9	8.1	3	90	2.CFI.50101.IK.1	Δ
1.02		51.0	10.0	8.2	3	90	2.CFI.50102.IK.1	Δ
1.03		51.5	10.1	8.2	3	90	2.CFI.50103.IK.1	Δ
1.04		52.0	10.2	8.3	3	90	2.CFI.50104.IK.1	Δ
1.05		52.5	10.3	8.4	3	90	2.CFI.50105.IK.1	■
1.06		53.0	10.4	8.5	3	90	2.CFI.50106.IK.1	Δ
1.07		53.5	10.5	8.6	3	90	2.CFI.50107.IK.1	Δ
1.08		54.0	10.6	8.6	3	90	2.CFI.50108.IK.1	Δ
1.09		54.5	10.7	8.7	3	90	2.CFI.50109.IK.1	Δ
1.10		55.0	10.8	8.8	3	90	2.CFI.50110.IK.1	■
1.11		55.5	10.9	8.9	3	95	2.CFI.50111.IK.1	Δ
1.12		56.0	11.0	9.0	3	95	2.CFI.50112.IK.1	Δ
1.13		56.5	11.1	9.0	3	95	2.CFI.50113.IK.1	Δ
1.14		57.0	11.2	9.1	3	95	2.CFI.50114.IK.1	Δ
1.15		57.5	11.3	9.2	3	95	2.CFI.50115.IK.1	■
1.16		58.0	11.4	9.3	3	95	2.CFI.50116.IK.1	Δ
1.17		58.5	11.5	9.4	3	95	2.CFI.50117.IK.1	Δ
1.18		59.0	11.6	9.4	3	95	2.CFI.50118.IK.1	Δ
1.19		59.5	11.7	9.5	3	95	2.CFI.50119.IK.1	Δ
1.20		60.0	11.8	9.6	3	95	2.CFI.50120.IK.1	■
1.25		62.5	12.3	10.0	4	105	2.CFI.50125.IK.1	■
1.30		65.0	12.7	10.4	4	105	2.CFI.50130.IK.1	■
1.35		67.5	13.2	10.8	4	105	2.CFI.50135.IK.1	■
1.40		70.0	13.7	11.2	4	110	2.CFI.50140.IK.1	■
1.45		72.5	14.2	11.6	4	115	2.CFI.50145.IK.1	■
1.50		75.0	14.7	12.0	4	115	2.CFI.50150.IK.1	■
1.55		77.5	15.2	12.4	4	115	2.CFI.50155.IK.1	■
1.587	1/16	80.0	15.7	12.8	4	115	2.CFI.50F116.IK.1	■
1.60		80.0	15.7	12.8	4	120	2.CFI.50160.IK.1	■
1.65		82.5	16.2	13.2	4	120	2.CFI.50165.IK.1	■
1.70		85.0	16.7	13.6	4	125	2.CFI.50170.IK.1	■
1.75		87.5	17.2	14.0	4	130	2.CFI.50175.IK.1	■
1.80		90.0	17.6	14.4	4	130	2.CFI.50180.IK.1	■
1.85		92.5	18.1	14.8	4	135	2.CFI.50185.IK.1	■
1.90		95.0	18.6	15.2	4	135	2.CFI.50190.IK.1	■
1.95		97.5	19.1	15.6	4	140	2.CFI.50195.IK.1	■
2.00		100.0	19.6	16.0	4	140	2.CFI.50200.IK.1	■

Complementary products	
CrazyDrill Pilot SST-Inox	p.122
CrazyDrill Crosspilot	p.146

SST-Inox - 50 x d

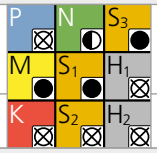
DRILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4 Mid	Ød1 ≤ 0.4 High	Ød1 > 0.4 Mid	Ød1 > 0.4 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	35	35	40
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	15	30	35	40
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	15	30	35	40
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	15	30	35	40
		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	30	35	60
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	15	30	35	60
		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	20	20	30
		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	30	30	40
			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]						
	Q1	Qx	0.2 mm f	0.4 mm 1/64" f	0.6 mm f	Ød1 0.8 mm 1/32" f	1.0 mm f	1.5 mm 1/16" f	2.0 mm f
			Recommended: CrazyDrill Flex Steel 50 x d1						
	2xd1	0.5xd1	0.010	0.015	0.020	0.025	0.030	0.040	0.050
	2xd1	0.5xd1	0.010	0.015	0.020	0.025	0.030	0.040	0.050
	2xd1	0.5xd1	0.010	0.015	0.020	0.025	0.030	0.040	0.050
	2xd1	0.5xd1	0.005	0.010	0.015	0.020	0.025	0.030	0.040
			Recommended: CrazyDrill Flex Steel 50 x d1						
			Recommended: CrazyDrill Flex Steel 50 x d1						
	2xd1	0.5xd1	0.040	0.045	0.050	0.060	0.070	0.080	0.100
	2xd1	0.5xd1	0.040	0.045	0.050	0.060	0.070	0.080	0.100
			Recommended: CrazyDrill Flex Steel 50 x d1						
	2xd1	0.2xd1	0.010	0.015	0.020	0.025	0.030	0.040	0.050
			Recommended: CrazyDrill Flex Titanium 50 x d1						
	2xd1	0.5xd1	0.010	0.015	0.020	0.025	0.030	0.040	0.050

Drilling process CrazyDrill Flex

PRECISE AND EFFICIENT DRILLING FROM Ø 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 ≤ 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	[giri/min]	≤ 10'000	> 10'000
Minimal pressure	[bar]	15	30

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 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

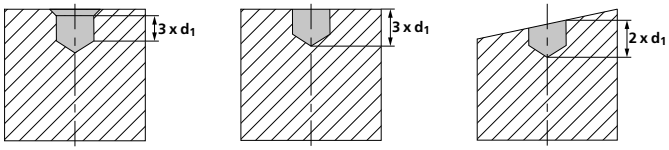
Drilling as per DIN 66025 / PAL

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

Q = depth of the respective peck

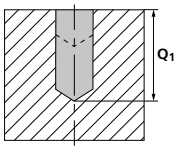
1 | PILOT DRILLING

- 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.

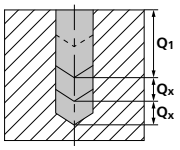


2 | DRILLING

- 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.



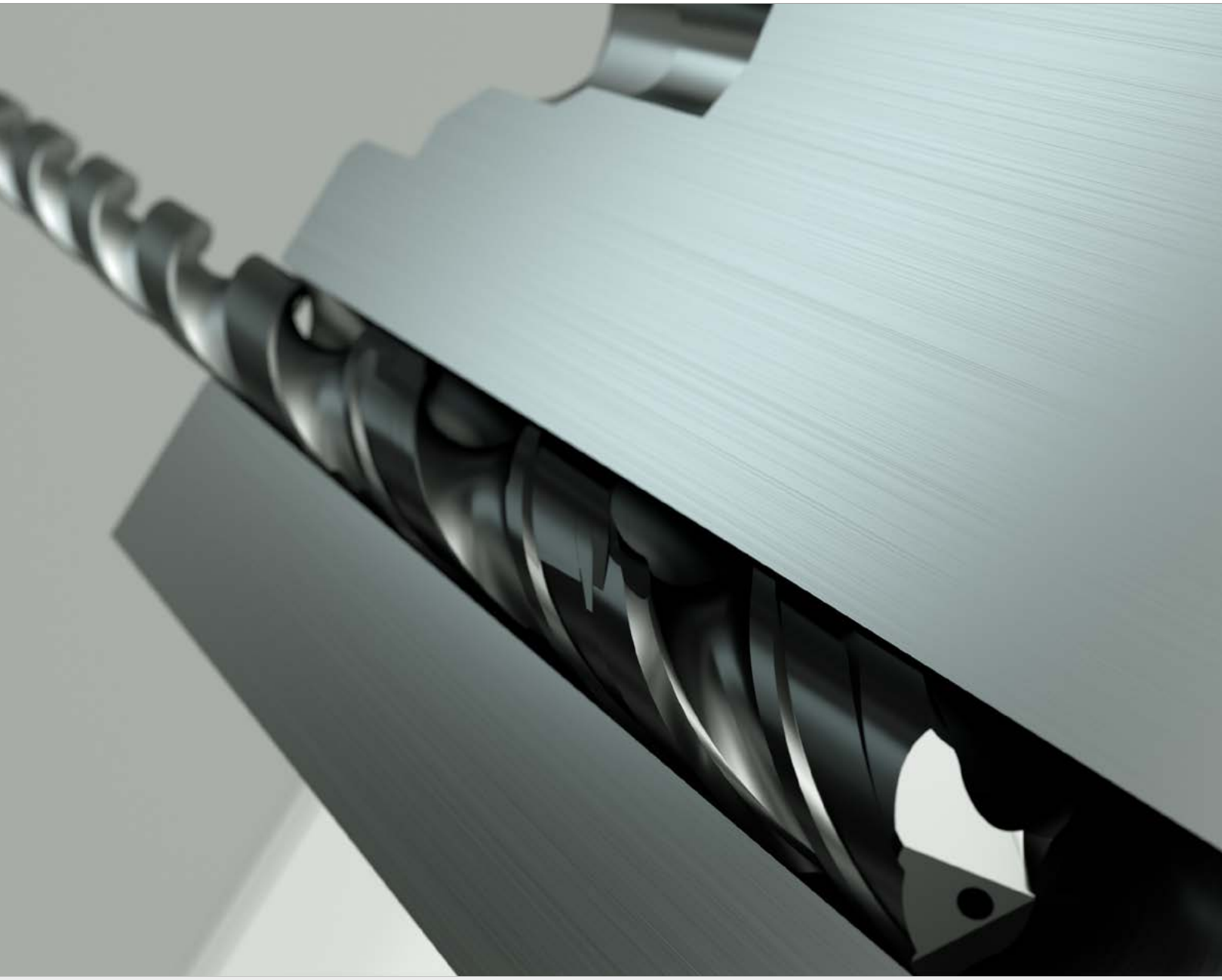
- Further drilling steps Q_X as per cutting data table, with subsequent chip removal.



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.

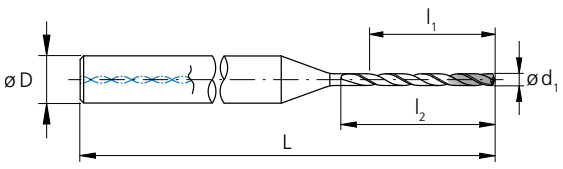
Customized drills



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

CHARACTERISTICS

- Diameter min.: 0.1 mm
- Diameter max.: 32.0 mm, please contact us for larger diameters
- Drilling depth max.: 50 x d
- Maximum tool length: 415 mm
- Tool diameter tolerance max.: ± 0.5 µm
- Chamfer and point angle as per customer need
- Step drill: see customer-specific step drill
- Concentricity between shank and diameters max.: ≤ 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

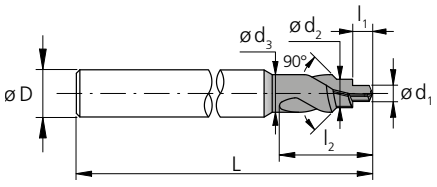
Cutting edge preparation, polishing of flutes

Customized step drills

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

CHARACTERISTICS

- Diameter min.: 0.1 mm
- Diameter max.: 32.0 mm, please contact us for larger diameters
- Drilling depth max.: depending on application
- Maximum tool length: 330 mm
- Tool diameter tolerance max.: ± 0.5 µm
- Chamfer and point angle as per customer need
- Concentricity between shank and diameters max.: ≤ 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

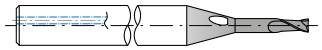
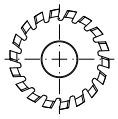
Cutting edge preparation, polishing of flutes

crazy about milling

07

Overview

CUTTING TOOL SOLUTIONS

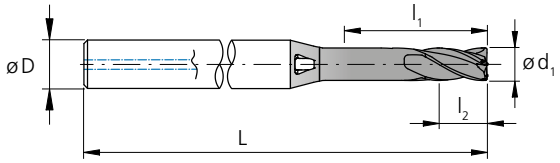
NEW	CRAZYMILL Cool Micro	Micro Square - Z3 / Z4	
	CRAZYMILL Cool	Square - Z2	
	CRAZYMILL Cool	Corner radius - Z2	
	CRAZYMILL Cool	Square - Z4	
	CRAZYMILL Cool	Corner radius - Z4	
NEW	CRAZYMILL Hexalobe	Hexalobe	
	CRAZYMILL Cool	Plunge&Slot Square - Z3	
NEW	CRAZYMILL Cool	Plunge&Slot Corner radius - Z3	
	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]	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	3 x d 5 x d	✔	–	●	●	●	●	●	●	●	●	⊠	**418**
0.3 – 6.35	1.5 x d 3 x d 5 x d	✔	–	●	●	●	●	●	●	●	●	⊠	**452**
0.3 – 6.35	1.5 x d 3 x d 5 x d	✔	–	●	●	●	●	●	●	●	●	⊠	**452**
1.0 – 8.0	2 x d 3 x d 4 x d 5 x d	✔	–	●	●	●	●	●	●	●	⊠	⊠	**478**
1.0 – 8.0	2 x d 3 x d 4 x d 5 x d	✔	–	●	●	●	●	●	●	●	⊠	⊠	**478**
0.2 – 1.0	3.5 x d 5 x d	–	✔	⊠	●	⊠	⊠	⊠	●	●	⊠	⊠	**512**
1.0 – 8.0	2.5 x d 5 x d	✔	–	●	●	●	●	●	●	●	⊠	⊠	**526**
1.0 – 8.0	2.5 x d 5 x d	✔	–	●	●	●	●	●	●	●	⊠	⊠	**526**
0.3 – 8.0	2 x d 3 x d 5 x d	✔	–	●	●	●	●	●	●	●	●	⊠	**566**
1.0 – 8.0	2 x d 3 x d 3.5 x d 4.5 x d 5 x d	✔	–	●	●	●	●	●	●	●	●	⊠	**594**
0.2 – 32.0	as required	✔	✔	●	●	●	●	●	●	●	●	⊠	**630**
Bore 2.0 – 40.0 Thickness 1.0 – 30.0	–	–	✔	●	●	●	●	●	●	●	●	⊠	**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°

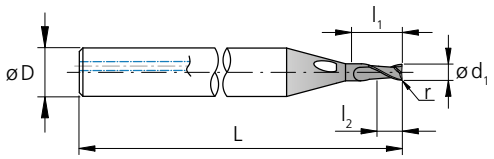
Tool type
- A = Type A - Short milling depth
- B = Type B - Medium milling depth
- C = Type C - Long milling depth
- M = Type M - Medium cutting length
- N = Type N - Long cutting length

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

Flutes number
- Z4 = 4 flute

Cutting diameter d_1
- 400 = Ø 4 mm

Coating
- 1 = Coated



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 0.2 mm to 1.0 mm with a milling depth of up to 5 x d:

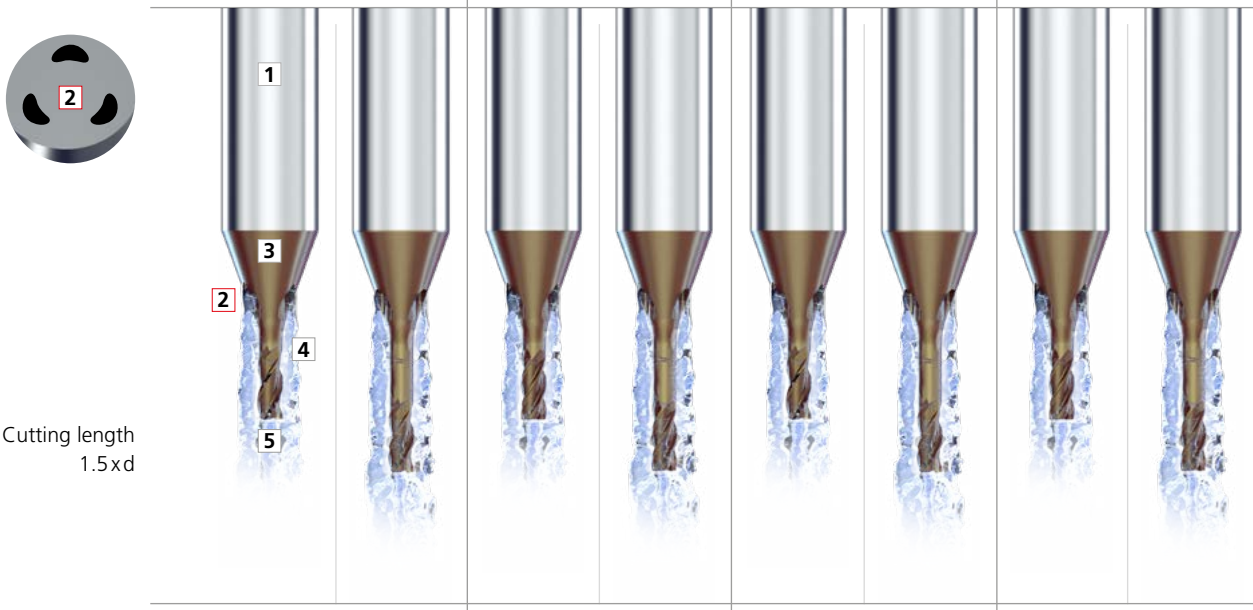
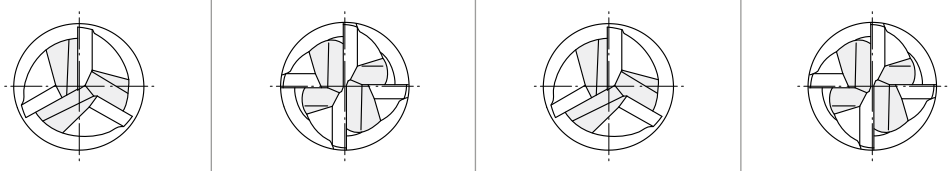
- **Geometry S** - specially developed for stainless steels, structural steels, non-ferrous metals and titanium alloys. It is characterized by a higher cutting capacity for materials with a specific cutting force of less than 2250 N/mm^2.
- **Geometry SX** - featuring a special cutting edge protection,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

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
								
								
	Diameter range Ø 0.2 - 1.0 mm		Diameter range Ø 0.4 - 1.0 mm		Diameter range Ø 0.2 - 1.0 mm		Diameter range Ø 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

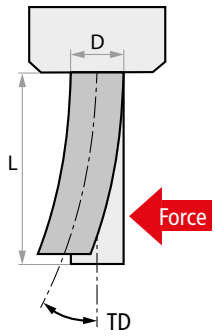
THE NEW HIGH-PERFORMANCE MICRO-ENDMILL FOR DIFFICULT-TO-MACHINE MATERIALS

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 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

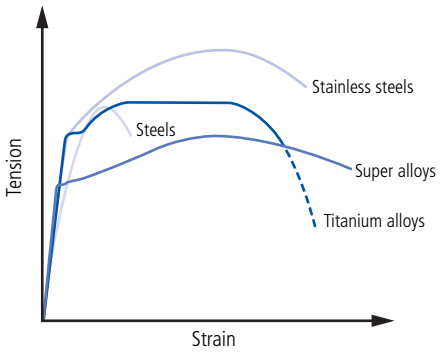
Custom geometry for optimum cutting performance and stability

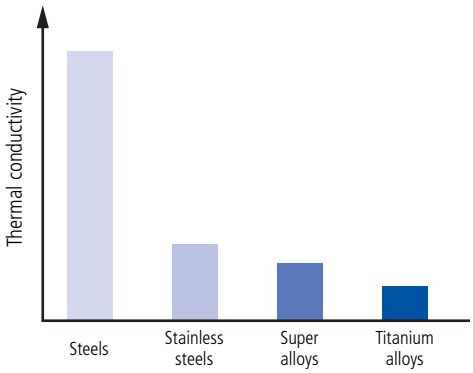
Cutting edge type	Deflection	Cutting-edge stability
Sharp	●	●
Rounded	●	●
CrazyMill Cool Micro	●	●

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

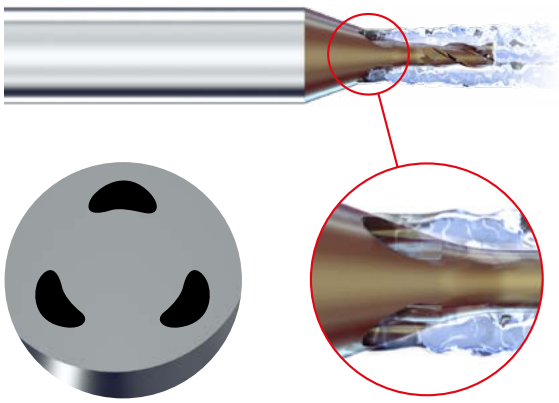




Titanium and heat-resistant alloys are notable for their high toughness and low thermal conductivity. Machining produces extreme temperatures on the cutting edges, resulting in high tool wear.

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.

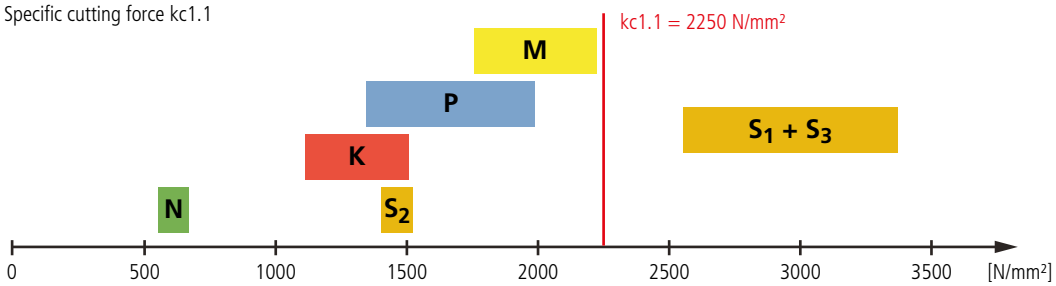
The continuous coolant jet ensures that the chips are continuously flushed out of the milling zone. This prevents them from being milled several times, which would damage the milling tool and the milled surface. This ensures a long tool life and an excellent surface finish.

NEW Important features

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

3. Challenge

Different material-specific properties

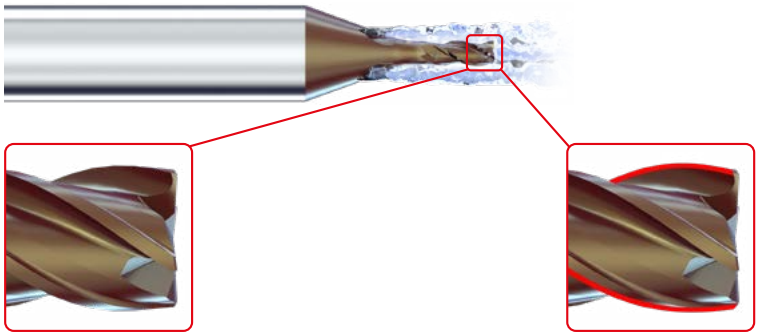


Close attention must be paid to the different mechanical properties of various material categories* in micro-machining. The cutting forces of superalloys and CoCr alloys are up to 45% higher than those of stainless steel and titanium (kc1.1 values). As a result, the cutting edge is subjected to high 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 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 2250 N/mm².

4. Challenge

Miniaturisation of tools

Miniaturisation presents the challenge of realising complex geometries with diameters less than 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

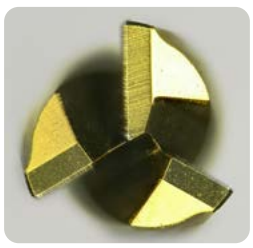
Ultra-fine carbide grade and state-of-the-art coating technology

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 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 20 m
in CoCr alloy

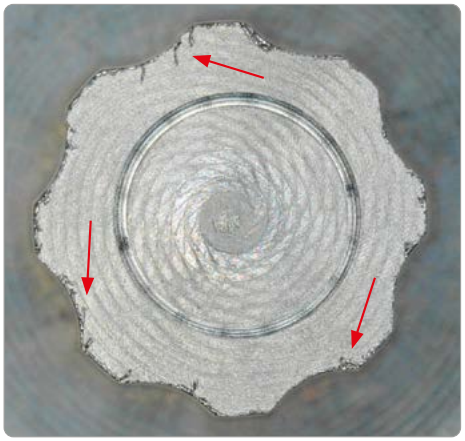
Conventional micro-milling tool

New

Edge wear
after 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

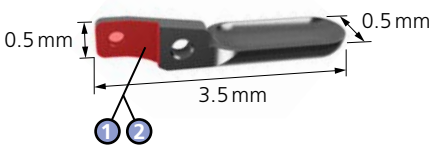
Features and benefits

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 tongs

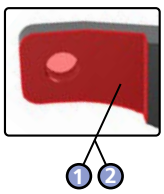
MATERIAL
X20Cr13 / 1.4021 / S42000

PROCESSING
- 1 Semi-finishing
- 2 Finishing
- Endmill diameter = 0.5 mm
- Width = 0.5 mm
- Depth = 0.75 mm
- Length = 1 mm

MACHINE INFORMATION
- n_{max}: 40,000 rpm
- Pressure: 40 bar
- Through-tool coolant: Cutting oil

TOOL
Mikron Tool - CrazyMill Cool Micro Square Z4 – Type B

DATA	MIKRON TOOL
Tool type	CrazyMill Cool Micro Square - Z4 - Carbide - Coated - Integrated cooling
Item number	2.CMC35.B1Z4.050.1
Cutting data	1 Semi-finishing v_c = 60 m/min f_z = 0.013 mm $a_{p,\,max}$ = 1.5 x d a_e = 0.05 mm Q = 75 mm³/min **Time= 3 sec** 2 Finishing v_c = 60 m/min f_z = 0.010 mm $a_{p,\,max}$ = 1.5 x d a_e = 0.01 mm Q = 15 mm³/min **Time= 1 sec**



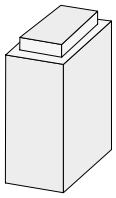
NEW Guaranteed maximum performance

COMPARISON OF MICRO-MACHINING EXAMPLES

Example 1

Longer tool life when milling a support

Processing: Side milling;
Milling depth: 1.25 mm;
Milling width: 1 mm;
Total length: 60 mm;
Coolant: Cutting oil



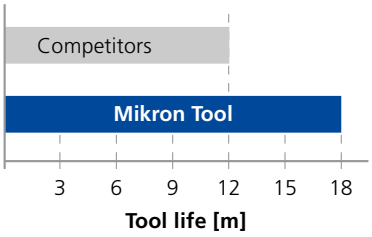
Titanium alloy: 3.7165 / TiAl6V4 / ASTM B348 S_2

Tool: CrazyMill Cool Micro – **Geometry S**
Diameter: 0.5 mm

Cutting data:

Conventional micro-endmill				CrazyMill Cool Micro			
v_c = 40 m/min		f_z = 0.008 mm		v_c = 60 m/min		f_z = 0.01 mm	
a_p = 0.40 mm		a_e = 0.08 mm		a_p = 0.50 mm		a_e = 0.10 mm	

Results:



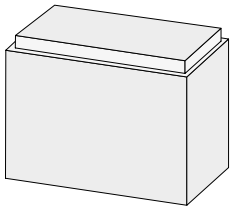
	No. pieces
Conventional micro-endmill	**4**
CrazyMill Cool Micro	**10**

2 x

■ Example 2

Shorter milling time with a thermocouple

Processing: Side milling;
Milling depth: 1.5 mm;
Milling width: 0.5 mm;
Total length: 100 mm;
Coolant: Cutting oil



CoCr alloy: 2.4964 / CoCr20W15Ni / Haynes 25 **S3**

Tool: CrazyMill Cool Micro – **Geometry SX**
Diameter: 0.5 mm

Cutting data:

Conventional micro-endmill	CrazyMill Cool Micro
v_c = 60 m/min f_z = 0.006 mm a_p = 0.04 mm a_e = 0.30 mm	v_c = 60 m/min f_z = 0.005 mm a_p = 0.50 mm a_e = 0.10 mm

Results:

	Material removal rate	Time
Conventional micro-endmill	**11 mm³ / min**	**4 min 30 sec**
CrazyMill Cool Micro	**28.6 mm³ / min**	**1 min 35 sec**

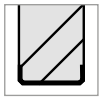
3 x

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.

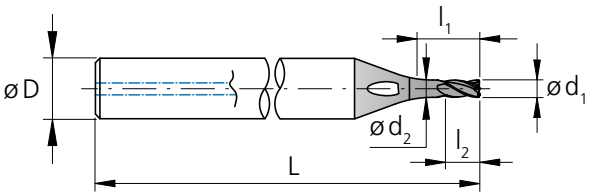
NEW Type B - 3 x d

Carbide | 35° | eXedur SNP | a_p | a_e

Square



protection phase of 45°



Ø d_1	0.2 - 1.0 mm
Tolerance	0 - 0.01 mm

l_1 = Effective length
l_2 = Cutting length

Z3

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [mm]	Item number	Geometry S	Geometry SX	Availability
0.2		0.60	0.3	0.19	3	38	2.CMC35.B1Z3.020	.1	.C	■
0.3		0.90	0.5	0.28	3	38	2.CMC35.B1Z3.030	.1	.C	■
0.396	**1/64**	1.19	0.6	0.37	3	38	2.CMC.SB1Z3.F164		.C	■
0.4		1.20	0.6	0.38	3	38	2.CMC35.B1Z3.040	.1	.C	■
0.5		1.50	0.8	0.47	3	38	2.CMC35.B1Z3.050	.1	.C	■
0.6		1.80	0.9	0.56	3	38	2.CMC35.B1Z3.060	.1	.C	■
0.7		2.10	1.1	0.66	3	38	2.CMC35.B1Z3.070	.1	.C	■
0.793	**1/32**	2.38	1.2	0.75	3	38	2.CMC.SB1Z3.F132		.C	■
0.8		2.40	1.2	0.75	3	38	2.CMC35.B1Z3.080	.1	.C	■
0.9		2.70	1.4	0.85	3	38	2.CMC35.B1Z3.090	.1	.C	■
1.0		3.00	1.5	0.94	4	40	2.CMC35.B1Z3.100	.1	.C	■

Z4

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [mm]	Item number	Geometry S	Geometry SX	Availability
0.396	**1/64**	1.19	0.6	0.37	3	38	2.CMC.SB1Z4.F164		.C	■
0.4		1.20	0.6	0.38	3	38	2.CMC35.B1Z4.040	.1	.C	■
0.5		1.50	0.8	0.47	3	38	2.CMC35.B1Z4.050	.1	.C	■
0.6		1.80	0.9	0.56	3	38	2.CMC35.B1Z4.060	.1	.C	■
0.7		2.10	1.1	0.66	3	38	2.CMC35.B1Z4.070	.1	.C	■
0.793	**1/32**	2.38	1.2	0.75	3	38	2.CMC.SB1Z4.F132		.C	■
0.8		2.40	1.2	0.75	3	38	2.CMC35.B1Z4.080	.1	.C	■
0.9		2.70	1.4	0.85	3	38	2.CMC35.B1Z4.090	.1	.C	■
1.0		3.00	1.5	0.94	4	40	2.CMC35.B1Z4.100	.1	.C	■

■ Stock item

Geometry S: Stainless steels, steels, cast irons, non-ferrous metals, titanium alloys

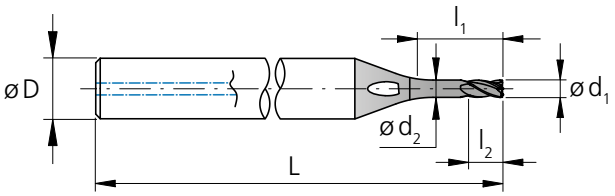
Geometry SX: Heat-resistant alloys (Inconel, Monel, Nilo, Hastelloy, etc.), CoCr alloys

Type C - 5 x d

Carbide | 35° | eXedur SNP

Square

protection phase of 45°



Ø d_1	0.2 - 1.0 mm
Tolerance	0 - 0.01 mm

l_1 = Effective length
l_2 = Cutting length

Z3

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [mm]	Item number	Geometry S	Geometry SX	Availability
0.2		1.00	0.3	0.19	3	38	2.CMC35.C1Z3.020	.1	.C	■
0.3		1.50	0.5	0.28	3	38	2.CMC35.C1Z3.030	.1	.C	■
0.396	**1/64**	1.98	0.6	0.37	3	38	2.CMC.SC1Z3.F164		.C	■
0.4		2.00	0.6	0.38	3	38	2.CMC35.C1Z3.040	.1	.C	■
0.5		2.50	0.8	0.47	3	38	2.CMC35.C1Z3.050	.1	.C	■
0.6		3.00	0.9	0.56	3	38	2.CMC35.C1Z3.060	.1	.C	■
0.7		3.50	1.1	0.66	3	38	2.CMC35.C1Z3.070	.1	.C	■
0.793	**1/32**	3.97	1.2	0.75	3	38	2.CMC.SC1Z3.F132		.C	■
0.8		4.00	1.2	0.75	3	38	2.CMC35.C1Z3.080	.1	.C	■
0.9		4.50	1.4	0.85	3	38	2.CMC35.C1Z3.090	.1	.C	■
1.0		5.00	1.5	0.94	4	40	2.CMC35.C1Z3.100	.1	.C	■

Z4

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [mm]	Item number	Geometry S	Geometry SX	Availability
0.396	**1/64**	1.98	0.6	0.37	3	38	2.CMC.SC1Z4.F164		.C	■
0.4		2.00	0.6	0.38	3	38	2.CMC35.C1Z4.040	.1	.C	■
0.5		2.50	0.8	0.47	3	38	2.CMC35.C1Z4.050	.1	.C	■
0.6		3.00	0.9	0.56	3	38	2.CMC35.C1Z4.060	.1	.C	■
0.7		3.50	1.1	0.66	3	38	2.CMC35.C1Z4.070	.1	.C	■
0.793	**1/32**	3.97	1.2	0.75	3	38	2.CMC.SC1Z4.F132		.C	■
0.8		4.00	1.2	0.75	3	38	2.CMC35.C1Z4.080	.1	.C	■
0.9		4.50	1.4	0.85	3	38	2.CMC35.C1Z4.090	.1	.C	■
1.0		5.00	1.5	0.94	4	40	2.CMC35.C1Z4.100	.1	.C	■

■ Stock item

Geometry S: Stainless steels, steels, cast irons, non-ferrous metals, titanium alloys

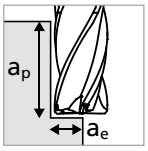
Geometry SX: Heat-resistant alloys (Inconel, Monel, Nilo, Hastelloy, etc.), CoCr alloys

NEW Type B - Z3 - Side milling - Roughing

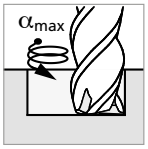
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Side milling

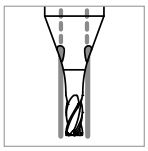
Roughing

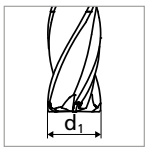


- $a_p = 1 \times d_1$
- $a_e = 0.2 \times d_1$



Note:
In case of helical interpolation milling see α_{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 [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

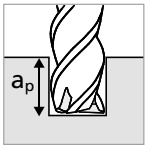
07

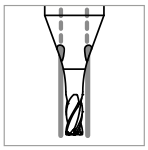
	Ød₁ 0.2 mm		0.3 mm		0.4 mm 1/64"		0.5 mm		0.6 mm		0.7 mm		0.8 mm 1/32"		0.9 - 1.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.002	20 - 40	0.003	25 - 50	0.004	30 - 65	0.005	40 - 75	0.007	45 - 90	0.008	50 - 100	0.009	55 - 115	0.010
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.002	20 - 40	0.003	25 - 50	0.004	30 - 65	0.005	40 - 75	0.007	45 - 90	0.008	50 - 100	0.009	55 - 115	0.010

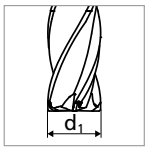
NEW Type B - Z3 - Slot milling

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 [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

a_p	Ød₁ 0.2 mm		0.3 mm		0.4 mm 1/64"		0.5 mm		0.6 mm		0.7 mm		0.8 mm 1/32"		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
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
0.5 x d₁	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
0.5 x d₁	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
0.5 x d₁	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
0.5 x d₁	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
0.25 x d₁	15 - 25	0.002	20 - 40	0.003	25 - 50	0.004	30 - 65	0.005	40 - 75	0.007	45 - 90	0.008	50 - 100	0.009	55 - 115	0.010
0.5 x d₁	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
0.5 x d₁	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
0.5 x d₁	15 - 25	0.002	20 - 40	0.003	25 - 50	0.004	30 - 65	0.005	40 - 75	0.007	45 - 90	0.008	50 - 100	0.009	55 - 115	0.010

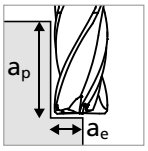
CRAZYMILL by Mikron Tool Cool Micro

NEW Type B - Z4 - Side milling - Semi-finishing

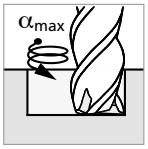
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Side milling

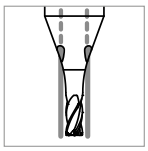
Semi-finishing

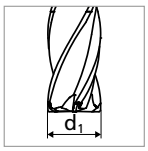


- $a_p = 1.5 \times d_1$
- $a_e = 0.1 \times d_1$



Note:
In case of helical interpolation milling see α_{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 [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

Ød₁	0.4 mm 1/64"		0.5 mm		0.6 mm		0.7 mm		0.8 mm 1/32"		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
	45 - 75	0.011	55 - 95	0.013	65 - 115	0.015	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.011	55 - 95	0.013	65 - 115	0.015	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.008	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.010	55 - 95	0.013	65 - 115	0.015	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.010	55 - 95	0.013	65 - 115	0.015	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.010	55 - 95	0.013	65 - 115	0.015	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.007	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.011	55 - 95	0.013	65 - 115	0.015	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.012	55 - 95	0.013	65 - 115	0.015	75 - 130	0.016	90 - 150	0.017	100 - 170	0.018
	45 - 75	0.012	55 - 95	0.013	65 - 115	0.015	75 - 130	0.016	90 - 150	0.017	100 - 170	0.018
	45 - 75	0.012	55 - 95	0.013	65 - 115	0.015	75 - 130	0.016	90 - 150	0.017	100 - 170	0.018
	45 - 75	0.012	55 - 95	0.013	65 - 115	0.015	75 - 130	0.016	90 - 150	0.017	100 - 170	0.018
	45 - 75	0.012	55 - 95	0.013	65 - 115	0.015	75 - 130	0.016	90 - 150	0.017	100 - 170	0.018
	45 - 75	0.012	55 - 95	0.013	65 - 115	0.015	75 - 130	0.016	90 - 150	0.017	100 - 170	0.018
	45 - 75	0.005	55 - 95	0.007	65 - 115	0.008	75 - 130	0.009	90 - 150	0.010	100 - 170	0.011
	45 - 75	0.007	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.007	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.005	55 - 95	0.007	65 - 115	0.008	75 - 130	0.009	90 - 150	0.010	100 - 170	0.011

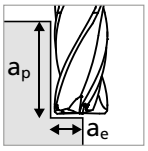
CRAZYMILL by Mikron Tool Cool Micro

NEW Type B - Z4 - Side milling - Finishing

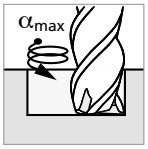
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Side milling

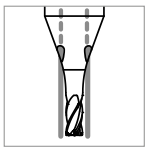
Finishing

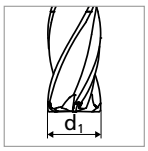


- $a_p = 1.5 \times d_1$
- $a_e = 0.02 \times d_1$



Note:
In case of helical interpolation milling see α_{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$_c$ [m/min]
f$_z$ [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

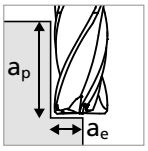
	Ød1											
	0.4 mm 1/64"		0.5 mm		0.6 mm		0.7 mm		0.8 mm 1/32"		0.9 - 1.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	45 - 75	0.009	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.009	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.006	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.013	100 - 170	0.014
	45 - 75	0.008	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.008	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.008	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.006	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.013	100 - 170	0.014
	45 - 75	0.009	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.010	55 - 95	0.010	65 - 115	0.012	75 - 130	0.013	90 - 150	0.014	100 - 170	0.014
	45 - 75	0.010	55 - 95	0.010	65 - 115	0.012	75 - 130	0.013	90 - 150	0.014	100 - 170	0.014
	45 - 75	0.010	55 - 95	0.010	65 - 115	0.012	75 - 130	0.013	90 - 150	0.014	100 - 170	0.014
	45 - 75	0.010	55 - 95	0.010	65 - 115	0.012	75 - 130	0.013	90 - 150	0.014	100 - 170	0.014
	45 - 75	0.010	55 - 95	0.010	65 - 115	0.012	75 - 130	0.013	90 - 150	0.014	100 - 170	0.014
	45 - 75	0.010	55 - 95	0.010	65 - 115	0.012	75 - 130	0.013	90 - 150	0.014	100 - 170	0.014
	45 - 75	0.004	55 - 95	0.006	65 - 115	0.006	75 - 130	0.007	90 - 150	0.008	100 - 170	0.009
	45 - 75	0.006	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.013	100 - 170	0.014
	45 - 75	0.006	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.013	100 - 170	0.014
	45 - 75	0.004	55 - 95	0.006	65 - 115	0.006	75 - 130	0.007	90 - 150	0.008	100 - 170	0.009

NEW Type C - Z3 - Side milling - Roughing

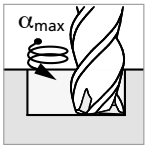
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Side milling

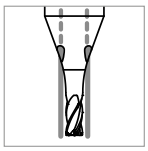
Roughing

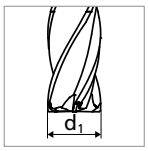


- $a_p = 1 \times d_1$
- $a_e = 0.1 \times d_1$



Note:
In case of helical interpolation milling see α_{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 [m/min]
f_z [mm]

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

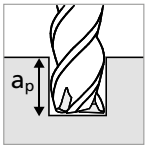
P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

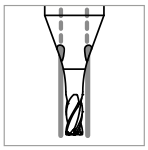
	Ød₁ 0.2 mm		0.3 mm		0.4 mm 1/64"		0.5 mm		0.6 mm		0.7 mm		0.8 mm 1/32"		0.9 - 1.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	15 - 25	0.004	20 - 40	0.006	25 - 50	0.010	30 - 65	0.012	40 - 75	0.014	45 - 90	0.017	50 - 100	0.019	55 - 115	0.021
	15 - 25	0.004	20 - 40	0.006	25 - 50	0.010	30 - 65	0.012	40 - 75	0.014	45 - 90	0.017	50 - 100	0.019	55 - 115	0.021
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.009	40 - 75	0.011	45 - 90	0.013	50 - 100	0.015	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.006	25 - 50	0.010	30 - 65	0.012	40 - 75	0.014	45 - 90	0.017	50 - 100	0.019	55 - 115	0.021
	15 - 25	0.004	20 - 40	0.006	25 - 50	0.010	30 - 65	0.012	40 - 75	0.014	45 - 90	0.017	50 - 100	0.019	55 - 115	0.021
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.009	40 - 75	0.011	45 - 90	0.013	50 - 100	0.015	55 - 115	0.017
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.009	40 - 75	0.011	45 - 90	0.013	50 - 100	0.015	55 - 115	0.017
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.009	40 - 75	0.011	45 - 90	0.013	50 - 100	0.015	55 - 115	0.017
	15 - 25	0.006	20 - 40	0.008	25 - 50	0.011	30 - 65	0.016	40 - 75	0.018	45 - 90	0.019	50 - 100	0.021	55 - 115	0.022
	15 - 25	0.006	20 - 40	0.008	25 - 50	0.011	30 - 65	0.016	40 - 75	0.018	45 - 90	0.019	50 - 100	0.021	55 - 115	0.022
	15 - 25	0.006	20 - 40	0.008	25 - 50	0.011	30 - 65	0.016	40 - 75	0.018	45 - 90	0.019	50 - 100	0.021	55 - 115	0.022
	15 - 25	0.006	20 - 40	0.008	25 - 50	0.011	30 - 65	0.016	40 - 75	0.018	45 - 90	0.019	50 - 100	0.021	55 - 115	0.022
	15 - 25	0.006	20 - 40	0.008	25 - 50	0.011	30 - 65	0.016	40 - 75	0.018	45 - 90	0.019	50 - 100	0.021	55 - 115	0.022
	15 - 25	0.006	20 - 40	0.008	25 - 50	0.011	30 - 65	0.016	40 - 75	0.018	45 - 90	0.019	50 - 100	0.021	55 - 115	0.022
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.010	50 - 100	0.012	55 - 115	0.014
	15 - 25	0.004	20 - 40	0.006	25 - 50	0.008	30 - 65	0.012	40 - 75	0.013	45 - 90	0.014	50 - 100	0.015	55 - 115	0.017
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.009	40 - 75	0.011	45 - 90	0.013	50 - 100	0.015	55 - 115	0.017
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.010	50 - 100	0.012	55 - 115	0.014

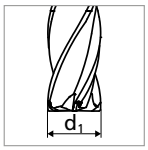
NEW Type C - Z3 - Slot milling

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 [m/min]
f_z [mm]

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

	P ●	N ●	S3 ●
	M ●	S1 ●	H1 ⊠
	K ●	S2 ●	H2 ⊠

07

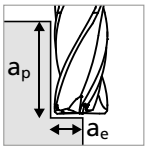
a_p	Ød1 0.2 mm		0.3 mm		0.4 mm 1/64"		0.5 mm		0.6 mm		0.7 mm		0.8 mm 1/32"		0.9 - 1.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
0.2 x d1	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
0.2 x d1	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
0.2 x d1	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
0.2 x d1	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
	15 - 25	0.004	20 - 40	0.007	25 - 50	0.009	30 - 65	0.012	40 - 75	0.013	45 - 90	0.015	50 - 100	0.016	55 - 115	0.017
0.1 x d1	15 - 25	0.002	20 - 40	0.003	25 - 50	0.004	30 - 65	0.005	40 - 75	0.007	45 - 90	0.008	50 - 100	0.009	55 - 115	0.010
0.2 x d1	15 - 25	0.002	20 - 40	0.004	25 - 50	0.006	30 - 65	0.008	40 - 75	0.009	45 - 90	0.011	50 - 100	0.013	55 - 115	0.015
0.2 x d1	15 - 25	0.003	20 - 40	0.005	25 - 50	0.007	30 - 65	0.010	40 - 75	0.012	45 - 90	0.014	50 - 100	0.016	55 - 115	0.018
0.2 x d1	15 - 25	0.002	20 - 40	0.003	25 - 50	0.004	30 - 65	0.005	40 - 75	0.007	45 - 90	0.008	50 - 100	0.009	55 - 115	0.010

NEW Type C - Z4 - Side milling - Semi-finishing

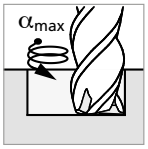
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Side milling

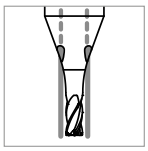
Semi-finishing

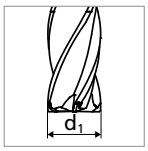


- $a_p = 1.5 \times d_1$
- $a_e = 0.05 \times d_1$



Note:
In case of helical interpolation milling see α_{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 [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

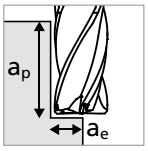
	Ød1											
	0.4 mm 1/64"		0.5 mm		0.6 mm		0.7 mm		0.8 mm 1/32"		0.9 - 1.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	45 - 75	0.012	55 - 95	0.015	65 - 115	0.018	75 - 130	0.021	90 - 150	0.024	100 - 170	0.027
	45 - 75	0.012	55 - 95	0.015	65 - 115	0.018	75 - 130	0.021	90 - 150	0.024	100 - 170	0.027
	45 - 75	0.008	55 - 95	0.011	65 - 115	0.014	75 - 130	0.016	90 - 150	0.019	100 - 170	0.022
	45 - 75	0.012	55 - 95	0.015	65 - 115	0.018	75 - 130	0.021	90 - 150	0.024	100 - 170	0.027
	45 - 75	0.012	55 - 95	0.015	65 - 115	0.018	75 - 130	0.021	90 - 150	0.024	100 - 170	0.027
	45 - 75	0.012	55 - 95	0.015	65 - 115	0.018	75 - 130	0.021	90 - 150	0.024	100 - 170	0.027
	45 - 75	0.008	55 - 95	0.011	65 - 115	0.014	75 - 130	0.016	90 - 150	0.019	100 - 170	0.022
	45 - 75	0.012	55 - 95	0.015	65 - 115	0.018	75 - 130	0.021	90 - 150	0.024	100 - 170	0.027
	45 - 75	0.013	55 - 95	0.015	65 - 115	0.016	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.013	55 - 95	0.015	65 - 115	0.016	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.013	55 - 95	0.015	65 - 115	0.016	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.013	55 - 95	0.015	65 - 115	0.016	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.013	55 - 95	0.015	65 - 115	0.016	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.013	55 - 95	0.015	65 - 115	0.016	75 - 130	0.018	90 - 150	0.020	100 - 170	0.022
	45 - 75	0.008	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018
	45 - 75	0.009	55 - 95	0.011	65 - 115	0.014	75 - 130	0.016	90 - 150	0.019	100 - 170	0.022
	45 - 75	0.009	55 - 95	0.011	65 - 115	0.014	75 - 130	0.016	90 - 150	0.019	100 - 170	0.022
	45 - 75	0.008	55 - 95	0.010	65 - 115	0.012	75 - 130	0.014	90 - 150	0.016	100 - 170	0.018

NEW Type C - Z4 - Side milling - Finishing

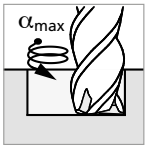
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Side milling

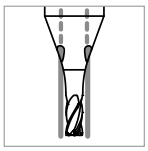
Finishing

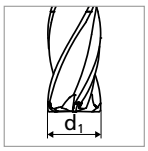


- $a_p = 1.5 \times d_1$
- $a_e = 0.02 \times d_1$



Note:
In case of helical interpolation milling see α_{max} on page 451





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		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	
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	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 [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

07

Ød1											
0.4 mm 1/64"		0.5 mm		0.6 mm		0.7 mm		0.8 mm 1/32"		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
45 - 75	0.007	55 - 95	0.008	65 - 115	0.010	75 - 130	0.012	90 - 150	0.014	100 - 170	0.016
45 - 75	0.007	55 - 95	0.008	65 - 115	0.010	75 - 130	0.012	90 - 150	0.014	100 - 170	0.016
45 - 75	0.004	55 - 95	0.006	65 - 115	0.008	75 - 130	0.009	90 - 150	0.011	100 - 170	0.012
45 - 75	0.006	55 - 95	0.008	65 - 115	0.010	75 - 130	0.012	90 - 150	0.014	100 - 170	0.016
45 - 75	0.006	55 - 95	0.008	65 - 115	0.010	75 - 130	0.012	90 - 150	0.014	100 - 170	0.016
45 - 75	0.006	55 - 95	0.008	65 - 115	0.010	75 - 130	0.012	90 - 150	0.014	100 - 170	0.016
45 - 75	0.004	55 - 95	0.006	65 - 115	0.008	75 - 130	0.009	90 - 150	0.011	100 - 170	0.012
45 - 75	0.007	55 - 95	0.008	65 - 115	0.010	75 - 130	0.012	90 - 150	0.014	100 - 170	0.016
45 - 75	0.008	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.012	100 - 170	0.012
45 - 75	0.008	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.012	100 - 170	0.012
45 - 75	0.008	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.012	100 - 170	0.012
45 - 75	0.008	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.012	100 - 170	0.012
45 - 75	0.008	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.012	100 - 170	0.012
45 - 75	0.008	55 - 95	0.008	65 - 115	0.010	75 - 130	0.011	90 - 150	0.012	100 - 170	0.012
45 - 75	0.002	55 - 95	0.004	65 - 115	0.004	75 - 130	0.005	90 - 150	0.006	100 - 170	0.007
45 - 75	0.004	55 - 95	0.006	65 - 115	0.008	75 - 130	0.009	90 - 150	0.011	100 - 170	0.012
45 - 75	0.004	55 - 95	0.006	65 - 115	0.008	75 - 130	0.009	90 - 150	0.011	100 - 170	0.012
45 - 75	0.002	55 - 95	0.004	65 - 115	0.004	75 - 130	0.005	90 - 150	0.006	100 - 170	0.007

NEW Process

PRECISE AND EFFICIENT MILLING

Coolant type, pressure and filtration

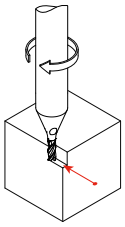
Coolant: For best results, Mikron Tool recommends cutting oil as coolant. Alternatively, an emulsion of 8% or more with EP additives (Extreme-Pressure-Additives) can be used as well.

Filter: The large cooling channels allow a standard filter with a quality of ≤ 0.05 mm.

Coolant pressure: At least 25 bar coolant pressure is required for reliable milling. High pressure is generally better for the cooling and flushing effect.

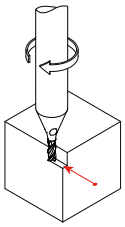
Revolution	[rpm]	≤ 10,000	> 10,000
Minimal pressure	[bar]	25	35

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.

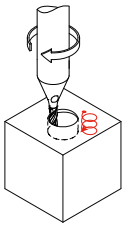
Side milling



Recommended cutting parameters
v_c and f_z = as indicated in the cutting data table

	Type B – Z3	Type C – Z3	Type B – Z4	Type C – Z4
Roughing	a_p = 1 x d a_e = 0.2 x d	a_p = 1 x d a_e = 0.1 x d	-	-
Semi-finishing	-	-	a_p = 1.5 x d a_e = 0.1 x d	a_p = 1.5 x d a_e = 0.05 x d
Finishing	-	-	a_p = 1.5 x d a_e = 0.02 x d	a_p = 1.5 x d a_e = 0.02 x d

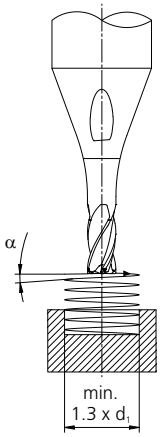
Milling with helical interpolation



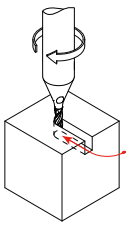
Helical interpolation is the best and gentlest way for plunging. Note that the minimum diameter to be produced must be 1.3 x d_1. The minimum and maximum helical interpolation angle α depends on the material (see table).

Recommended helical interpolation angles (calculated on the endmill center)

	Material	α - Helical interpolation min	max
P	Unalloyed and alloyed steels	5°	15°
M	Stainless steels	5°	10°
K	Cast irons	5°	15°
N	Aluminum and non ferrous metals	10°	30°
S_1	Super alloys	2°	8°
S_2	Titanium pure and titanium alloys	2°	8°
S_3	CoCr 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

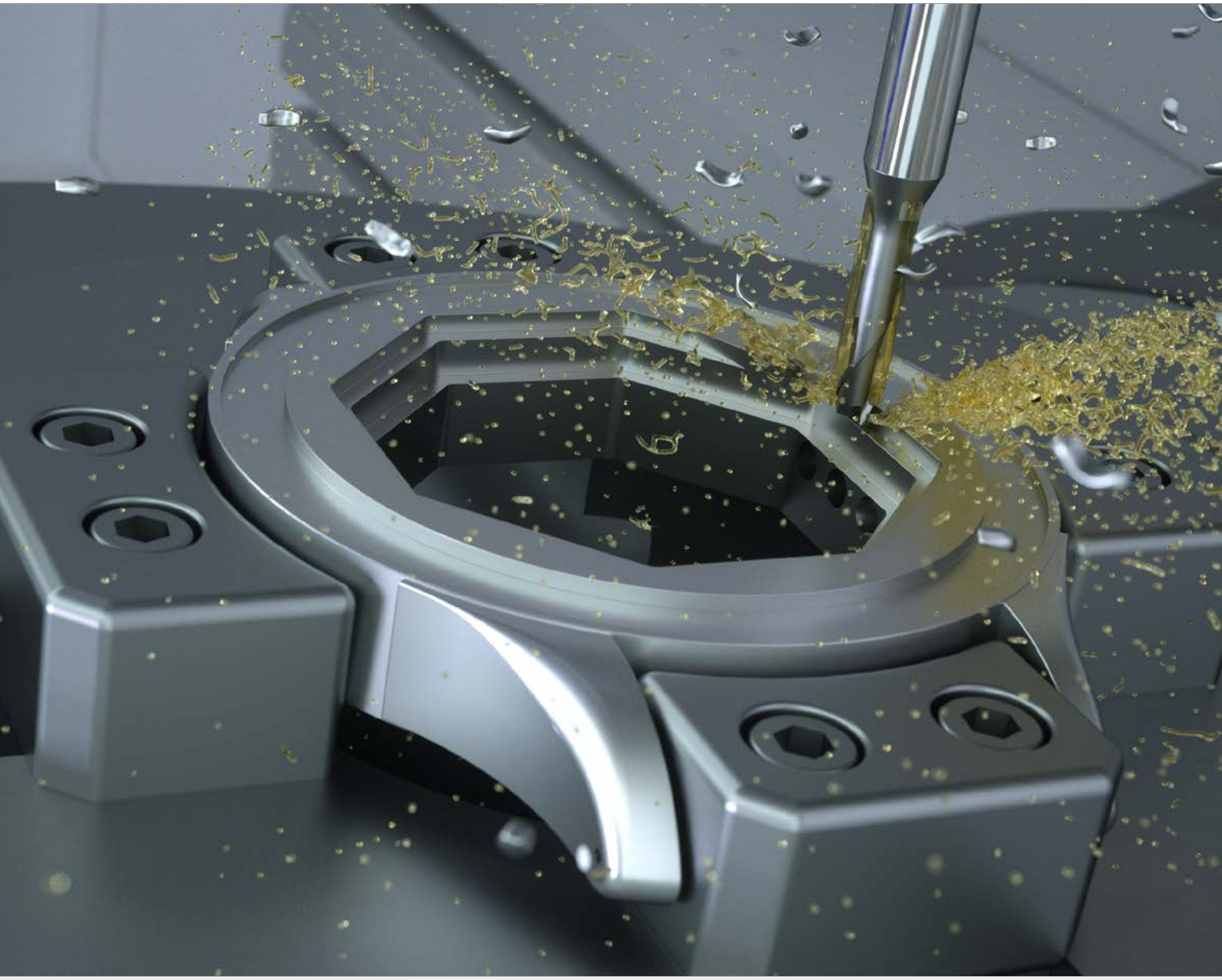
v_c and f_z: as specified in the cutting data table

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 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.

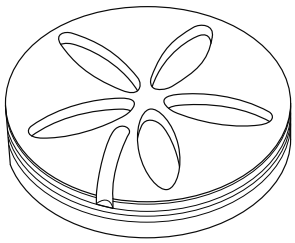
Please note: You couldn't find your suitable version of the CrazyMill Cool Square / Corner radius - Z2 (diameter, length, cutting direction…)? Ask us about our customized versions!

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

MILLING TOOL
Mikron Tool - CrazyMill Cool Corner radius Z2 - Type A

DATA	MIKRON TOOL
Tool type	CrazyMill Cool Corner radius - Z2 - Carbide - Coated - Internal cooling
Item number	2.CMC30.A3Z2.150.1
Cutting data	v_c = 180 m/min f_z = 0.016 mm a_p = 1.5 mm r = 0.2 mm

1.5 x d	3 x d	5 x d
Type A	Type B	Type C
Coated Integrated cooling l_1: 1.5xd, l_2: 1.5xd	Coated Integrated cooling l_1: 3xd, l_2: 1.5xd	Coated Integrated cooling l_1: 5xd, l_2: 1.5xd
		
		
page 456	page 462	page 468

PATENTED

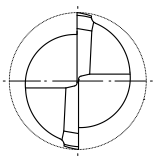
1 | SHANK
The robust carbide shank guarantees stable and vibration-free milling. A high degree of precision and excellent surface quality are achieved.

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

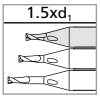
CRAZYMILL by Mikron Tool Cool

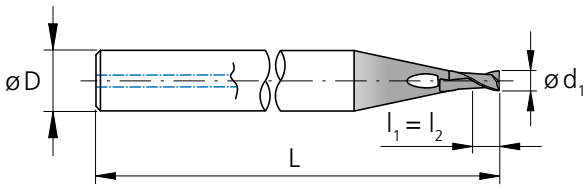
Type A - 1.5 x d - Square / Corner radius - Z2

MILLING WITH INTEGRATED COOLING

Square


protection phase of 45°





l_1 = Effective length
l_2 = Cutting length

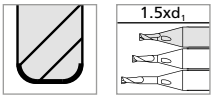
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.3		0.45	0.45	3	38	2.CMC30.A1Z2.030.1	■
0.396	**1/64**	0.59	0.59	3	38	2.CMC.SAZ2.F164	■
0.4		0.60	0.60	3	38	2.CMC30.A1Z2.040.1	■
0.5		0.75	0.75	3	38	2.CMC30.A1Z2.050.1	■
0.6		0.90	0.90	3	38	2.CMC30.A1Z2.060.1	■
0.793	**1/32**	1.19	1.19	3	38	2.CMC.SAZ2.F132	■
0.8		1.20	1.20	3	38	2.CMC30.A1Z2.080.1	■
1.0		1.50	1.50	4	40	2.CMC30.A1Z2.100.1	■
1.2		1.80	1.80	4	40	2.CMC30.A1Z2.120.1	■
1.5		2.25	2.25	4	40	2.CMC30.A1Z2.150.1	■
1.587	**1/16**	2.38	2.38	4	40	2.CMC.SAZ2.F116	■
1.8		2.70	2.70	4	40	2.CMC30.A1Z2.180.1	■
2.0		3.00	3.00	4	40	2.CMC30.A1Z2.200.1	■
2.381	**3/32**	3.57	3.57	4	40	2.CMC.SAZ2.F332	■
2.5		3.75	3.75	6	45	2.CMC30.A1Z2.250.1	■
3.0		4.50	4.50	6	50	2.CMC30.A1Z2.300.1	■
3.175	**1/8**	4.76	4.76	6	50	2.CMC.SAZ2.F18	■
3.968	**5/32**	5.95	5.95	6	50	2.CMC.SAZ2.F532	■
4.0		6.00	6.00	6	50	2.CMC30.A1Z2.400.1	■
4.762	**3/16**	7.14	7.14	8	60	2.CMC.SAZ2.F316	■
5.560	**7/32**	8.34	8.34	10	60	2.CMC.SAZ2.F732	■
6.0		9.00	9.00	10	60	2.CMC30.A1Z2.600.1	■
6.350	**1/4**	9.53	9.53	10	60	2.CMC.SAZ2.F14	■

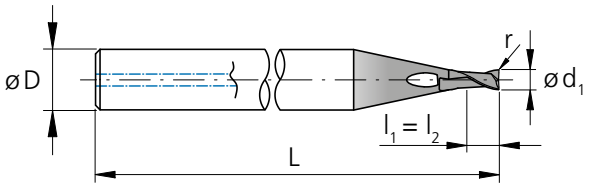
■ Stock item

Carbide | Z2 | 30° | eXedur RIP

Ød_1	0.3 - 6.35 mm
Tolerance	+ 0.01 mm - 0.01 mm

Corner radius





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
0.3		0.45	0.45	3	38	0.05		2.CMC30.A2Z2.030.1	■
0.396	**1/64**	0.59	0.59	3	38	0.076	.0030	2.CMC.RA2Z2.F164	■
0.4		0.60	0.60	3	38	0.05		2.CMC30.A2Z2.040.1	■
0.5		0.75	0.75	3	38	0.05		2.CMC30.A2Z2.050.1	■
0.5		0.75	0.75	3	38	0.10		2.CMC30.A3Z2.050.1	■
0.6		0.90	0.90	3	38	0.05		2.CMC30.A2Z2.060.1	■
0.6		0.90	0.90	3	38	0.10		2.CMC30.A3Z2.060.1	■
0.793	**1/32**	1.19	1.19	3	38	0.076	.0030	2.CMC.RA2Z2.F132	■
0.793	**1/32**	1.19	1.19	3	38	0.127	.0050	2.CMC.RA3Z2.F132	■
0.8		1.20	1.20	3	38	0.05		2.CMC30.A2Z2.080.1	■
0.8		1.20	1.20	3	38	0.10		2.CMC30.A3Z2.080.1	■
1.0		1.50	1.50	4	40	0.10		2.CMC30.A2Z2.100.1	■
1.0		1.50	1.50	4	40	0.20		2.CMC30.A3Z2.100.1	■
1.2		1.80	1.80	4	40	0.10		2.CMC30.A2Z2.120.1	■
1.2		1.80	1.80	4	40	0.20		2.CMC30.A3Z2.120.1	■
1.5		2.25	2.25	4	40	0.10		2.CMC30.A2Z2.150.1	■
1.5		2.25	2.25	4	40	0.30		2.CMC30.A3Z2.150.1	■
1.587	**1/16**	2.38	2.38	4	40	0.127	.0050	2.CMC.RA2Z2.F116	■
1.587	**1/16**	2.38	2.38	4	40	0.254	.0100	2.CMC.RA3Z2.F116	■
1.8		2.70	2.70	4	40	0.10		2.CMC30.A2Z2.180.1	■
1.8		2.70	2.70	4	40	0.30		2.CMC30.A3Z2.180.1	■
2.0		3.00	3.00	4	40	0.10		2.CMC30.A2Z2.200.1	■
2.0		3.00	3.00	4	40	0.20		2.CMC30.A3Z2.200.1	■
2.0		3.00	3.00	4	40	0.50		2.CMC30.A4Z2.200.1	■
2.381	**3/32**	3.57	3.57	4	40	0.127	.0050	2.CMC.RA2Z2.F332	■
2.381	**3/32**	3.57	3.57	4	40	0.254	.0100	2.CMC.RA3Z2.F332	■
2.381	**3/32**	3.57	3.57	4	40	0.381	.0150	2.CMC.RA4Z2.F332	■
2.5		3.75	3.75	6	45	0.20		2.CMC30.A2Z2.250.1	■
2.5		3.75	3.75	6	45	0.50		2.CMC30.A3Z2.250.1	■
3.0		4.50	4.50	6	50	0.20		2.CMC30.A2Z2.300.1	■
3.0		4.50	4.50	6	50	0.50		2.CMC30.A3Z2.300.1	■
3.175	**1/8**	4.76	4.76	6	50	0.254	.0100	2.CMC.RA2Z2.F18	■
3.175	**1/8**	4.76	4.76	6	50	0.381	.0150	2.CMC.RA3Z2.F18	■
3.968	**5/32**	5.95	5.95	6	50	0.254	.0100	2.CMC.RA2Z2.F532	■
3.968	**5/32**	5.95	5.95	6	50	0.381	.0150	2.CMC.RA3Z2.F532	■
4.0		6.00	6.00	6	50	0.20		2.CMC30.A2Z2.400.1	■
4.0		6.00	6.00	6	50	0.50		2.CMC30.A3Z2.400.1	■
4.762	**3/16**	7.14	7.14	8	60	0.254	.0100	2.CMC.RA2Z2.F316	■
4.762	**3/16**	7.14	7.14	8	60	0.381	.0150	2.CMC.RA3Z2.F316	■
5.560	**7/32**	8.34	8.34	10	60	0.381	.0150	2.CMC.RA2Z2.F732	■
5.560	**7/32**	8.34	8.34	10	60	0.762	.0300	2.CMC.RA3Z2.F732	■
6.0		9.00	9.00	10	60	0.50		2.CMC30.A2Z2.600.1	■
6.0		9.00	9.00	10	60	1.00		2.CMC30.A3Z2.600.1	■
6.350	**1/4**	9.53	9.53	10	60	0.762	.0300	2.CMC.RA2Z2.F14	■

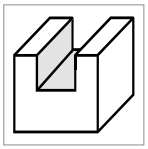
■ Stock item

CRAZYMILL by Mikron Tool Cool

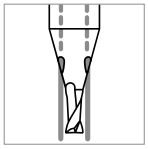
Type A - Conventional slot milling

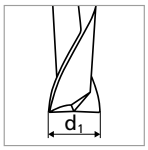
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

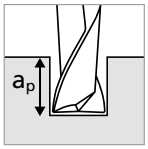
Conventional slot milling



■ $a_p = 1 \times d_1$



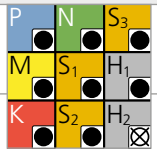




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm – 0.4 mm 1/64" v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.004 – 0.006
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.003 – 0.005
		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	0.003 – 0.005
		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	0.004 – 0.006
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	0.003 – 0.005
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	0.003 – 0.005
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	0.003 – 0.005
		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	0.002 – 0.004
		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	0.005 – 0.007
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.005 – 0.007
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.005 – 0.007
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.005 – 0.007
		2.036	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.005 – 0.007
		2.102	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.005 – 0.007
		2.096	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	60	0.002 – 0.003
		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	0.003 – 0.005
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.003 – 0.005
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.002 – 0.003
			CrCoMo28	ASTM F1537		
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.003 – 0.005
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

v_c [m/min]
f_z [mm]

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



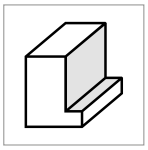
Ød1	0.5 mm – 0.8 mm 1/32"		1.0 mm – 1.2 mm		1.5 mm – 1.8 mm 1/16"		2.0 mm – 2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm – 6.0 mm 5/32 – 3/16 – 7/32 – 1/4"	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	100	0.008 – 0.012	140	0.013 – 0.015	180	0.022 – 0.024	200	0.030 – 0.032	220	0.046	260	0.048
	100	0.007 – 0.010	140	0.012 – 0.014	180	0.020 – 0.022	200	0.028 – 0.030	220	0.044	260	0.046
	100	0.006 – 0.009	140	0.009 – 0.011	180	0.018 – 0.020	200	0.026 – 0.028	220	0.040	260	0.042
	100	0.008 – 0.012	140	0.014 – 0.016	180	0.022 – 0.024	200	0.030 – 0.032	220	0.044	260	0.046
	100	0.007 – 0.010	140	0.013 – 0.015	180	0.020 – 0.022	200	0.028 – 0.030	220	0.042	260	0.044
	100	0.007 – 0.010	140	0.013 – 0.015	180	0.020 – 0.022	200	0.028 – 0.030	220	0.042	260	0.044
	100	0.006 – 0.009	140	0.010 – 0.012	180	0.016 – 0.018	200	0.026 – 0.028	220	0.040	260	0.042
	100	0.005 – 0.008	120	0.010 – 0.020	140	0.022 – 0.025	160	0.026 – 0.035	180	0.040 – 0.046	200	0.050 – 0.054
	100	0.010 – 0.014	140	0.015 – 0.017	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.055
	100	0.010 – 0.014	140	0.015 – 0.017	180	0.024 – 0.026	200	0.032 – 0.034	220	0.050	260	0.053
	100	0.012 – 0.016	140	0.018 – 0.020	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.055
	100	0.012 – 0.016	140	0.018 – 0.020	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.055
	100	0.012 – 0.016	140	0.018 – 0.020	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.055
	100	0.010 – 0.014	140	0.016 – 0.018	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.055
	100	0.004 – 0.006	120	0.007 – 0.008	130	0.009 – 0.010	140	0.010 – 0.012	150	0.015	170	0.020
	100	0.006 – 0.009	120	0.014 – 0.016	130	0.018 – 0.020	140	0.026 – 0.028	150	0.040	170	0.042
	100	0.006 – 0.009	120	0.014 – 0.016	130	0.018 – 0.020	140	0.026 – 0.028	150	0.040	170	0.042
	100	0.004 – 0.006	140	0.007 – 0.008	160	0.009 – 0.010	180	0.010 – 0.012	200	0.015	220	0.020
	80	0.006 – 0.007	100	0.008 – 0.010	140	0.012 – 0.016	180	0.018 – 0.024	200	0.030	240	0.035

CRAZYMILL by Mikron Tool Cool

Type A - Side and trochoidal slot milling

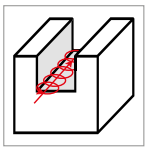
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Side milling

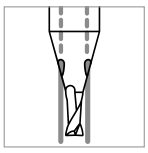


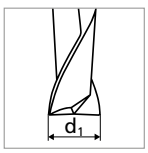
- $a_p = 1 \times d_1$
- $a_e = 0.3 \times d_1$

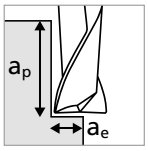
Trochoidal Slot Milling



- $a_p = 1 \times d_1$
- $a_e = 0.1 \times d_1$



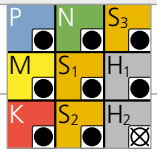




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm – 0.4 mm 1/64" v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.005 – 0.007
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.004 – 0.006
		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	0.004 – 0.006
		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	0.005 – 0.007
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	0.004 – 0.006
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	0.004 – 0.006
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	0.004 – 0.006
		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	0.003 – 0.005
		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	0.006 – 0.008
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.006 – 0.008
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.006 – 0.008
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.006 – 0.008
		2.036	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.006 – 0.008
		2.102	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.006 – 0.008
		2.096	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	60	0.003 – 0.004
		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	0.004 – 0.006
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.004 – 0.006
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.003 – 0.004
			CrCoMo28	ASTM F1537		
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.004 – 0.006
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

v_c [m/min]
f_z [mm]

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



Ød1	0.5 mm – 0.8 mm 1/32"		1.0 mm – 1.2 mm		1.5 mm – 1.8 mm 1/16"		2.0 mm – 2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm – 6.0 mm 5/32 – 3/16 – 7/32 – 1/4"	
	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	0.010 – 0.014	140	0.015 – 0.017	200	0.024 – 0.026	220	0.034 – 0.036	240	0.048	280	0.050
	100	0.009 – 0.012	140	0.014 – 0.016	200	0.022 – 0.024	220	0.032 – 0.034	240	0.046	280	0.048
	100	0.008 – 0.011	140	0.011 – 0.013	200	0.020 – 0.022	220	0.030 – 0.032	240	0.042	280	0.044
	100	0.010 – 0.014	140	0.016 – 0.018	200	0.024 – 0.026	220	0.034 – 0.036	240	0.046	280	0.048
	100	0.009 – 0.012	140	0.015 – 0.017	200	0.022 – 0.024	220	0.032 – 0.034	240	0.044	280	0.046
	100	0.009 – 0.012	140	0.015 – 0.017	200	0.022 – 0.024	220	0.032 – 0.034	240	0.044	280	0.046
	100	0.008 – 0.011	140	0.012 – 0.014	200	0.016 – 0.018	220	0.030 – 0.032	240	0.042	280	0.044
	100	0.006 – 0.009	120	0.011 – 0.022	140	0.024 – 0.026	160	0.028 – 0.036	180	0.042 – 0.048	200	0.052 – 0.057
	100	0.012 – 0.016	140	0.018 – 0.020	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.012 – 0.016	140	0.018 – 0.020	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.014 – 0.018	140	0.020 – 0.022	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.014 – 0.018	140	0.020 – 0.022	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.014 – 0.018	140	0.020 – 0.022	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.012 – 0.016	140	0.018 – 0.020	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.004 – 0.006	120	0.007 – 0.008	130	0.009 – 0.010	140	0.010 – 0.012	150	0.015	170	0.020
	100	0.008 – 0.011	120	0.016 – 0.018	130	0.020 – 0.022	140	0.028 – 0.030	150	0.042	170	0.044
	100	0.008 – 0.011	120	0.016 – 0.018	130	0.020 – 0.022	140	0.028 – 0.030	150	0.042	170	0.044
	100	0.004 – 0.006	140	0.007 – 0.008	180	0.009 – 0.010	200	0.010 – 0.012	220	0.015	240	0.020
	80	0.007 – 0.009	100	0.010 – 0.012	140	0.014 – 0.018	180	0.020 – 0.026	200	0.035	240	0.040

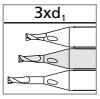
CRAZYMILL by Mikron Tool Cool

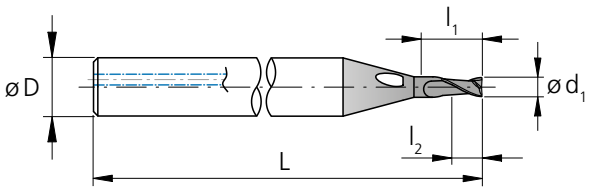
Type B - 3 x d - Square / Corner radius - Z2

MILLING WITH INTEGRATED COOLING

Square

protection phase of 45°





l_1 = Effective length
l_2 = Cutting length

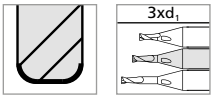
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.3		0.90	0.45	3	38	2.CMC30.B1Z2.030.1	■
0.396	**1/64**	1.19	0.59	3	38	2.CMC.SBZ2.F164	■
0.4		1.20	0.60	3	38	2.CMC30.B1Z2.040.1	■
0.5		1.50	0.75	3	38	2.CMC30.B1Z2.050.1	■
0.6		1.80	0.90	3	38	2.CMC30.B1Z2.060.1	■
0.793	**1/32**	2.38	1.19	3	38	2.CMC.SBZ2.F132	■
0.8		2.40	1.20	3	38	2.CMC30.B1Z2.080.1	■
1.0		3.00	1.50	4	40	2.CMC30.B1Z2.100.1	■
1.2		3.60	1.80	4	40	2.CMC30.B1Z2.120.1	■
1.5		4.50	2.25	4	40	2.CMC30.B1Z2.150.1	■
1.587	**1/16**	4.76	2.38	4	40	2.CMC.SBZ2.F116	■
1.8		5.40	2.70	4	40	2.CMC30.B1Z2.180.1	■
2.0		6.00	3.00	4	40	2.CMC30.B1Z2.200.1	■
2.381	**3/32**	7.14	3.57	4	40	2.CMC.SBZ2.F332	■
2.5		7.50	3.75	6	45	2.CMC30.B1Z2.250.1	■
3.0		9.00	4.50	6	50	2.CMC30.B1Z2.300.1	■
3.175	**1/8**	9.53	4.76	6	55	2.CMC.SBZ2.F18	■
3.968	**5/32**	11.90	5.95	6	55	2.CMC.SBZ2.F532	■
4.0		12.00	6.00	6	55	2.CMC30.B1Z2.400.1	■
4.762	**3/16**	14.29	7.14	8	65	2.CMC.SBZ2.F316	■
5.560	**7/32**	16.68	8.34	10	65	2.CMC.SBZ2.F732	■
6.0		18.00	9.00	10	65	2.CMC30.B1Z2.600.1	■
6.350	**1/4**	19.05	9.53	10	65	2.CMC.SBZ2.F14	■

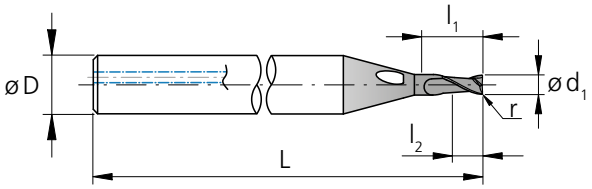
■ Stock item

Carbide | Z2 | 30° | eXedur RIP

Ø d_1	0.3 - 6.35 mm
Tolerance	+ 0.01 mm - 0.01 mm

Corner radius





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
0.3		0.90	0.45	3	38	0.05		2.CMC30.B2Z2.030.1	■
0.396	**1/64**	1.19	0.59	3	38	0.076	.0030	2.CMC.RB2Z2.F164	■
0.4		1.20	0.60	3	38	0.05		2.CMC30.B2Z2.040.1	■
0.5		1.50	0.75	3	38	0.05		2.CMC30.B2Z2.050.1	■
0.5		1.50	0.75	3	38	0.10		2.CMC30.B3Z2.050.1	■
0.6		1.80	0.90	3	38	0.05		2.CMC30.B2Z2.060.1	■
0.6		1.80	0.90	3	38	0.10		2.CMC30.B3Z2.060.1	■
0.793	**1/32**	2.38	1.19	3	38	0.076	.0030	2.CMC.RB2Z2.F132	■
0.793	**1/32**	2.38	1.19	3	38	0.127	.0050	2.CMC.RB3Z2.F132	■
0.8		2.40	1.20	3	38	0.05		2.CMC30.B2Z2.080.1	■
0.8		2.40	1.20	3	38	0.10		2.CMC30.B3Z2.080.1	■
1.0		3.00	1.50	4	40	0.10		2.CMC30.B2Z2.100.1	■
1.0		3.00	1.50	4	40	0.20		2.CMC30.B3Z2.100.1	■
1.2		3.60	1.80	4	40	0.10		2.CMC30.B2Z2.120.1	■
1.2		3.60	1.80	4	40	0.20		2.CMC30.B3Z2.120.1	■
1.5		4.50	2.25	4	40	0.10		2.CMC30.B2Z2.150.1	■
1.5		4.50	2.25	4	40	0.30		2.CMC30.B3Z2.150.1	■
1.587	**1/16**	4.76	2.38	4	40	0.127	.0050	2.CMC.RB2Z2.F116	■
1.587	**1/16**	4.76	2.38	4	40	0.254	.0100	2.CMC.RB3Z2.F116	■
1.8		5.40	2.70	4	40	0.10		2.CMC30.B2Z2.180.1	■
1.8		5.40	2.70	4	40	0.30		2.CMC30.B3Z2.180.1	■
2.0		6.00	3.00	4	40	0.10		2.CMC30.B2Z2.200.1	■
2.0		6.00	3.00	4	40	0.20		2.CMC30.B3Z2.200.1	■
2.0		6.00	3.00	4	40	0.50		2.CMC30.B4Z2.200.1	■
2.381	**3/32**	7.14	3.57	4	40	0.127	.0050	2.CMC.RB2Z2.F332	■
2.381	**3/32**	7.14	3.57	4	40	0.254	.0100	2.CMC.RB3Z2.F332	■
2.381	**3/32**	7.14	3.57	4	40	0.381	.0150	2.CMC.RB4Z2.F332	■
2.5		7.50	3.75	6	45	0.20		2.CMC30.B2Z2.250.1	■
2.5		7.50	3.75	6	45	0.50		2.CMC30.B3Z2.250.1	■
3.0		9.00	4.50	6	50	0.20		2.CMC30.B2Z2.300.1	■
3.0		9.00	4.50	6	50	0.50		2.CMC30.B3Z2.300.1	■
3.175	**1/8**	9.53	4.76	6	55	0.254	.0100	2.CMC.RB2Z2.F18	■
3.175	**1/8**	9.53	4.76	6	55	0.381	.0150	2.CMC.RB3Z2.F18	■
3.968	**5/32**	11.90	5.95	6	55	0.254	.0100	2.CMC.RB2Z2.F532	■
3.968	**5/32**	11.90	5.95	6	55	0.381	.0150	2.CMC.RB3Z2.F532	■
4.0		12.00	6.00	6	55	0.20		2.CMC30.B2Z2.400.1	■
4.0		12.00	6.00	6	55	0.50		2.CMC30.B3Z2.400.1	■
4.762	**3/16**	14.29	7.14	8	65	0.254	.0100	2.CMC.RB2Z2.F316	■
4.762	**3/16**	14.29	7.14	8	65	0.381	.0150	2.CMC.RB3Z2.F316	■
5.560	**7/32**	16.68	8.34	10	65	0.381	.0150	2.CMC.RB2Z2.F732	■
5.560	**7/32**	16.68	8.34	10	65	0.762	.0300	2.CMC.RB3Z2.F732	■
6.0		18.00	9.00	10	65	0.50		2.CMC30.B2Z2.600.1	■
6.0		18.00	9.00	10	65	1.00		2.CMC30.B3Z2.600.1	■
6.350	**1/4**	19.05	9.53	10	65	0.762	.0300	2.CMC.RB2Z2.F14	■

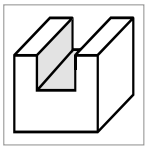
■ Stock item

CRAZYMILL by Mikron Tool Cool

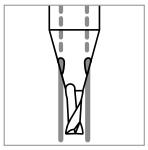
Type B - Conventional slot milling

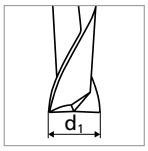
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

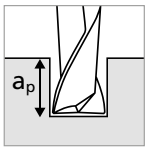
Conventional slot milling



- $a_p = 1 \times d_1$
- $a_p = 0.5 \times d_1$ for group S_1 and S_3



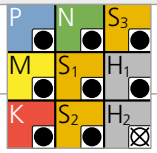




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm – 0.4 mm 1/64" v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.004 – 0.006
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.003 – 0.005
		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	0.003 – 0.005
		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	0.004 – 0.006
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	0.003 – 0.005
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	0.003 – 0.005
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	0.003 – 0.005
		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	0.002 – 0.004
		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	0.005 – 0.007
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.005 – 0.007
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.005 – 0.007
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.005 – 0.007
		2.036	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.005 – 0.007
		2.102	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.005 – 0.007
		2.096	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	60	0.002 – 0.003
		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	0.003 – 0.005
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.003 – 0.005
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.002 – 0.003
			CrCoMo28	ASTM F1537		
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.003 – 0.005
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

v_c [m/min]
f_z [mm]

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



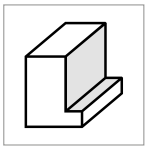
Ød1	0.5 mm – 0.8 mm 1/32"		1.0 mm – 1.2 mm		1.5 mm – 1.8 mm 1/16"		2.0 mm – 2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm – 6.0 mm 5/32 – 3/16 – 7/32 – 1/4"	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	100	0.008 – 0.012	140	0.013 – 0.015	180	0.022 – 0.024	200	0.030 – 0.032	220	0.044	260	0.048
	100	0.007 – 0.010	140	0.012 – 0.014	180	0.020 – 0.022	200	0.028 – 0.030	220	0.042	260	0.046
	100	0.006 – 0.009	140	0.009 – 0.011	180	0.018 – 0.020	200	0.026 – 0.028	220	0.038	260	0.040
	100	0.008 – 0.012	140	0.014 – 0.016	180	0.022 – 0.024	200	0.030 – 0.032	220	0.042	260	0.046
	100	0.007 – 0.010	140	0.013 – 0.015	180	0.020 – 0.022	200	0.028 – 0.030	220	0.040	260	0.044
	100	0.007 – 0.010	140	0.013 – 0.015	180	0.020 – 0.022	200	0.028 – 0.030	220	0.040	260	0.044
	100	0.006 – 0.009	140	0.010 – 0.012	180	0.016 – 0.018	200	0.026 – 0.028	220	0.038	260	0.042
	100	0.005 – 0.008	120	0.010 – 0.020	140	0.022 – 0.025	160	0.026 – 0.035	180	0.038 – 0.045	200	0.048 – 0.052
	100	0.010 – 0.014	140	0.015 – 0.017	180	0.024 – 0.026	200	0.032 – 0.034	220	0.050	260	0.055
	100	0.010 – 0.014	140	0.015 – 0.017	180	0.024 – 0.026	200	0.032 – 0.034	220	0.048	260	0.053
	100	0.012 – 0.016	140	0.018 – 0.020	180	0.024 – 0.026	200	0.032 – 0.034	220	0.050	260	0.055
	100	0.012 – 0.016	140	0.018 – 0.020	180	0.024 – 0.026	200	0.032 – 0.034	220	0.050	260	0.055
	100	0.012 – 0.016	140	0.018 – 0.020	180	0.024 – 0.026	200	0.032 – 0.034	220	0.050	260	0.055
	100	0.010 – 0.014	140	0.016 – 0.018	180	0.024 – 0.026	200	0.032 – 0.034	220	0.050	260	0.055
	100	0.004 – 0.006	120	0.007 – 0.008	130	0.009 – 0.010	140	0.010 – 0.012	150	0.015	170	0.020
	100	0.006 – 0.009	120	0.014 – 0.016	130	0.018 – 0.020	140	0.026 – 0.028	150	0.040	170	0.042
	100	0.006 – 0.009	120	0.014 – 0.016	130	0.018 – 0.020	140	0.026 – 0.028	150	0.040	170	0.042
	100	0.004 – 0.006	140	0.007 – 0.008	160	0.009 – 0.010	180	0.010 – 0.012	200	0.015	220	0.020
	80	0.006 – 0.007	100	0.008 – 0.010	140	0.012 – 0.016	180	0.018 – 0.024	200	0.030	240	0.035

CRAZYMILL by Mikron Tool Cool

Type B - Side and trochoidal slot milling

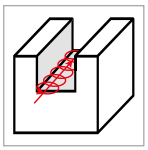
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Side milling

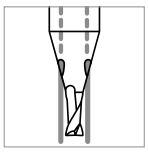


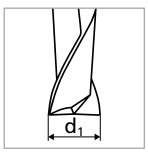
- $a_p = 1 \times d_1$
- $a_e = 0.3 \times d_1$

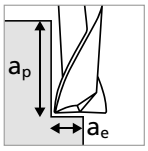
Trochoidal Slot Milling



- $a_p = 1 \times d_1$
- $a_e = 0.1 \times d_1$



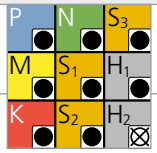




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm – 0.4 mm 1/64" v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.005 – 0.007
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.004 – 0.006
		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	0.004 – 0.006
		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	0.005 – 0.007
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	0.004 – 0.006
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	0.004 – 0.006
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	0.004 – 0.006
		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	0.003 – 0.005
		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	0.006 – 0.008
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.006 – 0.008
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.006 – 0.008
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.006 – 0.008
		2.036	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.006 – 0.008
		2.102	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.006 – 0.008
		2.096	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	60	0.003 – 0.004
		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	0.004 – 0.006
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.004 – 0.006
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.003 – 0.004
			CrCoMo28	ASTM F1537		
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.004 – 0.006
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

v_c [m/min]
f_z [mm]

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



Ød1	0.5 mm – 0.8 mm 1/32"		1.0 mm – 1.2 mm		1.5 mm – 1.8 mm 1/16"		2.0 mm – 2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm – 6.0 mm 5/32 – 3/16 – 7/32 – 1/4"	
	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	0.010 – 0.014	140	0.015 – 0.017	200	0.024 – 0.026	220	0.034 – 0.036	240	0.046	280	0.050
	100	0.009 – 0.012	140	0.014 – 0.016	200	0.022 – 0.024	220	0.032 – 0.034	240	0.044	280	0.048
	100	0.008 – 0.011	140	0.011 – 0.013	200	0.020 – 0.022	220	0.030 – 0.032	240	0.040	280	0.042
	100	0.010 – 0.014	140	0.016 – 0.018	200	0.024 – 0.026	220	0.034 – 0.036	240	0.044	280	0.048
	100	0.009 – 0.012	140	0.015 – 0.017	200	0.022 – 0.024	220	0.032 – 0.034	240	0.044	280	0.046
	100	0.009 – 0.012	140	0.015 – 0.017	200	0.022 – 0.024	220	0.032 – 0.034	240	0.044	280	0.046
	100	0.008 – 0.011	140	0.012 – 0.014	200	0.016 – 0.018	220	0.030 – 0.032	240	0.040	280	0.044
	100	0.006 – 0.009	120	0.011 – 0.022	140	0.024 – 0.026	160	0.028 – 0.036	180	0.040 – 0.047	200	0.050 – 0.054
	100	0.012 – 0.016	140	0.018 – 0.020	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.012 – 0.016	140	0.018 – 0.020	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.014 – 0.018	140	0.020 – 0.022	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.014 – 0.018	140	0.020 – 0.022	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.014 – 0.018	140	0.020 – 0.022	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.012 – 0.016	140	0.018 – 0.020	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.060
	100	0.004 – 0.006	120	0.007 – 0.008	130	0.009 – 0.010	140	0.010 – 0.012	150	0.015	170	0.020
	100	0.008 – 0.011	120	0.016 – 0.018	130	0.020 – 0.022	140	0.028 – 0.030	150	0.040	170	0.044
	100	0.008 – 0.011	120	0.016 – 0.018	130	0.020 – 0.022	140	0.028 – 0.030	150	0.040	170	0.044
	100	0.004 – 0.006	140	0.007 – 0.008	180	0.009 – 0.010	200	0.010 – 0.012	220	0.015	240	0.020
	80	0.007 – 0.009	100	0.010 – 0.012	140	0.014 – 0.018	180	0.020 – 0.026	200	0.033	240	0.040

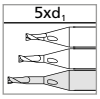
CRAZYMILL by Mikron Tool Cool

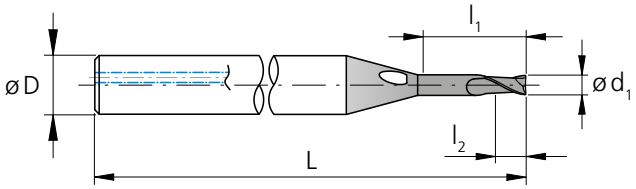
Type C - 5 x d - Square / Corner radius - Z2

MILLING WITH INTEGRATED COOLING

Square

protection phase of 45°





l_1 = Effective length
l_2 = Cutting length

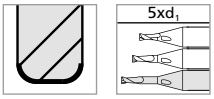
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.3		1.50	0.45	3	38	2.CMC30.C1Z2.030.1	■
0.396	**1/64**	1.98	0.59	3	38	2.CMC.SCZ2.F164	■
0.4		2.00	0.60	3	38	2.CMC30.C1Z2.040.1	■
0.5		2.50	0.75	3	38	2.CMC30.C1Z2.050.1	■
0.6		3.00	0.90	3	38	2.CMC30.C1Z2.060.1	■
0.793	**1/32**	3.97	1.19	3	38	2.CMC.SCZ2.F132	■
0.8		4.00	1.20	3	38	2.CMC30.C1Z2.080.1	■
1.0		5.00	1.50	4	40	2.CMC30.C1Z2.100.1	■
1.2		6.00	1.80	4	40	2.CMC30.C1Z2.120.1	■
1.5		7.50	2.25	4	40	2.CMC30.C1Z2.150.1	■
1.587	**1/16**	7.94	2.38	4	40	2.CMC.SCZ2.F116	■
1.8		9.00	2.70	4	40	2.CMC30.C1Z2.180.1	■
2.0		10.00	3.00	4	44	2.CMC30.C1Z2.200.1	■
2.381	**3/32**	11.91	3.57	4	44	2.CMC.SCZ2.F332	■
2.5		12.50	3.75	6	50	2.CMC30.C1Z2.250.1	■
3.0		15.00	4.50	6	55	2.CMC30.C1Z2.300.1	■
3.175	**1/8**	15.88	4.76	6	60	2.CMC.SCZ2.F18	■
3.968	**5/32**	19.84	5.95	6	60	2.CMC.SCZ2.F532	■
4.0		20.00	6.00	6	60	2.CMC30.C1Z2.400.1	■
4.762	**3/16**	23.81	7.14	8	70	2.CMC.SCZ2.F316	■
5.560	**7/32**	27.80	8.34	10	70	2.CMC.SCZ2.F732	■
6.0		30.00	9.00	10	70	2.CMC30.C1Z2.600.1	■
6.350	**1/4**	31.75	9.53	10	70	2.CMC.SCZ2.F14	■

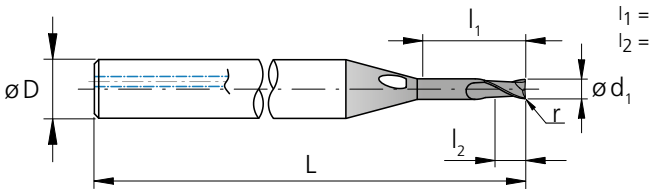
■ Stock item

Carbide | Z2 | 30° | eXedur RIP

Ø d_1	0.3 - 6.35 mm
Tolerance	+ 0.01 mm - 0.01 mm

Corner radius





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
0.3		1.50	0.45	3	38	0.05		2.CMC30.C2Z2.030.1	■
0.396	**1/64**	1.98	0.59	3	38	0.076	.0030	2.CMC.RC2Z2.F164	■
0.4		2.00	0.60	3	38	0.05		2.CMC30.C2Z2.040.1	■
0.5		2.50	0.75	3	38	0.05		2.CMC30.C2Z2.050.1	■
0.5		2.50	0.75	3	38	0.10		2.CMC30.C3Z2.050.1	■
0.6		3.00	0.90	3	38	0.05		2.CMC30.C2Z2.060.1	■
0.6		3.00	0.90	3	38	0.10		2.CMC30.C3Z2.060.1	■
0.793	**1/32**	3.97	1.19	3	38	0.076	.0030	2.CMC.RC2Z2.F132	■
0.793	**1/32**	3.97	1.19	3	38	0.127	.0050	2.CMC.RC3Z2.F132	■
0.8		4.00	1.20	3	38	0.05		2.CMC30.C2Z2.080.1	■
0.8		4.00	1.20	3	38	0.10		2.CMC30.C3Z2.080.1	■
1.0		5.00	1.50	4	40	0.10		2.CMC30.C2Z2.100.1	■
1.0		5.00	1.50	4	40	0.20		2.CMC30.C3Z2.100.1	■
1.2		6.00	1.80	4	40	0.10		2.CMC30.C2Z2.120.1	■
1.2		6.00	1.80	4	40	0.20		2.CMC30.C3Z2.120.1	■
1.5		7.50	2.25	4	40	0.10		2.CMC30.C2Z2.150.1	■
1.5		7.50	2.25	4	40	0.30		2.CMC30.C3Z2.150.1	■
1.587	**1/16**	7.94	2.38	4	40	0.127	.0050	2.CMC.RC2Z2.F116	■
1.587	**1/16**	7.94	2.38	4	40	0.254	.0100	2.CMC.RC3Z2.F116	■
1.8		9.00	2.70	4	40	0.10		2.CMC30.C2Z2.180.1	■
1.8		9.00	2.70	4	40	0.30		2.CMC30.C3Z2.180.1	■
2.0		10.00	3.00	4	44	0.10		2.CMC30.C2Z2.200.1	■
2.0		10.00	3.00	4	44	0.20		2.CMC30.C3Z2.200.1	■
2.0		10.00	3.00	4	44	0.50		2.CMC30.C4Z2.200.1	■
2.381	**3/32**	11.91	3.57	4	44	0.127	.0050	2.CMC.RC2Z2.F332	■
2.381	**3/32**	11.91	3.57	4	44	0.254	.0100	2.CMC.RC3Z2.F332	■
2.381	**3/32**	11.91	3.57	4	44	0.381	.0150	2.CMC.RC4Z2.F332	■
2.5		12.50	3.75	6	50	0.20		2.CMC30.C2Z2.250.1	■
2.5		12.50	3.75	6	50	0.50		2.CMC30.C3Z2.250.1	■
3.0		15.00	4.50	6	55	0.20		2.CMC30.C2Z2.300.1	■
3.0		15.00	4.50	6	55	0.50		2.CMC30.C3Z2.300.1	■
3.175	**1/8**	15.88	4.76	6	60	0.254	.0100	2.CMC.RC2Z2.F18	■
3.175	**1/8**	15.88	4.76	6	60	0.381	.0150	2.CMC.RC3Z2.F18	■
3.968	**5/32**	19.84	5.95	6	60	0.254	.0100	2.CMC.RC2Z2.F532	■
3.968	**5/32**	19.84	5.95	6	60	0.381	.0150	2.CMC.RC3Z2.F532	■
4.0		20.00	6.00	6	60	0.20		2.CMC30.C2Z2.400.1	■
4.0		20.00	6.00	6	60	0.50		2.CMC30.C3Z2.400.1	■
4.762	**3/16**	23.81	7.14	8	70	0.254	.0100	2.CMC.RC2Z2.F316	■
4.762	**3/16**	23.81	7.14	8	70	0.381	.0150	2.CMC.RC3Z2.F316	■
5.560	**7/32**	27.80	8.34	10	70	0.381	.0150	2.CMC.RC2Z2.F732	■
5.560	**7/32**	27.80	8.34	10	70	0.762	.0300	2.CMC.RC3Z2.F732	■
6.0		30.00	9.00	10	70	0.50		2.CMC30.C2Z2.600.1	■
6.0		30.00	9.00	10	70	1.00		2.CMC30.C3Z2.600.1	■
6.350	**1/4**	31.75	9.53	10	70	0.762	.0300	2.CMC.RC2Z2.F14	■

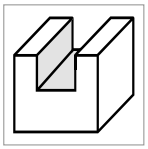
■ Stock item

CRAZYMILL by Mikron Tool Cool

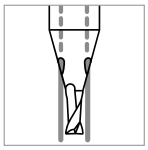
Type C - Conventional slot milling

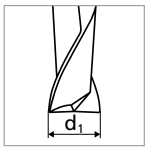
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

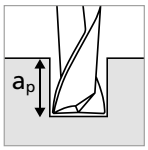
Conventional slot milling



- $a_p = 1 \times d_1$
- $a_p = 0.5 \times d_1$ for group S_1 and S_3



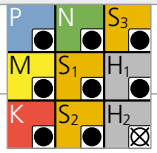




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm – 0.4 mm 1/64" v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.004 – 0.006
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.003 – 0.005
		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	0.003 – 0.005
		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	0.004 – 0.006
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	0.003 – 0.005
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	0.003 – 0.005
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	0.003 – 0.005
		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	0.002 – 0.004
		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	0.005 – 0.007
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.005 – 0.007
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.005 – 0.007
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.005 – 0.007
		2.036	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.005 – 0.007
		2.102	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.005 – 0.007
		2.096	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	60	0.002 – 0.003
		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	0.003 – 0.005
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.003 – 0.005
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.002 – 0.003
			CrCoMo28	ASTM F1537		
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.003 – 0.005
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

v_c [m/min]
f_z [mm]

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



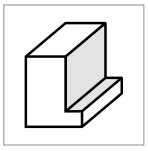
Ød1	0.5 mm – 0.8 mm 1/32"		1.0 mm – 1.2 mm		1.5 mm – 1.8 mm 1/16"		2.0 mm – 2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm – 6.0 mm 5/32 – 3/16 – 7/32 – 1/4"	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	100	0.008 – 0.012	140	0.013 – 0.015	180	0.022 – 0.024	200	0.030 – 0.032	220	0.034	260	0.048
	100	0.007 – 0.010	140	0.012 – 0.014	180	0.020 – 0.022	200	0.028 – 0.030	220	0.032	260	0.046
	100	0.006 – 0.009	140	0.009 – 0.011	180	0.018 – 0.020	200	0.026 – 0.028	220	0.028	260	0.042
	100	0.008 – 0.012	140	0.014 – 0.016	180	0.022 – 0.024	200	0.030 – 0.032	220	0.034	260	0.046
	100	0.007 – 0.010	140	0.013 – 0.015	180	0.020 – 0.022	200	0.028 – 0.030	220	0.032	260	0.044
	100	0.007 – 0.010	140	0.013 – 0.015	180	0.020 – 0.022	200	0.028 – 0.030	220	0.032	260	0.044
	100	0.006 – 0.009	140	0.010 – 0.012	180	0.016 – 0.018	200	0.026 – 0.028	220	0.030	260	0.042
	100	0.005 – 0.008	120	0.010 – 0.020	140	0.022 – 0.025	160	0.026 – 0.035	180	0.040	200	0.050
	100	0.010 – 0.014	140	0.015 – 0.017	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.050
	100	0.010 – 0.014	140	0.015 – 0.017	180	0.024 – 0.026	200	0.032 – 0.034	220	0.050	260	0.050
	100	0.012 – 0.016	140	0.018 – 0.020	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.050
	100	0.012 – 0.016	140	0.018 – 0.020	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.050
	100	0.012 – 0.016	140	0.018 – 0.020	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.050
	100	0.010 – 0.014	140	0.016 – 0.018	180	0.024 – 0.026	200	0.032 – 0.034	220	0.052	260	0.050
	100	0.004 – 0.006	120	0.007 – 0.008	130	0.009 – 0.010	140	0.010 – 0.012	150	0.015	170	0.020
	100	0.006 – 0.009	120	0.014 – 0.016	130	0.018 – 0.020	140	0.026 – 0.028	150	0.030	170	0.040
	100	0.006 – 0.009	120	0.014 – 0.016	130	0.018 – 0.020	140	0.026 – 0.028	150	0.030	170	0.040
	100	0.004 – 0.006	140	0.007 – 0.008	160	0.009 – 0.010	180	0.010 – 0.012	200	0.015	220	0.020
	80	0.006 – 0.007	100	0.008 – 0.010	140	0.012 – 0.016	180	0.018 – 0.024	200	0.028	240	0.030

CRAZYMILL by Mikron Tool Cool

Type C - Side and trochoidal slot milling

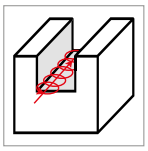
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Side milling

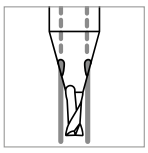


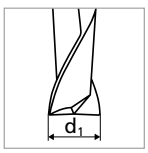
- $a_p = 1 \times d_1$
- $a_e = 0.3 \times d_1$

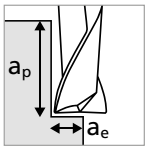
Trochoidal Slot Milling



- $a_p = 1 \times d_1$
- $a_e = 0.1 \times d_1$



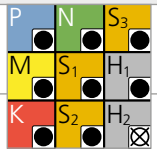




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm – 0.4 mm 1/64" v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.005 – 0.007
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.004 – 0.006
		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	0.004 – 0.006
		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	0.005 – 0.007
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	0.004 – 0.006
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	0.004 – 0.006
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	0.004 – 0.006
		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	0.003 – 0.005
		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	0.006 – 0.008
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.006 – 0.008
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.006 – 0.008
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.006 – 0.008
		2.036	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.006 – 0.008
		2.102	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.006 – 0.008
		2.096	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	60	0.003 – 0.004
		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	0.004 – 0.006
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.004 – 0.006
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.003 – 0.004
			CrCoMo28	ASTM F1537		
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.004 – 0.006
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

v_c [m/min]
f_z [mm]

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



Ød1											
0.5 mm – 0.8 mm 1/32"		1.0 mm – 1.2 mm		1.5 mm – 1.8 mm 1/16"		2.0 mm – 2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm – 6.0 mm 5/32" – 3/16" – 7/32" – 1/4"	
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	0.010 – 0.014	140	0.015 – 0.017	200	0.024 – 0.026	220	0.034 – 0.036	240	0.040	280	0.050
100	0.009 – 0.012	140	0.014 – 0.016	200	0.022 – 0.024	220	0.032 – 0.034	240	0.038	280	0.048
100	0.008 – 0.011	140	0.011 – 0.013	200	0.020 – 0.022	220	0.030 – 0.032	240	0.035	280	0.044
100	0.010 – 0.014	140	0.016 – 0.018	200	0.024 – 0.026	220	0.034 – 0.036	240	0.040	280	0.048
100	0.009 – 0.012	140	0.015 – 0.017	200	0.022 – 0.024	220	0.032 – 0.034	240	0.036	280	0.046
100	0.009 – 0.012	140	0.015 – 0.017	200	0.022 – 0.024	220	0.032 – 0.034	240	0.036	280	0.046
100	0.008 – 0.011	140	0.012 – 0.014	200	0.016 – 0.018	220	0.030 – 0.032	240	0.034	280	0.044
100	0.006 – 0.009	120	0.011 – 0.022	140	0.024 – 0.026	160	0.028 – 0.036	180	0.042	200	0.052
100	0.012 – 0.016	140	0.018 – 0.020	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.055
100	0.012 – 0.016	140	0.018 – 0.020	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.055
100	0.014 – 0.018	140	0.020 – 0.022	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.055
100	0.014 – 0.018	140	0.020 – 0.022	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.055
100	0.014 – 0.018	140	0.020 – 0.022	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.055
100	0.012 – 0.016	140	0.018 – 0.020	200	0.026 – 0.028	220	0.036 – 0.040	240	0.058	280	0.055
100	0.004 – 0.006	120	0.007 – 0.008	130	0.009 – 0.010	140	0.010 – 0.012	150	0.015	170	0.020
100	0.008 – 0.011	120	0.016 – 0.018	130	0.020 – 0.022	140	0.028 – 0.030	150	0.034	170	0.042
100	0.008 – 0.011	120	0.016 – 0.018	130	0.020 – 0.022	140	0.028 – 0.030	150	0.034	170	0.042
100	0.004 – 0.006	140	0.007 – 0.008	180	0.009 – 0.010	200	0.010 – 0.012	220	0.015	240	0.020
80	0.007 – 0.009	100	0.010 – 0.012	140	0.014 – 0.018	180	0.020 – 0.026	200	0.030	240	0.032

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 ≤ 0.05 mm.

Coolant pressure: at least 15 bar coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

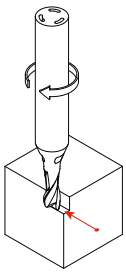
Revolution	[rpm]	≤ 10'000	> 10'000
Minimal pressure	[bar]	15	30

Tool holders

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

MLLING PROCESS

Climb milling and conventional milling

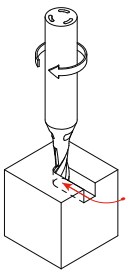


When milling pockets or walls, for example, Mikron Tool recommends climb milling since chip thickness in conventional milling is zero at the beginning and increases up to the exit. In this case, high cutting forces push the milling tool and the workpiece away from each other. Thus, surface quality decreases.

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:

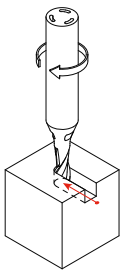
1. Indirect entry



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.

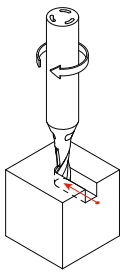
2. Reduced feed



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).

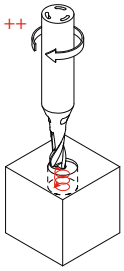
Process CrazyMill Cool Square / Corner radius - Z2

MILLING PROCESS

Immersion

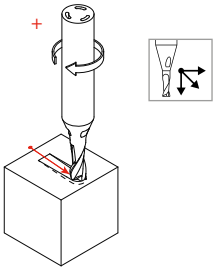
Spiral interpolation offers the best and most gentle method of immersion. The methods of immersion using a linear ramp can also be used with milling tools such as CrazyMill Cool (milling tool cuts over center).

1. Spiral interpolation



Note that the minimum diameter to be produced must be 1.3 x d_1. The minimum and maximum immersion angle α and the feed correction v_f must be maintained depending on the material (see tables).

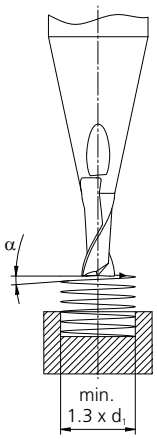
2. Linear ramp



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 α 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 α min	Ramp angle α 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 α - Feed correction v_f				
α	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

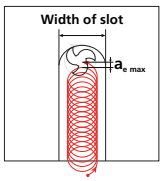
Drawbacks

- 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 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.

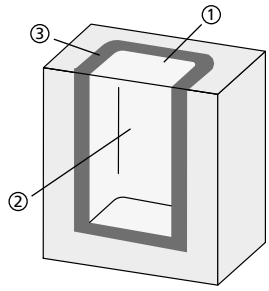
Regrinding: This product is not suitable for regrinding.

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!

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

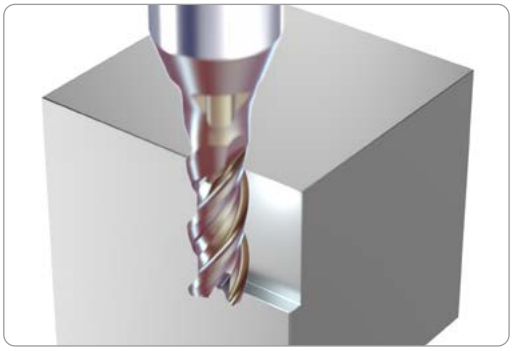
MATERIAL
X2CrNiMo17-12-2 / 1.4404 / AISI 316L

MACHINING
- ① Helical ramp
- ② Pre-machining
- ③ Finishing
- Diameter endmill = 8 mm
- Pocket depth = 16 mm

MILLING TOOL
Mikron Tool - CrazyMill Cool Square - Z4
Type A

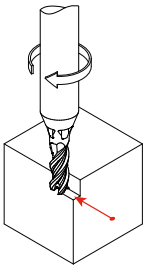
DATA	MIKRON TOOL
Tool type	CrazyMill Cool Square - Z4 - Carbide - Coated - Integrated cooling
Item number	2.CMC42.A1Z4.800.1
Cutting data	① Helical ramp v_c = 160 m/min f_z = 0.03 mm $a_{p,\,max}$ = 1 x d a_e = 7.5 mm α = 20° Q = 22.9 cm³/min Δt = 4 s ② Pre-machining v_c = 180 m/min f_z = 0.048 mm $a_{p,\,max}$ = 2 x d a_e = 1.6 mm Q = 35.2 cm³/min Δt = 1 min 40 s ③ Finishing v_c = 260 m/min f_z = 0.04 mm $a_{p,\,max}$ = 2 x d a_e = 0.16 mm Q = 4.2 cm³/min Δt = 9 s

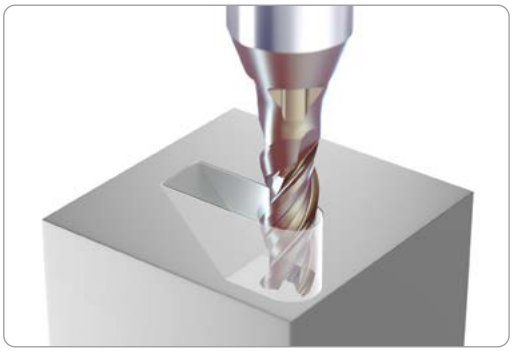
■ CrazyMill Cool Square / Corner radius - Z4 for:



1. Side milling: Pre-machining and Finishing

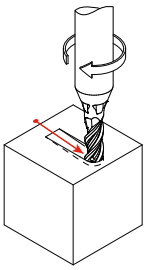
a_p = 2 x d / 3 x d / 4 x d

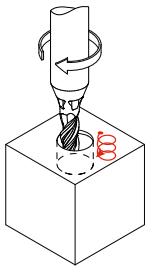


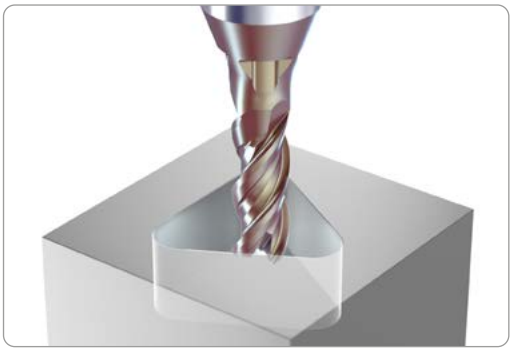


2. Linear ramp or helical interpolation milling

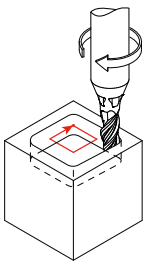
Angle depending on material







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.

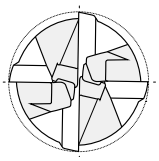
4 | COATING
The high-performance eXedur SNP coating is heat and wear resistant, prevents buildup edges and guarantees optimum chip flushing. The result is a long tool life.

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



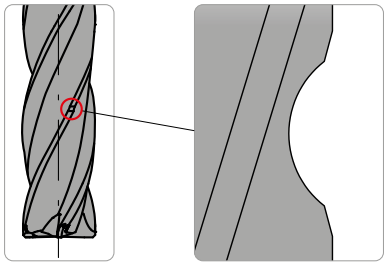
4 - Flute

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.

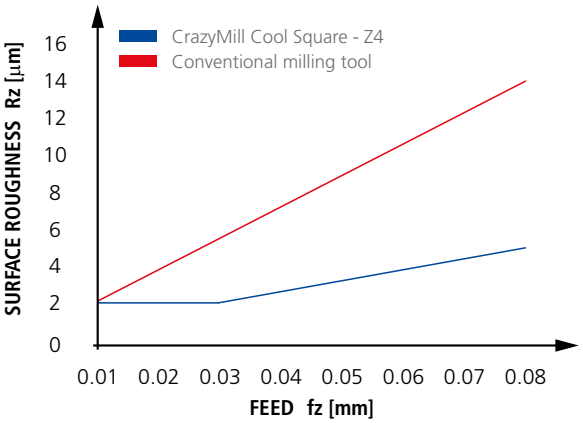
Surface quality

CrazyMill Cool

Conventional endmill

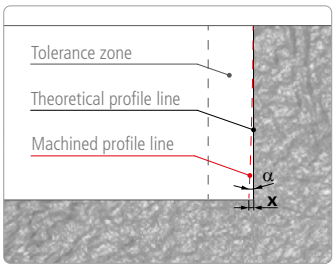
Due to the new design of chip-splitting, there is no visible mark as happens when using a conventional milling tool. The result is an excellent surface quality.

■ Surface roughness Rz



Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: 8 mm; Milling depth: 16 mm; Coolant: cutting oil;
Cutting data: v_C = 260 m/min; a_p = 16 mm; a_e = 0.16 mm

■ Perpendicularity



	Perpendicularity precision
x	0.02 mm
α	- 0.05°

Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: 6 mm; Milling depth: 24 mm; Coolant: cutting oil;
Cutting data: v_C = 220 m/min; f_Z = 0.03 mm;
a_p = 24 mm; a_e = 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.

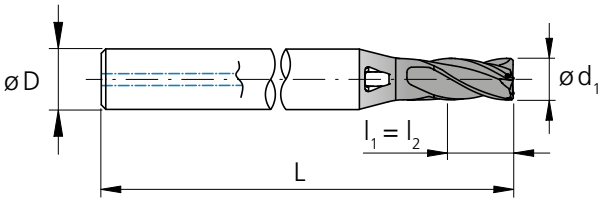
CRAZYMILL by Mikron Tool Cool

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

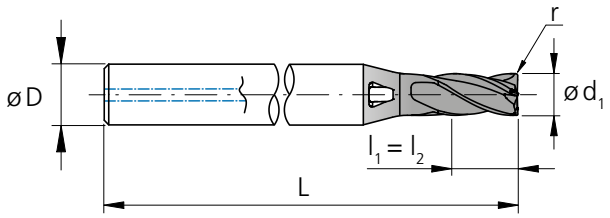
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.0		2.0	2.0	4	40	2.CMC42.A1Z4.100.1	■
1.2		2.4	2.4	4	40	2.CMC42.A1Z4.120.1	■
1.5		3.0	3.0	4	40	2.CMC42.A1Z4.150.1	■
1.587	**1/16**	3.1	3.1	4	40	2.CMC.SAZ4.F116	■
1.8		3.6	3.6	4	40	2.CMC42.A1Z4.180.1	■
2.0		4.0	4.0	4	40	2.CMC42.A1Z4.200.1	■
2.381	**3/32**	4.7	4.7	4	40	2.CMC.SAZ4.F332	■
2.5		5.0	5.0	6	50	2.CMC42.A1Z4.250.1	■
3.0		6.0	6.0	6	50	2.CMC42.A1Z4.300.1	■
3.175	**1/8**	6.4	6.4	6	50	2.CMC.SAZ4.F18	■
3.5		7.0	7.0	6	50	2.CMC42.A1Z4.350.1	■
3.968	**5/32**	7.9	7.9	6	50	2.CMC.SAZ4.F532	■
4.0		8.0	8.0	6	50	2.CMC42.A1Z4.400.1	■
4.5		9.0	9.0	8	60	2.CMC42.A1Z4.450.1	■
4.762	**3/16**	9.5	9.5	8	60	2.CMC.SAZ4.F316	■
5.0		10.0	10.0	8	60	2.CMC42.A1Z4.500.1	■
5.560	**7/32**	11.1	11.1	10	60	2.CMC.SAZ4.F732	■
6.0		12.0	12.0	10	60	2.CMC42.A1Z4.600.1	■
6.350	**1/4**	12.7	12.7	10	60	2.CMC.SAZ4.F14	■
8.0		16.0	16.0	12	70	2.CMC42.A1Z4.800.1	■

■ Stock item

Carbide | 2xd$_1$ | Z4 | 42° | eXedur SNP | a_p | a_e

Ø d$_1$	0.1 - 3.0 mm	3.1 - 6.0 mm	6.1 - 10.0 mm
Tolerance	- 0.014 mm - 0.028 mm	- 0.020 mm - 0.038 mm	- 0.025 mm - 0.047 mm

Corner radius



l$_1$ = Effective length
l$_2$ = Cutting length

d$_1$ [mm]	d$_1$ [inch]	l$_1$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
1.0		2.0	2.0	4	40	0.10		2.CMC42.A2Z4.100.1	■
1.0		2.0	2.0	4	40	0.20		2.CMC42.A3Z4.100.1	■
1.2		2.4	2.4	4	40	0.10		2.CMC42.A2Z4.120.1	■
1.2		2.4	2.4	4	40	0.20		2.CMC42.A3Z4.120.1	■
1.5		3.0	3.0	4	40	0.10		2.CMC42.A2Z4.150.1	■
1.5		3.0	3.0	4	40	0.30		2.CMC42.A3Z4.150.1	■
1.587	**1/16**	3.1	3.1	4	40	0.127	.0050	2.CMC.RA2Z4.F116	■
1.587	**1/16**	3.1	3.1	4	40	0.254	.0100	2.CMC.RA3Z4.F116	■
1.8		3.6	3.6	4	40	0.10		2.CMC42.A2Z4.180.1	■
1.8		3.6	3.6	4	40	0.30		2.CMC42.A3Z4.180.1	■
2.0		4.0	4.0	4	40	0.10		2.CMC42.A2Z4.200.1	■
2.0		4.0	4.0	4	40	0.20		2.CMC42.A3Z4.200.1	■
2.0		4.0	4.0	4	40	0.50		2.CMC42.A4Z4.200.1	■
2.381	**3/32**	4.7	4.7	4	40	0.127	.0050	2.CMC.RA2Z4.F332	■
2.381	**3/32**	4.7	4.7	4	40	0.254	.0100	2.CMC.RA3Z4.F332	■
2.381	**3/32**	4.7	4.7	4	40	0.381	.0150	2.CMC.RA4Z4.F332	■
2.5		5.0	5.0	6	50	0.20		2.CMC42.A2Z4.250.1	■
2.5		5.0	5.0	6	50	0.50		2.CMC42.A3Z4.250.1	■
3.0		6.0	6.0	6	50	0.20		2.CMC42.A2Z4.300.1	■
3.0		6.0	6.0	6	50	0.50		2.CMC42.A3Z4.300.1	■
3.175	**1/8**	6.4	6.4	6	50	0.254	.0100	2.CMC.RA2Z4.F18	■
3.175	**1/8**	6.4	6.4	6	50	0.381	.0150	2.CMC.RA3Z4.F18	■
3.5		7.0	7.0	6	50	0.20		2.CMC42.A2Z4.350.1	■
3.5		7.0	7.0	6	50	0.50		2.CMC42.A3Z4.350.1	■
3.968	**5/32**	7.9	7.9	6	50	0.254	.0100	2.CMC.RA2Z4.F532	■
3.968	**5/32**	7.9	7.9	6	50	0.381	.0150	2.CMC.RA3Z4.F532	■
4.0		8.0	8.0	6	50	0.20		2.CMC42.A2Z4.400.1	■
4.0		8.0	8.0	6	50	0.50		2.CMC42.A3Z4.400.1	■
4.5		9.0	9.0	8	60	0.20		2.CMC42.A2Z4.450.1	■
4.5		9.0	9.0	8	60	0.50		2.CMC42.A3Z4.450.1	■
4.762	**3/16**	9.5	9.5	8	60	0.254	.0100	2.CMC.RA2Z4.F316	■
4.762	**3/16**	9.5	9.5	8	60	0.381	.0150	2.CMC.RA3Z4.F316	■
5.0		10.0	10.0	8	60	0.20		2.CMC42.A2Z4.500.1	■
5.0		10.0	10.0	8	60	0.50		2.CMC42.A3Z4.500.1	■
5.560	**7/32**	11.1	11.1	10	60	0.381	.0150	2.CMC.RA2Z4.F732	■
5.560	**7/32**	11.1	11.1	10	60	0.762	.0300	2.CMC.RA3Z4.F732	■
6.0		12.0	12.0	10	60	0.20		2.CMC42.A2Z4.600.1	■
6.0		12.0	12.0	10	60	0.50		2.CMC42.A3Z4.600.1	■
6.0		12.0	12.0	10	60	1.00		2.CMC42.A4Z4.600.1	■
6.350	**1/4**	12.7	12.7	10	60	0.381	.0150	2.CMC.RA2Z4.F14	■
6.350	**1/4**	12.7	12.7	10	60	0.762	.0300	2.CMC.RA3Z4.F14	■
6.350	**1/4**	12.7	12.7	10	60	1.524	.0600	2.CMC.RA4Z4.F14	■
8.0		16.0	16.0	12	70	0.20		2.CMC42.A2Z4.800.1	■
8.0		16.0	16.0	12	70	0.50		2.CMC42.A3Z4.800.1	■
8.0		16.0	16.0	12	70	1.50		2.CMC42.A4Z4.800.1	■

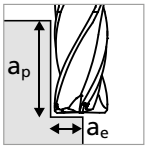
■ Stock item

CRAZYMILL by Mikron Tool Cool

Type A - Pre-machining

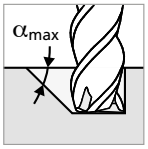
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Pre-machining

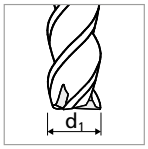


①
- $a_p = 1.5 \times d_1$
- $a_e = 0.3 \times d_1$

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	v_c	1.0 mm ① f_z	1.0 mm ② f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.011	0.013
		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	0.010	0.012
		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	0.008	0.009
		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	0.012	0.014
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.011	0.013
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.011	0.013
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.009	0.011
		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	0.008	0.010
		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	0.013	0.015
		3.4365	AlZnMgCu1.5	ASTM 7075			
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	160	0.013	0.015
		3.2381	GD-AlSi10Mg	UNS A03590			
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	160	0.013	0.015
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	160	0.013	0.015
		2.0360	CuZn40 CW509L	UNS C28000			
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	160	0.013	0.015
		2.1020	CuSn6	UNS C51900			
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	160	0.013	0.015
		2.0960	CuAl9Mn2	UNS C63200			
S_1	Super alloys	2.4856		Inconel 625	80	-	0.006
		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	0.01	0.012
		3.7065	Gr.4	ASTM B348 / F68			
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	100	0.01	0.012
		9.9367	TiAl6Nb7	ASTM F1295			
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	80	-	0.006
			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]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

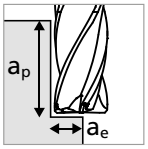
	Ød₁																				
	1.5 mm 1/16"			2.0 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			5.0 mm 3/16" - 7/32"			6.0 mm 1/4"			8.0 mm		
	v_c	f_z ①	f_z ②	v_c	f_z ①	f_z ②	v_c	f_z ①	f_z ②	v_c	f_z ①	f_z ②	v_c	f_z ①	f_z ②	v_c	f_z ①	f_z ②	v_c	f_z ①	f_z ②
	200	0.015	0.017	220	0.024	0.027	240	0.033	0.038	260	0.035	0.040	260	0.035	0.040	260	0.046	0.052	260	0.054	0.064
	200	0.013	0.015	220	0.022	0.025	240	0.031	0.035	260	0.033	0.038	260	0.033	0.038	260	0.044	0.050	260	0.052	0.060
	200	0.011	0.013	220	0.019	0.022	240	0.028	0.032	260	0.030	0.034	260	0.030	0.034	260	0.042	0.048	260	0.050	0.057
	180	0.014	0.016	180	0.021	0.024	200	0.030	0.034	220	0.033	0.038	220	0.033	0.038	220	0.040	0.045	260	0.048	0.055
	180	0.014	0.016	180	0.021	0.024	200	0.030	0.034	220	0.032	0.037	220	0.032	0.037	220	0.037	0.043	260	0.045	0.052
	180	0.014	0.016	180	0.021	0.024	200	0.030	0.034	220	0.032	0.037	220	0.032	0.037	220	0.037	0.043	260	0.045	0.052
	180	0.012	0.014	180	0.018	0.020	200	0.026	0.030	220	0.031	0.035	220	0.031	0.035	220	0.035	0.040	260	0.042	0.048
	160	0.014	0.016	200	0.019	0.022	220	0.030	0.034	240	0.042	0.048	240	0.042	0.048	240	0.044	0.050	240	0.052	0.057
	200	0.016	0.018	240	0.026	0.030	260	0.040	0.046	300	0.051	0.058	300	0.051	0.058	320	0.052	0.060	350	0.060	0.069
	220	0.016	0.018	240	0.026	0.030	260	0.040	0.046	300	0.051	0.058	300	0.051	0.058	320	0.052	0.060	350	0.060	0.069
	220	0.016	0.018	240	0.026	0.030	260	0.040	0.046	300	0.051	0.058	300	0.051	0.058	320	0.052	0.060	350	0.060	0.069
	220	0.016	0.018	240	0.026	0.030	260	0.040	0.046	300	0.051	0.058	300	0.051	0.058	320	0.052	0.060	350	0.060	0.069
	220	0.016	0.018	240	0.026	0.030	260	0.040	0.046	300	0.051	0.058	300	0.051	0.058	320	0.052	0.060	350	0.060	0.069
	220	0.016	0.018	240	0.026	0.030	260	0.040	0.046	300	0.051	0.058	300	0.051	0.058	320	0.052	0.060	350	0.060	0.069
	100	-	0.008	100	-	0.010	100	-	0.014	120	-	0.016	120	-	0.018	120	-	0.020	120	-	0.025
	100	0.012	0.014	110	0.017	0.020	110	0.028	0.032	130	0.031	0.035	130	0.031	0.035	130	0.032	0.037	140	0.035	0.040
	100	0.012	0.014	110	0.017	0.020	110	0.028	0.032	130	0.031	0.035	130	0.031	0.035	130	0.032	0.037	140	0.035	0.040
	100	-	0.008	100	-	0.010	100	-	0.014	120	-	0.016	120	-	0.018	120	-	0.020	120	-	0.025

CRAZYMILL by Mikron Tool Cool

Type A - Finishing

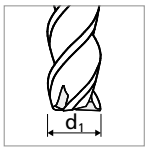
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

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	v_c	1.0 mm ① f_z	1.0 mm ② f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	130	0.008	0.009
		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	0.007	0.008
		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	0.006	0.007
		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	0.008	0.009
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	130	0.008	0.009
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	130	0.008	0.009
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	130	0.006	0.007
		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	0.006	0.007
		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	0.009	0.010
		3.4365	AlZnMgCu1.5	ASTM 7075			
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	130	0.009	0.010
		3.2381	GD-AlSi10Mg	UNS A03590			
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	130	0.010	0.012
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	130	0.010	0.012
		2.0360	CuZn40 CW509L	UNS C28000			
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	130	0.010	0.012
		2.1020	CuSn6	UNS C51900			
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	130	0.009	0.010
		2.0960	CuAl9Mn2	UNS C63200			
S_1	Super alloys	2.4856		Inconel 625	110	0.004	0.005
		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	0.008	0.009
		3.7065	Gr.4	ASTM B348 / F68			
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	110	0.008	0.009
		9.9367	TiAl6Nb7	ASTM F1295			
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	110	0.004	0.005
			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]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

	Ød1																				
	1.5 mm 1/16"			2.0 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			5.0 mm 3/16" - 7/32"			6.0 mm 1/4"			8.0 mm		
		①	②		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		v_c	f_z	
	180	0.012	0.014	200	0.017	0.020	210	0.023	0.026	220	0.025	0.029	220	0.028	0.032	220	0.033	0.038	220	0.038	0.044
	180	0.011	0.013	200	0.016	0.018	210	0.022	0.025	220	0.024	0.028	220	0.026	0.030	220	0.029	0.033	220	0.034	0.040
	180	0.010	0.012	200	0.015	0.017	210	0.020	0.023	220	0.021	0.024	220	0.023	0.026	220	0.025	0.029	220	0.030	0.035
	180	0.012	0.014	200	0.017	0.020	210	0.022	0.025	220	0.024	0.028	220	0.026	0.030	220	0.029	0.033	260	0.034	0.040
	180	0.011	0.013	200	0.016	0.018	210	0.022	0.025	220	0.023	0.027	220	0.025	0.029	220	0.028	0.032	260	0.033	0.038
	180	0.011	0.013	200	0.016	0.018	210	0.022	0.025	220	0.023	0.027	220	0.025	0.029	220	0.028	0.032	260	0.033	0.038
	180	0.008	0.009	200	0.015	0.017	210	0.020	0.023	220	0.022	0.025	220	0.024	0.028	220	0.026	0.030	260	0.032	0.037
	130	0.012	0.014	150	0.014	0.016	160	0.022	0.025	170	0.025	0.029	170	0.029	0.033	170	0.031	0.036	200	0.036	0.042
	180	0.013	0.015	200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	220	0.033	0.038	220	0.036	0.041	270	0.041	0.047
	180	0.013	0.015	200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	220	0.033	0.038	220	0.036	0.041	270	0.041	0.047
	180	0.013	0.015	200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	220	0.033	0.038	220	0.036	0.041	270	0.041	0.047
	180	0.013	0.015	200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	220	0.033	0.038	220	0.036	0.041	270	0.041	0.047
	180	0.013	0.015	200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	220	0.033	0.038	220	0.036	0.041	270	0.041	0.047
	180	0.013	0.015	200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	220	0.033	0.038	220	0.036	0.041	270	0.041	0.047
	120	0.005	0.006	130	0.005	0.006	130	0.008	0.009	140	0.010	0.012	140	0.011	0.013	150	0.012	0.014	160	0.017	0.020
	120	0.010	0.012	130	0.014	0.016	130	0.020	0.023	140	0.022	0.025	140	0.024	0.028	150	0.026	0.030	160	0.031	0.036
	120	0.010	0.012	130	0.014	0.016	130	0.020	0.023	140	0.022	0.025	140	0.024	0.028	150	0.026	0.030	160	0.031	0.036
	120	0.005	0.006	130	0.005	0.006	130	0.008	0.009	140	0.010	0.012	140	0.011	0.013	150	0.012	0.014	160	0.017	0.020

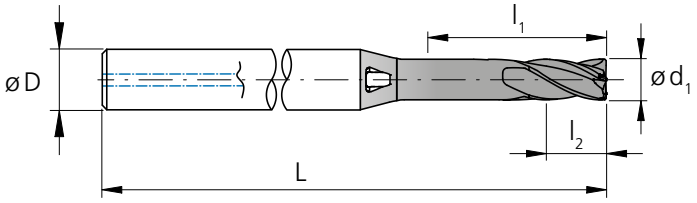
CRAZYMILL by Mikron Tool Cool

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

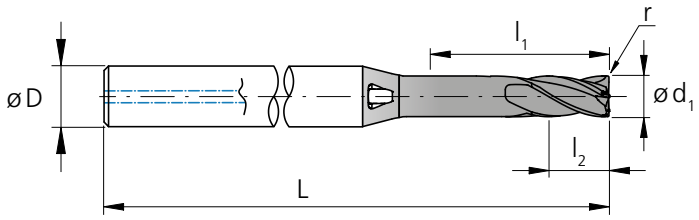
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.0		5.0	2.0	4	40	2.CMC42.C1Z4.100.1	■
1.2		6.0	2.4	4	40	2.CMC42.C1Z4.120.1	■
1.5		7.5	3.0	4	40	2.CMC42.C1Z4.150.1	■
1.587	**1/16**	7.9	3.1	4	45	2.CMC.SCZ4.F116	■
1.8		9.0	3.6	4	45	2.CMC42.C1Z4.180.1	■
2.0		10.0	4.0	4	44	2.CMC42.C1Z4.200.1	■
2.381	**3/32**	11.9	4.7	4	44	2.CMC.SCZ4.F332	■
2.5		12.5	5.0	6	55	2.CMC42.C1Z4.250.1	■
3.0		15.0	6.0	6	55	2.CMC42.C1Z4.300.1	■
3.175	**1/8**	15.9	6.4	6	60	2.CMC.SCZ4.F18	■
3.5		17.5	7.0	6	60	2.CMC42.C1Z4.350.1	■
3.968	**5/32**	19.8	7.9	6	60	2.CMC.SCZ4.F532	■
4.0		20.0	8.0	6	60	2.CMC42.C1Z4.400.1	■
4.5		22.5	9.0	8	70	2.CMC42.C1Z4.450.1	■
4.762	**3/16**	23.8	9.5	8	70	2.CMC.SCZ4.F316	■
5.0		25.0	10.0	8	70	2.CMC42.C1Z4.500.1	■
5.560	**7/32**	27.8	11.1	10	70	2.CMC.SCZ4.F732	■
6.0		30.0	12.0	10	70	2.CMC42.C1Z4.600.1	■
6.350	**1/4**	31.7	12.7	10	70	2.CMC.SCZ4.F14	■
8.0		40.0	16.0	12	90	2.CMC42.C1Z4.800.1	■

■ Stock item

Carbide | 5xd$_1$ | Z4 | 42° | eXedur SNP

Ø d$_1$	0.1 - 3.0 mm	3.1 - 6.0 mm	6.1 - 10.0 mm
Tolerance	- 0.014 mm - 0.028 mm	- 0.020 mm - 0.038 mm	- 0.025 mm - 0.047 mm

Corner radius



l$_1$ = Effective length
l$_2$ = Cutting length

d$_1$ [mm]	d$_1$ [inch]	l$_1$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
1.0		5.0	2.0	4	40	0.10		2.CMC42.C2Z4.100.1	■
1.0		5.0	2.0	4	40	0.20		2.CMC42.C3Z4.100.1	■
1.2		6.0	2.4	4	40	0.10		2.CMC42.C2Z4.120.1	■
1.2		6.0	2.4	4	40	0.20		2.CMC42.C3Z4.120.1	■
1.5		7.5	3.0	4	40	0.10		2.CMC42.C2Z4.150.1	■
1.5		7.5	3.0	4	40	0.30		2.CMC42.C3Z4.150.1	■
1.587	**1/16**	7.9	3.1	4	45	0.127	.0050	2.CMC.RC2Z4.F116	■
1.587	**1/16**	7.9	3.1	4	45	0.254	.0100	2.CMC.RC3Z4.F116	■
1.8		9.0	3.6	4	45	0.10		2.CMC42.C2Z4.180.1	■
1.8		9.0	3.6	4	45	0.30		2.CMC42.C3Z4.180.1	■
2.0		10.0	4.0	4	44	0.10		2.CMC42.C2Z4.200.1	■
2.0		10.0	4.0	4	44	0.20		2.CMC42.C3Z4.200.1	■
2.0		10.0	4.0	4	44	0.50		2.CMC42.C4Z4.200.1	■
2.381	**3/32**	11.9	4.7	4	44	0.127	.0050	2.CMC.RC2Z4.F332	■
2.381	**3/32**	11.9	4.7	4	44	0.254	.0100	2.CMC.RC3Z4.F332	■
2.381	**3/32**	11.9	4.7	4	44	0.381	.0150	2.CMC.RC4Z4.F332	■
2.5		12.5	5.0	6	55	0.20		2.CMC42.C2Z4.250.1	■
2.5		12.5	5.0	6	55	0.50		2.CMC42.C3Z4.250.1	■
3.0		15.0	6.0	6	55	0.20		2.CMC42.C2Z4.300.1	■
3.0		15.0	6.0	6	55	0.50		2.CMC42.C3Z4.300.1	■
3.175	**1/8**	15.9	6.4	6	60	0.254	.0100	2.CMC.RC2Z4.F18	■
3.175	**1/8**	15.9	6.4	6	60	0.381	.0150	2.CMC.RC3Z4.F18	■
3.5		17.5	7.0	6	60	0.20		2.CMC42.C2Z4.350.1	■
3.5		17.5	7.0	6	60	0.50		2.CMC42.C3Z4.350.1	■
3.968	**5/32**	19.8	7.9	6	60	0.254	.0100	2.CMC.RC2Z4.F532	■
3.968	**5/32**	19.8	7.9	6	60	0.381	.0150	2.CMC.RC3Z4.F532	■
4.0		20.0	8.0	6	60	0.20		2.CMC42.C2Z4.400.1	■
4.0		20.0	8.0	6	60	0.50		2.CMC42.C3Z4.400.1	■
4.5		22.5	9.0	8	70	0.20		2.CMC42.C2Z4.450.1	■
4.5		22.5	9.0	8	70	0.50		2.CMC42.C3Z4.450.1	■
4.762	**3/16**	23.8	9.5	8	70	0.254	.0100	2.CMC.RC2Z4.F316	■
4.762	**3/16**	23.8	9.5	8	70	0.381	.0150	2.CMC.RC3Z4.F316	■
5.0		25.0	10.0	8	70	0.20		2.CMC42.C2Z4.500.1	■
5.0		25.0	10.0	8	70	0.50		2.CMC42.C3Z4.500.1	■
5.560	**7/32**	27.8	11.1	10	70	0.381	.0150	2.CMC.RC2Z4.F732	■
5.560	**7/32**	27.8	11.1	10	70	0.762	.0300	2.CMC.RC3Z4.F732	■
6.0		30.0	12.0	10	70	0.20		2.CMC42.C2Z4.600.1	■
6.0		30.0	12.0	10	70	0.50		2.CMC42.C3Z4.600.1	■
6.0		30.0	12.0	10	70	1.00		2.CMC42.C4Z4.600.1	■
6.350	**1/4**	31.7	12.7	10	70	0.381	.0150	2.CMC.RC2Z4.F14	■
6.350	**1/4**	31.7	12.7	10	70	0.762	.0300	2.CMC.RC3Z4.F14	■
6.350	**1/4**	31.7	12.7	10	70	1.524	.0600	2.CMC.RC4Z4.F14	■
8.0		40.0	16.0	12	90	0.20		2.CMC42.C2Z4.800.1	■
8.0		40.0	16.0	12	90	0.50		2.CMC42.C3Z4.800.1	■
8.0		40.0	16.0	12	90	1.50		2.CMC42.C4Z4.800.1	■

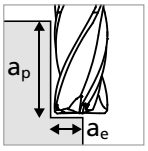
■ Stock item

CRAZYMILL by Mikron Tool Cool

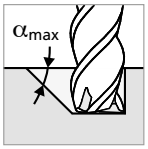
Type C - Pre-machining

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

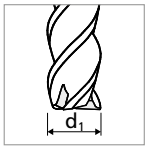
Pre-machining



- $a_p = 2 \times d_1$
- $a_e = 0.1 \times d_1$



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 v_c	1.0 mm f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	120	0.017
		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	0.016
		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	0.012
		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	0.018
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	120	0.017
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	120	0.017
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	120	0.013
		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	0.012
		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	0.020
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	170	0.020
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	170	0.022
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	170	0.022
		2.0360	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	170	0.022
		2.1020	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	170	0.020
		2.0960	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	100	0.008
		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	0.018
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	100	0.018
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	100	0.008
			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]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

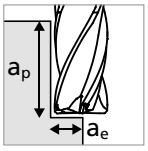
Ød1													
1.5 mm 1/16"		2.0 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"		8.0 mm	
v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
140	0.026	160	0.038	180	0.048	200	0.050	200	0.052	220	0.056	220	0.068
140	0.025	160	0.036	180	0.044	200	0.048	200	0.050	220	0.054	220	0.066
140	0.022	160	0.035	180	0.042	200	0.043	200	0.045	220	0.048	220	0.058
140	0.026	160	0.038	180	0.046	200	0.048	200	0.050	220	0.055	260	0.062
140	0.025	160	0.036	180	0.044	200	0.046	200	0.048	220	0.052	260	0.060
140	0.025	160	0.036	180	0.044	200	0.046	200	0.048	220	0.052	260	0.060
140	0.016	160	0.034	180	0.042	200	0.044	200	0.046	220	0.049	260	0.058
120	0.026	140	0.032	160	0.043	180	0.054	180	0.056	200	0.058	200	0.070
190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
100	0.010	120	0.012	120	0.016	140	0.018	140	0.020	160	0.022	160	0.024
100	0.022	120	0.032	120	0.042	140	0.044	140	0.046	160	0.048	160	0.054
100	0.022	120	0.032	120	0.042	140	0.044	140	0.046	160	0.048	160	0.054
100	0.010	120	0.012	120	0.016	140	0.018	140	0.020	160	0.022	160	0.024

CRAZYMILL by Mikron Tool Cool

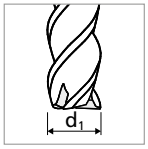
Type C - Finishing

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 v_c	1.0 mm f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	130	0.008
		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	0.007
		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	0.006
		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	0.008
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	130	0.008
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	130	0.008
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	130	0.006
		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	0.006
		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	0.009
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	130	0.009
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	130	0.010
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	130	0.010
		2.0360	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	130	0.010
		2.1020	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	130	0.009
		2.0960	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	110	0.004
		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	0.008
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	110	0.008
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	110	0.004
			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]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

Ød1 1.5 mm 1/16"		2.0 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"		8.0 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
180	0.012	200	0.017	210	0.023	220	0.025	220	0.028	220	0.033	220	0.042
180	0.011	200	0.016	210	0.022	220	0.024	220	0.026	220	0.029	220	0.038
180	0.010	200	0.015	210	0.020	220	0.021	220	0.023	220	0.025	220	0.034
180	0.012	200	0.017	210	0.022	220	0.024	220	0.026	220	0.029	260	0.036
180	0.011	200	0.016	210	0.022	220	0.023	220	0.025	220	0.028	260	0.037
180	0.011	200	0.016	210	0.022	220	0.023	220	0.025	220	0.028	260	0.037
180	0.008	200	0.015	210	0.020	220	0.022	220	0.024	220	0.026	260	0.035
130	0.012	150	0.014	160	0.022	170	0.025	170	0.029	170	0.031	200	0.040
180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
120	0.005	130	0.005	130	0.008	140	0.010	140	0.011	150	0.012	160	0.021
120	0.010	130	0.014	130	0.020	140	0.022	140	0.024	150	0.026	160	0.035
120	0.010	130	0.014	130	0.020	140	0.022	140	0.024	150	0.026	160	0.035
120	0.005	130	0.005	130	0.008	140	0.010	140	0.011	150	0.012	160	0.021

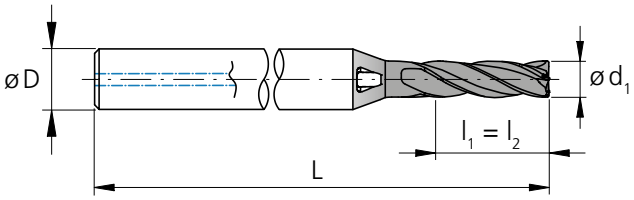
CRAZYMILL by Mikron Tool Cool

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

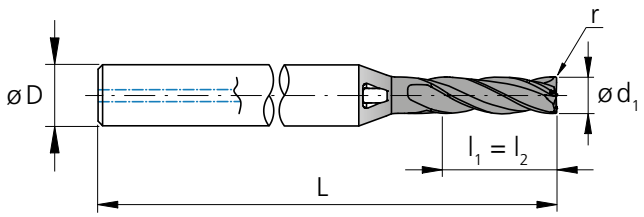
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.0		3.0	3.0	4	40	2.CMC42.M1Z4.100.1	■
1.2		3.6	3.6	4	40	2.CMC42.M1Z4.120.1	■
1.5		4.5	4.5	4	40	2.CMC42.M1Z4.150.1	■
1.587	**1/16**	4.7	4.7	4	40	2.CMC.SMZ4.F116	■
1.8		5.4	5.4	4	40	2.CMC42.M1Z4.180.1	■
2.0		6.0	6.0	4	40	2.CMC42.M1Z4.200.1	■
2.381	**3/32**	7.1	7.1	4	40	2.CMC.SMZ4.F332	■
2.5		7.5	7.5	6	50	2.CMC42.M1Z4.250.1	■
3.0		9.0	9.0	6	50	2.CMC42.M1Z4.300.1	■
3.175	**1/8**	9.5	9.5	6	55	2.CMC.SMZ4.F18	■
3.5		10.5	10.5	6	55	2.CMC42.M1Z4.350.1	■
3.968	**5/32**	11.9	11.9	6	55	2.CMC.SMZ4.F532	■
4.0		12.0	12.0	6	55	2.CMC42.M1Z4.400.1	■
4.5		13.5	13.5	8	65	2.CMC42.M1Z4.450.1	■
4.762	**3/16**	14.3	14.3	8	65	2.CMC.SMZ4.F316	■
5.0		15.0	15.0	8	65	2.CMC42.M1Z4.500.1	■
5.560	**7/32**	16.7	16.7	10	65	2.CMC.SMZ4.F732	■
6.0		18.0	18.0	10	65	2.CMC42.M1Z4.600.1	■
6.350	**1/4**	19.0	19.0	10	65	2.CMC.SMZ4.F14	■
8.0		24.0	24.0	12	80	2.CMC42.M1Z4.800.1	■

■ Stock item

Carbide | 3xd$_1$ | Z4 | 42° | eXedur SNP

Ø d$_1$	0.1 - 3.0 mm	3.1 - 6.0 mm	6.1 - 10.0 mm
Tolerance	- 0.014 mm - 0.028 mm	- 0.020 mm - 0.038 mm	- 0.025 mm - 0.047 mm

Corner radius



l$_1$ = Effective length
l$_2$ = Cutting length

d$_1$ [mm]	d$_1$ [inch]	l$_1$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
1.0		3.0	3.0	4	40	0.10		2.CMC42.M2Z4.100.1	■
1.0		3.0	3.0	4	40	0.20		2.CMC42.M3Z4.100.1	■
1.2		3.6	3.6	4	40	0.10		2.CMC42.M2Z4.120.1	■
1.2		3.6	3.6	4	40	0.20		2.CMC42.M3Z4.120.1	■
1.5		4.5	4.5	4	40	0.10		2.CMC42.M2Z4.150.1	■
1.5		4.5	4.5	4	40	0.30		2.CMC42.M3Z4.150.1	■
1.587	**1/16**	4.7	4.7	4	40	0.127	.0050	2.CMC.RM2Z4.F116	■
1.587	**1/16**	4.7	4.7	4	40	0.254	.0100	2.CMC.RM3Z4.F116	■
1.8		5.4	5.4	4	40	0.10		2.CMC42.M2Z4.180.1	■
1.8		5.4	5.4	4	40	0.30		2.CMC42.M3Z4.180.1	■
2.0		6.0	6.0	4	40	0.10		2.CMC42.M2Z4.200.1	■
2.0		6.0	6.0	4	40	0.20		2.CMC42.M3Z4.200.1	■
2.0		6.0	6.0	4	40	0.50		2.CMC42.M4Z4.200.1	■
2.381	**3/32**	7.1	7.1	4	40	0.127	.0050	2.CMC.RM2Z4.F332	■
2.381	**3/32**	7.1	7.1	4	40	0.254	.0100	2.CMC.RM3Z4.F332	■
2.381	**3/32**	7.1	7.1	4	40	0.381	.0150	2.CMC.RM4Z4.F332	■
2.5		7.5	7.5	6	50	0.20		2.CMC42.M2Z4.250.1	■
2.5		7.5	7.5	6	50	0.50		2.CMC42.M3Z4.250.1	■
3.0		9.0	9.0	6	50	0.20		2.CMC42.M2Z4.300.1	■
3.0		9.0	9.0	6	50	0.50		2.CMC42.M3Z4.300.1	■
3.175	**1/8**	9.5	9.5	6	55	0.254	.0100	2.CMC.RM2Z4.F18	■
3.175	**1/8**	9.5	9.5	6	55	0.381	.0150	2.CMC.RM3Z4.F18	■
3.5		10.5	10.5	6	55	0.20		2.CMC42.M2Z4.350.1	■
3.5		10.5	10.5	6	55	0.50		2.CMC42.M3Z4.350.1	■
3.968	**5/32**	11.9	11.9	6	55	0.254	.0100	2.CMC.RM2Z4.F532	■
3.968	**5/32**	11.9	11.9	6	55	0.381	.0150	2.CMC.RM3Z4.F532	■
4.0		12.0	12.0	6	55	0.20		2.CMC42.M2Z4.400.1	■
4.0		12.0	12.0	6	55	0.50		2.CMC42.M3Z4.400.1	■
4.5		13.5	13.5	8	65	0.20		2.CMC42.M2Z4.450.1	■
4.5		13.5	13.5	8	65	0.50		2.CMC42.M3Z4.450.1	■
4.762	**3/16**	14.3	14.3	8	65	0.254	.0100	2.CMC.RM2Z4.F316	■
4.762	**3/16**	14.3	14.3	8	65	0.381	.0150	2.CMC.RM3Z4.F316	■
5.0		15.0	15.0	8	65	0.20		2.CMC42.M2Z4.500.1	■
5.0		15.0	15.0	8	65	0.50		2.CMC42.M3Z4.500.1	■
5.560	**7/32**	16.7	16.7	10	65	0.381	.0150	2.CMC.RM2Z4.F732	■
5.560	**7/32**	16.7	16.7	10	65	0.762	.0300	2.CMC.RM3Z4.F732	■
6.0		18.0	18.0	10	65	0.20		2.CMC42.M2Z4.600.1	■
6.0		18.0	18.0	10	65	0.50		2.CMC42.M3Z4.600.1	■
6.0		18.0	18.0	10	65	1.00		2.CMC42.M4Z4.600.1	■
6.350	**1/4**	19.0	19.0	10	65	0.381	.0150	2.CMC.RM2Z4.F14	■
6.350	**1/4**	19.0	19.0	10	65	0.762	.0300	2.CMC.RM3Z4.F14	■
6.350	**1/4**	19.0	19.0	10	65	1.524	.0600	2.CMC.RM4Z4.F14	■
8.0		24.0	24.0	12	80	0.20		2.CMC42.M2Z4.800.1	■
8.0		24.0	24.0	12	80	0.50		2.CMC42.M3Z4.800.1	■
8.0		24.0	24.0	12	80	1.50		2.CMC42.M4Z4.800.1	■

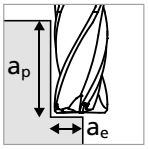
■ Stock item

CRAZYMILL by Mikron Tool Cool

Type M - Pre-machining

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

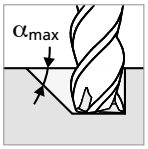
Pre-machining



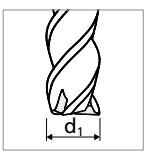
①
- $a_p = 1.5 \times d_1$
- $a_e = 0.2 \times d_1$

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 v_c	① f_z	② f_z	③ f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.011	0.015	0.020
		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	0.010	0.013	0.018
		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	0.008	0.011	0.015
		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	0.012	0.016	0.022
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.011	0.015	0.020
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.011	0.015	0.020
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.009	0.012	0.017
		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	0.010	0.016	0.022
		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	0.013	0.017	0.024
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	160	0.013	0.017	0.024
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	160	0.013	0.017	0.024
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	160	0.013	0.017	0.024
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	160	0.013	0.017	0.024
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	160	0.013	0.017	0.024
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	80	0.006	0.008	0.011
		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	0.010	0.013	0.018
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.010	0.013	0.018
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	80	0.006	0.008	0.011
			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]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

Ød₁

1.5 mm 1/16"				2.0 mm 3/32"				3.0 mm 1/8"				4.0 mm 5/32"				5.0 mm 3/16" - 7/32"				6.0 mm 1/4"				8.0 mm			
v_c	f_z ①	f_z ②	f_z ③	v_c	f_z ①	f_z ②	f_z ③	v_c	f_z ①	f_z ②	f_z ③	v_c	f_z ①	f_z ②	f_z ③	v_c	f_z ①	f_z ②	f_z ③	v_c	f_z ①	f_z ②	f_z ③	v_c	f_z ①	f_z ②	f_z ③
200	0.015	0.02	0.028	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
200	0.013	0.017	0.024	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
200	0.011	0.015	0.020	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
180	0.015	0.020	0.028	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
180	0.014	0.019	0.026	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
180	0.014	0.019	0.026	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
180	0.012	0.016	0.022	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
160	0.014	0.019	0.026	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
200	0.016	0.021	0.029	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
220	0.016	0.021	0.029	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
220	0.016	0.021	0.029	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
220	0.016	0.021	0.029	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
220	0.016	0.021	0.029	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
220	0.016	0.021	0.029	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
100	0.008	0.011	0.015	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
120	0.012	0.016	0.022	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
120	0.012	0.016	0.022	130	0.017	0.023	0.031	130	0.028	0.037	0.051	150	0.030	0.04	0.055	150	0.031	0.041	0.057	150	0.032	0.043	0.059	170	0.035	0.047	0.064
100	0.008	0.011	0.015	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

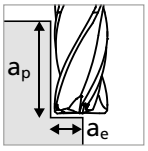
07

CRAZYMILL by Mikron Tool Cool

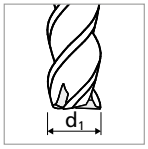
Type M - Finishing

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 v_c	1.0 mm f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	130	0.009
		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	0.008
		1.7131	16MnCr5	AISI 5115		
		1.3505	100Cr6	AIS1		
		1.7225	42CrMo4	AISI 4140		
		1.2842	90MnCrV8	AISI O2		
	High alloyed tool steel Rm < 1200 N/mm²	1.2379	X153CrMoV12	AISI D2	130	0.007
		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	0.009
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	130	0.009
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	130	0.009
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	130	0.007
		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	0.007
		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	0.010
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	130	0.010
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	130	0.012
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	130	0.012
		2.0360	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	130	0.012
		2.1020	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	130	0.010
		2.0960	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	110	0.005
		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	0.009
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	110	0.009
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	110	0.005
			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]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

	Ød1													
	1.5 mm 1/16"		2.0 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"		8.0 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
	180	0.014	200	0.020	210	0.026	220	0.029	220	0.032	220	0.038	220	0.044
	180	0.013	200	0.018	210	0.025	220	0.028	220	0.030	220	0.033	220	0.040
	180	0.012	200	0.017	210	0.023	220	0.024	220	0.026	220	0.029	220	0.035
	180	0.014	200	0.020	210	0.025	220	0.028	220	0.030	220	0.033	260	0.040
	180	0.013	200	0.018	210	0.025	220	0.027	220	0.029	220	0.032	260	0.038
	180	0.013	200	0.018	210	0.025	220	0.027	220	0.029	220	0.032	260	0.038
	180	0.009	200	0.017	210	0.023	220	0.025	220	0.028	220	0.030	260	0.037
	130	0.014	150	0.016	160	0.025	170	0.029	170	0.033	170	0.036	200	0.042
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	120	0.006	130	0.006	130	0.009	140	0.012	140	0.013	150	0.014	160	0.020
	120	0.012	130	0.016	130	0.023	140	0.025	140	0.028	150	0.030	160	0.036
	120	0.012	130	0.016	130	0.023	140	0.025	140	0.028	150	0.030	160	0.036
	120	0.006	130	0.006	130	0.009	140	0.012	140	0.013	150	0.014	160	0.020

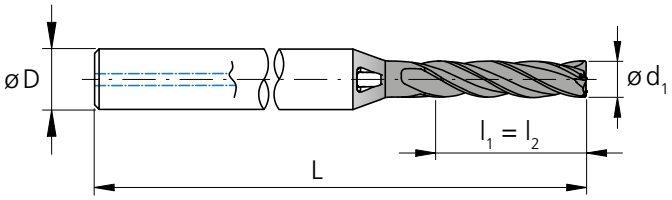
CRAZYMILL by Mikron Tool Cool

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

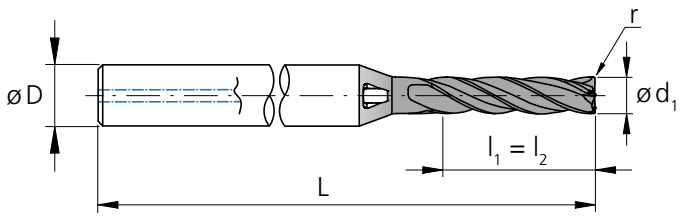
d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.0		4.0	4.0	4	40	2.CMC42.N1Z4.100.1	■
1.2		4.8	4.8	4	40	2.CMC42.N1Z4.120.1	■
1.5		6.0	6.0	4	40	2.CMC42.N1Z4.150.1	■
1.587	**1/16**	6.3	6.3	4	45	2.CMC.SNZ4.F116	■
1.8		7.2	7.2	4	45	2.CMC42.N1Z4.180.1	■
2.0		8.0	8.0	4	44	2.CMC42.N1Z4.200.1	■
2.381	**3/32**	9.5	9.5	4	44	2.CMC.SNZ4.F332	■
2.5		10.0	10.0	6	55	2.CMC42.N1Z4.250.1	■
3.0		12.0	12.0	6	55	2.CMC42.N1Z4.300.1	■
3.175	**1/8**	12.7	12.7	6	60	2.CMC.SNZ4.F18	■
3.5		14.0	14.0	6	60	2.CMC42.N1Z4.350.1	■
3.968	**5/32**	15.9	15.9	6	60	2.CMC.SNZ4.F532	■
4.0		16.0	16.0	6	60	2.CMC42.N1Z4.400.1	■
4.5		18.0	18.0	8	70	2.CMC42.N1Z4.450.1	■
4.762	**3/16**	19.0	19.0	8	70	2.CMC.SNZ4.F316	■
5.0		20.0	20.0	8	70	2.CMC42.N1Z4.500.1	■
5.560	**7/32**	22.2	22.2	10	70	2.CMC.SNZ4.F732	■
6.0		24.0	24.0	10	70	2.CMC42.N1Z4.600.1	■
6.350	**1/4**	25.4	25.4	10	70	2.CMC.SNZ4.F14	■
8.0		32.0	32.0	12	90	2.CMC42.N1Z4.800.1	■

■ Stock item

Carbide | 4xd$_1$ | Z4 | 42° | eXedur SNP | a_p | a_e

Ø d$_1$	0.1 - 3.0 mm	3.1 - 6.0 mm	6.1 - 10.0 mm
Tolerance	- 0.014 mm - 0.028 mm	- 0.020 mm - 0.038 mm	- 0.025 mm - 0.047 mm

Corner radius



l$_1$ = Effective length
l$_2$ = Cutting length

d$_1$ [mm]	d$_1$ [inch]	l$_1$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
1.0		4.0	4.0	4	40	0.10		2.CMC42.N2Z4.100.1	■
1.0		4.0	4.0	4	40	0.20		2.CMC42.N3Z4.100.1	■
1.2		4.8	4.8	4	40	0.10		2.CMC42.N2Z4.120.1	■
1.2		4.8	4.8	4	40	0.20		2.CMC42.N3Z4.120.1	■
1.5		6.0	6.0	4	40	0.10		2.CMC42.N2Z4.150.1	■
1.5		6.0	6.0	4	40	0.30		2.CMC42.N3Z4.150.1	■
1.587	**1/16**	6.3	6.3	4	45	0.127	.0050	2.CMC.RN2Z4.F116	■
1.587	**1/16**	6.3	6.3	4	45	0.254	.0100	2.CMC.RN3Z4.F116	■
1.8		7.2	7.2	4	45	0.10		2.CMC42.N2Z4.180.1	■
1.8		7.2	7.2	4	45	0.30		2.CMC42.N3Z4.180.1	■
2.0		8.0	8.0	4	44	0.10		2.CMC42.N2Z4.200.1	■
2.0		8.0	8.0	4	44	0.20		2.CMC42.N3Z4.200.1	■
2.0		8.0	8.0	4	44	0.50		2.CMC42.N4Z4.200.1	■
2.381	**3/32**	9.5	9.5	4	44	0.127	.0050	2.CMC.RN2Z4.F332	■
2.381	**3/32**	9.5	9.5	4	44	0.254	.0100	2.CMC.RN3Z4.F332	■
2.381	**3/32**	9.5	9.5	4	44	0.381	.0150	2.CMC.RN4Z4.F332	■
2.5		10.0	10.0	6	55	0.20		2.CMC42.N2Z4.250.1	■
2.5		10.0	10.0	6	55	0.50		2.CMC42.N3Z4.250.1	■
3.0		12.0	12.0	6	55	0.20		2.CMC42.N2Z4.300.1	■
3.0		12.0	12.0	6	55	0.50		2.CMC42.N3Z4.300.1	■
3.175	**1/8**	12.7	12.7	6	60	0.254	.0100	2.CMC.RN2Z4.F18	■
3.175	**1/8**	12.7	12.7	6	60	0.381	.0150	2.CMC.RN3Z4.F18	■
3.5		14.0	14.0	6	60	0.20		2.CMC42.N2Z4.350.1	■
3.5		14.0	14.0	6	60	0.50		2.CMC42.N3Z4.350.1	■
3.968	**5/32**	15.9	15.9	6	60	0.254	.0100	2.CMC.RN2Z4.F532	■
3.968	**5/32**	15.9	15.9	6	60	0.381	.0150	2.CMC.RN3Z4.F532	■
4.0		16.0	16.0	6	60	0.20		2.CMC42.N2Z4.400.1	■
4.0		16.0	16.0	6	60	0.50		2.CMC42.N3Z4.400.1	■
4.5		18.0	18.0	8	70	0.20		2.CMC42.N2Z4.450.1	■
4.5		18.0	18.0	8	70	0.50		2.CMC42.N3Z4.450.1	■
4.762	**3/16**	19.0	19.0	8	70	0.254	.0100	2.CMC.RN2Z4.F316	■
4.762	**3/16**	19.0	19.0	8	70	0.381	.0150	2.CMC.RN3Z4.F316	■
5.0		20.0	20.0	8	70	0.20		2.CMC42.N2Z4.500.1	■
5.0		20.0	20.0	8	70	0.50		2.CMC42.N3Z4.500.1	■
5.560	**7/32**	22.2	22.2	10	70	0.381	.0150	2.CMC.RN2Z4.F732	■
5.560	**7/32**	22.2	22.2	10	70	0.762	.0300	2.CMC.RN3Z4.F732	■
6.0		24.0	24.0	10	70	0.20		2.CMC42.N2Z4.600.1	■
6.0		24.0	24.0	10	70	0.50		2.CMC42.N3Z4.600.1	■
6.0		24.0	24.0	10	70	1.00		2.CMC42.N4Z4.600.1	■
6.350	**1/4**	25.4	25.4	10	70	0.381	.0150	2.CMC.RN2Z4.F14	■
6.350	**1/4**	25.4	25.4	10	70	0.762	.0300	2.CMC.RN3Z4.F14	■
6.350	**1/4**	25.4	25.4	10	70	1.524	.0600	2.CMC.RN4Z4.F14	■
8.0		32.0	32.0	12	90	0.20		2.CMC42.N2Z4.800.1	■
8.0		32.0	32.0	12	90	0.50		2.CMC42.N3Z4.800.1	■
8.0		32.0	32.0	12	90	1.50		2.CMC42.N4Z4.800.1	■

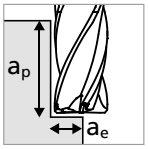
■ Stock item

CRAZYMILL by Mikron Tool Cool

Type N - Pre-machining

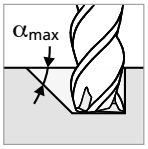
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Pre-machining

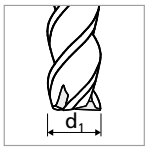


①
- $a_p = 2 \times d_1$
- $a_e = 0.1 \times d_1$

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	v_c	1.0 mm ① f_z	1.0 mm ② f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.011	0.008
		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	0.010	0.007
		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	0.008	0.006
		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	0.012	0.008
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.011	0.008
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.011	0.008
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.009	0.006
		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	0.010	0.006
		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	0.013	0.009
		3.4365	AlZnMgCu1.5	ASTM 7075			
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	160	0.013	0.009
		3.2381	GD-AlSi10Mg	UNS A03590			
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	160	0.013	0.010
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	160	0.013	0.010
		2.0360	CuZn40 CW509L	UNS C28000			
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	160	0.013	0.010
		2.1020	CuSn6	UNS C51900			
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	160	0.013	0.009
		2.0960	CuAl9Mn2	UNS C63200			
S_1	Super alloys	2.4856		Inconel 625	100	0.006	0.004
		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	0.010	0.008
		3.7065	Gr.4	ASTM B348 / F68			
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.010	0.008
		9.9367	TiAl6Nb7	ASTM F1295			
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	100	0.006	0.004
			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]
f_z [mm]

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

P ●	N ●	S3 ●
M ●	S1 ●	H1 ⊠
K ●	S2 ●	H2 ⊠

07

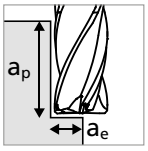
	Ød1																				
	1.5 mm 1/16"			2.0 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			5.0 mm 3/16" - 7/32"			6.0 mm 1/4"			8.0 mm		
		①	②		①	②		①	②		①	②		①	②		①	②		①	②
	v_c	f_z		v_c	f_z		v_c	f_z		v_c	f_z		v_c	f_z		v_c	f_z		v_c	f_z	
	200	0.015	0.012	220	0.024	0.017	240	0.033	0.020	260	0.034	0.025	260	0.035	0.028	260	0.046	0.029	260	0.054	0.033
	200	0.013	0.011	220	0.022	0.016	240	0.031	0.019	260	0.032	0.024	260	0.033	0.026	260	0.044	0.028	260	0.052	0.031
	200	0.011	0.010	220	0.019	0.015	240	0.028	0.018	260	0.029	0.022	260	0.030	0.024	260	0.042	0.026	260	0.050	0.029
	180	0.015	0.012	180	0.021	0.017	200	0.030	0.020	220	0.032	0.024	220	0.033	0.026	220	0.040	0.028	260	0.048	0.031
	180	0.014	0.011	180	0.020	0.016	200	0.028	0.018	220	0.031	0.023	220	0.032	0.025	220	0.037	0.027	260	0.045	0.030
	180	0.014	0.011	180	0.020	0.016	200	0.028	0.018	220	0.031	0.023	220	0.032	0.025	220	0.037	0.027	260	0.045	0.030
	180	0.012	0.008	180	0.018	0.015	200	0.026	0.017	220	0.030	0.022	220	0.031	0.024	220	0.035	0.026	260	0.042	0.029
	160	0.014	0.012	200	0.024	0.014	220	0.032	0.021	240	0.038	0.026	240	0.042	0.029	240	0.044	0.030	240	0.052	0.034
	200	0.016	0.013	240	0.026	0.018	260	0.040	0.029	300	0.048	0.028	300	0.051	0.030	320	0.052	0.032	350	0.060	0.036
	220	0.016	0.013	240	0.026	0.018	260	0.040	0.029	300	0.048	0.028	300	0.051	0.030	320	0.052	0.032	350	0.060	0.036
	220	0.016	0.013	240	0.026	0.018	260	0.040	0.029	300	0.048	0.028	300	0.051	0.030	320	0.052	0.032	350	0.060	0.036
	220	0.016	0.013	240	0.026	0.018	260	0.040	0.029	300	0.048	0.028	300	0.051	0.030	320	0.052	0.032	350	0.060	0.036
	220	0.016	0.013	240	0.026	0.018	260	0.040	0.029	300	0.048	0.028	300	0.051	0.030	320	0.052	0.032	350	0.060	0.036
	220	0.016	0.013	240	0.026	0.018	260	0.040	0.029	300	0.048	0.028	300	0.051	0.030	320	0.052	0.032	350	0.060	0.036
	100	0.008	0.005	100	0.010	0.005	100	0.014	0.008	120	0.016	0.010	120	0.018	0.011	120	0.020	0.012	120	0.025	0.013
	120	0.012	0.010	130	0.017	0.014	130	0.028	0.017	150	0.030	0.021	150	0.031	0.023	150	0.032	0.025	170	0.035	0.027
	120	0.012	0.010	130	0.017	0.014	130	0.028	0.017	150	0.030	0.021	150	0.031	0.023	150	0.032	0.025	170	0.035	0.027
	100	0.008	0.005	100	0.010	0.005	100	0.014	0.008	120	0.016	0.010	120	0.018	0.011	120	0.020	0.012	120	0.025	0.013

CRAZYMILL by Mikron Tool Cool

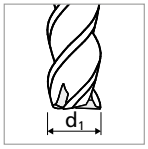
Type N - Finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Finishing



- $a_p = 4 \times d_1$
- $a_e = 0.02 \times d_1$

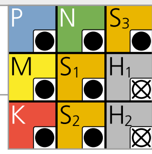


Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm v_c	1.0 mm f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	130	0.009
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	130	0.008
		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	0.007
		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	0.009
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	130	0.009
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	130	0.009
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	130	0.007
		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	0.007
		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	0.010
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	130	0.010
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	130	0.012
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	130	0.012
		2.0360	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	130	0.012
		2.1020	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	130	0.010
		2.0960	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	110	0.005
		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	0.009
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	110	0.009
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	110	0.005
			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		

CRAZYMILL Cool by Mikron Tool

v_c [m/min]
f_z [mm]

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



07

	Ød1 1.5 mm 1/16"		2.0 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"		8.0 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
	180	0.014	200	0.020	210	0.026	220	0.029	220	0.032	220	0.038	220	0.044
	180	0.013	200	0.018	210	0.025	220	0.028	220	0.030	220	0.033	220	0.040
	180	0.012	200	0.017	210	0.023	220	0.024	220	0.026	220	0.029	220	0.035
	180	0.014	200	0.020	210	0.025	220	0.028	220	0.030	220	0.033	260	0.040
	180	0.013	200	0.018	210	0.025	220	0.027	220	0.029	220	0.032	260	0.038
	180	0.013	200	0.018	210	0.025	220	0.027	220	0.029	220	0.032	260	0.038
	180	0.009	200	0.017	210	0.023	220	0.025	220	0.028	220	0.030	260	0.037
	130	0.014	150	0.016	160	0.025	170	0.029	170	0.033	170	0.036	200	0.042
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	180	0.015	200	0.021	210	0.033	220	0.035	220	0.038	220	0.041	270	0.047
	120	0.006	130	0.006	130	0.009	140	0.012	140	0.013	150	0.014	160	0.020
	120	0.012	130	0.016	130	0.023	140	0.025	140	0.028	150	0.030	160	0.036
	120	0.012	130	0.016	130	0.023	140	0.025	140	0.028	150	0.030	160	0.036
	120	0.006	130	0.006	130	0.009	140	0.012	140	0.013	150	0.014	160	0.020

Process CrazyMill Cool Square / Corner radius - Z4

ACCURATE AND EFFICIENT MILLING

Coolant type, pressure and filtration

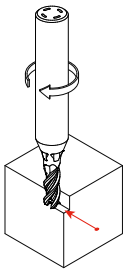
Coolant: for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

Filter: the large cooling channels permit the use of a standard filter with filter quality of ≤ 0.05 mm.

Coolant pressure: at least 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

Climb milling and conventional milling

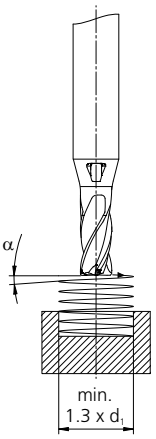


Mikron tool recommends climb milling for the machining of side and pocket milling. The chip thickness here is greater at the beginning and decreases continuously; the cutting forces remain low. With conventional milling, however, high cutting forces would push the milling tool away from the part.Thus surface quality decreases.

MILLING PROCESS

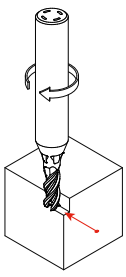
Maximum ramp angles in linear ramping or helical interpolation (calculated on the endmill center)

	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

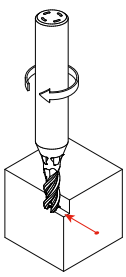


Recommended cutting parameters

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 a_e = 0.3 x d	a_p = 1.5 x d a_e = 0.2 x d	a_p = 2 x d a_e = 0.1 x d	a_p = 2 x d a_e = 0.1 x d
②	a_p = 2 x d a_e = 0.2 x d	a_p = 3 x d a_e = 0.1 x d	a_p = 4 x d a_e = 0.05 x d	-
③	-	a_p = 3 x d a_e = 0.05 x d	-	-

Finishing

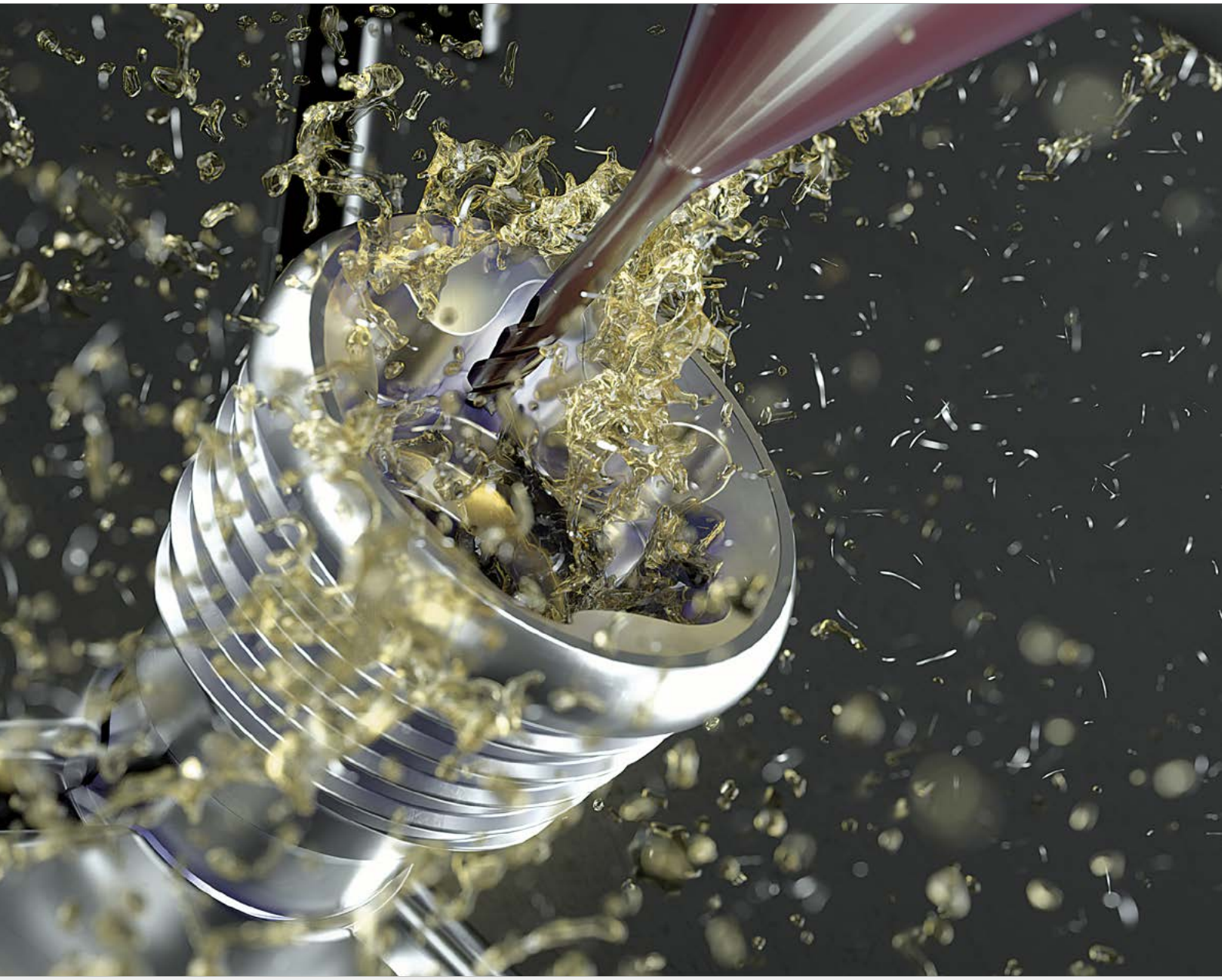


Recommended cutting parameters

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 a_e = 0.04 x d	a_p = 3 x d a_e = 0.02 x d	a_p = 4 x d a_e = 0.02 x d	a_p = 2 x d a_e = 0.02 x d
②	a_p = 2 x d a_e = 0.02 x d	-	-	-

NEW CrazyMill Hexalobe



NEW

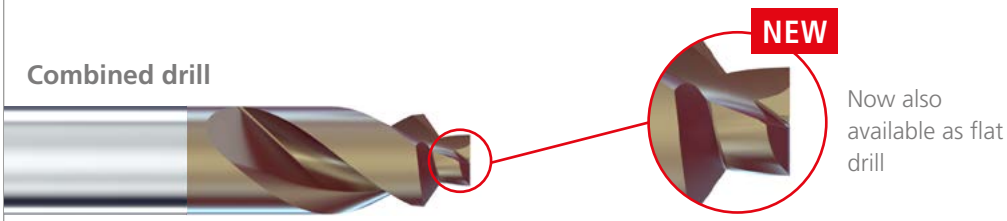
THE NEW CONCEPT FOR MACHINING YOUR TORX® SOCKET

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.

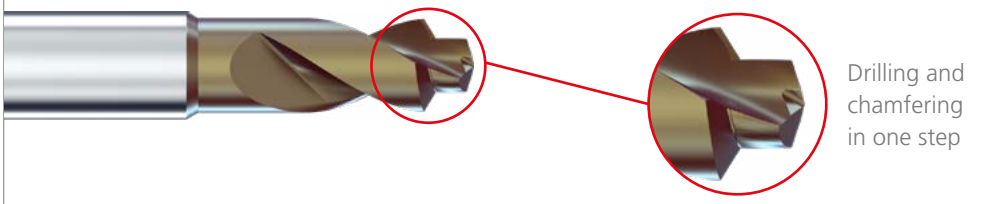
CRAZYDRILL Hexalobe FLAT

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

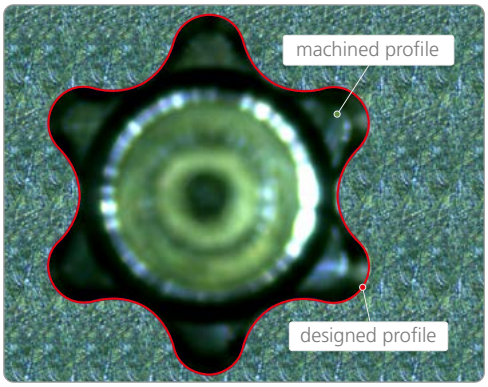
TURNKEY SOLUTION FOR TITANIUM, STAINLESS STEEL AND COBALT CHROME

Material

Titanium	Stainless Steel	Cobalt chrome
S2	M	S3
Ti Gr.5 ELI TiAl6V4 ELI 3.7165	316 LM X2CrNiMo18-15-3 1.4441	ASTM F1537 CrCoMo28 ISO 5832-12

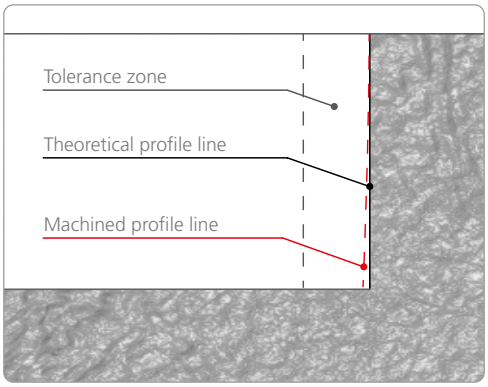
Shape precision

Nearly perfect profile



Perfect profile matching.

Perpendicularity



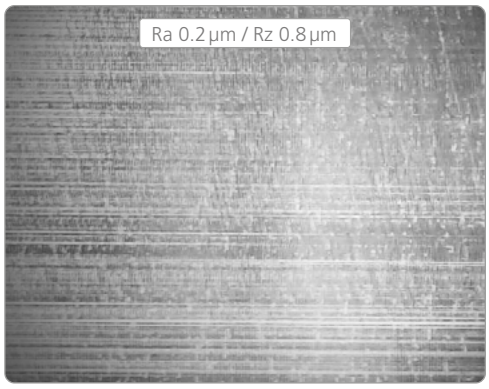
Guaranteed profile geometry.

NEW

07

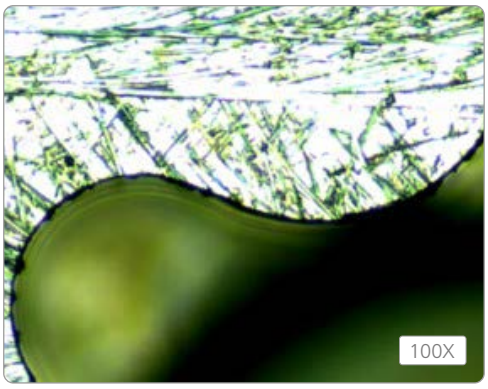
Quality and performance

Surface quality



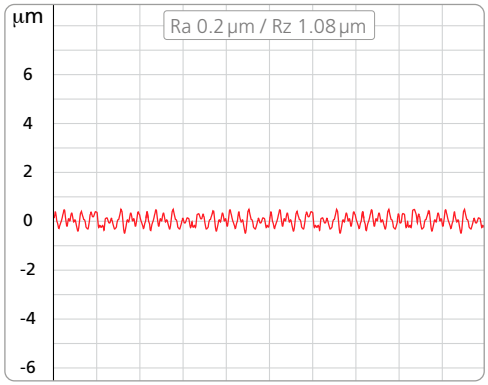
Excellent surface quality.*

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.*

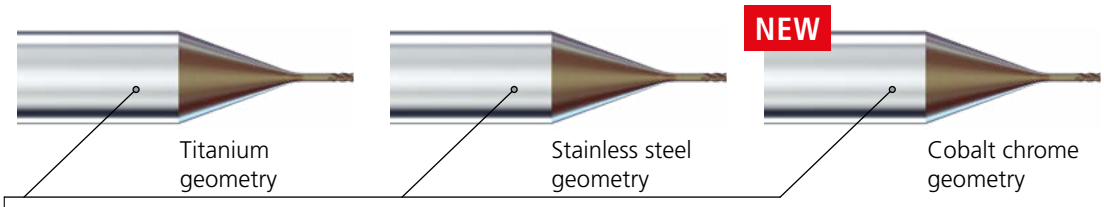
Note *: The quality and cycle time depends on cutting parameters and machine conditions.

NEW High efficient milling hexalobular socket

THE MICRO ENDMILL

CrazyMill Hexalobe

The new endmill for TORX® socket machining

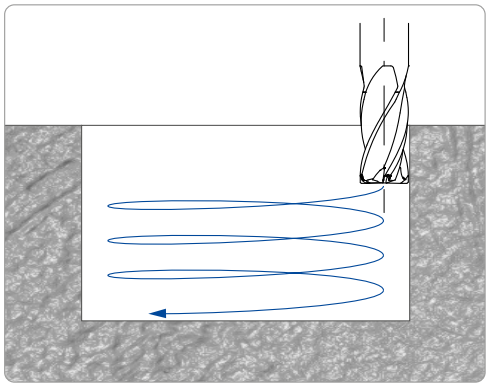


Performance

■ 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

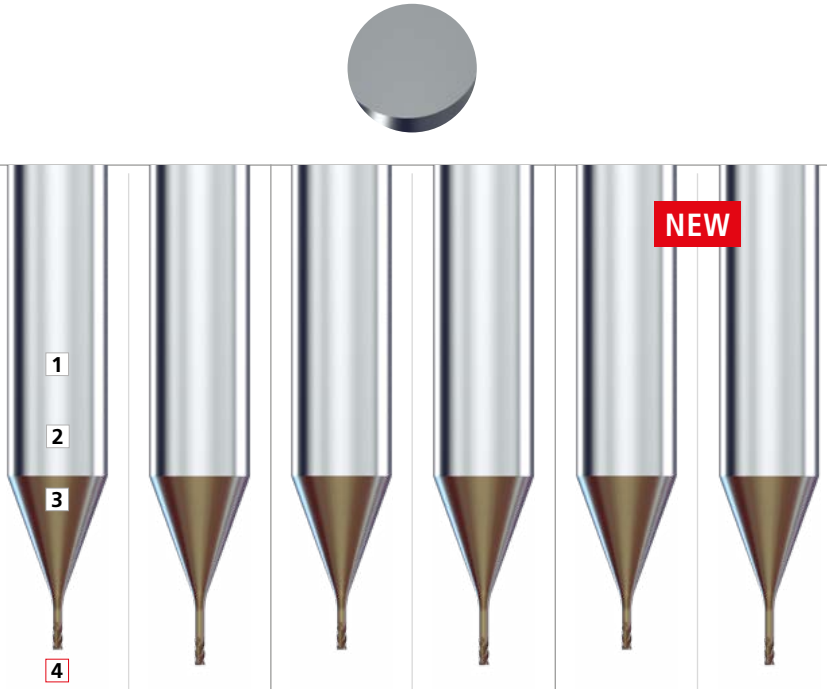
Cr

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



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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.

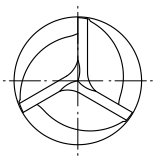
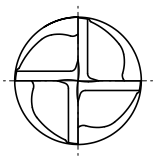
3 | NEW COATING
The high-performance coating eXedur SNP is heat and wear resistant, prevents buildup edges and guarantees optimum chip flushing. The result is a long tool life.

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	4 Flutes
	
Diameter range Ø 0.2 - 0.3 mm	Diameter range Ø 0.4 - 1.0 mm

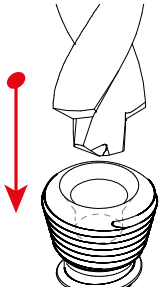
NEW Machining process

HELICAL INTERPOLATION FOR TITANIUM

Ti
S2

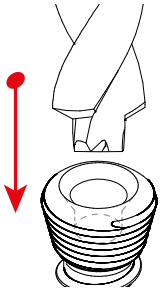
Step 1

Pre-hole drilling with 120° chamfer



140° tip angle

or

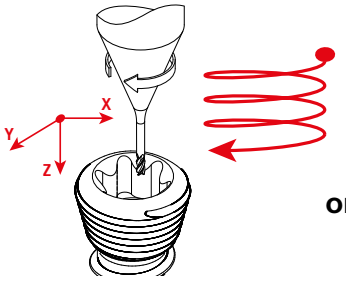


180° tip angle

Step 2

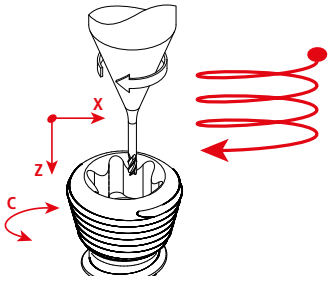
Helical interpolation XYZ

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



or

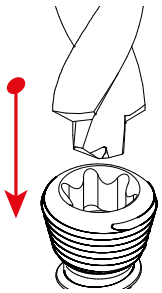
Helical interpolation XCZ



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

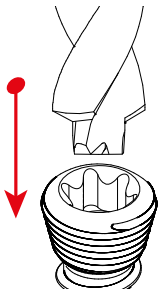
Step 3

Deburring



140° tip angle

or



180° tip angle

Repeat chamfering to clean the burrs.

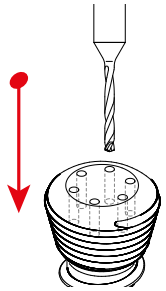
Titanium: Helical interpolation is the optimum process, ssaving up to 20% of cycle time in comparison to side milling process (see page 180).

LOBE DRILLING AND HELICAL INTERPOLATION FOR STAINLESS STEEL AND COBALT CHROME

Step 1

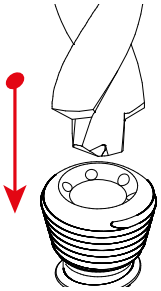
Lobe drilling

SST M | CoCr S3



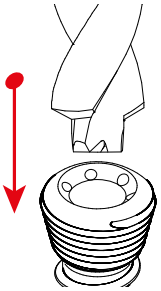
Step 2

Pre-hole drilling with 120° chamfer



140° tip angle

or

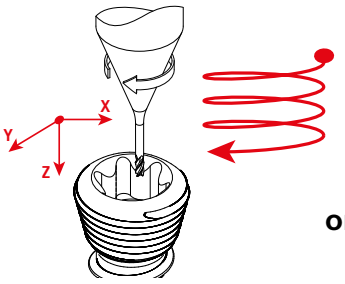


180° tip angle

Step 3

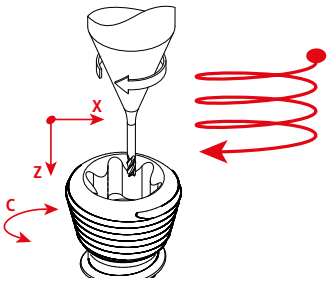
Helical interpolation XYZ

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



or

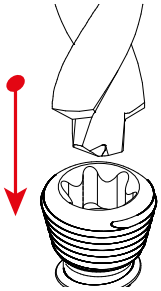
Helical interpolation XCZ



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

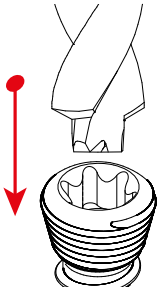
Step 4

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).

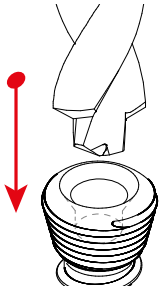
NEW Machining process

SIDE MILLING FOR TITANIUM AND STAINLESS STEEL

Ti S2 | SST M

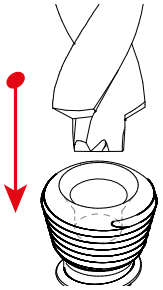
Step 1

Pre-hole drilling with 120° chamfer



140° tip angle

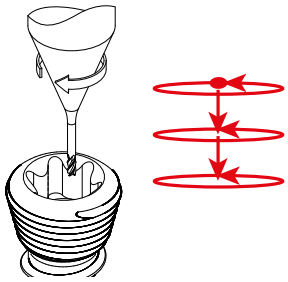
or



180° tip angle

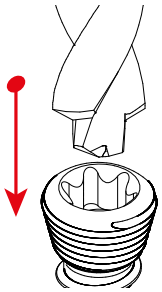
Step 2

Side milling



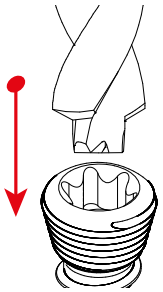
Step 3

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.

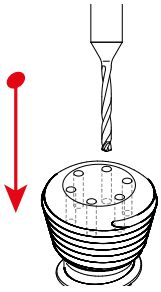
Stainless steel: With helical iterpolation, drilling of the lobes is required (see page 179). Result: longer tool life, better dimensional control of the TORX® shape and a more stable process in comparison to side milling process.

LOBE DRILLING AND SIDE MILLING FOR COBALT CHROME

CoCr
S3

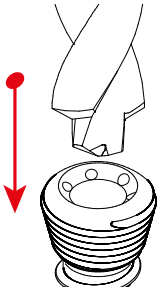
Step 1

Lobe drilling



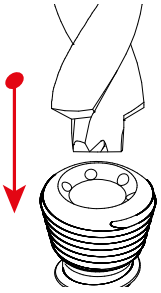
Step 2

Pre-hole drilling with 120° chamfer



140° tip angle

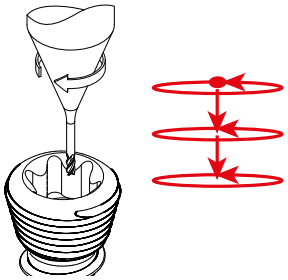
or



180° tip angle

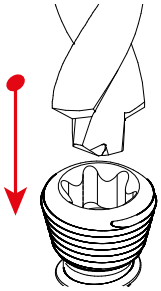
Step 3

Side milling



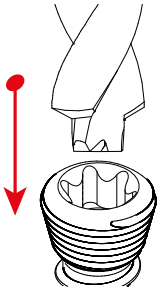
Step 4

Deburring



140° tip angle

or



180° tip angle

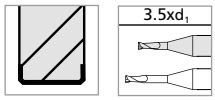
Repeat chamfering to clean the burrs.

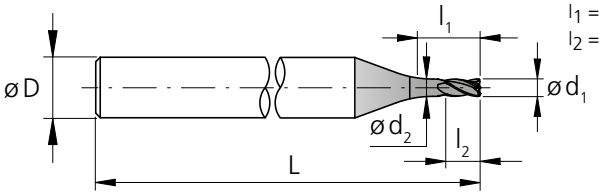
Cobalt chrome: Helical interpolation is the optimum process (see page 179), saving up to 20% of cycle time in comparison to side milling process.

CrazyMill Hexalobe

MILLING WITH EXTERNAL COOLING

Short version





l_1 = Effective length
l_2 = Cutting length

SST M | Ti S2

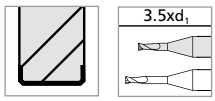
TORX® type	d_1 0/-0.01 [mm]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [mm]	Z [Teeth]	Item number **Titanium**	Item number **SST-Inox**	Availability
T4	0.20	0.70	0.30	0.19	4	40	3	2.CMT35.B1Z3.020.1	2.CMI35.B1Z3.020.1	■
T5	0.25	0.875	0.40	0.23	4	40	3	2.CMT35.B1Z3.025.1	2.CMI35.B1Z3.025.1	■
T6 / T7	0.30	1.05	0.45	0.28	4	40	3	2.CMT35.B1Z3.030.1	2.CMI35.B1Z3.030.1	■
T8 / T10	0.40	1.40	0.60	0.38	4	40	4	2.CMT35.B1Z4.040.1	2.CMI35.B1Z4.040.1	■
T10 / T15	0.50	1.75	0.75	0.47	4	40	4	2.CMT35.B1Z4.050.1	2.CMI35.B1Z4.050.1	■
T20	0.60	2.10	0.90	0.56	4	40	4	2.CMT35.B1Z4.060.1	2.CMI35.B1Z4.060.1	■
T25	0.80	2.80	1.20	0.75	4	40	4	2.CMT35.B1Z4.080.1	2.CMI35.B1Z4.080.1	■
T30	1.00	3.50	1.50	0.94	4	40	4	2.CMT35.B1Z4.100.1	2.CMI35.B1Z4.100.1	■

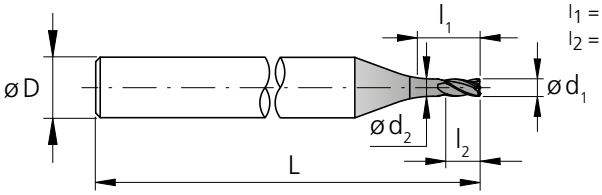
■ Stock item

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/-0.01 [mm]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [mm]	Z [Teeth]	Item number **Cobalt - Chrome**	Availability
T4	0.20	0.70	0.30	0.19	4	40	3	2.CMR35.B1Z3.020.1	■
T5	0.25	0.875	0.40	0.23	4	40	3	2.CMR35.B1Z3.025.1	■
T6 / T7	0.30	1.05	0.45	0.28	4	40	3	2.CMR35.B1Z3.030.1	■
T8 / T10	0.40	1.40	0.60	0.38	4	40	4	2.CMR35.B1Z4.040.1	■
T10 / T15	0.50	1.75	0.75	0.47	4	40	4	2.CMR35.B1Z4.050.1	■
T20	0.60	2.10	0.90	0.56	4	40	4	2.CMR35.B1Z4.060.1	■
T25	0.80	2.80	1.20	0.75	4	40	4	2.CMR35.B1Z4.080.1	■
T30	1.00	3.50	1.50	0.94	4	40	4	2.CMR35.B1Z4.100.1	■

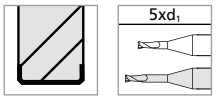
■ Stock item

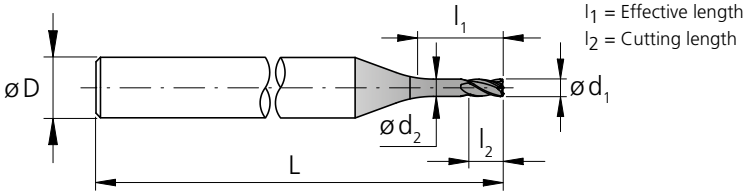
Complementary products	
CrazyDrill Hexalobe	p.182
CrazyDrill Hexalobe Flat	p.183

Carbide	Z 3-4	35°	eXedur SNP

Ød$_1$	0.2 - 1.0 mm
Tolerance	0 - 0.01 mm

Long version





SST M | Ti S2

TORX® type	d$_1$ 0/-0.01 [mm]	l$_1$ [mm]	l$_2$ [mm]	d$_2$ [mm]	D (h6) [mm]	L [mm]	Z [Teeth]	Item number **Titanium**	Item number **SST-Inox**	Availability
T4	0.20	1.00	0.30	0.19	4	40	3	2.CMT35.C1Z3.020.1	2.CMI35.C1Z3.020.1	■
T5	0.25	1.25	0.40	0.23	4	40	3	2.CMT35.C1Z3.025.1	2.CMI35.C1Z3.025.1	■
T6 / T7	0.30	1.50	0.45	0.28	4	40	3	2.CMT35.C1Z3.030.1	2.CMI35.C1Z3.030.1	■
T8 / T10	0.40	2.00	0.60	0.38	4	40	4	2.CMT35.C1Z4.040.1	2.CMI35.C1Z4.040.1	■
T10 / T15	0.50	2.50	0.75	0.47	4	40	4	2.CMT35.C1Z4.050.1	2.CMI35.C1Z4.050.1	■
T20	0.60	3.00	0.90	0.56	4	40	4	2.CMT35.C1Z4.060.1	2.CMI35.C1Z4.060.1	■
T25	0.80	4.00	1.20	0.75	4	40	4	2.CMT35.C1Z4.080.1	2.CMI35.C1Z4.080.1	■
T30	1.00	5.00	1.50	0.94	4	40	4	2.CMT35.C1Z4.100.1	2.CMI35.C1Z4.100.1	■

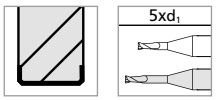
■ Stock item

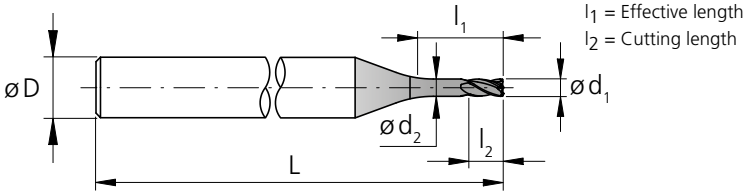
Complementary products

CrazyDrill Hexalobe p.182
CrazyDrill Hexalobe Flat p.183

NEW

Long version





CoCr S3

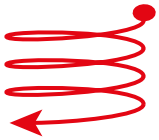
TORX® type	d$_1$ 0/-0.01 [mm]	l$_1$ [mm]	l$_2$ [mm]	d$_2$ [mm]	D (h6) [mm]	L [mm]	Z [Teeth]	Item number **Cobalt - Chrome**	Availability
T4	0.20	1.00	0.30	0.19	4	40	3	2.CMR35.C1Z3.020.1	■
T5	0.25	1.25	0.40	0.23	4	40	3	2.CMR35.C1Z3.025.1	■
T6 / T7	0.30	1.50	0.45	0.28	4	40	3	2.CMR35.C1Z3.030.1	■
T8 / T10	0.40	2.00	0.60	0.38	4	40	4	2.CMR35.C1Z4.040.1	■
T10 / T15	0.50	2.50	0.75	0.47	4	40	4	2.CMR35.C1Z4.050.1	■
T20	0.60	3.00	0.90	0.56	4	40	4	2.CMR35.C1Z4.060.1	■
T25	0.80	4.00	1.20	0.75	4	40	4	2.CMR35.C1Z4.080.1	■
T30	1.00	5.00	1.50	0.94	4	40	4	2.CMR35.C1Z4.100.1	■

■ Stock item

Complementary products

CrazyDrill Hexalobe p.182
CrazyDrill Hexalobe Flat p.183

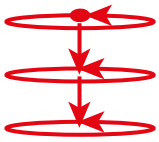
NEW Helical interpolation (XYZ / XCZ) - 3.5 x d / 5 x d



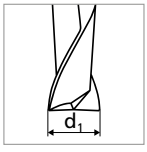
Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	p (pitch) 3.5 x d1	p (pitch) 5 x d1
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	0.2 - 0.8 x d1	0.1 - 0.4 x d1
		1.4441	X2CrNiMo 18-15-3	AISI 316LM		
S_2	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	0.2 - 0.8 x d1	0.1 - 0.4 x d1
		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

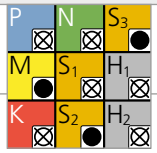


Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	$a_{p, max}$	a_e
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	0.5 x d1	0.1 x d1
		1.4441	X2CrNiMo 18-15-3	AISI 316LM		
S_2	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	0.5 x d1	variable
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	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.

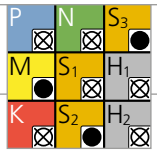
v_c [m/min]
f_z [mm]
p [mm]



T4 Ød1 0.20 mm		T5 Ød1 0.25 mm		T6 - T7 Ød1 0.30 mm		T8 - T10 Ød1 0.40 mm		T10 - T15 Ød1 0.50 mm		T20 Ød1 0.60 mm		T25 Ød1 0.80 mm		T30 Ød1 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
20 - 40	0.0010	25 - 50	0.0010	30 - 60	0.0010	40 - 75	0.0015	50 - 90	0.0020	60 - 100	0.0025	70 - 130	0.0030	80 - 140	0.0040
20 - 40	0.0010	25 - 50	0.0010	30 - 60	0.0010	40 - 75	0.0015	50 - 90	0.0020	60 - 100	0.0025	70 - 130	0.0030	80 - 140	0.0040
20 - 40	0.0008	25 - 50	0.0008	30 - 60	0.0008	40 - 75	0.0012	50 - 90	0.0015	60 - 100	0.0020	70 - 130	0.0025	80 - 140	0.0030

v_c [m/min] a_p [mm]
f_z [mm] a_e [mm]

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



T4 Ød1 0.20 mm		T5 Ød1 0.25 mm		T6 - T7 Ød1 0.30 mm		T8 - T10 Ød1 0.40 mm		T10 - T15 Ød1 0.50 mm		T20 Ød1 0.60 mm		T25 Ød1 0.80 mm		T30 Ød1 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
20 - 40	0.0015	25 - 50	0.0025	30 - 60	0.0030	40 - 75	0.0045	50 - 90	0.0060	60 - 100	0.0065	70 - 130	0.0080	80 - 140	0.0100
20 - 40	0.0015	25 - 50	0.0025	30 - 60	0.0030	40 - 75	0.0045	50 - 90	0.0060	60 - 100	0.0065	70 - 130	0.0080	80 - 140	0.0100
20 - 40	0.0012	25 - 50	0.0020	30 - 60	0.0025	40 - 75	0.0035	50 - 90	0.0045	60 - 100	0.0050	70 - 130	0.0060	80 - 140	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.

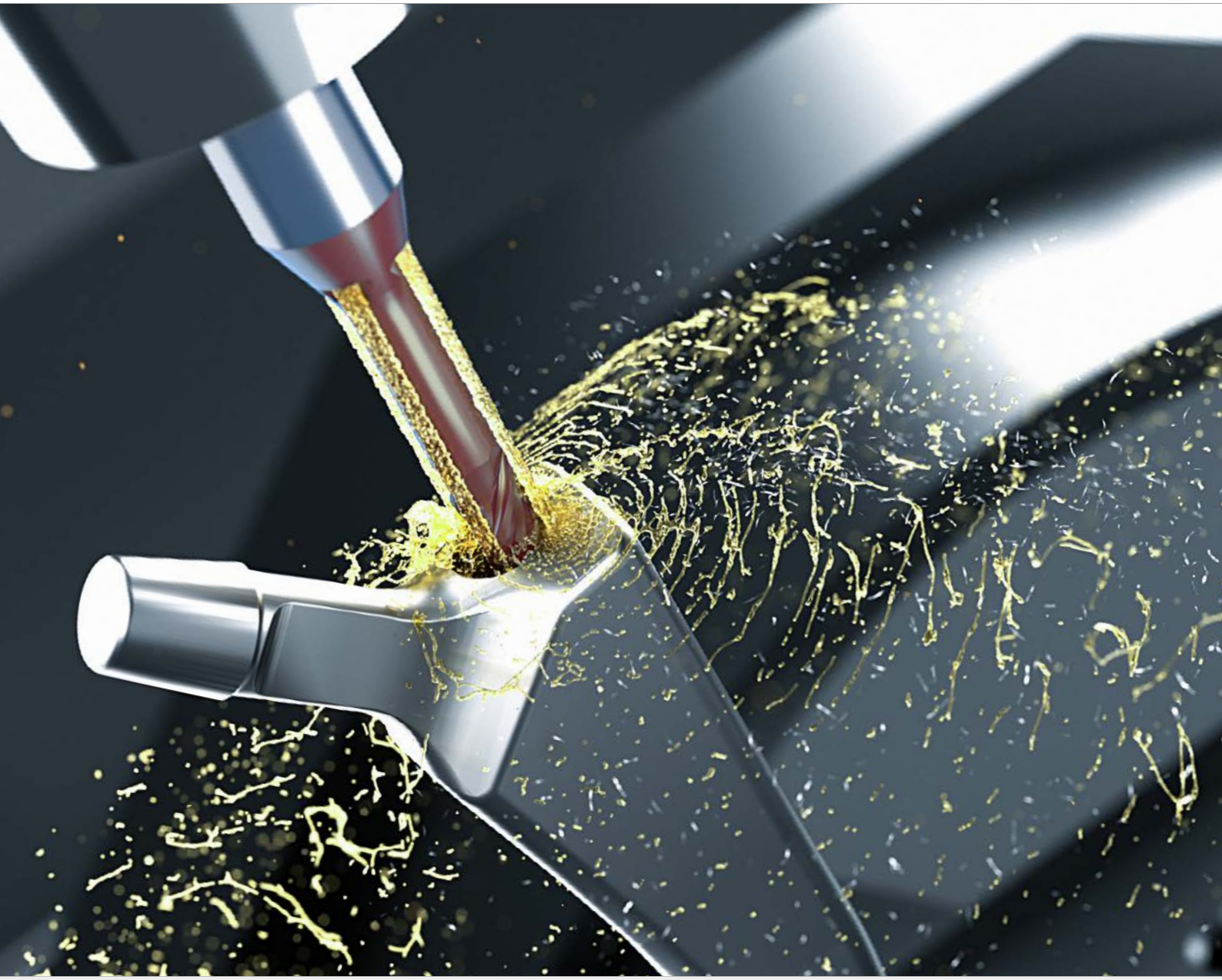
For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling medium is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

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 1 - 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.

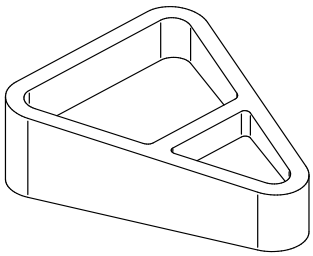
Please note: You couldn't find your suitable version of the CrazyMill Cool P&S Square / Corner radius - Z3 (diameter, length, cutting direction…)? Ask us about our customized versions!

NEW

Features and benefits

ROUGHING AND FINISHING CUTTER WITH INTEGRATED COOLING, FROM 1 MM

- **SHORT MACHINING TIME** | up to 5 times faster
- **LONG TOOL LIFE** | due to efficient cooling
- **HIGH SURFACE QUALITY** | Ra ≤ 0.5 µm
- **PERFECT CHIP CONTROL** | Thanks to specific geometry and greater coolant flow

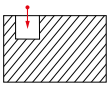
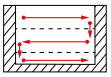
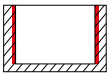


COMPONENT
Steering component

MATERIAL
X2CrNiMo18-14-3 / 1.4435 / AISI 316L

MACHINING
- ① Plunging
- ② Slotting
- ③ Finishing
- d = 6 mm
- Milling depth = 14.4 mm

MILLING TOOL
Mikron Tool - CrazyMill Cool P&S

DATA	MIKRON TOOL
Tool type	CrazyMill Cool P&S Square - Z3 - Carbide - Coated - Integrated cooling
Item number	2.CMC42.A8Z3.600.1
Cutting data	① Plunging v_c = 160 m/min $f_{z,p}$ = 0.005 mm a_p = 1 x d  ② Slotting v_c = 160 m/min $f_{z,s}$ = 0.025 mm a_p = 1 x d  ③ Finishing v_c = 220 m/min f_z = 0.026 mm a_p = 2.5 x d a_e = 0.3 mm 

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.

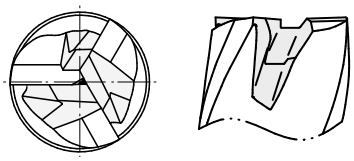
3 | CARBIDE
The specially developed micro-grain carbide meets all requirements in terms of mechanical properties.

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



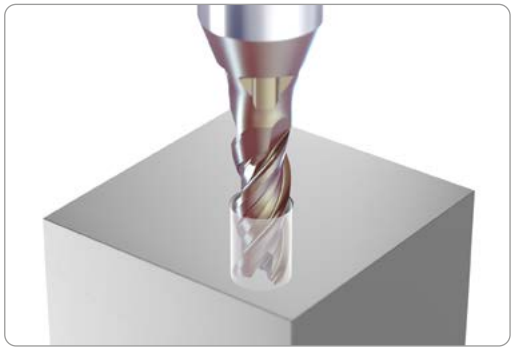
l_1 = Effective length l_2 = Cutting length

CRAZYMILL by Mikron Tool Cool

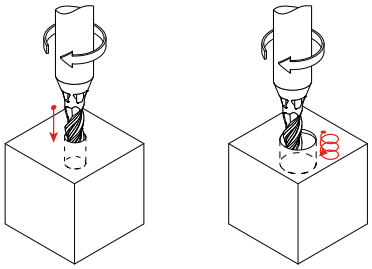
NEW One tool for many applications

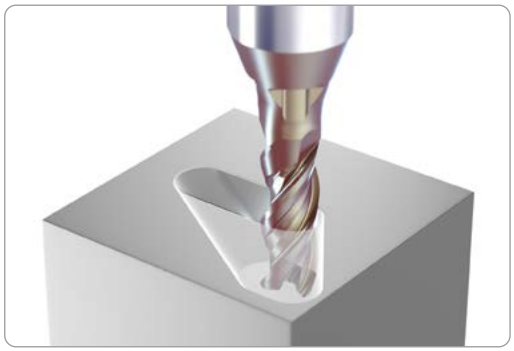
FOR DIFFICULT TO MACHINE MATERIALS

CrazyMill Cool P&S for:

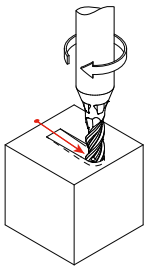


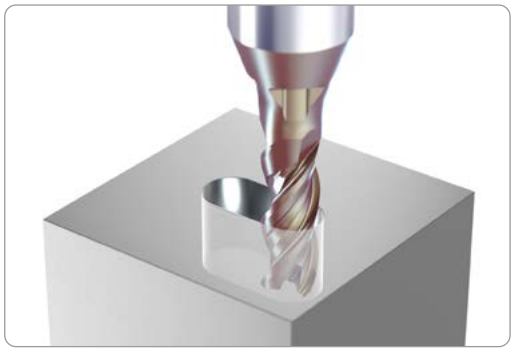
1. Plunge milling
Direct or with helical interpolation



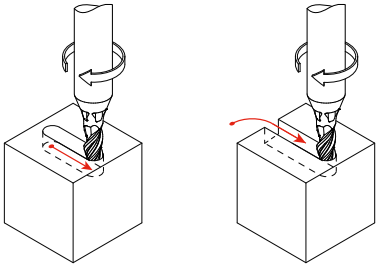


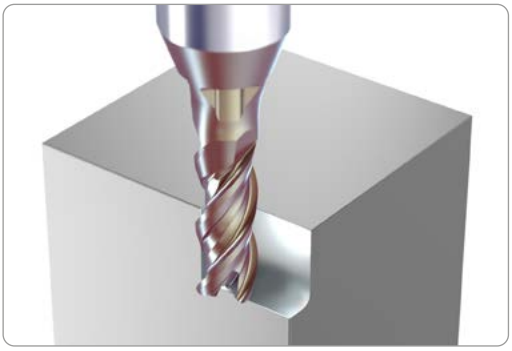
2. Linear ramp milling
Angle depending on material





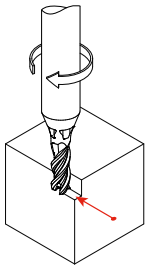
3. Slot milling
Pockets or through slots

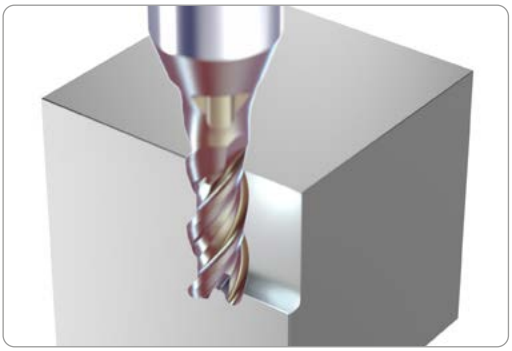




4. Side milling - Semi-finishing

a_p = 1 - 2 x d

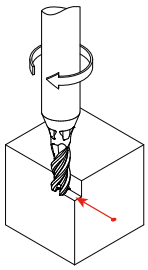




5. Side milling - Finishing

Type A: a_p = 2.5 x d

Type C: a_p = 2 x d

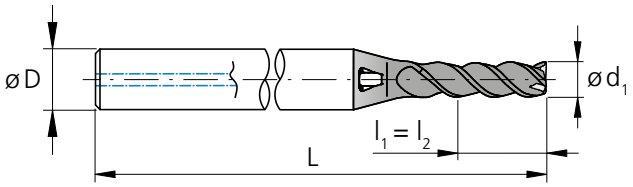


Type A - 2.5 x d - Square - Z3

MILLING WITH INTEGRATED COOLING

Square

protection
phase of 45°



l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.0		2.50	2.50	4	40	2.CMC42.A8Z3.100.1	■
1.1		2.75	2.75	4	40	2.CMC42.A8Z3.110.1	■
1.2		3.00	3.00	4	40	2.CMC42.A8Z3.120.1	■
1.3		3.25	3.25	4	40	2.CMC42.A8Z3.130.1	■
1.4		3.50	3.50	4	40	2.CMC42.A8Z3.140.1	■
1.5		3.75	3.75	4	40	2.CMC42.A8Z3.150.1	■
1.587	**1/16**	3.97	3.97	4	40	2.CMC.PSSAZ3.F116	■
1.6		4.00	4.00	4	40	2.CMC42.A8Z3.160.1	■
1.7		4.25	4.25	4	40	2.CMC42.A8Z3.170.1	■
1.8		4.50	4.50	4	40	2.CMC42.A8Z3.180.1	■
1.9		4.75	4.75	4	40	2.CMC42.A8Z3.190.1	■
2.0		5.00	5.00	4	40	2.CMC42.A8Z3.200.1	■
2.1		5.25	5.25	4	40	2.CMC42.A8Z3.210.1	■
2.2		5.50	5.50	4	40	2.CMC42.A8Z3.220.1	■
2.3		5.75	5.75	4	40	2.CMC42.A8Z3.230.1	■
2.381	**3/32**	5.95	5.95	4	40	2.CMC.PSSAZ3.F332	■
2.4		6.00	6.00	4	40	2.CMC42.A8Z3.240.1	■
2.5		6.25	6.25	6	50	2.CMC42.A8Z3.250.1	■
2.6		6.50	6.50	6	50	2.CMC42.A8Z3.260.1	■
2.7		6.75	6.75	6	50	2.CMC42.A8Z3.270.1	■

■ Stock item

Carbide | 2.5xd1 | Z3 | 42° | eXedur SNP

Ø d_1	1.0 - 3.0 mm	3.1 - 6.0 mm	6.1 - 8.0 mm
Tolerance	- 0.014 mm - 0.028 mm	- 0.020 mm - 0.038 mm	- 0.025 mm - 0.047 mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.8		7.00	7.00	6	50	2.CMC42.A8Z3.280.1	■
2.9		7.25	7.25	6	50	2.CMC42.A8Z3.290.1	■
3.0		7.50	7.50	6	50	2.CMC42.A8Z3.300.1	■
3.1		7.75	7.75	6	50	2.CMC42.A8Z3.310.1	■
3.175	**1/8**	7.94	7.94	6	50	2.CMC.PSSAZ3.F18	■
3.3		8.25	8.25	6	50	2.CMC42.A8Z3.330.1	■
3.7		9.25	9.25	6	50	2.CMC42.A8Z3.370.1	■
3.968	**5/32**	9.92	9.92	6	50	2.CMC.PSSAZ3.F532	■
4.0		10.00	10.00	6	50	2.CMC42.A8Z3.400.1	■
4.3		10.75	10.75	8	60	2.CMC42.A8Z3.430.1	■
4.7		11.75	11.75	8	60	2.CMC42.A8Z3.470.1	■
4.762	**3/16**	11.91	11.91	8	60	2.CMC.PSSAZ3.F316	■
4.8		12.00	12.00	8	60	2.CMC42.A8Z3.480.1	■
5.0		12.50	12.50	8	60	2.CMC42.A8Z3.500.1	■
5.3		13.25	13.25	10	65	2.CMC42.A8Z3.530.1	■
5.560	**7/32**	13.90	13.90	10	65	2.CMC.PSSAZ3.F732	■
5.7		14.25	14.25	10	65	2.CMC42.A8Z3.570.1	■
6.0		15.00	15.00	10	65	2.CMC42.A8Z3.600.1	■
6.350	**1/4**	15.88	15.88	10	65	2.CMC.PSSAZ3.F14	■
8.0		20.00	20.00	12	70	2.CMC42.A8Z3.800.1	■

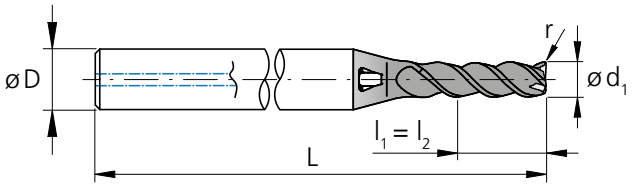
■ Stock item

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 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
1.0		2.50	2.50	4	40	0.10		2.CMC42.A2Z3.100.1	■
1.0		2.50	2.50	4	40	0.20		2.CMC42.A3Z3.100.1	■
1.1		2.75	2.75	4	40	0.10		2.CMC42.A2Z3.110.1	■
1.1		2.75	2.75	4	40	0.20		2.CMC42.A3Z3.110.1	■
1.2		3.00	3.00	4	40	0.10		2.CMC42.A2Z3.120.1	■
1.2		3.00	3.00	4	40	0.20		2.CMC42.A3Z3.120.1	■
1.3		3.25	3.25	4	40	0.10		2.CMC42.A2Z3.130.1	■
1.3		3.25	3.25	4	40	0.20		2.CMC42.A3Z3.130.1	■
1.4		3.50	3.50	4	40	0.10		2.CMC42.A2Z3.140.1	■
1.4		3.50	3.50	4	40	0.20		2.CMC42.A3Z3.140.1	■
1.5		3.75	3.75	4	40	0.10		2.CMC42.A2Z3.150.1	■
1.5		3.75	3.75	4	40	0.30		2.CMC42.A3Z3.150.1	■
1.587	**1/16**	3.97	3.97	4	40	0.127	.005	2.CMC.PSRA2Z3.F116	■
1.587	**1/16**	3.97	3.97	4	40	0.254	.010	2.CMC.PSRA3Z3.F116	■
1.6		4.00	4.00	4	40	0.10		2.CMC42.A2Z3.160.1	■
1.6		4.00	4.00	4	40	0.30		2.CMC42.A3Z3.160.1	■
1.7		4.25	4.25	4	40	0.10		2.CMC42.A2Z3.170.1	■
1.7		4.25	4.25	4	40	0.30		2.CMC42.A3Z3.170.1	■
1.8		4.50	4.50	4	40	0.10		2.CMC42.A2Z3.180.1	■
1.8		4.50	4.50	4	40	0.30		2.CMC42.A3Z3.180.1	■
1.9		4.75	4.75	4	40	0.10		2.CMC42.A2Z3.190.1	■
1.9		4.75	4.75	4	40	0.30		2.CMC42.A3Z3.190.1	■
2.0		5.00	5.00	4	40	0.10		2.CMC42.A2Z3.200.1	■
2.0		5.00	5.00	4	40	0.20		2.CMC42.A3Z3.200.1	■
2.0		5.00	5.00	4	40	0.50		2.CMC42.A4Z3.200.1	■
2.1		5.25	5.25	4	40	0.20		2.CMC42.A2Z3.210.1	■
2.1		5.25	5.25	4	40	0.50		2.CMC42.A3Z3.210.1	■
2.2		5.50	5.50	4	40	0.20		2.CMC42.A2Z3.220.1	■
2.2		5.50	5.50	4	40	0.50		2.CMC42.A3Z3.220.1	■
2.3		5.75	5.75	4	40	0.20		2.CMC42.A2Z3.230.1	■
2.3		5.75	5.75	4	40	0.50		2.CMC42.A3Z3.230.1	■
2.381	**3/32**	5.95	5.95	4	40	0.127	.005	2.CMC.PSRA2Z3.F332	■
2.381	**3/32**	5.95	5.95	4	40	0.254	.010	2.CMC.PSRA3Z3.F332	■
2.381	**3/32**	5.95	5.95	4	40	0.381	.015	2.CMC.PSRA4Z3.F332	■
2.4		6.00	6.00	4	40	0.20		2.CMC42.A2Z3.240.1	■
2.4		6.00	6.00	4	40	0.50		2.CMC42.A3Z3.240.1	■
2.5		6.25	6.25	6	50	0.20		2.CMC42.A2Z3.250.1	■
2.5		6.25	6.25	6	50	0.50		2.CMC42.A3Z3.250.1	■

■ Stock item

Carbide | 2.5xd1 | Z3 | 42° | eXedur SNP

Ø d_1	1.0 - 3.0 mm	3.1 - 6.0 mm	6.1 - 8.0 mm	r	0.1 - 1.524 mm
Tolerance	- 0.014 mm - 0.028 mm	- 0.020 mm - 0.038 mm	- 0.025 mm - 0.047 mm	Tolerance	± 0.05 · r mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
2.6		6.50	6.50	6	50	0.20		2.CMC42.A2Z3.260.1	■
2.6		6.50	6.50	6	50	0.50		2.CMC42.A3Z3.260.1	■
2.7		6.75	6.75	6	50	0.20		2.CMC42.A2Z3.270.1	■
2.7		6.75	6.75	6	50	0.50		2.CMC42.A3Z3.270.1	■
2.8		7.00	7.00	6	50	0.20		2.CMC42.A2Z3.280.1	■
2.8		7.00	7.00	6	50	0.50		2.CMC42.A3Z3.280.1	■
2.9		7.25	7.25	6	50	0.20		2.CMC42.A2Z3.290.1	■
2.9		7.25	7.25	6	50	0.50		2.CMC42.A3Z3.290.1	■
3.0		7.50	7.50	6	50	0.20		2.CMC42.A2Z3.300.1	■
3.0		7.50	7.50	6	50	0.50		2.CMC42.A3Z3.300.1	■
3.1		7.75	7.75	6	50	0.20		2.CMC42.A2Z3.310.1	■
3.1		7.75	7.75	6	50	0.50		2.CMC42.A3Z3.310.1	■
3.175	**1/8**	7.94	7.94	6	50	0.254	.010	2.CMC.PSRA2Z3.F18	■
3.175	**1/8**	7.94	7.94	6	50	0.381	.015	2.CMC.PSRA3Z3.F18	■
3.3		8.25	8.25	6	50	0.20		2.CMC42.A2Z3.330.1	■
3.3		8.25	8.25	6	50	0.50		2.CMC42.A3Z3.330.1	■
3.7		9.25	9.25	6	50	0.20		2.CMC42.A2Z3.370.1	■
3.7		9.25	9.25	6	50	0.50		2.CMC42.A3Z3.370.1	■
3.968	**5/32**	9.92	9.92	6	50	0.254	.010	2.CMC.PSRA2Z3.F532	■
3.968	**5/32**	9.92	9.92	6	50	0.381	.015	2.CMC.PSRA3Z3.F532	■
4.0		10.00	10.00	6	50	0.20		2.CMC42.A2Z3.400.1	■
4.0		10.00	10.00	6	50	0.50		2.CMC42.A3Z3.400.1	■
4.3		10.75	10.75	8	60	0.20		2.CMC42.A2Z3.430.1	■
4.3		10.75	10.75	8	60	0.50		2.CMC42.A3Z3.430.1	■
4.7		11.75	11.75	8	60	0.20		2.CMC42.A2Z3.470.1	■
4.7		11.75	11.75	8	60	0.50		2.CMC42.A3Z3.470.1	■
4.762	**3/16**	11.91	11.91	8	60	0.254	.010	2.CMC.PSRA2Z3.F316	■
4.762	**3/16**	11.91	11.91	8	60	0.381	.015	2.CMC.PSRA3Z3.F316	■
4.8		12.00	12.00	8	60	0.20		2.CMC42.A2Z3.480.1	■
4.8		12.00	12.00	8	60	0.50		2.CMC42.A3Z3.480.1	■
5.0		12.50	12.50	8	60	0.20		2.CMC42.A2Z3.500.1	■
5.0		12.50	12.50	8	60	0.50		2.CMC42.A3Z3.500.1	■
5.3		13.25	13.25	10	65	0.20		2.CMC42.A2Z3.530.1	■
5.3		13.25	13.25	10	65	0.50		2.CMC42.A3Z3.530.1	■
5.560	**7/32**	13.90	13.90	10	65	0.381	.015	2.CMC.PSRA2Z3.F732	■
5.560	**7/32**	13.90	13.90	10	65	0.762	.030	2.CMC.PSRA3Z3.F732	■
5.7		14.25	14.25	10	65	0.20		2.CMC42.A2Z3.570.1	■
5.7		14.25	14.25	10	65	0.50		2.CMC42.A3Z3.570.1	■
6.0		15.00	15.00	10	65	0.20		2.CMC42.A2Z3.600.1	■
6.0		15.00	15.00	10	65	0.50		2.CMC42.A3Z3.600.1	■
6.0		15.00	15.00	10	65	1.00		2.CMC42.A4Z3.600.1	■
6.350	**1/4**	15.88	15.88	10	65	0.381	.015	2.CMC.PSRA2Z3.F14	■
6.350	**1/4**	15.88	15.88	10	65	0.762	.030	2.CMC.PSRA3Z3.F14	■
6.350	**1/4**	15.88	15.88	10	65	1.524	.060	2.CMC.PSRA4Z3.F14	■
8.0		20.00	20.00	12	70	0.20		2.CMC42.A2Z3.800.1	■
8.0		20.00	20.00	12	70	0.50		2.CMC42.A3Z3.800.1	■
8.0		20.00	20.00	12	70	1.50		2.CMC42.A4Z3.800.1	■

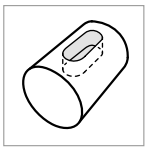
■ Stock item

CRAZYMILL by Mikron Tool Cool

NEW Type A - Keyways - Plunge - Slot milling

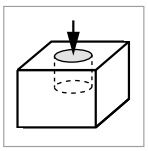
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Keyway slot milling



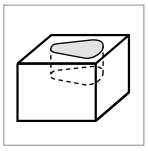
- $f_{z,p}$: for plunge milling
- $f_{z,s}$: for slot milling

Plunge milling

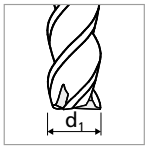


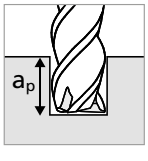
- $f_{z,p}$: for plunge milling

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 v_c	$f_{z,p}$	$f_{z,s}$	a_p
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	100	0.0013	0.0046	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	0.0014	0.0049	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	0.0012	0.0042	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	0.0010	0.0035	1xd1
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	80	0.0010	0.0035	0.5xd1
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	80	0.0010	0.0035	0.5xd1
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	80	0.0010	0.0035	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	0.0013	0.0042	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	0.0012	0.0100	1xd1
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100	0.0012	0.0100	1xd1
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	100	0.0012	0.0100	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	0.0012	0.0100	1xd1
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	100	0.0012	0.0100	1xd1
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	100	0.0012	0.0100	1xd1
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	40	0.0010	0.0035	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	0.0010	0.0032	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	80	0.0010	0.0032	0.25xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.0010	0.0035	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] a_p [mm]
$f_{z,p}$ [mm] $f_{z,s}$ [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

07

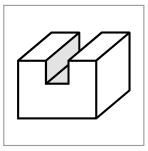
	Ød1																							
	1.5 mm 1/16"				2.0 mm 3/32"				3.0 mm 1/8"				4.0 mm 5/32"				5.0 mm 3/16" - 7/32"				6.0 mm - 8.0 mm 1/4"			
	v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p
	120	0.0020	0.0065	1xd1	120	0.0026	0.0091	1xd1	140	0.004	0.013	1xd1	140	0.005	0.020	1xd1	150	0.005	0.026	1xd1	160	0.006	0.033	1xd1
	120	0.0021	0.0070	1xd1	120	0.0028	0.0098	1xd1	140	0.004	0.014	1xd1	140	0.005	0.021	1xd1	150	0.006	0.027	1xd1	160	0.006	0.034	1xd1
	120	0.0018	0.0060	0.5xd1	120	0.0024	0.0084	0.5xd1	140	0.003	0.012	0.5xd1	140	0.004	0.017	0.5xd1	150	0.004	0.022	0.5xd1	160	0.005	0.028	0.5xd1
	100	0.0015	0.0050	1xd1	100	0.0020	0.0070	1xd1	120	0.003	0.010	1xd1	120	0.004	0.015	1xd1	130	0.004	0.020	1xd1	140	0.005	0.025	1xd1
	100	0.0015	0.0050	0.5xd1	100	0.0020	0.0070	0.5xd1	120	0.003	0.010	0.5xd1	120	0.004	0.015	0.5xd1	130	0.004	0.020	0.5xd1	140	0.005	0.025	0.5xd1
	100	0.0015	0.0050	0.5xd1	100	0.0020	0.0070	0.5xd1	120	0.003	0.010	0.5xd1	120	0.004	0.015	0.5xd1	130	0.004	0.020	0.5xd1	140	0.005	0.025	0.5xd1
	100	0.0015	0.0050	1xd1	100	0.0020	0.0070	1xd1	120	0.003	0.010	1xd1	120	0.004	0.015	1xd1	130	0.004	0.020	1xd1	140	0.005	0.025	1xd1
	120	0.0019	0.0060	1xd1	120	0.0024	0.0084	1xd1	140	0.004	0.012	1xd1	140	0.004	0.017	1xd1	150	0.005	0.022	1xd1	160	0.005	0.028	1xd1
	120	0.0018	0.0160	1xd1	120	0.0024	0.0210	1xd1	150	0.004	0.034	1xd1	160	0.004	0.035	1xd1	170	0.005	0.036	1xd1	180	0.005	0.037	1xd1
	120	0.0018	0.0160	1xd1	120	0.0024	0.0210	1xd1	150	0.004	0.034	1xd1	160	0.004	0.035	1xd1	170	0.005	0.036	1xd1	180	0.005	0.037	1xd1
	120	0.0018	0.0160	1xd1	120	0.0024	0.0210	1xd1	150	0.004	0.034	1xd1	160	0.004	0.035	1xd1	170	0.005	0.036	1xd1	180	0.005	0.037	1xd1
	120	0.0018	0.0160	1xd1	120	0.0024	0.0210	1xd1	150	0.004	0.034	1xd1	160	0.004	0.035	1xd1	170	0.005	0.036	1xd1	180	0.005	0.037	1xd1
	120	0.0018	0.0160	1xd1	120	0.0024	0.0210	1xd1	150	0.004	0.034	1xd1	160	0.004	0.035	1xd1	170	0.005	0.036	1xd1	180	0.005	0.037	1xd1
	120	0.0018	0.0160	1xd1	120	0.0024	0.0210	1xd1	150	0.004	0.034	1xd1	160	0.004	0.035	1xd1	170	0.005	0.036	1xd1	180	0.005	0.037	1xd1
	40	0.0015	0.0050	0.25xd1	50	0.0020	0.0070	0.25xd1	50	0.003	0.010	0.25xd1	60	0.004	0.014	0.25xd1	80	0.004	0.018	0.25xd1	80	0.005	0.021	0.25xd1
	90	0.0014	0.0045	0.25xd1	100	0.0018	0.0063	0.25xd1	110	0.003	0.010	0.25xd1	120	0.004	0.013	0.25xd1	120	0.004	0.016	0.25xd1	120	0.005	0.019	0.25xd1
	90	0.0014	0.0045	0.25xd1	100	0.0018	0.0063	0.25xd1	110	0.003	0.010	0.25xd1	120	0.004	0.013	0.25xd1	120	0.004	0.016	0.25xd1	120	0.005	0.019	0.25xd1
	60	0.0015	0.0050	0.5xd1	80	0.0020	0.0070	0.5xd1	80	0.003	0.010	0.5xd1	100	0.004	0.014	0.5xd1	100	0.004	0.018	0.5xd1	120	0.005	0.021	0.5xd1

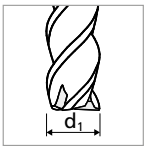
CRAZYMILL by Mikron Tool Cool

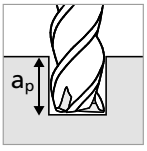
NEW Type A - Milling of through slots

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Through slot milling







Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm v_c	f_z	a_p
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.009	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	0.008	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	0.006	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	0.009	1xd1
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	120	0.009	1xd1
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	120	0.009	1xd1
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	120	0.007	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	0.007	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	0.010	1xd1
		3.4365	AlZnMgCu1.5	ASTM 7075			
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.010	1xd1
		3.2381	GD-AlSi10Mg	UNS A03590			
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.012	1xd1
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.012	1xd1
		2.0360	CuZn40 CW509L	UNS C28000			
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.012	1xd1
		2.1020	CuSn6	UNS C51900			
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.011	1xd1
		2.0960	CuAl9Mn2	UNS C63200			
S_1	Super alloys	2.4856		Inconel 625	80	0.005	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	0.009	0.5xd1
		3.7065	Gr.4	ASTM B348 / F68			
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	100	0.009	0.5xd1
		9.9367	TiAl6Nb7	ASTM F1295			
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	80	0.005	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]
f_z [mm]
a_p [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

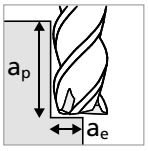
Ød1																	
1.5 mm 1/16"			2.0 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			5.0 mm 3/16" - 7/32"			6.0 mm - 8.0 mm 1/4"		
v_c	f_z	a_p	v_c	f_z	a_p	v_c	f_z	a_p	v_c	f_z	a_p	v_c	f_z	a_p	v_c	f_z	a_p
180	0.015	1xd1	200	0.020	1xd1	220	0.029	1xd1	230	0.031	1xd1	240	0.031	1xd1	260	0.032	1xd1
180	0.013	1xd1	200	0.019	1xd1	220	0.028	1xd1	230	0.029	1xd1	240	0.030	1xd1	260	0.031	1xd1
180	0.012	0.5xd1	200	0.017	0.5xd1	220	0.025	0.5xd1	230	0.026	0.5xd1	240	0.026	0.5xd1	260	0.027	0.5xd1
160	0.015	1xd1	180	0.020	1xd1	200	0.028	1xd1	200	0.029	1xd1	220	0.030	1xd1	240	0.031	1xd1
160	0.013	1xd1	180	0.019	1xd1	200	0.027	1xd1	200	0.028	1xd1	220	0.029	1xd1	240	0.029	1xd1
160	0.013	1xd1	180	0.019	1xd1	200	0.027	1xd1	200	0.028	1xd1	220	0.029	1xd1	240	0.029	1xd1
160	0.011	1xd1	180	0.017	1xd1	200	0.025	1xd1	200	0.027	1xd1	220	0.027	1xd1	240	0.028	1xd1
140	0.015	1xd1	160	0.017	1xd1	180	0.025	1xd1	200	0.031	1xd1	200	0.031	1xd1	200	0.032	1xd1
180	0.016	1xd1	200	0.021	1xd1	220	0.034	1xd1	260	0.035	1xd1	300	0.036	1xd1	340	0.037	1xd1
180	0.016	1xd1	200	0.021	1xd1	220	0.032	1xd1	260	0.034	1xd1	300	0.034	1xd1	340	0.036	1xd1
180	0.016	1xd1	200	0.021	1xd1	220	0.034	1xd1	260	0.035	1xd1	300	0.036	1xd1	340	0.037	1xd1
180	0.016	1xd1	200	0.021	1xd1	220	0.034	1xd1	260	0.035	1xd1	300	0.036	1xd1	340	0.037	1xd1
180	0.016	1xd1	200	0.021	1xd1	220	0.034	1xd1	260	0.035	1xd1	300	0.036	1xd1	340	0.037	1xd1
180	0.016	1xd1	200	0.021	1xd1	220	0.034	1xd1	260	0.035	1xd1	300	0.036	1xd1	340	0.037	1xd1
80	0.006	0.5xd1	100	0.007	0.5xd1	100	0.010	0.5xd1	120	0.013	0.5xd1	120	0.013	0.5xd1	120	0.013	0.5xd1
100	0.012	0.5xd1	120	0.017	0.5xd1	120	0.027	0.5xd1	140	0.027	0.5xd1	140	0.027	0.5xd1	140	0.028	0.5xd1
100	0.012	0.5xd1	120	0.017	0.5xd1	120	0.027	0.5xd1	140	0.027	0.5xd1	140	0.027	0.5xd1	140	0.028	0.5xd1
80	0.006	0.5xd1	100	0.007	0.5xd1	100	0.010	0.5xd1	120	0.013	0.5xd1	120	0.013	0.5xd1	120	0.013	0.5xd1

CRAZYMILL by Mikron Tool Cool

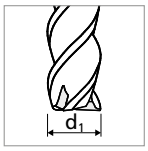
NEW Type A - Side milling - Semi-finishing

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 v_c	1.0 mm f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.013
		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	0.012
		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	0.009
		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	0.014
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	120	0.013
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	120	0.013
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	120	0.010
		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	0.009
		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	0.015
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.015
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.017
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.017
		2.0360	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.017
		2.1020	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.015
		2.0960	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	80	0.006
		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	0.014
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.014
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	80	0.006
			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]
f_z [mm]

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

P ● | N ● | S_3 ●
M ● | S_1 ● | H_1 ⊠
K ● | S_2 ● | H_2 ⊠

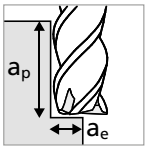
	Ød1													
	1.5 mm 1/16"		2.0 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"		8.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	200	0.020	220	0.029	240	0.037	260	0.040	260	0.040	260	0.043	260	0.051
	200	0.019	220	0.027	240	0.035	260	0.038	260	0.038	260	0.041	260	0.049
	200	0.017	220	0.026	240	0.032	260	0.034	260	0.034	260	0.036	260	0.043
	180	0.020	200	0.029	200	0.035	220	0.038	240	0.038	240	0.041	240	0.046
	180	0.019	200	0.027	200	0.035	220	0.037	240	0.037	240	0.039	240	0.045
	180	0.019	200	0.027	200	0.035	220	0.037	240	0.037	240	0.039	240	0.045
	180	0.014	200	0.026	200	0.032	220	0.035	240	0.035	240	0.037	240	0.043
	140	0.020	160	0.024	180	0.034	200	0.040	200	0.042	200	0.044	200	0.052
	200	0.022	220	0.031	240	0.046	260	0.048	260	0.048	260	0.051	260	0.063
	200	0.022	220	0.031	240	0.046	260	0.048	260	0.048	260	0.051	260	0.063
	200	0.022	220	0.031	240	0.046	260	0.048	260	0.048	260	0.051	260	0.063
	200	0.022	220	0.031	240	0.046	260	0.048	260	0.048	260	0.051	260	0.063
	200	0.022	220	0.031	240	0.046	260	0.048	260	0.048	260	0.051	260	0.063
	200	0.022	220	0.031	240	0.046	260	0.048	260	0.048	260	0.051	260	0.063
	100	0.008	100	0.009	100	0.012	120	0.016	120	0.016	120	0.017	120	0.018
	120	0.017	130	0.024	130	0.032	150	0.035	150	0.035	150	0.037	150	0.040
	120	0.017	130	0.024	130	0.032	150	0.035	150	0.035	150	0.037	150	0.040
	100	0.008	100	0.009	100	0.012	120	0.016	120	0.016	120	0.017	120	0.018

CRAZYMILL by Mikron Tool Cool

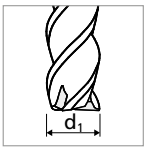
NEW Type A - Side milling - Finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Finishing



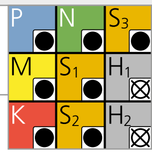
- $a_p = 2.5 \times d_1$
- $a_e = 0.05 - 0.10 \times d_1$



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm v_c	1.0 mm f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	130	0.008
		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	0.007
		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	0.006
		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	0.008
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	100	0.008
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	100	0.008
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	100	0.006
		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	0.006
		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	0.009
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	130	0.009
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	130	0.010
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	130	0.010
		2.0360	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	130	0.010
		2.1020	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	130	0.009
		2.0960	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	110	0.004
		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	0.008
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	110	0.008
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	110	0.004
			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]
f_z [mm]

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



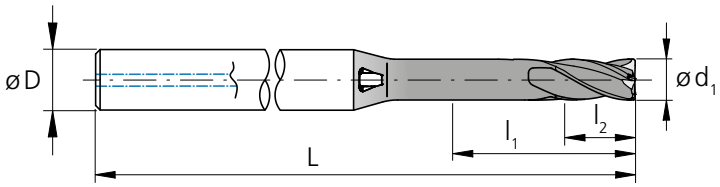
	Ød1 1.5 mm 1/16"		2.0 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"		8.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	180	0.012	200	0.017	210	0.023	220	0.025	220	0.028	220	0.033	220	0.042
	180	0.011	200	0.016	210	0.022	220	0.024	220	0.026	220	0.029	220	0.038
	180	0.010	200	0.015	210	0.020	220	0.021	220	0.023	220	0.025	220	0.034
	150	0.012	170	0.017	180	0.022	200	0.024	200	0.026	200	0.029	200	0.036
	150	0.011	170	0.016	180	0.022	200	0.023	200	0.025	200	0.028	200	0.037
	150	0.011	170	0.016	180	0.022	200	0.023	200	0.025	200	0.028	200	0.037
	150	0.008	170	0.015	180	0.020	200	0.022	200	0.024	200	0.026	200	0.035
	130	0.012	150	0.014	160	0.022	170	0.025	170	0.029	170	0.031	200	0.040
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	270	0.045
	120	0.005	130	0.005	130	0.008	140	0.010	140	0.011	150	0.012	160	0.021
	120	0.010	130	0.014	130	0.020	140	0.022	140	0.024	150	0.026	160	0.035
	120	0.010	130	0.014	130	0.020	140	0.022	140	0.024	150	0.026	160	0.035
	120	0.005	130	0.005	130	0.008	140	0.010	140	0.011	150	0.012	160	0.021

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 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.0		5.00	2.00	4	40	2.CMC42.C1Z3.100.1	■
1.1		5.50	2.20	4	40	2.CMC42.C1Z3.110.1	■
1.2		6.00	2.40	4	40	2.CMC42.C1Z3.120.1	■
1.3		6.50	2.60	4	40	2.CMC42.C1Z3.130.1	■
1.4		7.00	2.80	4	40	2.CMC42.C1Z3.140.1	■
1.5		7.50	3.00	4	40	2.CMC42.C1Z3.150.1	■
1.587	**1/16**	7.94	3.17	4	45	2.CMC.PSSCZ3.F116	■
1.6		8.00	3.20	4	45	2.CMC42.C1Z3.160.1	■
1.7		8.50	3.40	4	45	2.CMC42.C1Z3.170.1	■
1.8		9.00	3.60	4	45	2.CMC42.C1Z3.180.1	■
1.9		9.50	3.80	4	44	2.CMC42.C1Z3.190.1	■
2.0		10.00	4.00	4	44	2.CMC42.C1Z3.200.1	■
2.1		10.50	4.20	4	44	2.CMC42.C1Z3.210.1	■
2.2		11.00	4.40	4	44	2.CMC42.C1Z3.220.1	■
2.3		11.50	4.60	4	44	2.CMC42.C1Z3.230.1	■
2.381	**3/32**	11.91	4.76	4	44	2.CMC.PSSCZ3.F332	■
2.4		12.00	4.80	4	44	2.CMC42.C1Z3.240.1	■
2.5		12.50	5.00	6	55	2.CMC42.C1Z3.250.1	■
2.6		13.00	5.20	6	55	2.CMC42.C1Z3.260.1	■
2.7		13.50	5.40	6	55	2.CMC42.C1Z3.270.1	■

■ Stock item

Carbide | 5xd$_1$ | Z3 | 42° | eXedur SNP

Ø d$_1$	1.0 - 3.0 mm	3.1 - 6.0 mm	6.1 - 8.0 mm
Tolerance	- 0.014 mm - 0.028 mm	- 0.020 mm - 0.038 mm	- 0.025 mm - 0.047 mm

d$_1$ [mm]	d$_1$ [inch]	l$_1$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	Item number	Availability
2.8		14.00	5.60	6	55	2.CMC42.C1Z3.280.1	■
2.9		14.50	5.80	6	55	2.CMC42.C1Z3.290.1	■
3.0		15.00	6.00	6	55	2.CMC42.C1Z3.300.1	■
3.1		15.50	6.20	6	60	2.CMC42.C1Z3.310.1	■
3.175	**1/8**	15.88	6.35	6	60	2.CMC.PSSCZ3.F18	■
3.3		16.50	6.60	6	60	2.CMC42.C1Z3.330.1	■
3.7		18.50	7.40	6	60	2.CMC42.C1Z3.370.1	■
3.968	**5/32**	19.84	7.94	6	60	2.CMC.PSSCZ3.F532	■
4.0		20.00	8.00	6	60	2.CMC42.C1Z3.400.1	■
4.3		21.50	8.60	8	70	2.CMC42.C1Z3.430.1	■
4.7		23.50	9.40	8	70	2.CMC42.C1Z3.470.1	■
4.762	**3/16**	23.81	9.52	8	70	2.CMC.PSSCZ3.F316	■
4.8		24.00	9.60	8	70	2.CMC42.C1Z3.480.1	■
5.0		25.00	10.00	8	70	2.CMC42.C1Z3.500.1	■
5.3		26.50	10.60	10	70	2.CMC42.C1Z3.530.1	■
5.560	**7/32**	27.80	11.12	10	70	2.CMC.PSSCZ3.F732	■
5.7		28.50	11.40	10	70	2.CMC42.C1Z3.570.1	■
6.0		30.00	12.00	10	70	2.CMC42.C1Z3.600.1	■
6.350	**1/4**	31.75	12.70	10	70	2.CMC.PSSCZ3.F14	■
8.0		40.00	16.00	12	90	2.CMC42.C1Z3.800.1	■

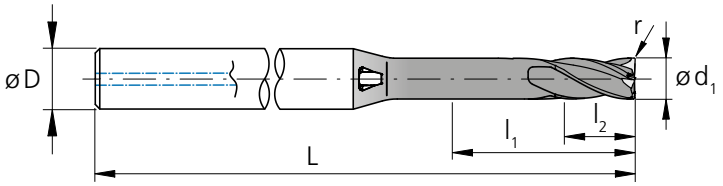
■ Stock item

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 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
1.0		5.00	2.00	4	40	0.10		2.CMC42.C2Z3.100.1	■
1.0		5.00	2.00	4	40	0.20		2.CMC42.C3Z3.100.1	■
1.1		5.50	2.20	4	40	0.10		2.CMC42.C2Z3.110.1	■
1.1		5.50	2.20	4	40	0.20		2.CMC42.C3Z3.110.1	■
1.2		6.00	2.40	4	40	0.10		2.CMC42.C2Z3.120.1	■
1.2		6.00	2.40	4	40	0.20		2.CMC42.C3Z3.120.1	■
1.3		6.50	2.60	4	40	0.10		2.CMC42.C2Z3.130.1	■
1.3		6.50	2.60	4	40	0.20		2.CMC42.C3Z3.130.1	■
1.4		7.00	2.80	4	40	0.10		2.CMC42.C2Z3.140.1	■
1.4		7.00	2.80	4	40	0.20		2.CMC42.C3Z3.140.1	■
1.5		7.50	3.00	4	40	0.10		2.CMC42.C2Z3.150.1	■
1.5		7.50	3.00	4	40	0.30		2.CMC42.C3Z3.150.1	■
1.587	**1/16**	7.94	3.17	4	45	0.127	.005	2.CMC.PSRC2Z3.F116	■
1.587	**1/16**	7.94	3.17	4	45	0.254	.010	2.CMC.PSRC3Z3.F116	■
1.6		8.00	3.20	4	45	0.10		2.CMC42.C2Z3.160.1	■
1.6		8.00	3.20	4	45	0.30		2.CMC42.C3Z3.160.1	■
1.7		8.50	3.40	4	45	0.10		2.CMC42.C2Z3.170.1	■
1.7		8.50	3.40	4	45	0.30		2.CMC42.C3Z3.170.1	■
1.8		9.00	3.60	4	45	0.10		2.CMC42.C2Z3.180.1	■
1.8		9.00	3.60	4	45	0.30		2.CMC42.C3Z3.180.1	■
1.9		9.50	3.80	4	44	0.10		2.CMC42.C2Z3.190.1	■
1.9		9.50	3.80	4	44	0.30		2.CMC42.C3Z3.190.1	■
2.0		10.00	4.00	4	44	0.10		2.CMC42.C2Z3.200.1	■
2.0		10.00	4.00	4	44	0.20		2.CMC42.C3Z3.200.1	■
2.0		10.00	4.00	4	44	0.50		2.CMC42.C4Z3.200.1	■
2.1		10.50	4.20	4	44	0.20		2.CMC42.C2Z3.210.1	■
2.1		10.50	4.20	4	44	0.50		2.CMC42.C3Z3.210.1	■
2.2		11.00	4.40	4	44	0.20		2.CMC42.C2Z3.220.1	■
2.2		11.00	4.40	4	44	0.50		2.CMC42.C3Z3.220.1	■
2.3		11.50	4.60	4	44	0.20		2.CMC42.C2Z3.230.1	■
2.3		11.50	4.60	4	44	0.50		2.CMC42.C3Z3.230.1	■
2.381	**3/32**	11.91	4.76	4	44	0.127	.005	2.CMC.PSRC2Z3.F332	■
2.381	**3/32**	11.91	4.76	4	44	0.254	.010	2.CMC.PSRC3Z3.F332	■
2.381	**3/32**	11.91	4.76	4	44	0.381	.015	2.CMC.PSRC4Z3.F332	■
2.4		12.00	4.80	4	44	0.20		2.CMC42.C2Z3.240.1	■
2.4		12.00	4.80	4	44	0.50		2.CMC42.C3Z3.240.1	■
2.5		12.50	5.00	6	55	0.20		2.CMC42.C2Z3.250.1	■
2.5		12.50	5.00	6	55	0.50		2.CMC42.C3Z3.250.1	■

■ Stock item

Carbide | 5xd$_1$ | Z3 | 42° | eXedur SNP | a_p | a_e

Ø d_1	1.0 - 3.0 mm	3.1 - 6.0 mm	6.1 - 8.0 mm	r	0.1 - 1.524 mm
Tolerance	- 0.014 mm - 0.028 mm	- 0.020 mm - 0.038 mm	- 0.025 mm - 0.047 mm	Tolerance	± 0.05 · r mm

d_1 [mm]	d_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	r [mm]	r [inch]	Item number	Availability
2.6		13.00	5.20	6	55	0.20		2.CMC42.C2Z3.260.1	■
2.6		13.00	5.20	6	55	0.50		2.CMC42.C3Z3.260.1	■
2.7		13.50	5.40	6	55	0.20		2.CMC42.C2Z3.270.1	■
2.7		13.50	5.40	6	55	0.50		2.CMC42.C3Z3.270.1	■
2.8		14.00	5.60	6	55	0.20		2.CMC42.C2Z3.280.1	■
2.8		14.00	5.60	6	55	0.50		2.CMC42.C3Z3.280.1	■
2.9		14.50	5.80	6	55	0.20		2.CMC42.C2Z3.290.1	■
2.9		14.50	5.80	6	55	0.50		2.CMC42.C3Z3.290.1	■
3.0		15.00	6.00	6	55	0.20		2.CMC42.C2Z3.300.1	■
3.0		15.00	6.00	6	55	0.50		2.CMC42.C3Z3.300.1	■
3.1		15.50	6.20	6	60	0.20		2.CMC42.C2Z3.310.1	■
3.1		15.50	6.20	6	60	0.50		2.CMC42.C3Z3.310.1	■
3.175	**1/8**	15.88	6.35	6	60	0.254	.010	2.CMC.PSRC2Z3.F18	■
3.175	**1/8**	15.88	6.35	6	60	0.381	.015	2.CMC.PSRC3Z3.F18	■
3.3		16.50	6.60	6	60	0.20		2.CMC42.C2Z3.330.1	■
3.3		16.50	6.60	6	60	0.50		2.CMC42.C3Z3.330.1	■
3.7		18.50	7.40	6	60	0.20		2.CMC42.C2Z3.370.1	■
3.7		18.50	7.40	6	60	0.50		2.CMC42.C3Z3.370.1	■
3.968	**5/32**	19.84	7.94	6	60	0.254	.010	2.CMC.PSRC2Z3.F532	■
3.968	**5/32**	19.84	7.94	6	60	0.381	.015	2.CMC.PSRC3Z3.F532	■
4.0		20.00	8.00	6	60	0.20		2.CMC42.C2Z3.400.1	■
4.0		20.00	8.00	6	60	0.50		2.CMC42.C3Z3.400.1	■
4.3		21.50	8.60	8	60	0.20		2.CMC42.C2Z3.430.1	■
4.3		21.50	8.60	8	60	0.50		2.CMC42.C3Z3.430.1	■
4.7		23.50	9.40	8	70	0.20		2.CMC42.C2Z3.470.1	■
4.7		23.50	9.40	8	70	0.50		2.CMC42.C3Z3.470.1	■
4.762	**3/16**	23.81	9.52	8	70	0.254	.010	2.CMC.PSRC2Z3.F316	■
4.762	**3/16**	23.81	9.52	8	70	0.381	.015	2.CMC.PSRC3Z3.F316	■
4.8		24.00	9.60	8	70	0.20		2.CMC42.C2Z3.480.1	■
4.8		24.00	9.60	8	70	0.50		2.CMC42.C3Z3.480.1	■
5.0		25.00	10.00	8	70	0.20		2.CMC42.C2Z3.500.1	■
5.0		25.00	10.00	8	70	0.50		2.CMC42.C3Z3.500.1	■
5.3		26.50	10.60	10	70	0.20		2.CMC42.C2Z3.530.1	■
5.3		26.50	10.60	10	70	0.50		2.CMC42.C3Z3.530.1	■
5.560	**7/32**	27.80	11.12	10	70	0.381	.015	2.CMC.PSRC2Z3.F732	■
5.560	**7/32**	27.80	11.12	10	70	0.762	.030	2.CMC.PSRC3Z3.F732	■
5.7		28.50	11.40	10	70	0.20		2.CMC42.C2Z3.570.1	■
5.7		28.50	11.40	10	70	0.50		2.CMC42.C3Z3.570.1	■
6.0		30.00	12.00	10	70	0.20		2.CMC42.C2Z3.600.1	■
6.0		30.00	12.00	10	70	0.50		2.CMC42.C3Z3.600.1	■
6.0		30.00	12.00	10	70	1.00		2.CMC42.C4Z3.600.1	■
6.350	**1/4**	31.75	12.70	10	70	0.381	.015	2.CMC.PSRC2Z3.F14	■
6.350	**1/4**	31.75	12.70	10	70	0.762	.030	2.CMC.PSRC3Z3.F14	■
6.350	**1/4**	31.75	12.70	10	70	1.524	.060	2.CMC.PSRC4Z3.F14	■
8.0		40.00	16.00	12	90	0.20		2.CMC42.C2Z3.800.1	■
8.0		40.00	16.00	12	90	0.50		2.CMC42.C3Z3.800.1	■
8.0		40.00	16.00	12	90	1.50		2.CMC42.C4Z3.800.1	■

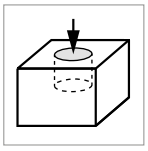
■ Stock item

CRAZYMILL by Mikron Tool Cool

NEW Type C - Plunge - Slot milling

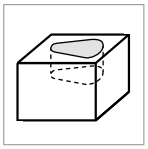
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Plunge milling

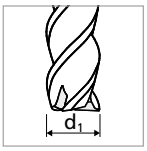


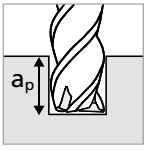
■ $f_{z,p}$: for plunge milling

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 v_c	$f_{z,p}$	$f_{z,s}$	a_p
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	100	0.0013	0.0046	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	0.0014	0.0049	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	0.0012	0.0042	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	0.0010	0.0035	0.5xd1
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	80	0.0010	0.0035	0.25xd1
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	80	0.0010	0.0035	0.25xd1
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	80	0.0010	0.0035	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	0.0013	0.0042	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	0.0012	0.0100	0.5xd1
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	100	0.0012	0.0100	0.5xd1
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	100	0.0012	0.0100	0.5xd1
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	100	0.0012	0.0100	0.5xd1
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	100	0.0012	0.0100	0.5xd1
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	100	0.0012	0.0100	0.5xd1
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	40	0.0010	0.0035	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	0.0010	0.0032	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	80	0.0010	0.0032	0.25xd1
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.0010	0.0035	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] a_p [mm]
$f_{z,p}$ [mm] $f_{z,s}$ [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

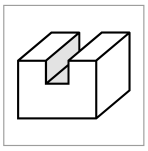
Ød1																							
1.5 mm 1/16"				2.0 mm 3/32"				3.0 mm 1/8"				4.0 mm 5/32"				5.0 mm 3/16" - 7/32"				6.0 mm - 8.0 mm 1/4"			
v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p	v_c	$f_{z,p}$	$f_{z,s}$	a_p
120	0.0020	0.0065	0.5xd1	120	0.0026	0.0091	0.5xd1	140	0.004	0.013	0.5xd1	140	0.005	0.020	0.5xd1	150	0.005	0.026	0.5xd1	160	0.006	0.033	0.5xd1
120	0.0021	0.0070	0.5xd1	120	0.0028	0.0098	0.5xd1	140	0.004	0.014	0.5xd1	140	0.005	0.021	0.5xd1	150	0.006	0.027	0.5xd1	160	0.006	0.034	0.5xd1
120	0.0018	0.0060	0.25xd1	120	0.0024	0.0084	0.25xd1	140	0.003	0.012	0.25xd1	140	0.004	0.017	0.25xd1	150	0.004	0.022	0.25xd1	160	0.005	0.028	0.25xd1
100	0.0015	0.0050	0.5xd1	100	0.0020	0.0070	0.5xd1	120	0.003	0.010	0.5xd1	120	0.004	0.015	0.5xd1	130	0.004	0.020	0.5xd1	140	0.005	0.025	0.5xd1
100	0.0015	0.0050	0.25xd1	100	0.0020	0.0070	0.25xd1	120	0.003	0.010	0.25xd1	120	0.004	0.015	0.25xd1	130	0.004	0.020	0.25xd1	140	0.005	0.025	0.25xd1
100	0.0015	0.0050	0.25xd1	100	0.0020	0.0070	0.25xd1	120	0.003	0.010	0.25xd1	120	0.004	0.015	0.25xd1	130	0.004	0.020	0.25xd1	140	0.005	0.025	0.25xd1
100	0.0015	0.0050	0.5xd1	100	0.0020	0.0070	0.5xd1	120	0.003	0.010	0.5xd1	120	0.004	0.015	0.5xd1	130	0.004	0.020	0.5xd1	140	0.005	0.020	0.5xd1
120	0.0019	0.0060	0.5xd1	120	0.0024	0.0084	0.5xd1	140	0.004	0.012	0.5xd1	140	0.004	0.017	0.5xd1	150	0.005	0.022	0.5xd1	160	0.005	0.028	0.5xd1
120	0.0018	0.0160	0.5xd1	120	0.0024	0.0210	0.5xd1	150	0.004	0.034	0.5xd1	160	0.004	0.035	0.5xd1	170	0.005	0.036	0.5xd1	180	0.005	0.037	0.5xd1
120	0.0018	0.0160	0.5xd1	120	0.0024	0.0210	0.5xd1	150	0.004	0.034	0.5xd1	160	0.004	0.035	0.5xd1	170	0.005	0.036	0.5xd1	180	0.005	0.037	0.5xd1
120	0.0018	0.0160	0.5xd1	120	0.0024	0.0210	0.5xd1	150	0.004	0.034	0.5xd1	160	0.004	0.035	0.5xd1	170	0.005	0.036	0.5xd1	180	0.005	0.037	0.5xd1
120	0.0018	0.0160	0.5xd1	120	0.0024	0.0210	0.5xd1	150	0.004	0.034	0.5xd1	160	0.004	0.035	0.5xd1	170	0.005	0.036	0.5xd1	180	0.005	0.037	0.5xd1
120	0.0018	0.0160	0.5xd1	120	0.0024	0.0210	0.5xd1	150	0.004	0.034	0.5xd1	160	0.004	0.035	0.5xd1	170	0.005	0.036	0.5xd1	180	0.005	0.037	0.5xd1
120	0.0018	0.0160	0.5xd1	120	0.0024	0.0210	0.5xd1	150	0.004	0.034	0.5xd1	160	0.004	0.035	0.5xd1	170	0.005	0.036	0.5xd1	180	0.005	0.037	0.5xd1
40	0.0015	0.0050	0.25xd1	50	0.0020	0.0070	0.25xd1	50	0.003	0.010	0.25xd1	60	0.004	0.014	0.25xd1	80	0.004	0.018	0.25xd1	80	0.005	0.021	0.25xd1
90	0.0014	0.0045	0.25xd1	100	0.0018	0.0063	0.25xd1	110	0.003	0.010	0.25xd1	120	0.004	0.013	0.25xd1	120	0.004	0.016	0.25xd1	120	0.005	0.019	0.25xd1
90	0.0014	0.0045	0.25xd1	100	0.0018	0.0063	0.25xd1	110	0.003	0.010	0.25xd1	120	0.004	0.013	0.25xd1	120	0.004	0.016	0.25xd1	120	0.005	0.019	0.25xd1
60	0.0015	0.0050	0.25xd1	80	0.0020	0.0070	0.25xd1	80	0.003	0.010	0.25xd1	100	0.004	0.014	0.25xd1	100	0.004	0.018	0.25xd1	120	0.005	0.021	0.25xd1

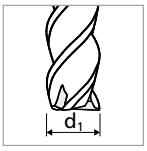
CRAZYMILL by Mikron Tool Cool

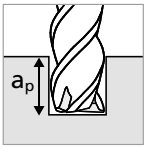
NEW Type C - Milling of through slots

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Through slot milling







Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm v_c	f_z	a_p
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	120	0.009	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	0.008	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	0.006	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	0.009	0.5xd1
		1.4105	X6CrMoS17	AISI 430F			
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	100	0.009	0.5xd1
		1.4112	X90CrMoV18	AISI 440B			
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	100	0.009	0.5xd1
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH			
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	100	0.007	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	0.007	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	0.010	0.5xd1
		3.4365	AlZnMgCu1.5	ASTM 7075			
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	170	0.010	0.5xd1
		3.2381	GD-AlSi10Mg	UNS A03590			
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	170	0.012	0.5xd1
		2.0065	Cu-ETP / CW004A	UNS C11000			
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	170	0.012	0.5xd1
		2.0360	CuZn40 CW509L	UNS C28000			
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	170	0.012	0.5xd1
		2.1020	CuSn6	UNS C51900			
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	170	0.011	0.5xd1
		2.0960	CuAl9Mn2	UNS C63200			
S_1	Super alloys	2.4856		Inconel 625	80	0.005	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	0.009	0.25xd1
		3.7065	Gr.4	ASTM B348 / F68			
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	80	0.009	0.25xd1
		9.9367	TiAl6Nb7	ASTM F1295			
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	80	0.005	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]
f_z [mm]
a_p [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

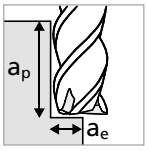
Ød1																	
1.5 mm 1/16"			2.0 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			5.0 mm 3/16" - 7/32"			6.0 mm - 8.0 mm 1/4"		
v_c	f_z	a_p	v_c	f_z	a_p	v_c	f_z	a_p	v_c	f_z	a_p	v_c	f_z	a_p	v_c	f_z	a_p
140	0.015	0.5xd1	160	0.020	0.5xd1	180	0.029	0.5xd1	200	0.031	0.5xd1	200	0.031	0.5xd1	220	0.032	0.5xd1
140	0.013	0.5xd1	160	0.019	0.5xd1	180	0.028	0.5xd1	200	0.029	0.5xd1	200	0.030	0.5xd1	220	0.031	0.5xd1
140	0.012	0.25xd1	160	0.017	0.25xd1	180	0.025	0.25xd1	200	0.026	0.25xd1	200	0.026	0.25xd1	220	0.027	0.25xd1
120	0.015	0.5xd1	140	0.020	0.5xd1	160	0.028	0.5xd1	180	0.029	0.5xd1	180	0.030	0.5xd1	200	0.031	0.5xd1
120	0.013	0.5xd1	140	0.019	0.5xd1	160	0.027	0.5xd1	180	0.028	0.5xd1	180	0.029	0.5xd1	200	0.029	0.5xd1
120	0.013	0.5xd1	140	0.019	0.5xd1	160	0.027	0.5xd1	180	0.028	0.5xd1	180	0.029	0.5xd1	200	0.029	0.5xd1
120	0.011	0.5xd1	140	0.017	0.5xd1	160	0.025	0.5xd1	180	0.027	0.5xd1	180	0.027	0.5xd1	200	0.028	0.5xd1
120	0.015	0.5xd1	140	0.017	0.5xd1	160	0.025	0.5xd1	180	0.031	0.5xd1	200	0.031	0.5xd1	200	0.032	0.5xd1
190	0.016	0.5xd1	210	0.021	0.5xd1	230	0.034	0.5xd1	250	0.035	0.5xd1	250	0.036	0.5xd1	270	0.037	0.5xd1
190	0.016	0.5xd1	210	0.021	0.5xd1	230	0.032	0.5xd1	250	0.034	0.5xd1	250	0.034	0.5xd1	270	0.036	0.5xd1
190	0.016	0.5xd1	210	0.021	0.5xd1	230	0.034	0.5xd1	250	0.035	0.5xd1	250	0.036	0.5xd1	270	0.037	0.5xd1
190	0.016	0.5xd1	210	0.021	0.5xd1	230	0.034	0.5xd1	250	0.035	0.5xd1	250	0.036	0.5xd1	270	0.037	0.5xd1
190	0.016	0.5xd1	210	0.021	0.5xd1	230	0.034	0.5xd1	250	0.035	0.5xd1	250	0.036	0.5xd1	270	0.037	0.5xd1
190	0.016	0.5xd1	210	0.021	0.5xd1	230	0.034	0.5xd1	250	0.035	0.5xd1	250	0.036	0.5xd1	270	0.037	0.5xd1
80	0.006	0.25xd1	100	0.007	0.25xd1	100	0.010	0.25xd1	120	0.013	0.25xd1	120	0.013	0.25xd1	120	0.013	0.25xd1
80	0.012	0.25xd1	100	0.017	0.25xd1	100	0.027	0.25xd1	120	0.027	0.25xd1	120	0.027	0.25xd1	140	0.028	0.25xd1
80	0.012	0.25xd1	100	0.017	0.25xd1	100	0.027	0.25xd1	120	0.027	0.25xd1	120	0.027	0.25xd1	140	0.028	0.25xd1
80	0.006	0.25xd1	100	0.007	0.25xd1	100	0.010	0.25xd1	120	0.013	0.25xd1	120	0.013	0.25xd1	120	0.013	0.25xd1

CRAZYMILL by Mikron Tool Cool

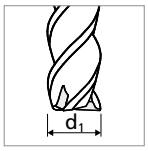
NEW Type C - Side milling - Semi-finishing

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 v_c	1.0 mm f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	120	0.017
		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	0.016
		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	0.012
		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	0.018
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	100	0.017
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	100	0.017
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	100	0.013
		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	0.012
		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	0.020
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	170	0.020
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	170	0.022
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	170	0.022
		2.0360	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	170	0.022
		2.1020	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	170	0.020
		2.0960	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	100	0.008
		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	0.018
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	100	0.018
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	100	0.008
			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]
f_z [mm]

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

P ●	N ●	S3 ●
M ●	S1 ●	H1 ⊠
K ●	S2 ●	H2 ⊠

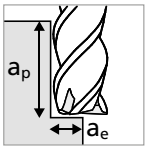
Ød1	1.5 mm 1/16"		2.0 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"		8.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	140	0.026	160	0.038	180	0.048	200	0.050	200	0.052	220	0.056	220	0.068
	140	0.025	160	0.036	180	0.044	200	0.048	200	0.050	220	0.054	220	0.066
	140	0.022	160	0.035	180	0.042	200	0.043	200	0.045	220	0.048	220	0.058
	120	0.026	140	0.038	160	0.046	180	0.048	180	0.050	200	0.055	200	0.062
	120	0.025	140	0.036	160	0.044	180	0.046	180	0.048	200	0.052	200	0.060
	120	0.025	140	0.036	160	0.044	180	0.046	180	0.048	200	0.052	200	0.060
	120	0.016	140	0.034	160	0.042	180	0.044	180	0.046	200	0.049	200	0.058
	120	0.026	140	0.032	160	0.043	180	0.054	180	0.056	200	0.058	200	0.070
	190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
	190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
	190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
	190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
	190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
	190	0.029	210	0.040	230	0.060	250	0.062	250	0.064	270	0.068	270	0.084
	100	0.010	120	0.012	120	0.016	140	0.018	140	0.020	160	0.022	160	0.024
	100	0.022	120	0.032	120	0.042	140	0.044	140	0.046	160	0.048	160	0.054
	100	0.022	120	0.032	120	0.042	140	0.044	140	0.046	160	0.048	160	0.054
	100	0.010	120	0.012	120	0.016	140	0.018	140	0.020	160	0.022	160	0.024

CRAZYMILL by Mikron Tool Cool

NEW Type C - Side milling - Finishing

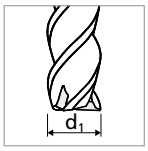
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

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 v_c	1.0 mm f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	130	0.008
		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	0.007
		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	0.006
		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	0.008
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	100	0.008
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	100	0.008
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	100	0.006
		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	0.006
		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	0.009
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	130	0.009
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	130	0.010
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	130	0.010
		2.0360	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	130	0.010
		2.1020	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	130	0.009
		2.0960	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	110	0.004
		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	0.008
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	110	0.008
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	110	0.004
			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]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ⊠
K ●	S_2 ●	H_2 ⊠

	Ød1 1.5 mm 1/16"		2.0 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16" - 7/32"		6.0 mm 1/4"		8.0 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
	180	0.012	200	0.017	210	0.023	220	0.025	220	0.028	220	0.033	220	0.042
	180	0.011	200	0.016	210	0.022	220	0.024	220	0.026	220	0.029	220	0.038
	180	0.010	200	0.015	210	0.020	220	0.021	220	0.023	220	0.025	220	0.034
	150	0.012	170	0.017	180	0.022	200	0.024	200	0.026	200	0.029	200	0.036
	150	0.011	170	0.016	180	0.022	200	0.023	200	0.025	200	0.028	200	0.037
	150	0.011	170	0.016	180	0.022	200	0.023	200	0.025	200	0.028	200	0.037
	150	0.008	170	0.015	180	0.020	200	0.022	200	0.024	200	0.026	200	0.035
	130	0.012	150	0.014	160	0.022	170	0.025	170	0.029	170	0.031	200	0.040
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	220	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	220	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	220	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	220	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	220	0.045
	180	0.013	200	0.018	210	0.029	220	0.030	220	0.033	220	0.036	220	0.045
	120	0.005	130	0.005	130	0.008	140	0.010	140	0.011	150	0.012	150	0.021
	120	0.010	130	0.014	130	0.020	140	0.022	140	0.024	150	0.026	150	0.035
	120	0.010	130	0.014	130	0.020	140	0.022	140	0.024	150	0.026	150	0.035
	120	0.005	130	0.005	130	0.008	140	0.010	140	0.011	150	0.012	150	0.021

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 ≤ 0.05 mm.

Coolant pressure: at least 15 bar coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

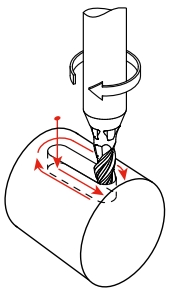
Revolution	[rpm]	≤ 10'000	> 10'000
Minimal pressure	[bar]	15	30

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



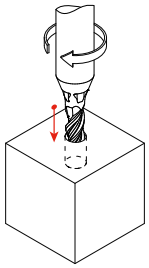
Mikron Tool recommends a machining process in 3 steps to guarantee the tolerance of the slot:

- **1. Plunge milling or plunging with a linear ramp**
- **2. Slot milling**
- **3. Side milling (finishing milling)**

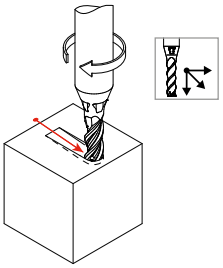
Mikron Tool generally recommends the time and space saving plunge milling (vertical). As an alternative, plunging with a linear ramp is also possible.

MILLING PROCESS

1. Plunge milling or Linear ramp

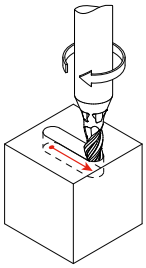


When plunge milling, an increase of the drilling diameter of approx. 0.05 mm respect to the tool diameter needs to be applied. The maximum milling depth is 2.5 x d_1 ($a_{p,max}$ = 1 x d_1). For data regarding feed **$f_{z,p}$** refer to cutting data for plunge milling (page 536).



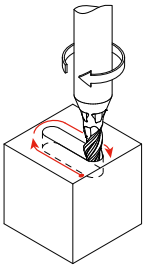
The maximum plunge angle α depends on the material and cannot be overcut (see table below). For data regarding feed **$f_{z,s}$** refer to cutting data for keyway milling (page 536).

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).

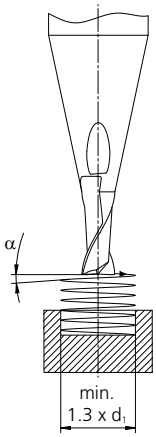
3. Side milling



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°

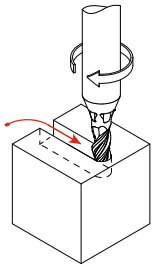


NEW

Process CrazyMill Cool P&S

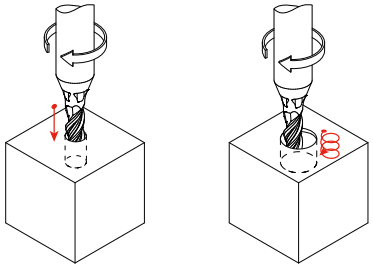
MILLING PROCESS

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.

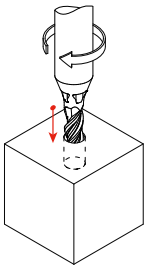
C. Plunge milling



With CrazyMill Cool P&S, plunge milling (drilling) can be executed in two versions:

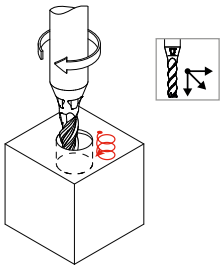
- **1. Direct plunge milling**
- **2. Plunging with helical interpolation**

1. Direct plunge milling



When plunge milling, an increase of the drilling diameter of approx. 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 $\mathbf{f_{z,p}}$ refer to cutting data for plunge milling (page 536 / page 548).

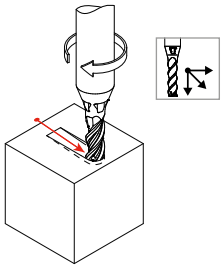
2. Plunging with helical interpolation



The maximum plunge angle α depends on the material and cannot be overcut (see table page 557). For data regarding feed $\mathbf{f_{z,s}}$ refer to cutting data for keyway milling (page 536 / page 548). Attention: the minimum diameter of the hole is $\mathbf{d_{hole} = 1.3 \times d_{tool}}$

MILLING PROCESS

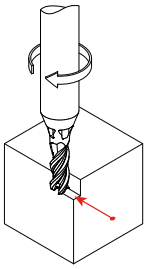
D. Linear ramp



The maximum plunge angle α 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).

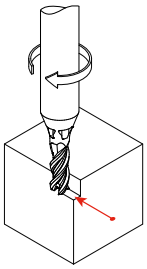
E. Side milling

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

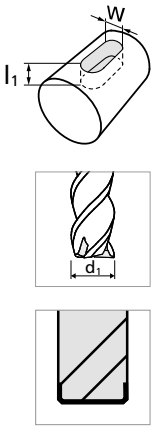


Recommended cutting parameters:
v_c and f_z = as specified in the cutting data table
Type A: a_p = 2.5 x d; a_e = 0.05 – 0.10 x d depending on required surface quality
Type C: a_p = 2 x d; a_e = 0.02 – 0.05 x d depending on required surface quality

Process CrazyMill Cool P&S Square - Type A

THE RIGHT TOOL FOR KEYWAY SLOTTING - ONLY FOR TYPE A

Tool selection



w slot [mm]	w slot [inch]	d_1 Tool [mm] | [inch]	$l_{1, max}$ [mm]	Item number
1.1		1.0	2.50	2.CMC42.A8Z3.100.1
1.2		1.0	2.50	2.CMC42.A8Z3.100.1
		1.1	2.75	2.CMC42.A8Z3.110.1
1.3		1.1	2.75	2.CMC42.A8Z3.110.1
		1.2	3.00	2.CMC42.A8Z3.120.1
1.4		1.2	3.00	2.CMC42.A8Z3.120.1
		1.3	3.25	2.CMC42.A8Z3.130.1
1.5		1.3	3.25	2.CMC42.A8Z3.130.1
		1.4	3.50	2.CMC42.A8Z3.140.1
1.587	**1/16**	1.3	3.25	2.CMC42.A8Z3.130.1
		1.4	3.50	2.CMC42.A8Z3.140.1
1.6		1.4	3.50	2.CMC42.A8Z3.140.1
		1.5	3.75	2.CMC42.A8Z3.150.1
1.7		1.5	3.75	2.CMC42.A8Z3.150.1
		1/16	3.97	2.CMC.PSSAZ3.F116
		1.6	4.00	2.CMC42.A8Z3.160.1
1.8		1.5	3.75	2.CMC42.A8Z3.150.1
		1/16	3.97	2.CMC.PSSAZ3.F116
		1.6	4.00	2.CMC42.A8Z3.160.1
1.9		1.6	4.00	2.CMC42.A8Z3.160.1
		1.7	4.25	2.CMC42.A8Z3.170.1
2.0		1.7	4.25	2.CMC42.A8Z3.170.1
		1.8	4.50	2.CMC42.A8Z3.180.1
2.1		1.8	4.50	2.CMC42.A8Z3.180.1
		1.9	4.75	2.CMC42.A8Z3.190.1
2.2		1.9	4.75	2.CMC42.A8Z3.190.1
		2.0	5.00	2.CMC42.A8Z3.200.1
2.3		2.0	5.00	2.CMC42.A8Z3.200.1
		2.1	5.25	2.CMC42.A8Z3.210.1
2.381	**3/32**	2.0	5.00	2.CMC42.A8Z3.200.1
		2.1	5.25	2.CMC42.A8Z3.210.1
		2.2	5.50	2.CMC42.A8Z3.220.1
2.4		2.0	5.00	2.CMC42.A8Z3.200.1
		2.1	5.25	2.CMC42.A8Z3.210.1
		2.2	5.50	2.CMC42.A8Z3.220.1
2.5		2.1	5.25	2.CMC42.A8Z3.210.1
		2.2	5.50	2.CMC42.A8Z3.220.1
		2.3	5.75	2.CMC42.A8Z3.230.1
2.6		2.2	5.50	2.CMC42.A8Z3.220.1
		2.3	5.75	2.CMC42.A8Z3.230.1
		3/32	5.95	2.CMC.PSSAZ3.F332
		2.4	6.00	2.CMC42.A8Z3.240.1
2.7		2.3	5.75	2.CMC42.A8Z3.230.1
		3/32	5.95	2.CMC.PSSAZ3.F332
		2.4	6.00	2.CMC42.A8Z3.240.1
		2.5	6.25	2.CMC42.A8Z3.250.1
2.8		2.4	6.00	2.CMC42.A8Z3.240.1
		2.5	6.25	2.CMC42.A8Z3.250.1
		2.6	6.50	2.CMC42.A8Z3.260.1
2.9		2.5	6.25	2.CMC42.A8Z3.250.1
		2.6	6.50	2.CMC42.A8Z3.260.1
		2.7	6.75	2.CMC42.A8Z3.270.1
3.0		2.6	6.50	2.CMC42.A8Z3.260.1
		2.7	6.75	2.CMC42.A8Z3.270.1
		2.8	7.00	2.CMC42.A8Z3.280.1

w slot [mm]	w slot [inch]	d_1 Tool [mm] | [inch]	$l_{1, max}$ [mm]	Item number
3.1		2.6	6.50	2.CMC42.A8Z3.260.1
		2.7	6.75	2.CMC42.A8Z3.270.1
		2.8	7.00	2.CMC42.A8Z3.280.1
		2.9	7.25	2.CMC42.A8Z3.290.1
3.175	**1/8**	2.7	6.75	2.CMC42.A8Z3.270.1
		2.8	7.00	2.CMC42.A8Z3.280.1
		2.9	7.25	2.CMC42.A8Z3.290.1
3.2		2.7	6.75	2.CMC42.A8Z3.270.1
		2.8	7.00	2.CMC42.A8Z3.280.1
		2.9	7.25	2.CMC42.A8Z3.290.1
		3.0	7.50	2.CMC42.A8Z3.300.1
3.3		2.8	7.00	2.CMC42.A8Z3.280.1
		2.9	7.25	2.CMC42.A8Z3.290.1
		3.0	7.50	2.CMC42.A8Z3.300.1
		3.1	7.75	2.CMC42.A8Z3.310.1
3.4		2.9	7.25	2.CMC42.A8Z3.290.1
		3.0	7.50	2.CMC42.A8Z3.300.1
		3.1	7.75	2.CMC42.A8Z3.310.1
3.5		3.0	7.50	2.CMC42.A8Z3.300.1
		3.1	7.75	2.CMC42.A8Z3.310.1
		1/8	7.94	2.CMC.PSSAZ3.F18
		3.3	8.25	2.CMC42.A8Z3.330.1
3.6		3.0	7.50	2.CMC42.A8Z3.300.1
		3.1	7.75	2.CMC42.A8Z3.310.1
		1/8	7.94	2.CMC.PSSAZ3.F18
		3.3	8.25	2.CMC42.A8Z3.330.1
3.7		3.1	7.75	2.CMC42.A8Z3.310.1
		1/8	7.94	2.CMC.PSSAZ3.F18
		3.3	8.25	2.CMC42.A8Z3.330.1
3.8		3.3	8.25	2.CMC42.A8Z3.330.1
3.9		3.3	8.25	2.CMC42.A8Z3.330.1
		3.7	9.25	2.CMC42.A8Z3.370.1
3.968	**5/32**	3.3	8.25	2.CMC42.A8Z3.330.1
		3.7	9.25	2.CMC42.A8Z3.370.1
4.0		3.7	9.25	2.CMC42.A8Z3.370.1
4.1		3.7	9.25	2.CMC42.A8Z3.370.1
4.2		3.7	9.25	2.CMC42.A8Z3.370.1
		5/32	9.92	2.CMC.PSSAZ3.F532
		4.0	10.00	2.CMC42.A8Z3.400.1
4.3		3.7	9.25	2.CMC42.A8Z3.370.1
		5/32	9.92	2.CMC.PSSAZ3.F532
		4.0	10.00	2.CMC42.A8Z3.400.1
4.4		3.7	9.25	2.CMC42.A8Z3.370.1
		5/32	9.92	2.CMC.PSSAZ3.F532
		4.0	10.00	2.CMC42.A8Z3.400.1
4.5		4.0	10.00	2.CMC42.A8Z3.400.1
		4.3	10.75	2.CMC42.A8Z3.430.1
4.6		4.0	10.00	2.CMC42.A8Z3.400.1
		4.3	10.75	2.CMC42.A8Z3.430.1
4.7		4.0	10.00	2.CMC42.A8Z3.400.1
		4.3	10.75	2.CMC42.A8Z3.430.1
4.762	**3/16**	4.0	10.00	2.CMC42.A8Z3.400.1
		4.3	10.75	2.CMC42.A8Z3.430.1
4.8		4.0	10.00	2.CMC42.A8Z3.400.1
		4.3	10.75	2.CMC42.A8Z3.430.1

w slot [mm]	**w** slot **[inch]**	**d_1** Tool [mm]**|[inch]**	**$l_{1,\,max}$** [mm]	Item number
4.9		4.3	10.75	2.CMC42.A8Z3.430.1
		4.7	11.75	2.CMC42.A8Z3.470.1
5.0		4.3	10.75	2.CMC42.A8Z3.430.1
		4.7	11.75	2.CMC42.A8Z3.470.1
		3/16	11.91	2.CMC.PSSAZ3.F316
		4.8	12.00	2.CMC42.A8Z3.480.1
5.1		4.3	10.75	2.CMC42.A8Z3.430.1
		4.7	11.75	2.CMC42.A8Z3.470.1
		3/16	11.91	2.CMC.PSSAZ3.F316
		4.8	12.00	2.CMC42.A8Z3.480.1
5.2		4.7	11.75	2.CMC42.A8Z3.470.1
		3/16	11.91	2.CMC.PSSAZ3.F316
		4.8	12.00	2.CMC42.A8Z3.480.1
		5.0	12.50	2.CMC42.A8Z3.500.1
5.3		4.7	11.75	2.CMC42.A8Z3.470.1
		3/16	11.91	2.CMC.PSSAZ3.F316
		4.8	12.00	2.CMC42.A8Z3.480.1
		5.0	12.50	2.CMC42.A8Z3.500.1
5.4		4.7	11.75	2.CMC42.A8Z3.470.1
		3/16	11.91	2.CMC.PSSAZ3.F316
		4.8	12.00	2.CMC42.A8Z3.480.1
		5.0	12.50	2.CMC42.A8Z3.500.1
5.5		4.7	11.75	2.CMC42.A8Z3.470.1
		3/16	11.91	2.CMC.PSSAZ3.F316
		4.8	12.00	2.CMC42.A8Z3.480.1
		5.0	12.50	2.CMC42.A8Z3.500.1
		5.3	13.25	2.CMC42.A8Z3.530.1
5.560	**7/32**	4.7	11.75	2.CMC42.A8Z3.470.1
		3/16	11.91	2.CMC.PSSAZ3.F316
		4.8	12.00	2.CMC42.A8Z3.480.1
		5.0	12.50	2.CMC42.A8Z3.500.1
		5.3	13.25	2.CMC42.A8Z3.530.1
5.6		4.7	11.75	2.CMC42.A8Z3.470.1
		3/16	11.91	2.CMC.PSSAZ3.F316
		4.8	12.00	2.CMC42.A8Z3.480.1
		5.0	12.50	2.CMC42.A8Z3.500.1
		5.3	13.25	2.CMC42.A8Z3.530.1
5.7		4.8	12.00	2.CMC42.A8Z3.480.1
		5.0	12.50	2.CMC42.A8Z3.500.1
		5.3	13.25	2.CMC42.A8Z3.530.1
5.8		5.0	12.50	2.CMC42.A8Z3.500.1
		5.3	13.25	2.CMC42.A8Z3.530.1
5.9		5.0	12.50	2.CMC42.A8Z3.500.1
		5.3	13.25	2.CMC42.A8Z3.530.1
		7/32	13.90	2.CMC.PSSAZ3.F732
		5.7	14.25	2.CMC42.A8Z3.570.1

w slot [mm]	**w** slot **[inch]**	**d_1** Tool [mm]**|[inch]**	**$l_{1,\,max}$** [mm]	Item number
6.0		5.0	12.50	2.CMC42.A8Z3.500.1
		5.3	13.25	2.CMC42.A8Z3.530.1
		7/32	13.90	2.CMC.PSSAZ3.F732
		5.7	14.25	2.CMC42.A8Z3.570.1
6.1		5.3	13.25	2.CMC42.A8Z3.530.1
		7/32	13.90	2.CMC.PSSAZ3.F732
		5.7	14.25	2.CMC42.A8Z3.570.1
6.2		5.3	13.25	2.CMC42.A8Z3.530.1
		7/32	13.90	2.CMC.PSSAZ3.F732
		5.7	14.25	2.CMC42.A8Z3.570.1
		6.0	15.00	2.CMC42.A8Z3.600.1
6.3		5.3	13.25	2.CMC42.A8Z3.530.1
		7/32	13.90	2.CMC.PSSAZ3.F732
		5.7	14.25	2.CMC42.A8Z3.570.1
		6.0	15.00	2.CMC42.A8Z3.600.1
6.350	**1/4**	5.3	13.25	2.CMC42.A8Z3.530.1
		7/32	13.90	2.CMC.PSSAZ3.F732
		5.7	14.25	2.CMC42.A8Z3.570.1
		6.0	15.00	2.CMC42.A8Z3.600.1
6.4		5.7	14.25	2.CMC42.A8Z3.570.1
		6.0	15.00	2.CMC42.A8Z3.600.1
6.5		5.7	14.25	2.CMC42.A8Z3.570.1
		6.0	15.00	2.CMC42.A8Z3.600.1
6.6		5.7	14.25	2.CMC42.A8Z3.570.1
		6.0	15.00	2.CMC42.A8Z3.600.1
		1/4	15.88	2.CMC.PSSAZ3.F14
6.7		5.7	14.25	2.CMC42.A8Z3.570.1
		6.0	15.00	2.CMC42.A8Z3.600.1
		1/4	15.88	2.CMC.PSSAZ3.F14
6.8		5.7	14.25	2.CMC42.A8Z3.570.1
		6.0	15.00	2.CMC42.A8Z3.600.1
		1/4	15.88	2.CMC.PSSAZ3.F14
6.9		6.0	15.00	2.CMC42.A8Z3.600.1
		1/4	15.88	2.CMC.PSSAZ3.F14
7.0		6.0	15.00	2.CMC42.A8Z3.600.1
		1/4	15.88	2.CMC.PSSAZ3.F14
7.1		6.0	15.00	2.CMC42.A8Z3.600.1
		1/4	15.88	2.CMC.PSSAZ3.F14
7.2		6.0	15.00	2.CMC42.A8Z3.600.1
		1/4	15.88	2.CMC.PSSAZ3.F14
7.3		**1/4**	15.88	2.CMC.PSSAZ3.F14
7.4		**1/4**	15.88	2.CMC.PSSAZ3.F14
7.5		**1/4**	15.88	2.CMC.PSSAZ3.F14
7.6		**1/4**	15.88	2.CMC.PSSAZ3.F14
8.2 - 9.6		8.0	20.00	2.CMC42.A8Z3.800.1

Example:

Milling of keyway slot 3x1.8 mm DIN 6885

Width of keyway: **w** = 3 mm; Depth of keyway: $\mathbf{l_1}$ = 1.8 mm;

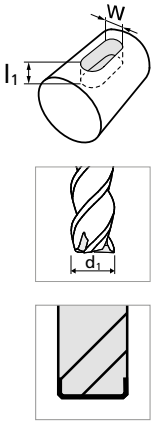
Mikron Tool recommends the following diameters: $\mathbf{d_1}$ = 2.6 mm or $\mathbf{d_1}$ = 2.7 mm or $\mathbf{d_1}$ = 2.8 mm

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 [mm]	w Slot **[inch]**	d_1 Tool [mm]|**[inch]**	$l_{1, max}$ [mm]	r [mm]|**[inch]**	Item number
1.1		1.0	2.50	0.10	2.CMC42.A2Z3.100.1
		1.0	2.50	0.20	2.CMC42.A3Z3.100.1
1.2		1.0	2.50	0.10	2.CMC42.A2Z3.100.1
		1.0	2.50	0.20	2.CMC42.A3Z3.100.1
		1.1	2.75	0.10	2.CMC42.A2Z3.110.1
		1.1	2.75	0.20	2.CMC42.A3Z3.110.1
1.3		1.1	2.75	0.10	2.CMC42.A2Z3.110.1
		1.1	2.75	0.20	2.CMC42.A3Z3.110.1
		1.2	3.00	0.10	2.CMC42.A2Z3.120.1
		1.2	3.00	0.20	2.CMC42.A3Z3.120.1
1.4		1.2	3.00	0.10	2.CMC42.A2Z3.120.1
		1.2	3.00	0.20	2.CMC42.A3Z3.120.1
		1.3	3.25	0.10	2.CMC42.A2Z3.130.1
		1.3	3.25	0.20	2.CMC42.A3Z3.130.1
1.5		1.3	3.25	0.10	2.CMC42.A2Z3.130.1
		1.3	3.25	0.20	2.CMC42.A3Z3.130.1
		1.4	3.50	0.10	2.CMC42.A2Z3.140.1
		1.4	3.50	0.20	2.CMC42.A3Z3.140.1
1.587	**1/16**	1.4	3.50	0.10	2.CMC42.A2Z3.140.1
		1.4	3.50	0.20	2.CMC42.A3Z3.140.1
		1.5	3.75	0.10	2.CMC42.A2Z3.150.1
		1.5	3.75	0.30	2.CMC42.A3Z3.150.1
1.6		1.4	3.50	0.10	2.CMC42.A2Z3.140.1
		1.4	3.50	0.20	2.CMC42.A3Z3.140.1
		1.5	3.75	0.10	2.CMC42.A2Z3.150.1
		1.5	3.75	0.30	2.CMC42.A3Z3.150.1
1.7		1.5	3.75	0.10	2.CMC42.A2Z3.150.1
		1.5	3.75	0.30	2.CMC42.A3Z3.150.1
		1/16	3.97	**0.127**	2.CMC.PSRA2Z3.F116
		1/16	3.97	**0.254**	2.CMC.PSRA3Z3.F116
		1.6	4.00	0.10	2.CMC42.A2Z3.160.1
		1.6	4.00	0.30	2.CMC42.A3Z3.160.1
1.8		1.5	3.75	0.10	2.CMC42.A2Z3.150.1
		1.5	3.75	0.30	2.CMC42.A3Z3.150.1
		1/16	3.97	**0.127**	2.CMC.PSRA2Z3.F116
		1/16	3.97	**0.254**	2.CMC.PSRA3Z3.F116
		1.6	4.00	0.10	2.CMC42.A2Z3.160.1
		1.6	4.00	0.30	2.CMC42.A3Z3.160.1
1.9		1.6	4.00	0.10	2.CMC42.A2Z3.160.1
		1.6	4.00	0.30	2.CMC42.A3Z3.160.1
		1.7	4.25	0.10	2.CMC42.A2Z3.170.1
		1.7	4.25	0.30	2.CMC42.A3Z3.170.1
2.0		1.7	4.25	0.10	2.CMC42.A2Z3.170.1
		1.7	4.25	0.30	2.CMC42.A3Z3.170.1
		1.8	4.50	0.10	2.CMC42.A2Z3.180.1
		1.8	4.50	0.30	2.CMC42.A3Z3.180.1
2.1		1.8	4.50	0.10	2.CMC42.A2Z3.180.1
		1.8	4.50	0.30	2.CMC42.A3Z3.180.1
		1.9	4.75	0.10	2.CMC42.A2Z3.190.1
		1.9	4.75	0.30	2.CMC42.A3Z3.190.1
2.2		1.9	4.75	0.10	2.CMC42.A2Z3.190.1
		1.9	4.75	0.30	2.CMC42.A3Z3.190.1
		2.0	5.00	0.10	2.CMC42.A2Z3.200.1
		2.0	5.00	0.20	2.CMC42.A3Z3.200.1
		2.0	5.00	0.50	2.CMC42.A4Z3.200.1

w Slot [mm]	w Slot **[inch]**	d_1 Tool [mm]|**[inch]**	$l_{1, max}$ [mm]	r [mm]|**[inch]**	Item number
2.3		2.0	5.00	0.10	2.CMC42.A2Z3.200.1
		2.0	5.00	0.20	2.CMC42.A3Z3.200.1
		2.0	5.00	0.50	2.CMC42.A4Z3.200.1
		2.1	5.25	0.20	2.CMC42.A2Z3.210.1
		2.1	5.25	0.50	2.CMC42.A3Z3.210.1
2.381	**3/32**	2.0	5.00	0.10	2.CMC42.A2Z3.200.1
		2.0	5.00	0.20	2.CMC42.A3Z3.200.1
		2.0	5.00	0.50	2.CMC42.A4Z3.200.1
		2.1	5.25	0.20	2.CMC42.A2Z3.210.1
		2.1	5.25	0.50	2.CMC42.A3Z3.210.1
		2.2	5.50	0.20	2.CMC42.A2Z3.220.1
		2.2	5.50	0.50	2.CMC42.A3Z3.220.1
2.4		2.0	5.00	0.10	2.CMC42.A2Z3.200.1
		2.0	5.00	0.20	2.CMC42.A3Z3.200.1
		2.0	5.00	0.50	2.CMC42.A4Z3.200.1
		2.1	5.25	0.20	2.CMC42.A2Z3.210.1
		2.1	5.25	0.50	2.CMC42.A3Z3.210.1
		2.2	5.50	0.20	2.CMC42.A2Z3.220.1
		2.2	5.50	0.50	2.CMC42.A3Z3.220.1
2.5		2.1	5.25	0.20	2.CMC42.A2Z3.210.1
		2.1	5.25	0.50	2.CMC42.A3Z3.210.1
		2.2	5.50	0.20	2.CMC42.A2Z3.220.1
		2.2	5.50	0.50	2.CMC42.A3Z3.220.1
		2.3	5.75	0.20	2.CMC42.A2Z3.230.1
		2.3	5.75	0.50	2.CMC42.A3Z3.230.1
2.6		2.2	5.50	0.20	2.CMC42.A2Z3.220.1
		2.2	5.50	0.50	2.CMC42.A3Z3.220.1
		2.3	5.75	0.20	2.CMC42.A2Z3.230.1
		2.3	5.75	0.50	2.CMC42.A3Z3.230.1
		3/32	5.95	**0.127**	2.CMC.PSRA2Z3.F332
		3/32	5.95	**0.254**	2.CMC.PSRA3Z3.F332
		3/32	5.95	**0.381**	2.CMC.PSRA4Z3.F332
		2.4	6.00	0.20	2.CMC42.A2Z3.240.1
		2.4	6.00	0.50	2.CMC42.A3Z3.240.1
2.7		2.3	5.75	0.20	2.CMC42.A2Z3.230.1
		2.3	5.75	0.50	2.CMC42.A3Z3.230.1
		3/32	5.95	**0.127**	2.CMC.PSRA2Z3.F332
		3/32	5.95	**0.254**	2.CMC.PSRA3Z3.F332
		3/32	5.95	**0.381**	2.CMC.PSRA4Z3.F332
		2.4	6.00	0.20	2.CMC42.A2Z3.240.1
		2.4	6.00	0.50	2.CMC42.A3Z3.240.1
		2.5	6.25	0.20	2.CMC42.A2Z3.250.1
		2.5	6.25	0.50	2.CMC42.A3Z3.250.1
2.8		2.4	6.00	0.20	2.CMC42.A2Z3.240.1
		2.4	6.00	0.50	2.CMC42.A3Z3.240.1
		2.5	6.25	0.20	2.CMC42.A2Z3.250.1
		2.5	6.25	0.50	2.CMC42.A3Z3.250.1
		2.6	6.50	0.20	2.CMC42.A2Z3.260.1
		2.6	6.50	0.50	2.CMC42.A3Z3.260.1
2.9		2.5	6.25	0.20	2.CMC42.A2Z3.250.1
		2.5	6.25	0.50	2.CMC42.A3Z3.250.1
		2.6	6.50	0.20	2.CMC42.A2Z3.260.1
		2.6	6.50	0.50	2.CMC42.A3Z3.260.1
		2.7	6.75	0.20	2.CMC42.A2Z3.270.1
		2.7	6.75	0.50	2.CMC42.A3Z3.270.1

w Slot [mm]	w Slot [inch]	d_1 Tool [mm]|[inch]	$l_{1, max}$ [mm]	r [mm]|[inch]	Item number
3.0		2.6	6.50	0.20	2.CMC42.A2Z3.260.1
		2.6	6.50	0.50	2.CMC42.A3Z3.260.1
		2.7	6.75	0.20	2.CMC42.A2Z3.270.1
		2.7	6.75	0.50	2.CMC42.A3Z3.270.1
		2.8	7.00	0.20	2.CMC42.A2Z3.280.1
		2.8	7.00	0.50	2.CMC42.A3Z3.280.1
3.1		2.6	6.50	0.20	2.CMC42.A2Z3.260.1
		2.6	6.50	0.50	2.CMC42.A3Z3.260.1
		2.7	6.75	0.20	2.CMC42.A2Z3.270.1
		2.7	6.75	0.50	2.CMC42.A3Z3.270.1
		2.8	7.00	0.20	2.CMC42.A2Z3.280.1
		2.8	7.00	0.50	2.CMC42.A3Z3.280.1
		2.9	7.25	0.20	2.CMC42.A2Z3.290.1
		2.9	7.25	0.50	2.CMC42.A3Z3.290.1
3.175	**1/8**	2.7	6.75	0.20	2.CMC42.A2Z3.270.1
		2.7	6.75	0.50	2.CMC42.A3Z3.270.1
		2.8	7.00	0.20	2.CMC42.A2Z3.280.1
		2.8	7.00	0.50	2.CMC42.A3Z3.280.1
		2.9	7.25	0.20	2.CMC42.A2Z3.290.1
		2.9	7.25	0.50	2.CMC42.A3Z3.290.1
3.2		2.7	6.75	0.20	2.CMC42.A2Z3.270.1
		2.7	6.75	0.50	2.CMC42.A3Z3.270.1
		2.8	7.00	0.20	2.CMC42.A2Z3.280.1
		2.8	7.00	0.50	2.CMC42.A3Z3.280.1
		2.9	7.25	0.20	2.CMC42.A2Z3.290.1
		2.9	7.25	0.50	2.CMC42.A3Z3.290.1
		3.0	7.50	0.20	2.CMC42.A2Z3.300.1
		3.0	7.50	0.50	2.CMC42.A3Z3.300.1
3.3		2.8	7.00	0.20	2.CMC42.A2Z3.280.1
		2.8	7.00	0.50	2.CMC42.A3Z3.280.1
		2.9	7.25	0.20	2.CMC42.A2Z3.290.1
		2.9	7.25	0.50	2.CMC42.A3Z3.290.1
		3.0	7.50	0.20	2.CMC42.A2Z3.300.1
		3.0	7.50	0.50	2.CMC42.A3Z3.300.1
		3.1	7.75	0.20	2.CMC42.A2Z3.310.1
		3.1	7.75	0.50	2.CMC42.A3Z3.310.1
3.4		2.9	7.25	0.20	2.CMC42.A2Z3.290.1
		2.9	7.25	0.50	2.CMC42.A3Z3.290.1
		3.0	7.50	0.20	2.CMC42.A2Z3.300.1
		3.0	7.50	0.50	2.CMC42.A3Z3.300.1
		3.1	7.75	0.20	2.CMC42.A2Z3.310.1
		3.1	7.75	0.50	2.CMC42.A3Z3.310.1
3.5		3.0	7.50	0.20	2.CMC42.A2Z3.300.1
		3.0	7.50	0.50	2.CMC42.A3Z3.300.1
		3.1	7.75	0.20	2.CMC42.A2Z3.310.1
		3.1	7.75	0.50	2.CMC42.A3Z3.310.1
		1/8	7.94	**0.254**	2.CMC.PSRA2Z3.F18
		1/8	7.94	**0.381**	2.CMC.PSRA3Z3.F18
		3.3	8.25	0.20	2.CMC42.A2Z3.330.1
		3.3	8.25	0.50	2.CMC42.A3Z3.330.1
3.6		3.0	7.50	0.20	2.CMC42.A2Z3.300.1
		3.0	7.50	0.50	2.CMC42.A3Z3.300.1
		3.1	7.75	0.20	2.CMC42.A2Z3.310.1
		3.1	7.75	0.50	2.CMC42.A3Z3.310.1
		1/8	7.94	**0.254**	2.CMC.PSRA2Z3.F18
		1/8	7.94	**0.381**	2.CMC.PSRA3Z3.F18
		3.3	8.25	0.20	2.CMC42.A2Z3.330.1
		3.3	8.25	0.50	2.CMC42.A3Z3.330.1

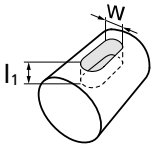
w Slot [mm]	w Slot [inch]	d_1 Tool [mm]|[inch]	$l_{1, max}$ [mm]	r [mm]|[inch]	Item number
3.7		3.1	7.75	0.20	2.CMC42.A2Z3.310.1
		3.1	7.75	0.50	2.CMC42.A3Z3.310.1
		1/8	7.94	**0.254**	2.CMC.PSRA2Z3.F18
		1/8	7.94	**0.381**	2.CMC.PSRA3Z3.F18
		3.3	8.25	0.20	2.CMC42.A2Z3.330.1
		3.3	8.25	0.50	2.CMC42.A3Z3.330.1
3.8		3.3	8.25	0.20	2.CMC42.A2Z3.330.1
		3.3	8.25	0.50	2.CMC42.A3Z3.330.1
3.9		3.3	8.25	0.20	2.CMC42.A2Z3.330.1
		3.3	8.25	0.50	2.CMC42.A3Z3.330.1
		3.7	9.25	0.20	2.CMC42.A2Z3.370.1
		3.7	9.25	0.50	2.CMC42.A3Z3.370.1
3.968	**5/32**	3.3	8.25	0.20	2.CMC42.A2Z3.330.1
		3.3	8.25	0.50	2.CMC42.A3Z3.330.1
		3.7	9.25	0.20	2.CMC42.A2Z3.370.1
		3.7	9.25	0.50	2.CMC42.A3Z3.370.1
4.0		3.7	9.25	0.20	2.CMC42.A2Z3.370.1
		3.7	9.25	0.50	2.CMC42.A3Z3.370.1
4.1		3.7	9.25	0.20	2.CMC42.A2Z3.370.1
		3.7	9.25	0.50	2.CMC42.A3Z3.370.1
4.2		3.7	9.25	0.20	2.CMC42.A2Z3.370.1
		3.7	9.25	0.50	2.CMC42.A3Z3.370.1
		5/32	9.92	**0.254**	2.CMC.PSRA2Z3.F532
		5/32	9.92	**0.381**	2.CMC.PSRA3Z3.F532
		4.0	10.00	0.20	2.CMC42.A2Z3.400.1
		4.0	10.00	0.50	2.CMC42.A3Z3.400.1
4.3		3.7	9.25	0.20	2.CMC42.A2Z3.370.1
		3.7	9.25	0.50	2.CMC42.A3Z3.370.1
		5/32	9.92	**0.254**	2.CMC.PSRA2Z3.F532
		5/32	9.92	**0.381**	2.CMC.PSRA3Z3.F532
		4.0	10.00	0.20	2.CMC42.A2Z3.400.1
		4.0	10.00	0.50	2.CMC42.A3Z3.400.1
4.4		3.7	9.25	0.20	2.CMC42.A2Z3.370.1
		3.7	9.25	0.50	2.CMC42.A3Z3.370.1
		5/32	9.92	**0.254**	2.CMC.PSRA2Z3.F532
		5/32	9.92	**0.381**	2.CMC.PSRA3Z3.F532
		4.0	10.00	0.20	2.CMC42.A2Z3.400.1
		4.0	10.00	0.50	2.CMC42.A3Z3.400.1
4.5		4.0	10.00	0.20	2.CMC42.A2Z3.400.1
		4.0	10.00	0.50	2.CMC42.A3Z3.400.1
		4.3	10.75	0.20	2.CMC42.A2Z3.430.1
		4.3	10.75	0.50	2.CMC42.A3Z3.430.1
4.6		4.0	10.00	0.20	2.CMC42.A2Z3.400.1
		4.0	10.00	0.50	2.CMC42.A3Z3.400.1
		4.3	10.75	0.20	2.CMC42.A2Z3.430.1
		4.3	10.75	0.50	2.CMC42.A3Z3.430.1
4.7		4.0	10.00	0.20	2.CMC42.A2Z3.400.1
		4.0	10.00	0.50	2.CMC42.A3Z3.400.1
		4.3	10.75	0.20	2.CMC42.A2Z3.430.1
		4.3	10.75	0.50	2.CMC42.A3Z3.430.1
4.762	**3/16**	4.0	10.00	0.20	2.CMC42.A2Z3.400.1
		4.0	10.00	0.50	2.CMC42.A3Z3.400.1
		4.3	10.75	0.20	2.CMC42.A2Z3.430.1
		4.3	10.75	0.50	2.CMC42.A3Z3.430.1
4.8		4.0	10.00	0.20	2.CMC42.A2Z3.400.1
		4.0	10.00	0.50	2.CMC42.A3Z3.400.1
		4.3	10.75	0.20	2.CMC42.A2Z3.430.1
		4.3	10.75	0.50	2.CMC42.A3Z3.430.1

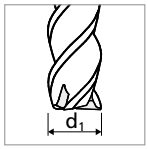
CRAZYMILL by Mikron Tool Cool

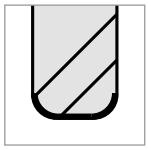
NEW Process CrazyMill Cool P&S Corner radius - Type A

THE RIGHT TOOL FOR KEYWAY SLOTTING

Tool selection







w Slot [mm]	w Slot **[inch]**	d_1 Tool [mm]|**[inch]**	$l_{1, max}$ [mm]	r [mm]|**[inch]**	Item number
4.9		4.3	10.75	0.20	2.CMC42.A2Z3.430.1
		4.3	10.75	0.50	2.CMC42.A3Z3.430.1
		4.7	11.75	0.20	2.CMC42.A2Z3.470.1
		4.7	11.75	0.50	2.CMC42.A3Z3.470.1
5.0		4.3	10.75	0.20	2.CMC42.A2Z3.430.1
		4.3	10.75	0.50	2.CMC42.A3Z3.430.1
		4.7	11.75	0.20	2.CMC42.A2Z3.470.1
		4.7	11.75	0.50	2.CMC42.A3Z3.470.1
		3/16	11.91	**0.254**	2.CMC.PSRA2Z3.F316
		3/16	11.91	**0.381**	2.CMC.PSRA3Z3.F316
		4.8	12.00	0.20	2.CMC42.A2Z3.480.1
		4.8	12.00	0.50	2.CMC42.A3Z3.480.1
5.1		4.3	10.75	0.20	2.CMC42.A2Z3.430.1
		4.3	10.75	0.50	2.CMC42.A3Z3.430.1
		4.7	11.75	0.20	2.CMC42.A2Z3.470.1
		4.7	11.75	0.50	2.CMC42.A3Z3.470.1
		3/16	11.91	**0.254**	2.CMC.PSRA2Z3.F316
		3/16	11.91	**0.381**	2.CMC.PSRA3Z3.F316
		4.8	12.00	0.20	2.CMC42.A2Z3.480.1
		4.8	12.00	0.50	2.CMC42.A3Z3.480.1
5.2		4.7	11.75	0.20	2.CMC42.A2Z3.470.1
		4.7	11.75	0.50	2.CMC42.A3Z3.470.1
		3/16	11.91	**0.254**	2.CMC.PSRA2Z3.F316
		3/16	11.91	**0.381**	2.CMC.PSRA3Z3.F316
		4.8	12.00	0.20	2.CMC42.A2Z3.480.1
		4.8	12.00	0.50	2.CMC42.A3Z3.480.1
		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
5.3		4.7	11.75	0.20	2.CMC42.A2Z3.470.1
		4.7	11.75	0.50	2.CMC42.A3Z3.470.1
		3/16	11.91	**0.254**	2.CMC.PSRA2Z3.F316
		3/16	11.91	**0.381**	2.CMC.PSRA3Z3.F316
		4.8	12.00	0.20	2.CMC42.A2Z3.480.1
		4.8	12.00	0.50	2.CMC42.A3Z3.480.1
		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
5.4		4.7	11.75	0.20	2.CMC42.A2Z3.470.1
		4.7	11.75	0.50	2.CMC42.A3Z3.470.1
		3/16	11.91	**0.254**	2.CMC.PSRA2Z3.F316
		3/16	11.91	**0.381**	2.CMC.PSRA3Z3.F316
		4.8	12.00	0.20	2.CMC42.A2Z3.480.1
		4.8	12.00	0.50	2.CMC42.A3Z3.480.1
		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
5.5		4.7	11.75	0.20	2.CMC42.A2Z3.470.1
		4.7	11.75	0.50	2.CMC42.A3Z3.470.1
		3/16	11.91	**0.254**	2.CMC.PSRA2Z3.F316
		3/16	11.91	**0.381**	2.CMC.PSRA3Z3.F316
		4.8	12.00	0.20	2.CMC42.A2Z3.480.1
		4.8	12.00	0.50	2.CMC42.A3Z3.480.1
		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1

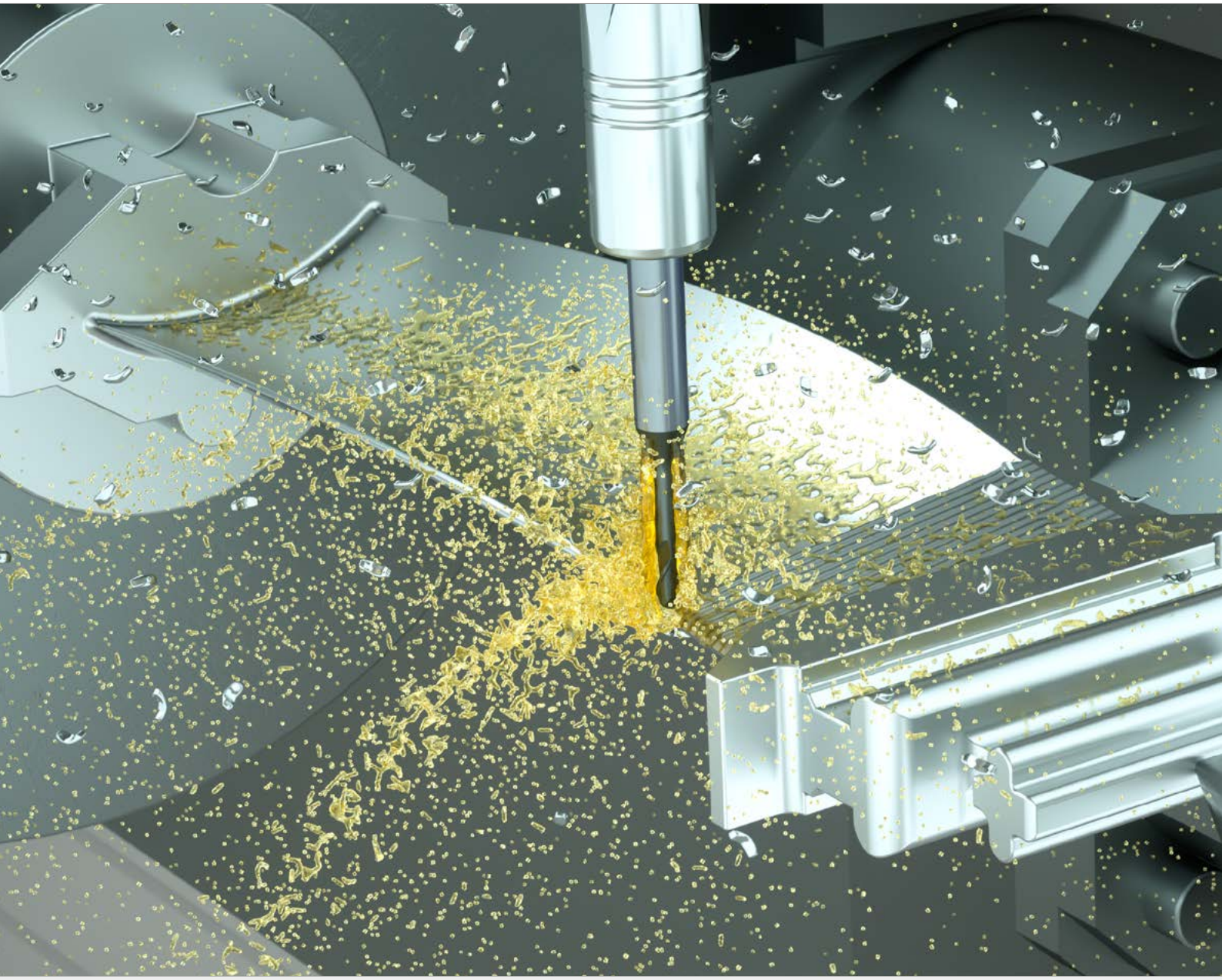
w Slot [mm]	w Slot **[inch]**	d_1 Tool [mm]|**[inch]**	$l_{1, max}$ [mm]	r [mm]|**[inch]**	Item number
5.560	**7/32**	4.7	11.75	0.20	2.CMC42.A2Z3.470.1
		4.7	11.75	0.50	2.CMC42.A3Z3.470.1
		3/16	11.91	**0.254**	2.CMC.PSRA2Z3.F316
		3/16	11.91	**0.381**	2.CMC.PSRA3Z3.F316
		4.8	12.00	0.20	2.CMC42.A2Z3.480.1
		4.8	12.00	0.50	2.CMC42.A3Z3.480.1
		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
5.6		4.7	11.75	0.20	2.CMC42.A2Z3.470.1
		4.7	11.75	0.50	2.CMC42.A3Z3.470.1
		3/16	11.91	**0.254**	2.CMC.PSRA2Z3.F316
		3/16	11.91	**0.381**	2.CMC.PSRA3Z3.F316
		4.8	12.00	0.20	2.CMC42.A2Z3.480.1
		4.8	12.00	0.50	2.CMC42.A3Z3.480.1
		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
5.7		4.8	12.00	0.20	2.CMC42.A2Z3.480.1
		4.8	12.00	0.50	2.CMC42.A3Z3.480.1
		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
5.8		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
5.9		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
		7/32	13.90	**0.381**	2.CMC.PSRA2Z3.F732
		7/32	13.90	**0.762**	2.CMC.PSRA3Z3.F732
		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
6.0		5.0	12.50	0.20	2.CMC42.A2Z3.500.1
		5.0	12.50	0.50	2.CMC42.A3Z3.500.1
		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
		7/32	13.90	**0.381**	2.CMC.PSRA2Z3.F732
		7/32	13.90	**0.762**	2.CMC.PSRA3Z3.F732
		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
6.1		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
		7/32	13.90	**0.381**	2.CMC.PSRA2Z3.F732
		7/32	13.90	**0.762**	2.CMC.PSRA3Z3.F732
		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1

w Slot [mm]	w Slot **[inch]**	d_1 Tool [mm]|**[inch]**	$l_{1, max}$ [mm]	r [mm]|**[inch]**	Item number
6.2		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
		7/32	13.90	**0.381**	2.CMC.PSRA2Z3.F732
		7/32	13.90	**0.762**	2.CMC.PSRA3Z3.F732
		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
6.3		5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
		7/32	13.90	**0.381**	2.CMC.PSRA2Z3.F732
		7/32	13.90	**0.762**	2.CMC.PSRA3Z3.F732
		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
6.350	**1/4**	5.3	13.25	0.20	2.CMC42.A2Z3.530.1
		5.3	13.25	0.50	2.CMC42.A3Z3.530.1
		7/32	13.90	**0.381**	2.CMC.PSRA2Z3.F732
		7/32	13.90	**0.762**	2.CMC.PSRA3Z3.F732
		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
6.4		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
6.5		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
6.6		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
		1/4	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
6.7		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
		1/4	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14

w Slot [mm]	w Slot **[inch]**	d_1 Tool [mm]|**[inch]**	$l_{1, max}$ [mm]	r [mm]|**[inch]**	Item number
6.8		5.7	14.25	0.20	2.CMC42.A2Z3.570.1
		5.7	14.25	0.50	2.CMC42.A3Z3.570.1
		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
		1/4	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
6.9		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
		1/4	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
7.0		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
		1/4	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
7.1		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
		1/4	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
7.2		6.0	15.00	0.20	2.CMC42.A2Z3.600.1
		6.0	15.00	0.50	2.CMC42.A3Z3.600.1
		6.0	15.00	1.00	2.CMC42.A4Z3.600.1
		1/4	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
7.3		**1/4**	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
7.4		**1/4**	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
7.5		**1/4**	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
7.6		**1/4**	15.88	**0.381**	2.CMC.PSRA2Z3.F14
		1/4	15.88	**0.762**	2.CMC.PSRA3Z3.F14
		1/4	15.88	**1.524**	2.CMC.PSRA4Z3.F14
8.2 - 9.6		8.0	20.00	0.20	2.CMC42.A2Z3.800.1
		8.0	20.00	0.50	2.CMC42.A3Z3.800.1
		8.0	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 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.

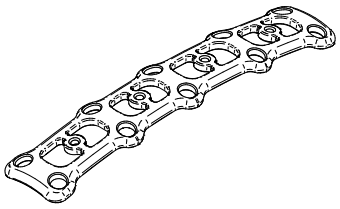
Regrinding: This product is not suitable for regrinding.

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

MILLING TOOL
Mikron Tool - CrazyMill Cool Ball - Z2 - Type C

DATA	MIKRON TOOL
Tool type	CrazyMill Cool Ball - Z2 - Carbide - Coated - Integrated cooling
Item number	2.CMC30.C5Z2.600.1
Cutting data	Roughing v_c = 170 m/min f_z = 0.050 mm $a_{p,\,max}$ = 1 x d a_e = 1 mm Z = 2

2 x d	3 x d	5 x d
Type A	Type B	Type C
Coated Integrated cooling l_1: 2xd, l_2: 2xd	Coated Integrated cooling l_1: 3xd, l_2: 2xd	Coated Integrated cooling l_1: 5xd, l_2: 2xd
		
		
page 570	page 571	page 572

PATENTED

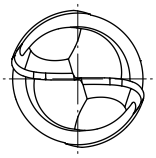
1 | SHANK
The robust carbide shank guarantees stable and vibration-free milling. A high degree of precision and excellent surface quality are achieved.

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

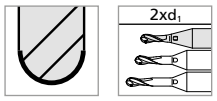
CRAZYMILL by Mikron Tool Cool

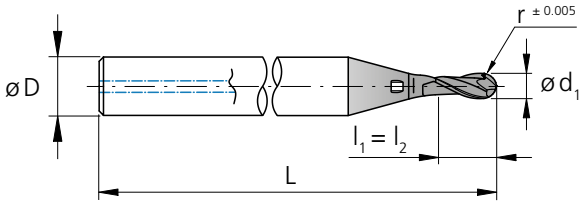
Type A - 2 x d - Ball - Z2

Carbide | Z2 | 30° | eXedur RIP

Ød_1	1.0 - 8.0 mm
Tolerance	+ 0.01 mm - 0.01 mm

Ball





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	r [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Z [teeth]	Item number	Availability
0.3		0.15	0.60	0.60	3	38	2	2.CMC30.A5Z2.030.1	■
0.396	**1/64**	0.198	0.79	0.79	3	38	2	2.CMC.BAZ2.F164	■
0.4		0.20	0.80	0.80	3	38	2	2.CMC30.A5Z2.040.1	■
0.5		0.25	1.00	1.00	3	38	2	2.CMC30.A5Z2.050.1	■
0.6		0.30	1.20	1.20	3	38	2	2.CMC30.A5Z2.060.1	■
0.793	**1/32**	0.397	1.59	1.59	3	38	2	2.CMC.BAZ2.F132	■
0.8		0.40	1.60	1.60	3	38	2	2.CMC30.A5Z2.080.1	■
1.0		0.50	2.00	2.00	4	40	2	2.CMC30.A5Z2.100.1	■
1.2		0.60	2.40	2.40	4	40	2	2.CMC30.A5Z2.120.1	■
1.5		0.75	3.00	3.00	4	40	2	2.CMC30.A5Z2.150.1	■
1.587	**1/16**	0.794	3.17	3.17	4	40	2	2.CMC.BAZ2.F116	■
1.8		0.90	3.60	3.60	4	40	2	2.CMC30.A5Z2.180.1	■
2.0		1.00	4.00	4.00	4	40	2	2.CMC30.A5Z2.200.1	■
2.381	**3/32**	1.191	4.76	4.76	4	40	2	2.CMC.BAZ2.F332	■
2.5		1.25	5.00	5.00	6	45	2	2.CMC30.A5Z2.250.1	■
3.0		1.50	6.00	6.00	6	50	2	2.CMC30.A5Z2.300.1	■
3.175	**1/8**	1.588	6.35	6.35	6	50	2	2.CMC.BAZ2.F18	■
3.968	**5/32**	1.984	7.94	7.94	6	50	2	2.CMC.BAZ2.F532	■
4.0		2.00	8.00	8.00	6	50	2	2.CMC30.A5Z2.400.1	■
4.762	**3/16**	2.381	9.52	9.52	8	60	2	2.CMC.BAZ2.F316	■
5.560	**7/32**	2.780	11.12	11.12	10	60	2	2.CMC.BAZ2.F732	■
6.0		3.00	12.00	12.00	10	60	2	2.CMC30.A5Z2.600.1	■
6.350	**1/4**	3.175	12.70	12.70	10	60	2	2.CMC.BAZ2.F14	■
8.0		4.00	16.00	16.00	12	70	2	2.CMC30.A5Z2.800.1	■

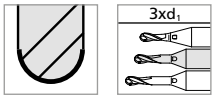
■ Stock item

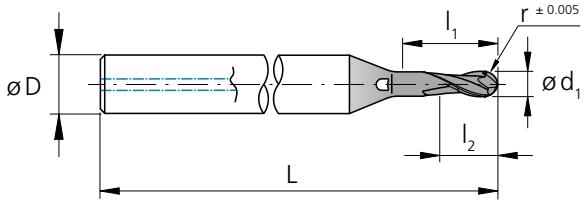
Type B - 3 x d - Ball - Z2

Carbide | Z2 | 30° | eXedur RIP

Ø d_1	1.0 - 8.0 mm
Tolerance	+ 0.01 mm - 0.01 mm

Ball





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	r [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Z [teeth]	Item number	Availability
0.3		0.15	0.90	0.60	3	38	2	2.CMC30.B5Z2.030.1	■
0.396	**1/64**	0.198	1.19	0.79	3	38	2	2.CMC.BBZ2.F164	■
0.4		0.20	1.20	0.80	3	38	2	2.CMC30.B5Z2.040.1	■
0.5		0.25	1.50	1.00	3	38	2	2.CMC30.B5Z2.050.1	■
0.6		0.30	1.80	1.20	3	38	2	2.CMC30.B5Z2.060.1	■
0.793	**1/32**	0.397	2.38	1.59	3	38	2	2.CMC.BBZ2.F132	■
0.8		0.40	2.40	1.60	3	38	2	2.CMC30.B5Z2.080.1	■
1.0		0.50	3.00	2.00	4	40	2	2.CMC30.B5Z2.100.1	■
1.2		0.60	3.60	2.40	4	40	2	2.CMC30.B5Z2.120.1	■
1.5		0.75	4.50	3.00	4	40	2	2.CMC30.B5Z2.150.1	■
1.587	**1/16**	0.794	4.76	3.17	4	40	2	2.CMC.BBZ2.F116	■
1.8		0.90	5.40	3.60	4	40	2	2.CMC30.B5Z2.180.1	■
2.0		1.00	6.00	4.00	4	40	2	2.CMC30.B5Z2.200.1	■
2.381	**3/32**	1.191	7.14	4.76	4	40	2	2.CMC.BBZ2.F332	■
2.5		1.25	7.50	5.00	6	45	2	2.CMC30.B5Z2.250.1	■
3.0		1.50	9.00	6.00	6	50	2	2.CMC30.B5Z2.300.1	■
3.175	**1/8**	1.588	9.53	6.35	6	55	2	2.CMC.BBZ2.F18	■
3.968	**5/32**	1.984	11.90	7.94	6	55	2	2.CMC.BBZ2.F532	■
4.0		2.00	12.00	8.00	6	55	2	2.CMC30.B5Z2.400.1	■
4.762	**3/16**	2.381	14.29	9.52	8	65	2	2.CMC.BBZ2.F316	■
5.560	**7/32**	2.780	16.68	11.12	10	65	2	2.CMC.BBZ2.F732	■
6.0		3.00	18.00	12.00	10	65	2	2.CMC30.B5Z2.600.1	■
6.350	**1/4**	3.175	19.05	12.70	10	65	2	2.CMC.BBZ2.F14	■
8.0		4.00	24.00	16.00	12	80	2	2.CMC30.B5Z2.800.1	■

■ Stock item

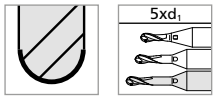
CRAZYMILL by Mikron Tool Cool

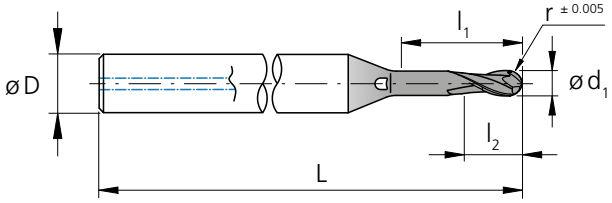
Type C - 5 x d - Ball - Z2

Carbide | Z2 | 30° | eXedur RIP

Ød_1	1.0 - 8.0 mm
Tolerance	+ 0.01 mm - 0.01 mm

Ball





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	r [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Z [teeth]	Item number	Availability
0.3		0.15	1.50	0.60	3	38	2	2.CMC30.C5Z2.030.1	■
0.396	**1/64**	0.198	1.98	0.79	3	38	2	2.CMC.BCZ2.F164	■
0.4		0.20	2.00	0.80	3	38	2	2.CMC30.C5Z2.040.1	■
0.5		0.25	2.50	1.00	3	38	2	2.CMC30.C5Z2.050.1	■
0.6		0.30	3.00	1.20	3	38	2	2.CMC30.C5Z2.060.1	■
0.793	**1/32**	0.397	3.97	1.59	3	38	2	2.CMC.BCZ2.F132	■
0.8		0.40	4.00	1.60	3	38	2	2.CMC30.C5Z2.080.1	■
1.0		0.50	5.00	2.00	4	40	2	2.CMC30.C5Z2.100.1	■
1.2		0.60	6.00	2.40	4	40	2	2.CMC30.C5Z2.120.1	■
1.5		0.75	7.50	3.00	4	40	2	2.CMC30.C5Z2.150.1	■
1.587	**1/16**	0.794	7.94	3.17	4	40	2	2.CMC.BCZ2.F116	■
1.8		0.90	9.00	3.60	4	44	2	2.CMC30.C5Z2.180.1	■
2.0		1.00	10.00	4.00	4	44	2	2.CMC30.C5Z2.200.1	■
2.381	**3/32**	1.191	11.91	4.76	4	44	2	2.CMC.BCZ2.F332	■
2.5		1.25	12.50	5.00	6	50	2	2.CMC30.C5Z2.250.1	■
3.0		1.50	15.00	6.00	6	55	2	2.CMC30.C5Z2.300.1	■
3.175	**1/8**	1.588	15.88	6.35	6	60	2	2.CMC.BCZ2.F18	■
3.968	**5/32**	1.984	19.84	7.94	6	60	2	2.CMC.BCZ2.F532	■
4.0		2.00	20.00	8.00	6	60	2	2.CMC30.C5Z2.400.1	■
4.762	**3/16**	2.381	23.81	9.52	8	70	2	2.CMC.BCZ2.F316	■
5.560	**7/32**	2.780	27.80	11.12	10	70	2	2.CMC.BCZ2.F732	■
6.0		3.00	30.00	12.00	10	70	2	2.CMC30.C5Z2.600.1	■
6.350	**1/4**	3.175	31.75	12.70	10	70	2	2.CMC.BCZ2.F14	■
8.0		4.00	40.00	16.00	12	90	2	2.CMC30.C5Z2.800.1	■

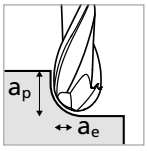
■ Stock item

CRAZYMILL by Mikron Tool Cool

Type A - Roughing

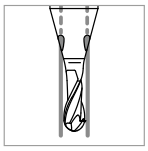
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

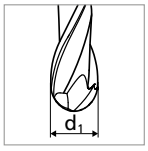
Roughing



- $a_p = 0.5 \times d_1$ ($Ød_1 \leq 0.5$ mm)
- $a_p = 1 \times d_1$ ($Ød_1 > 0.5$ mm)
- $a_e = 0.3 \times d_1$

Machining angle = 0°

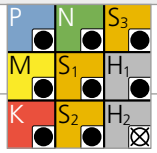




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm–0.4 mm 1/64" v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.005–0.007
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.004–0.006
		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	0.004–0.006
		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	0.005–0.007
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	0.004–0.006
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	0.004–0.006
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	0.004–0.006
		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	0.003–0.005
		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	0.006–0.008
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.006–0.008
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.006–0.008
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.006–0.008
		2.036	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.006–0.008
		2.102	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.006–0.008
		2.096	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	60	0.003–0.004
		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	0.004–0.006
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.004–0.006
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.003–0.004
			CrCoMo28	ASTM F1537		
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.004–0.006
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

v_c [m/min]
f_z [mm]

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



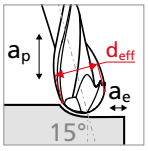
Ød1	0.5 mm–0.8 mm 1/32"		1.0 mm–1.2 mm		1.5 mm–1.8 mm 1/16"		2.0 mm–2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm–6.0 mm 5/32–3/16–7/32–1/4"		8.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	100	0.010–0.014	140	0.015–0.017	200	0.024–0.026	220	0.034–0.036	240	0.048	280	0.050	280	0.050
	100	0.009–0.012	140	0.014–0.016	200	0.022–0.024	220	0.032–0.034	240	0.046	280	0.048	280	0.048
	100	0.008–0.011	140	0.011–0.013	200	0.020–0.022	220	0.030–0.032	240	0.042	280	0.044	280	0.044
	100	0.010–0.014	140	0.016–0.018	200	0.024–0.026	220	0.034–0.036	240	0.046	280	0.048	280	0.048
	100	0.009–0.012	140	0.015–0.017	200	0.022–0.024	220	0.032–0.034	240	0.044	280	0.046	280	0.046
	100	0.009–0.012	140	0.015–0.017	200	0.022–0.024	220	0.032–0.034	240	0.044	280	0.046	280	0.046
	100	0.008–0.011	140	0.012–0.014	200	0.016–0.018	220	0.030–0.032	240	0.042	280	0.044	280	0.044
	100	0.006–0.009	120	0.011–0.022	140	0.024–0.026	160	0.028–0.036	180	0.042–0.048	200	0.052–0.057	200	0.052–0.057
	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.004–0.006	120	0.007–0.008	130	0.009–0.010	140	0.010–0.012	150	0.015	170	0.020	170	0.020
	100	0.008–0.011	120	0.016–0.018	130	0.020–0.022	140	0.028–0.030	150	0.042	170	0.044	170	0.044
	100	0.008–0.011	120	0.016–0.018	130	0.020–0.022	140	0.028–0.030	150	0.042	170	0.044	170	0.044
	100	0.004–0.006	140	0.007–0.008	180	0.009–0.010	200	0.010–0.012	220	0.015	240	0.020	240	0.020
	80	0.007–0.009	100	0.010–0.012	140	0.014–0.018	180	0.020–0.026	200	0.035	240	0.040	240	0.040

CRAZYMILL by Mikron Tool Cool

Type A - Semi-finishing

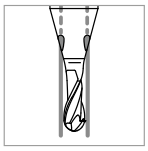
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

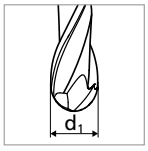
Semi-finishing



- $a_p = 0.25 \times d_1$ ($Ød_1 \leq 0.5$ mm)
- $a_p = 0.5 \times d_1$ ($Ød_1 > 0.5$ mm)
- $a_e = 0.1 \times d_1$

Machining angle = 15°





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm			0.4 mm 1/64"			0.5 mm			0.6 mm		
					v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	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												
		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												
		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												
		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												
	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												
	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												
	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												
		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												
		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												
	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												
	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												
	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												
	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												
	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												
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												
		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												
	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												
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												
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
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2												

v_c [m/min]
f_z [mm]
d_{eff} [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

Ød1

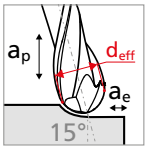
0.8 mm 1/32"			1.0 mm			1.2 mm			1.5 mm 1/16"			1.8 mm			2.0 mm			2.5 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			6.0 mm 3/16–7/32–1/4"			8.0 mm		
v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

CRAZYMILL by Mikron Tool Cool

Type A - Finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

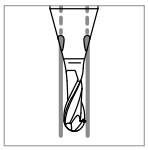
Finishing

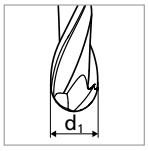


- $a_p = 0.1 \times d_1$
- $a_e = 0.05 \times d_1$

Machining angle = 15°

n_{max} = 60'000 rpm





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm			0.4 mm 1/64"			0.5 mm			0.6 mm		
					v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	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												
		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												
		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												
		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												
	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												
	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												
	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												
		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												
		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												
	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												
	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												
	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												
	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												
	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												
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												
		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	89	0.47	0.011
		3.7065	Gr.4	ASTM B348												
	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												
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												
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
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2												

v$_c$ [m/min]
f$_z$ [mm]
d$_{eff}$ [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

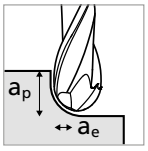
	Ød1 0.8 mm 1/32"			1.0 mm			1.2 mm			1.5 mm 1/16"			1.8 mm			2.0 mm			2.5 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			6.0 mm 3/16–7/32–1/4"			8.0 mm		
	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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

CRAZYMILL by Mikron Tool Cool

Type B - Roughing

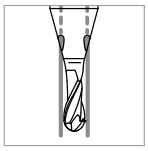
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

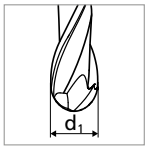
Roughing



- $a_p = 0.5 \times d_1$ ($Ød_1 \leq 0.5$ mm)
- $a_p = 1 \times d_1$ ($Ød_1 > 0.5$ mm)
- $a_e = 0.3 \times d_1$

Machining angle = 0°

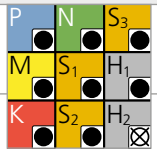




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm–0.4 mm 1/64" v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.005–0.007
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.004–0.006
		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	0.004–0.006
		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	0.005–0.007
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	0.004–0.006
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	0.004–0.006
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	0.004–0.006
		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	0.003–0.005
		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	0.006–0.008
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.006–0.008
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.006–0.008
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.006–0.008
		2.036	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.006–0.008
		2.102	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.006–0.008
		2.096	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	60	0.003–0.004
		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	0.004–0.006
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.004–0.006
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.003–0.004
			CrCoMo28	ASTM F1537		
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.004–0.006
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

v_c [m/min]
f_z [mm]

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



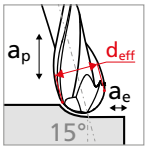
Ød1	0.5 mm–0.8 mm 1/32"		1.0 mm–1.2 mm		1.5 mm–1.8 mm 1/16"		2.0 mm–2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm–6.0 mm 5/32–3/16–7/32–1/4"		8.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	100	0.010–0.014	140	0.015–0.017	200	0.024–0.026	220	0.034–0.036	240	0.046	280	0.050	280	0.050
	100	0.009–0.012	140	0.014–0.016	200	0.022–0.024	220	0.032–0.034	240	0.044	280	0.048	280	0.048
	100	0.008–0.011	140	0.011–0.013	200	0.020–0.022	220	0.030–0.032	240	0.040	280	0.042	280	0.042
	100	0.010–0.014	140	0.016–0.018	200	0.024–0.026	220	0.034–0.036	240	0.044	280	0.048	280	0.048
	100	0.009–0.012	140	0.015–0.017	200	0.022–0.024	220	0.032–0.034	240	0.044	280	0.046	280	0.046
	100	0.009–0.012	140	0.015–0.017	200	0.022–0.024	220	0.032–0.034	240	0.044	280	0.046	280	0.046
	100	0.008–0.011	140	0.012–0.014	200	0.016–0.018	220	0.030–0.032	240	0.040	280	0.044	280	0.044
	100	0.006–0.009	120	0.011–0.022	140	0.024–0.026	160	0.028–0.036	180	0.040–0.047	200	0.050–0.054	200	0.050–0.054
	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060
	100	0.004–0.006	120	0.007–0.008	130	0.009–0.010	140	0.010–0.012	150	0.015	170	0.020	170	0.020
	100	0.008–0.011	120	0.016–0.018	130	0.020–0.022	140	0.028–0.030	150	0.040	170	0.044	170	0.044
	100	0.008–0.011	120	0.016–0.018	130	0.020–0.022	140	0.028–0.030	150	0.040	170	0.044	170	0.044
	100	0.004–0.006	140	0.007–0.008	180	0.009–0.010	200	0.010–0.012	220	0.015	240	0.020	240	0.020
	80	0.007–0.009	100	0.010–0.012	140	0.014–0.018	180	0.020–0.026	200	0.033	240	0.040	240	0.040

CRAZYMILL by Mikron Tool Cool

Type B - Semi-finishing

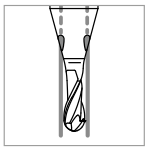
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

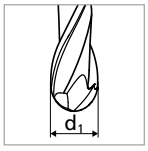
Semi-finishing



- $a_p = 0.25 \times d_1$ ($Ød_1 \leq 0.5$ mm)
- $a_p = 0.5 \times d_1$ ($Ød_1 > 0.5$ mm)
- $a_e = 0.1 \times d_1$

Machining angle = 15°





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm			0.4 mm 1/64"			0.5 mm			0.6 mm		
					v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	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												
		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												
		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												
		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												
	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												
	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												
	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												
		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												
		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												
	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												
	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												
	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												
	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												
	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												
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												
		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												
	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												
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												
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
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2												

v_c [m/min]
f_z [mm]
d_{eff} [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

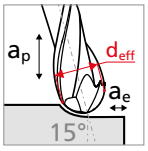
	Ød1																																
	0.8 mm 1/32"			1.0 mm			1.2 mm			1.5 mm 1/16"			1.8 mm			2.0 mm			2.5 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			6.0 mm 3/16–7/32–1/4"			8.0 mm		
	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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

CRAZYMILL by Mikron Tool Cool

Type B - Finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

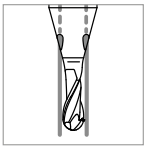
Finishing

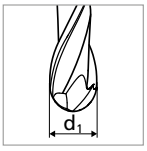


- $a_p = 0.1 \times d_1$
- $a_e = 0.05 \times d_1$

Machining angle = 15°

n_{max} = 60'000 rpm





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm			0.4 mm 1/64"			0.5 mm			0.6 mm		
					v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	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												
		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												
		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												
		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												
	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												
	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												
	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												
		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												
		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												
	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												
	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												
	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												
	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												
	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												
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												
		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	89	0.47	0.011
		3.7065	Gr.4	ASTM B348												
	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												
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												
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
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2												

v_c [m/min]
f_z [mm]
d_{eff} [mm]

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

P	N	S_3
●	●	●
M	S_1	H_1
●	●	●
K	S_2	H_2
●	●	⊠

Ød1

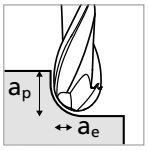
0.8 mm			1.0 mm			1.2 mm			1.5 mm			1.8 mm			2.0 mm			2.5 mm			3.0 mm			4.0 mm			6.0 mm			8.0 mm		
1/32"									1/16"									3/32"			1/8"			5/32"			3/16–7/32–1/4"					
v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

CRAZYMILL by Mikron Tool Cool

Type C - Roughing

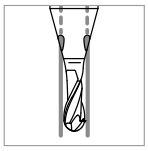
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

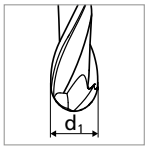
Roughing



- $a_p = 0.5 \times d_1$ ($Ød_1 \leq 0.5$ mm)
- $a_p = 1 \times d_1$ ($Ød_1 > 0.5$ mm)
- $a_e = 0.3 \times d_1$

Machining angle = 0°

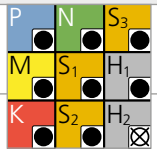




Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm–0.4 mm 1/64" v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.005–0.007
		1.0401	C15	AISI 1015		
		1.1191	C45E/CK45	AISI 1045		
		1.0044	S275JR	AISI 1020		
		1.0715	11SMn30	AISI 1215		
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.004–0.006
		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	0.004–0.006
		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	0.005–0.007
		1.4105	X6CrMoS17	AISI 430F		
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	60	0.004–0.006
		1.4112	X90CrMoV18	AISI 440B		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH	60	0.004–0.006
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH		
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	60	0.004–0.006
		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	0.003–0.005
		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	0.006–0.008
		3.4365	AlZnMgCu1.5	ASTM 7075		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.006–0.008
		3.2381	GD-AlSi10Mg	UNS A03590		
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.006–0.008
		2.0065	Cu-ETP / CW004A	UNS C11000		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.006–0.008
		2.036	CuZn40 CW509L	UNS C28000		
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.006–0.008
		2.102	CuSn6	UNS C51900		
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.006–0.008
		2.096	CuAl9Mn2	UNS C63200		
S_1	Super alloys	2.4856		Inconel 625	60	0.003–0.004
		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	0.004–0.006
		3.7065	Gr.4	ASTM B348 / F68		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.004–0.006
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	60	0.003–0.004
			CrCoMo28	ASTM F1537		
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.004–0.006
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

v_c [m/min]
f_z [mm]

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



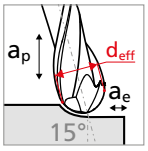
Ød1	0.5 mm–0.8 mm 1/32"		1.0 mm–1.2 mm		1.5 mm–1.8 mm 1/16"		2.0 mm–2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm–6.0 mm 5/32–3/16–7/32–1/4"		8.0 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	100	0.010–0.014	140	0.015–0.017	200	0.024–0.026	220	0.034–0.036	240	0.040	280	0.050	280	0.050
	100	0.009–0.012	140	0.014–0.016	200	0.022–0.024	220	0.032–0.034	240	0.038	280	0.048	280	0.048
	100	0.008–0.011	140	0.011–0.013	200	0.020–0.022	220	0.030–0.032	240	0.035	280	0.044	280	0.044
	100	0.010–0.014	140	0.016–0.018	200	0.024–0.026	220	0.034–0.036	240	0.040	280	0.048	280	0.048
	100	0.009–0.012	140	0.015–0.017	200	0.022–0.024	220	0.032–0.034	240	0.036	280	0.046	280	0.046
	100	0.009–0.012	140	0.015–0.017	200	0.022–0.024	220	0.032–0.034	240	0.036	280	0.046	280	0.046
	100	0.008–0.011	140	0.012–0.014	200	0.016–0.018	220	0.030–0.032	240	0.034	280	0.044	280	0.044
	100	0.006–0.009	120	0.011–0.022	140	0.024–0.026	160	0.028–0.036	180	0.042	200	0.052	200	0.052
	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.055	280	0.055
	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.055	280	0.055
	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.055	280	0.055
	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.055	280	0.055
	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.055	280	0.055
	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.055	280	0.055
	100	0.004–0.006	120	0.007–0.008	130	0.009–0.010	140	0.010–0.012	150	0.015	170	0.020	170	0.020
	100	0.008–0.011	120	0.016–0.018	130	0.020–0.022	140	0.028–0.030	150	0.034	170	0.042	170	0.042
	100	0.008–0.011	120	0.016–0.018	130	0.020–0.022	140	0.028–0.030	150	0.034	170	0.042	170	0.042
	100	0.004–0.006	140	0.007–0.008	180	0.009–0.010	200	0.010–0.012	220	0.015	240	0.020	240	0.020
	80	0.007–0.009	100	0.010–0.012	140	0.014–0.018	180	0.020–0.026	200	0.030	240	0.032	240	0.032

CRAZYMILL by Mikron Tool Cool

Type C - Semi-finishing

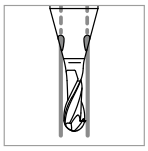
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

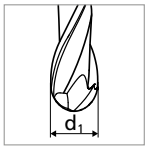
Semi-finishing



- $a_p = 0.25 \times d_1$ ($Ød_1 \leq 0.5$ mm)
- $a_p = 0.5 \times d_1$ ($Ød_1 > 0.5$ mm)
- $a_e = 0.1 \times d_1$

Machining angle = 15°





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm			0.4 mm 1/64"			0.5 mm			0.6 mm		
					v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	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												
		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												
		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												
		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												
	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												
	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												
	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												
		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												
		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												
	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												
	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												
	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												
	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												
	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												
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												
		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												
	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												
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												
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
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2												

v_c [m/min]
f_z [mm]
d_{eff} [mm]

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

P	N	S_3
●	●	●
M	**S_1**	**H_1**
●	●	●
K	**S_2**	**H_2**
●	●	⊠

Ød1

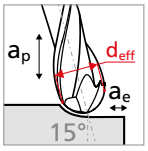
0.8 mm 1/32"			1.0 mm			1.2 mm			1.5 mm 1/16"			1.8 mm			2.0 mm			2.5 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			6.0 mm 3/16–7/32–1/4"			8.0 mm		
v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	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
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	0.048	260	6.00	0.048	260	8.00	0.048
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

CRAZYMILL by Mikron Tool Cool

Type C - Finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

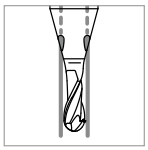
Finishing

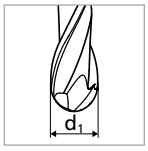


- $a_p = 0.1 \times d_1$
- $a_e = 0.05 \times d_1$

Machining angle = 15°

n_{max} = 60'000 rpm





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm			0.4 mm 1/64"			0.5 mm			0.6 mm		
					v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	v_c	d_{eff}	f_z	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												
		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												
		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												
		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												
	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												
	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												
	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												
		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												
		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												
	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												
	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												
	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												
	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												
	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												
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												
		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	89	0.47	0.011
		3.7065	Gr.4	ASTM B348												
	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												
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												
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
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2												

v_c [m/min]
f_z [mm]
d_{eff} [mm]

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

P	N	S_3
●	●	●
M	S_1	H_1
●	●	●
K	S_2	H_2
●	●	⊠

Ød1

0.8 mm 1/32"			1.0 mm			1.2 mm			1.5 mm 1/16"			1.8 mm			2.0 mm			2.5 mm 3/32"			3.0 mm 1/8"			4.0 mm 5/32"			6.0 mm 3/16–7/32–1/4"			8.0 mm		
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

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 ≤ 0.05 mm.

Coolant pressure: at least 15 bar coolant pressure is required to achieve reliable milling.
High pressure is generally better for the cooling and flushing effect.

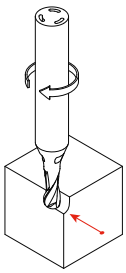
Revolution	[rpm]	≤ 10'000	> 10'000
Minimal pressure	[bar]	15	30

Tool holders

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

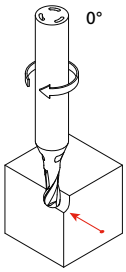
MILLING PROCESS

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

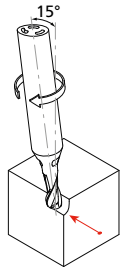


Mikron Tool recommends vertical machining with respect to the workpiece for roughing with CrazyMill Cool Ball (machining angle 0°). This allows the maximum recommended cutting depth a_p to be fully utilized. The result is an extremely high removal rate (Q [cm^3/min]).

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 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.

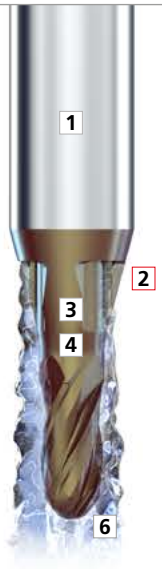
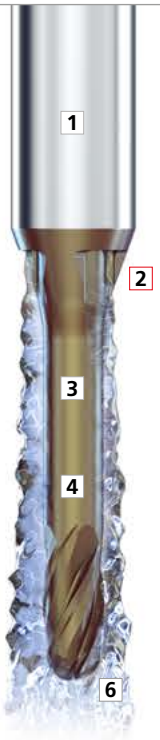
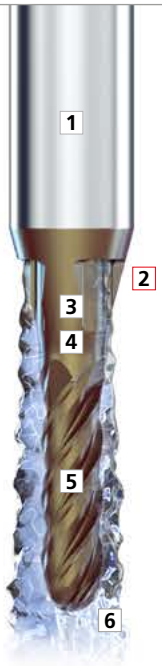
High performance is possible due to the new cutting edge geometry specially designed to reduce vibrations and improve process time and due to the integrated cooling channels that guarantee substantial cooling of the cutting edges.

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 l_2 = Cutting length	■ Coated ■ Integ. cooling ■ l_1: 2xd, l_2: 2xd	■ Coated ■ Integ. cooling ■ l_1: 3xd, l_2: 2xd	■ Coated ■ Integ. cooling ■ l_1: 5xd, l_2: 2xd	■ Coated ■ Integ. cooling ■ l_1: 3.5xd, l_2: 3.5xd	■ Coated ■ Integ. cooling ■ 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.

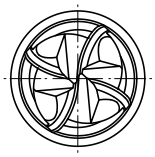
2 | INTEGRATED COOLING - PATENTED
The integrated cooling channels guarantee constant and maximal cooling of the cutting edges and optimal chip removal. The results are higher cutting speed and depth a_p as well as an excellent surface quality.

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.

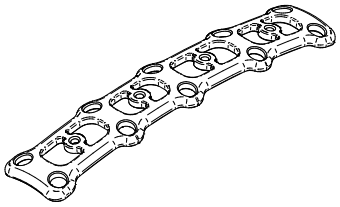
Mill tip  4 - Teeth

CRAZYMILL by Mikron Tool Cool

Benefits

SEMI-FINISHING AND FINISHING CUTTER WITH INTEGRATED COOLING, FROM 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** | semi-finishing and finishing with one tool



COMPONENT
Bone plate

MATERIAL
TiAl6V4 / 3.7165 / B348 (Grade 5)

MACHINING
- Semi-finishing and finishing
- d = 6 mm

MILLING TOOL
Mikron Tool - CrazyMill Cool Ball - Z4 - Type C

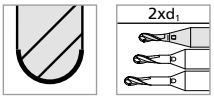
DATA	MIKRON TOOL
Tool type	CrazyMill Cool Ball - Z4 - Carbide - Coated - Integrated cooling
Item number	2.CMC30.C5Z4.600.1
Cutting data	Semi-finishing v_c = 170 m/min f_z = 0.036 mm $a_{p,\,max}$ = 0.5 x d a_e = 1 mm Z = 4 Finishing v_c = 170 m/min f_z = 0.039 mm $a_{p,\,max}$ = 0.1 x d a_e = 0.3 mm Z = 4

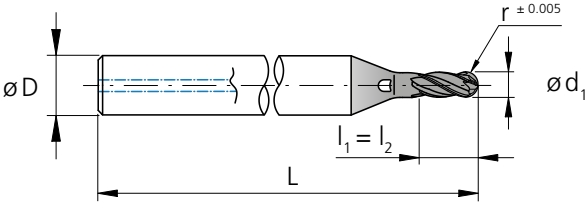
Type A - 2 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

Ød_1	1.0 - 8.0 mm
Tolerance	+ 0.01 mm - 0.01 mm

Ball





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	r [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Z [teeth]	Item number	Availability
1.0		0.50	2.00	2.00	4	40	4	2.CMC30.A5Z4.100.1	■
1.2		0.60	2.40	2.40	4	40	4	2.CMC30.A5Z4.120.1	■
1.5		0.75	3.00	3.00	4	40	4	2.CMC30.A5Z4.150.1	■
1.587	**1/16**	0.794	3.17	3.17	4	40	4	2.CMC.BAZ4.F116	■
1.8		0.90	3.60	3.60	4	40	4	2.CMC30.A5Z4.180.1	■
2.0		1.00	4.00	4.00	4	40	4	2.CMC30.A5Z4.200.1	■
2.381	**3/32**	1.191	4.76	4.76	4	40	4	2.CMC.BAZ4.F332	■
2.5		1.25	5.00	5.00	6	50	4	2.CMC30.A5Z4.250.1	■
3.0		1.50	6.00	6.00	6	50	4	2.CMC30.A5Z4.300.1	■
3.175	**1/8**	1.588	6.35	6.35	6	50	4	2.CMC.BAZ4.F18	■
3.968	**5/32**	1.984	7.94	7.94	6	50	4	2.CMC.BAZ4.F532	■
4.0		2.00	8.00	8.00	6	50	4	2.CMC30.A5Z4.400.1	■
4.762	**3/16**	2.381	9.52	9.52	8	60	4	2.CMC.BAZ4.F316	■
5.0		2.50	10.00	10.00	8	60	4	2.CMC30.A5Z4.500.1	■
5.560	**7/32**	2.780	11.12	11.12	10	60	4	2.CMC.BAZ4.F732	■
6.0		3.00	12.00	12.00	10	60	4	2.CMC30.A5Z4.600.1	■
6.350	**1/4**	3.175	12.70	12.70	10	60	4	2.CMC.BAZ4.F14	■
8.0		4.00	16.00	16.00	12	70	4	2.CMC30.A5Z4.800.1	■

■ Stock item

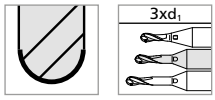
CRAZYMILL by Mikron Tool Cool

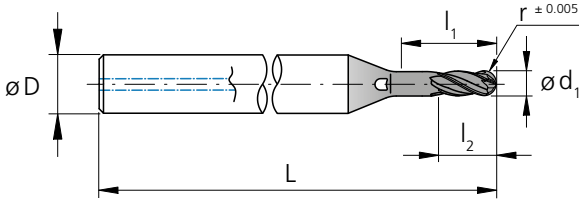
Type B - 3 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

Ød_1	1.0 - 8.0 mm
Tolerance	+ 0.01 mm - 0.01 mm

Ball





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	r [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Z [teeth]	Item number	Availability
1.0		0.50	3.00	2.00	4	40	4	2.CMC30.B5Z4.100.1	■
1.2		0.60	3.60	2.40	4	40	4	2.CMC30.B5Z4.120.1	■
1.5		0.75	4.50	3.00	4	40	4	2.CMC30.B5Z4.150.1	■
1.587	**1/16**	0.794	4.76	3.17	4	40	4	2.CMC.BBZ4.F116	■
1.8		0.90	5.40	3.60	4	40	4	2.CMC30.B5Z4.180.1	■
2.0		1.00	6.00	4.00	4	40	4	2.CMC30.B5Z4.200.1	■
2.381	**3/32**	1.191	7.14	4.76	4	40	4	2.CMC.BBZ4.F332	■
2.5		1.25	7.50	5.00	6	50	4	2.CMC30.B5Z4.250.1	■
3.0		1.50	9.00	6.00	6	50	4	2.CMC30.B5Z4.300.1	■
3.175	**1/8**	1.588	9.53	6.35	6	55	4	2.CMC.BBZ4.F18	■
3.968	**5/32**	1.984	11.90	7.94	6	55	4	2.CMC.BBZ4.F532	■
4.0		2.00	12.00	8.00	6	55	4	2.CMC30.B5Z4.400.1	■
4.762	**3/16**	2.381	14.29	9.52	8	65	4	2.CMC.BBZ4.F316	■
5.0		2.50	15.00	10.00	8	65	4	2.CMC30.B5Z4.500.1	■
5.560	**7/32**	2.780	16.68	11.12	10	65	4	2.CMC.BBZ4.F732	■
6.0		3.00	18.00	12.00	10	65	4	2.CMC30.B5Z4.600.1	■
6.350	**1/4**	3.175	19.05	12.70	10	65	4	2.CMC.BBZ4.F14	■
8.0		4.00	24.00	16.00	12	80	4	2.CMC30.B5Z4.800.1	■

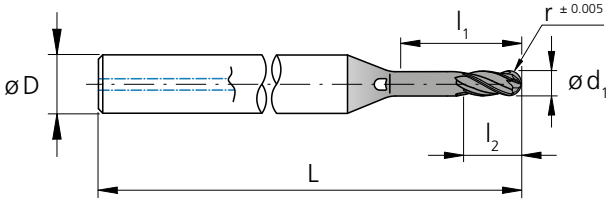
■ Stock item

Type C - 5 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

Ød_1	1.0 - 8.0 mm
Tolerance	+ 0.01 mm - 0.01 mm

Ball



l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	r [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Z [teeth]	Item number	Availability
1.0		0.50	5.00	2.00	4	40	4	2.CMC30.C5Z4.100.1	■
1.2		0.60	6.00	2.40	4	40	4	2.CMC30.C5Z4.120.1	■
1.5		0.75	7.50	3.00	4	40	4	2.CMC30.C5Z4.150.1	■
1.587	**1/16**	0.794	7.94	3.17	4	45	4	2.CMC.BCZ4.F116	■
1.8		0.90	9.00	3.60	4	45	4	2.CMC30.C5Z4.180.1	■
2.0		1.00	10.00	4.00	4	44	4	2.CMC30.C5Z4.200.1	■
2.381	**3/32**	1.191	11.91	4.76	4	44	4	2.CMC.BCZ4.F332	■
2.5		1.25	12.50	5.00	6	55	4	2.CMC30.C5Z4.250.1	■
3.0		1.50	15.00	6.00	6	55	4	2.CMC30.C5Z4.300.1	■
3.175	**1/8**	1.588	15.88	6.35	6	60	4	2.CMC.BCZ4.F18	■
3.968	**5/32**	1.984	19.84	7.94	6	60	4	2.CMC.BCZ4.F532	■
4.0		2.00	20.00	8.00	6	60	4	2.CMC30.C5Z4.400.1	■
4.762	**3/16**	2.381	23.81	9.52	8	70	4	2.CMC.BCZ4.F316	■
5.0		2.50	25.00	10.00	8	70	4	2.CMC30.C5Z4.500.1	■
5.560	**7/32**	2.780	27.80	11.12	10	70	4	2.CMC.BCZ4.F732	■
6.0		3.00	30.00	12.00	10	70	4	2.CMC30.C5Z4.600.1	■
6.350	**1/4**	3.175	31.75	12.70	10	70	4	2.CMC.BCZ4.F14	■
8.0		4.00	40.00	16.00	12	90	4	2.CMC30.C5Z4.800.1	■

■ Stock item

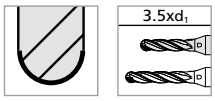
CRAZYMILL by Mikron Tool Cool

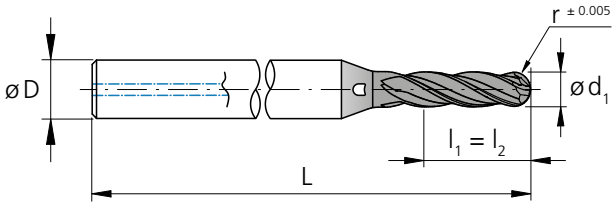
Type M - 3.5 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

Ø d_1	1.0 - 8.0 mm
Tolerance	+ 0.01 mm - 0.01 mm

Ball





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	r [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Z [teeth]	Item number	Availability
1.0		0.50	3.50	3.50	4	40	4	2.CMC30.M5Z4.100.1	■
1.2		0.60	4.20	4.20	4	40	4	2.CMC30.M5Z4.120.1	■
1.5		0.75	5.25	5.25	4	40	4	2.CMC30.M5Z4.150.1	■
1.587	**1/16**	0.794	5.55	5.55	4	40	4	2.CMC.BMZ4.F116	■
1.8		0.90	6.30	6.30	4	40	4	2.CMC30.M5Z4.180.1	■
2.0		1.00	7.00	7.00	4	40	4	2.CMC30.M5Z4.200.1	■
2.381	**3/32**	1.191	8.33	8.33	4	40	4	2.CMC.BMZ4.F332	■
2.5		1.25	8.75	8.75	6	50	4	2.CMC30.M5Z4.250.1	■
3.0		1.50	10.50	10.50	6	50	4	2.CMC30.M5Z4.300.1	■
3.175	**1/8**	1.588	11.11	11.11	6	55	4	2.CMC.BMZ4.F18	■
3.968	**5/32**	1.984	13.89	13.89	6	55	4	2.CMC.BMZ4.F532	■
4.0		2.00	14.00	14.00	6	55	4	2.CMC30.M5Z4.400.1	■
4.762	**3/16**	2.381	16.67	16.67	8	65	4	2.CMC.BMZ4.F316	■
5.0		2.50	17.50	17.50	8	65	4	2.CMC30.M5Z4.500.1	■
5.560	**7/32**	2.780	19.46	19.46	10	65	4	2.CMC.BMZ4.F732	■
6.0		3.00	21.00	21.00	10	65	4	2.CMC30.M5Z4.600.1	■
6.350	**1/4**	3.175	22.23	22.23	10	65	4	2.CMC.BMZ4.F14	■
8.0		4.00	28.00	28.00	12	80	4	2.CMC30.M5Z4.800.1	■

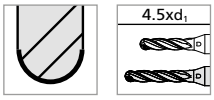
■ Stock item

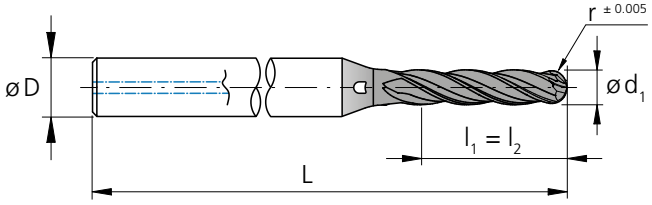
Type N - 4.5 x d - Ball - Z4

Carbide | Z4 | 30° | eXedur SNP

Ø d_1	1.0 - 8.0 mm
Tolerance	+ 0.01 mm - 0.01 mm

Ball





l_1 = Effective length
l_2 = Cutting length

d_1 [mm]	d_1 [inch]	r [mm]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Z [teeth]	Item number	Availability
1.0		0.50	4.50	4.50	4	40	4	2.CMC30.N5Z4.100.1	■
1.2		0.60	5.40	5.40	4	40	4	2.CMC30.N5Z4.120.1	■
1.5		0.75	6.75	6.75	4	40	4	2.CMC30.N5Z4.150.1	■
1.587	**1/16**	0.794	7.14	7.14	4	45	4	2.CMC.BNZ4.F116	■
1.8		0.90	8.10	8.10	4	45	4	2.CMC30.N5Z4.180.1	■
2.0		1.00	9.00	9.00	4	44	4	2.CMC30.N5Z4.200.1	■
2.381	**3/32**	1.191	10.71	10.71	4	44	4	2.CMC.BNZ4.F332	■
2.5		1.25	11.25	11.25	6	55	4	2.CMC30.N5Z4.250.1	■
3.0		1.50	13.50	13.50	6	55	4	2.CMC30.N5Z4.300.1	■
3.175	**1/8**	1.588	14.29	14.29	6	60	4	2.CMC.BNZ4.F18	■
3.968	**5/32**	1.984	17.86	17.86	6	60	4	2.CMC.BNZ4.F532	■
4.0		2.00	18.00	18.00	6	60	4	2.CMC30.N5Z4.400.1	■
4.762	**3/16**	2.381	21.43	21.43	8	70	4	2.CMC.BNZ4.F316	■
5.0		2.50	22.50	22.50	8	70	4	2.CMC30.N5Z4.500.1	■
5.560	**7/32**	2.780	25.02	25.02	10	70	4	2.CMC.BNZ4.F732	■
6.0		3.00	27.00	27.00	10	70	4	2.CMC30.N5Z4.600.1	■
6.350	**1/4**	3.175	28.58	28.58	10	70	4	2.CMC.BNZ4.F14	■
8.0		4.00	36.00	36.00	12	90	4	2.CMC30.N5Z4.800.1	■

■ Stock item

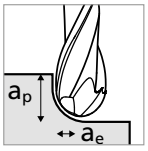
CRAZYMILL by Mikron Tool Cool

Type A - Semi-finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Possibility 1

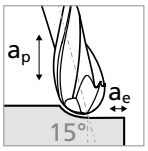
Inclination 0°



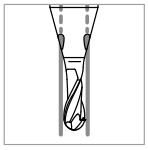
- $a_p = 1 \times d_1$
- $a_e = 0.2 \times d_1$

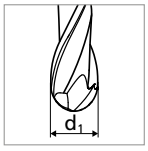
Possibility 2

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		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.013	140	0.014
		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	0.012	140	0.014
		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	0.009	140	0.011
		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	0.014	140	0.015
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.013	140	0.014
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.013	140	0.014
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.010	140	0.012
		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	0.009	120	0.019
		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	0.015	140	0.017
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.015	140	0.017
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.017	140	0.019
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.017	140	0.019
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.017	140	0.019
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.015	140	0.017
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.006	120	0.007
		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	0.014	120	0.015
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.014	120	0.015
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.006	140	0.007
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.009	100	0.010
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

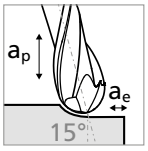
Ød1	1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm – 8.0 mm 7/32 – 1/4"	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	200	0.020	200	0.022	220	0.029	220	0.031	240	0.038	260	0.040	260	0.040	260	0.043
	200	0.019	200	0.020	220	0.027	220	0.029	240	0.037	260	0.038	260	0.038	260	0.041
	200	0.017	200	0.019	220	0.026	220	0.027	240	0.034	260	0.035	260	0.035	260	0.037
	200	0.020	200	0.022	220	0.029	220	0.031	240	0.037	260	0.038	260	0.038	260	0.041
	200	0.019	200	0.020	220	0.027	220	0.029	240	0.035	260	0.037	260	0.037	260	0.039
	200	0.019	200	0.020	220	0.027	220	0.029	240	0.035	260	0.037	260	0.037	260	0.039
	200	0.014	200	0.015	220	0.026	220	0.027	240	0.034	260	0.035	260	0.035	260	0.037
	140	0.020	140	0.022	160	0.024	160	0.031	180	0.035	200	0.044	200	0.044	200	0.047
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
	130	0.008	130	0.009	140	0.009	140	0.010	150	0.012	170	0.016	170	0.016	170	0.017
	130	0.017	130	0.019	140	0.024	140	0.026	150	0.034	170	0.035	170	0.035	170	0.037
	130	0.017	130	0.019	140	0.024	140	0.026	150	0.034	170	0.035	170	0.035	170	0.037
	180	0.008	180	0.009	200	0.009	200	0.010	220	0.012	240	0.016	240	0.016	240	0.017
	140	0.012	140	0.015	180	0.017	180	0.022	200	0.028	240	0.032	240	0.032	240	0.034

CRAZYMILL by Mikron Tool Cool

Type A - Finishing

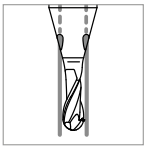
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

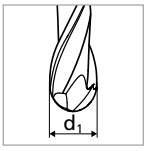
Inclination 15°



- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.015	140	0.017
		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	0.014	140	0.016
		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	0.011	140	0.013
		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	0.016	140	0.018
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.015	140	0.017
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.015	140	0.017
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.012	140	0.014
		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	0.011	120	0.022
		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	0.018	140	0.020
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.018	140	0.020
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.020	140	0.022
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.020	140	0.022
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.020	140	0.022
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.018	140	0.020
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.007	120	0.008
		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	0.016	120	0.018
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.016	120	0.018
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.007	140	0.008
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.010	100	0.012
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

Ød1 1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm–8.0 mm 7/32–1/4"	
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	0.024	200	0.026	220	0.034	220	0.036	240	0.042	260	0.044	260	0.044	260	0.047
200	0.022	200	0.024	220	0.032	220	0.034	240	0.040	260	0.042	260	0.042	260	0.045
200	0.020	200	0.022	220	0.030	220	0.032	240	0.037	260	0.039	260	0.039	260	0.041
200	0.024	200	0.026	220	0.034	220	0.036	240	0.040	260	0.042	260	0.042	260	0.045
200	0.022	200	0.024	220	0.032	220	0.034	240	0.039	260	0.040	260	0.040	260	0.043
200	0.022	200	0.024	220	0.032	220	0.034	240	0.039	260	0.040	260	0.040	260	0.043
200	0.016	200	0.018	220	0.030	220	0.032	240	0.037	260	0.039	260	0.039	260	0.041
140	0.024	140	0.026	160	0.028	160	0.036	180	0.039	200	0.048	200	0.048	200	0.051
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
130	0.009	130	0.010	140	0.010	140	0.012	150	0.013	170	0.018	170	0.018	170	0.019
130	0.020	130	0.022	140	0.028	140	0.030	150	0.037	170	0.039	170	0.039	170	0.041
130	0.020	130	0.022	140	0.028	140	0.030	150	0.037	170	0.039	170	0.039	170	0.041
180	0.009	180	0.010	200	0.010	200	0.012	220	0.013	240	0.018	240	0.018	240	0.019
140	0.014	140	0.018	180	0.020	180	0.026	200	0.031	240	0.035	240	0.035	240	0.037

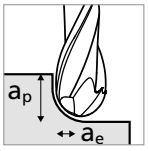
CRAZYMILL by Mikron Tool Cool

Type B - Semi-finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Possibility 1

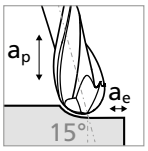
Inclination 0°



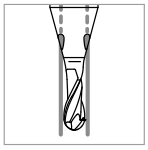
- $a_p = 1 \times d_1$
- $a_e = 0.2 \times d_1$

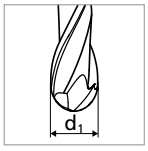
Possibility 2

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		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.013	140	0.014
		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	0.012	140	0.014
		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	0.009	140	0.011
		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	0.014	140	0.015
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.013	140	0.014
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.013	140	0.014
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.010	140	0.012
		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	0.009	120	0.019
		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	0.015	140	0.017
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.015	140	0.017
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.017	140	0.019
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.017	140	0.019
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.017	140	0.019
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.015	140	0.017
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.006	120	0.007
		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	0.014	120	0.015
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.014	120	0.015
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.006	140	0.007
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.009	100	0.010
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

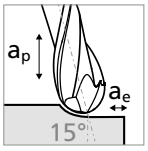
Ød1 1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm–8.0 mm 7/32–1/4"	
v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
200	0.020	200	0.022	220	0.029	220	0.031	240	0.037	260	0.040	260	0.040	260	0.043
200	0.019	200	0.020	220	0.027	220	0.029	240	0.035	260	0.038	260	0.038	260	0.041
200	0.017	200	0.019	220	0.026	220	0.027	240	0.032	260	0.034	260	0.034	260	0.036
200	0.020	200	0.022	220	0.029	220	0.031	240	0.035	260	0.038	260	0.038	260	0.041
200	0.019	200	0.020	220	0.027	220	0.029	240	0.035	260	0.037	260	0.037	260	0.039
200	0.019	200	0.020	220	0.027	220	0.029	240	0.035	260	0.037	260	0.037	260	0.039
200	0.014	200	0.015	220	0.026	220	0.027	240	0.032	260	0.035	260	0.035	260	0.037
140	0.020	140	0.022	160	0.024	160	0.031	180	0.034	200	0.040	200	0.042	200	0.044
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
130	0.008	130	0.009	140	0.009	140	0.010	150	0.012	170	0.016	170	0.016	170	0.017
130	0.017	130	0.019	140	0.024	140	0.026	150	0.032	170	0.035	170	0.035	170	0.037
130	0.017	130	0.019	140	0.024	140	0.026	150	0.032	170	0.035	170	0.035	170	0.037
180	0.008	180	0.009	200	0.009	200	0.010	220	0.012	240	0.016	240	0.016	240	0.017
140	0.012	140	0.015	180	0.017	180	0.022	200	0.026	240	0.032	240	0.032	240	0.034

CRAZYMILL by Mikron Tool Cool

Type B - Finishing

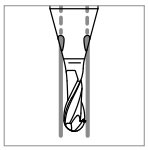
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

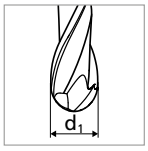
Inclination 15°



- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.015	140	0.017
		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	0.014	140	0.016
		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	0.011	140	0.013
		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	0.016	140	0.018
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.015	140	0.017
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.015	140	0.017
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.012	140	0.014
		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	0.011	120	0.022
		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	0.018	140	0.020
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.018	140	0.020
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.020	140	0.022
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.020	140	0.022
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.020	140	0.022
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.018	140	0.020
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.007	120	0.008
		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	0.016	120	0.018
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.016	120	0.018
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.007	140	0.008
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.010	100	0.012
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

07

Ød1															
1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm–8.0 mm 7/32–1/4"	
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	0.024	200	0.026	220	0.034	220	0.036	240	0.040	260	0.044	260	0.044	260	0.047
200	0.022	200	0.024	220	0.032	220	0.034	240	0.039	260	0.042	260	0.042	260	0.045
200	0.020	200	0.022	220	0.030	220	0.032	240	0.035	260	0.037	260	0.037	260	0.039
200	0.024	200	0.026	220	0.034	220	0.036	240	0.039	260	0.042	260	0.042	260	0.045
200	0.022	200	0.024	220	0.032	220	0.034	240	0.039	260	0.040	260	0.040	260	0.043
200	0.022	200	0.024	220	0.032	220	0.034	240	0.039	260	0.040	260	0.040	260	0.043
200	0.016	200	0.018	220	0.030	220	0.032	240	0.035	260	0.039	260	0.039	260	0.041
140	0.024	140	0.026	160	0.028	160	0.036	180	0.038	200	0.044	200	0.046	200	0.049
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
130	0.009	130	0.010	140	0.010	140	0.012	150	0.013	170	0.018	170	0.018	170	0.019
130	0.020	130	0.022	140	0.028	140	0.030	150	0.035	170	0.039	170	0.039	170	0.041
130	0.020	130	0.022	140	0.028	140	0.030	150	0.035	170	0.039	170	0.039	170	0.041
180	0.009	180	0.010	200	0.010	200	0.012	220	0.013	240	0.018	240	0.018	240	0.019
140	0.014	140	0.018	180	0.020	180	0.026	200	0.029	240	0.035	240	0.035	240	0.037

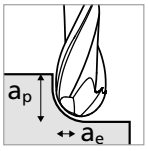
CRAZYMILL by Mikron Tool Cool

Type C - Semi-finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Possibility 1

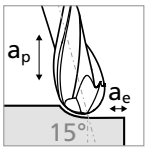
Inclination 0°



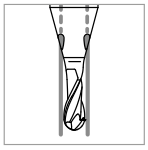
- $a_p = 0.5 \times d_1$
- $a_e = 0.2 \times d_1$

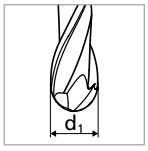
Possibility 2

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		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.013	140	0.014
		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	0.012	140	0.014
		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	0.009	140	0.011
		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	0.014	140	0.015
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.013	140	0.014
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.013	140	0.014
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.010	140	0.012
		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	0.009	120	0.019
		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	0.015	140	0.017
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.015	140	0.017
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.017	140	0.019
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.017	140	0.019
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.017	140	0.019
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.015	140	0.017
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.006	120	0.007
		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	0.014	120	0.015
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.014	120	0.015
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.006	140	0.007
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.009	100	0.010
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P	N	S3
●	●	●
M	S1	H1
●	●	●
K	S2	H2
●	●	⊠

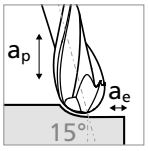
	Ød1															
	1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm–8.0 mm 7/32–1/4"	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	200	0.020	200	0.022	220	0.029	220	0.031	240	0.032	260	0.040	260	0.040	260	0.043
	200	0.019	200	0.020	220	0.027	220	0.029	240	0.030	260	0.038	260	0.038	260	0.041
	200	0.017	200	0.019	220	0.026	220	0.027	240	0.028	260	0.035	260	0.034	260	0.037
	200	0.020	200	0.022	220	0.029	220	0.031	240	0.032	260	0.038	260	0.038	260	0.041
	200	0.019	200	0.020	220	0.027	220	0.029	240	0.029	260	0.037	260	0.037	260	0.039
	200	0.019	200	0.020	220	0.027	220	0.029	240	0.029	260	0.037	260	0.037	260	0.039
	200	0.014	200	0.015	220	0.026	220	0.027	240	0.027	260	0.035	260	0.035	260	0.037
	140	0.020	140	0.022	160	0.024	160	0.031	180	0.034	200	0.042	200	0.042	200	0.044
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
	200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
	130	0.008	130	0.009	140	0.009	140	0.010	150	0.012	170	0.016	170	0.016	170	0.017
	130	0.017	130	0.019	140	0.024	140	0.026	150	0.027	170	0.034	170	0.035	170	0.036
	130	0.017	130	0.019	140	0.024	140	0.026	150	0.027	170	0.034	170	0.035	170	0.036
	180	0.008	180	0.009	200	0.009	200	0.010	220	0.012	240	0.016	240	0.016	240	0.017
	140	0.012	140	0.015	180	0.017	180	0.022	200	0.024	240	0.026	240	0.032	240	0.027

CRAZYMILL by Mikron Tool Cool

Type C - Finishing

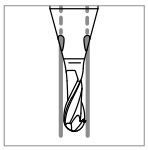
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

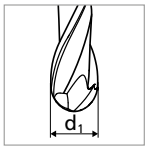
Inclination 15°



- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.015	140	0.017
		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	0.014	140	0.016
		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	0.011	140	0.013
		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	0.016	140	0.018
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.015	140	0.017
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.015	140	0.017
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.012	140	0.014
		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	0.011	120	0.022
		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	0.018	140	0.020
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.018	140	0.020
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.020	140	0.022
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.020	140	0.022
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.020	140	0.022
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.018	140	0.020
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.007	120	0.008
		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	0.016	120	0.018
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.016	120	0.018
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.007	140	0.008
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.010	100	0.012
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

07

Ød1															
1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm–8.0 mm 7/32–1/4"	
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	0.024	200	0.026	220	0.034	220	0.036	240	0.035	260	0.044	260	0.044	260	0.047
200	0.022	200	0.024	220	0.032	220	0.034	240	0.033	260	0.042	260	0.042	260	0.045
200	0.020	200	0.022	220	0.030	220	0.032	240	0.031	260	0.039	260	0.037	260	0.041
200	0.024	200	0.026	220	0.034	220	0.036	240	0.035	260	0.042	260	0.042	260	0.045
200	0.022	200	0.024	220	0.032	220	0.034	240	0.032	260	0.040	260	0.040	260	0.043
200	0.022	200	0.024	220	0.032	220	0.034	240	0.032	260	0.040	260	0.040	260	0.043
200	0.016	200	0.018	220	0.030	220	0.032	240	0.030	260	0.039	260	0.039	260	0.041
140	0.024	140	0.026	160	0.028	160	0.036	180	0.037	200	0.046	200	0.046	200	0.049
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
130	0.009	130	0.010	140	0.010	140	0.012	150	0.013	170	0.018	170	0.018	170	0.019
130	0.020	130	0.022	140	0.028	140	0.030	150	0.030	170	0.037	170	0.039	170	0.039
130	0.020	130	0.022	140	0.028	140	0.030	150	0.030	170	0.037	170	0.039	170	0.039
180	0.009	180	0.010	200	0.010	200	0.012	220	0.013	240	0.018	240	0.018	240	0.019
140	0.014	140	0.018	180	0.020	180	0.026	200	0.026	240	0.028	240	0.035	240	0.030

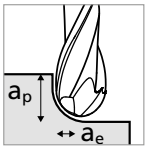
CRAZYMILL by Mikron Tool Cool

Type M - Semi-finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Possibility 1

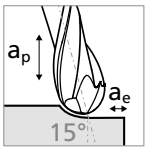
Inclination 0°



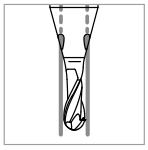
- $a_p = 1 \times d_1$
- $a_e = 0.2 \times d_1$

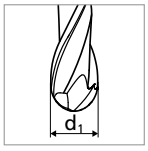
Possibility 2

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		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.013	140	0.014
		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	0.012	140	0.014
		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	0.009	140	0.011
		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	0.014	140	0.015
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.013	140	0.014
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.013	140	0.014
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.010	140	0.012
		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	0.009	120	0.019
		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	0.015	140	0.017
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.015	140	0.017
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.017	140	0.019
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.017	140	0.019
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.017	140	0.019
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.015	140	0.017
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.006	120	0.007
		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	0.014	120	0.015
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.014	120	0.015
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.006	140	0.007
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.009	100	0.010
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

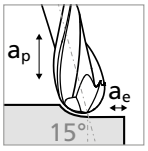
Ød1 1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm–8.0 mm 7/32–1/4"	
v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
200	0.020	200	0.022	220	0.029	220	0.031	240	0.037	260	0.040	260	0.040	260	0.043
200	0.019	200	0.020	220	0.027	220	0.029	240	0.035	260	0.038	260	0.038	260	0.041
200	0.017	200	0.019	220	0.026	220	0.027	240	0.032	260	0.034	260	0.034	260	0.036
200	0.020	200	0.022	220	0.029	220	0.031	240	0.035	260	0.038	260	0.038	260	0.041
200	0.019	200	0.020	220	0.027	220	0.029	240	0.035	260	0.037	260	0.037	260	0.039
200	0.019	200	0.020	220	0.027	220	0.029	240	0.035	260	0.037	260	0.037	260	0.039
200	0.014	200	0.015	220	0.026	220	0.027	240	0.032	260	0.035	260	0.035	260	0.037
140	0.020	140	0.022	160	0.024	160	0.031	180	0.034	200	0.040	200	0.042	200	0.044
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.048	260	0.048	260	0.051
130	0.008	130	0.009	140	0.009	140	0.010	150	0.012	170	0.016	170	0.016	170	0.017
130	0.017	130	0.019	140	0.024	140	0.026	150	0.032	170	0.035	170	0.035	170	0.037
130	0.017	130	0.019	140	0.024	140	0.026	150	0.032	170	0.035	170	0.035	170	0.037
180	0.008	180	0.009	200	0.009	200	0.010	220	0.012	240	0.016	240	0.016	240	0.017
140	0.012	140	0.015	180	0.017	180	0.022	200	0.026	240	0.032	240	0.032	240	0.034

CRAZYMILL by Mikron Tool Cool

Type M - Finishing

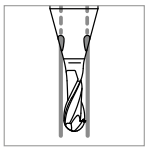
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

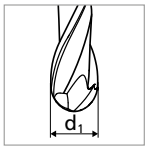
Inclination 15°



- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.015	140	0.017
		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	0.014	140	0.016
		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	0.011	140	0.013
		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	0.016	140	0.018
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.015	140	0.017
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.015	140	0.017
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.012	140	0.014
		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	0.011	120	0.022
		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	0.018	140	0.020
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.018	140	0.020
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.020	140	0.022
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.020	140	0.022
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.020	140	0.022
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.018	140	0.020
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.007	120	0.008
		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	0.016	120	0.018
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.016	120	0.018
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.007	140	0.008
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.010	100	0.012
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

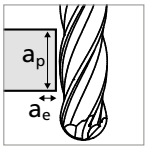
Ød1 1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm – 8.0 mm 7/32 – 1/4"	
v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
200	0.024	200	0.026	220	0.034	220	0.036	240	0.040	260	0.044	260	0.044	260	0.047
200	0.022	200	0.024	220	0.032	220	0.034	240	0.039	260	0.042	260	0.042	260	0.045
200	0.020	200	0.022	220	0.030	220	0.032	240	0.035	260	0.037	260	0.037	260	0.039
200	0.024	200	0.026	220	0.034	220	0.036	240	0.039	260	0.042	260	0.042	260	0.045
200	0.022	200	0.024	220	0.032	220	0.034	240	0.039	260	0.040	260	0.040	260	0.043
200	0.022	200	0.024	220	0.032	220	0.034	240	0.039	260	0.040	260	0.040	260	0.043
200	0.016	200	0.018	220	0.030	220	0.032	240	0.035	260	0.039	260	0.039	260	0.041
140	0.024	140	0.026	160	0.028	160	0.036	180	0.038	200	0.044	200	0.046	200	0.049
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.053	260	0.053	260	0.056
130	0.009	130	0.010	140	0.010	140	0.012	150	0.013	170	0.018	170	0.018	170	0.019
130	0.020	130	0.022	140	0.028	140	0.030	150	0.035	170	0.039	170	0.039	170	0.041
130	0.020	130	0.022	140	0.028	140	0.030	150	0.035	170	0.039	170	0.039	170	0.041
180	0.009	180	0.010	200	0.010	200	0.012	220	0.013	240	0.018	240	0.018	240	0.019
140	0.014	140	0.018	180	0.020	180	0.026	200	0.029	240	0.035	240	0.035	240	0.037

CRAZYMILL by Mikron Tool Cool

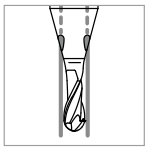
Type M - Side-finishing

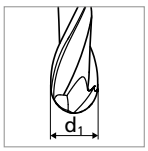
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

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		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	130	0.008	130	0.009
		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	0.007	130	0.008
		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	0.006	130	0.007
		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	0.008	130	0.009
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	130	0.008	130	0.009
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	130	0.008	130	0.009
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	130	0.006	130	0.007
		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	0.006	111	0.011
		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	0.009	130	0.010
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	130	0.009	130	0.010
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	130	0.010	130	0.011
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	130	0.010	130	0.011
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	130	0.010	130	0.011
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	130	0.009	130	0.010
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	111	0.004	111	0.004
		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	0.008	111	0.009
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	111	0.008	111	0.009
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	130	0.004	130	0.004
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	93	0.005	93	0.006
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

Ød1 1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm – 8.0 mm 7/32 – 1/4"	
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	0.012	180	0.013	200	0.017	200	0.018	210	0.023	220	0.025	220	0.028	220	0.033
180	0.011	180	0.012	200	0.016	200	0.017	210	0.022	220	0.024	220	0.026	220	0.029
180	0.010	180	0.011	200	0.015	200	0.016	210	0.020	220	0.021	220	0.023	220	0.025
180	0.012	180	0.013	200	0.017	200	0.018	210	0.022	220	0.024	220	0.026	220	0.029
180	0.011	180	0.012	200	0.016	200	0.017	210	0.022	220	0.023	220	0.025	220	0.028
180	0.011	180	0.012	200	0.016	200	0.017	210	0.022	220	0.023	220	0.025	220	0.028
180	0.008	180	0.009	200	0.015	200	0.016	210	0.020	220	0.022	220	0.024	220	0.026
126	0.012	126	0.013	145	0.014	145	0.018	157	0.022	169	0.025	169	0.029	169	0.031
180	0.013	180	0.014	200	0.018	200	0.020	210	0.029	220	0.030	220	0.033	220	0.036
180	0.013	180	0.014	200	0.018	200	0.020	210	0.029	220	0.030	220	0.033	220	0.036
180	0.013	180	0.014	200	0.018	200	0.020	210	0.029	220	0.030	220	0.033	220	0.036
180	0.013	180	0.014	200	0.018	200	0.020	210	0.029	220	0.030	220	0.033	220	0.036
180	0.013	180	0.014	200	0.018	200	0.020	210	0.029	220	0.030	220	0.033	220	0.036
180	0.013	180	0.014	200	0.018	200	0.020	210	0.029	220	0.030	220	0.033	220	0.036
117	0.005	117	0.005	127	0.005	127	0.006	131	0.008	144	0.010	144	0.011	144	0.012
117	0.010	117	0.011	127	0.014	127	0.015	131	0.020	144	0.022	144	0.024	144	0.026
117	0.010	117	0.011	127	0.014	127	0.015	131	0.020	144	0.022	144	0.024	144	0.026
162	0.005	162	0.005	182	0.005	182	0.006	192	0.008	203	0.010	203	0.011	203	0.012
126	0.007	126	0.009	164	0.010	164	0.013	175	0.017	203	0.020	203	0.022	203	0.024

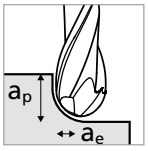
CRAZYMILL by Mikron Tool Cool

Type N - Semi-finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Possibility 1

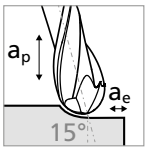
Inclination 0°



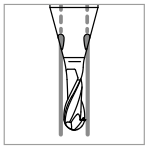
- $a_p = 0.5 \times d_1$
- $a_e = 0.2 \times d_1$

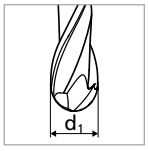
Possibility 2

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		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.013	140	0.014
		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	0.012	140	0.014
		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	0.009	140	0.011
		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	0.014	140	0.015
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.013	140	0.014
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.013	140	0.014
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.010	140	0.012
		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	0.009	120	0.019
		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	0.015	140	0.017
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.015	140	0.017
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.017	140	0.019
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.017	140	0.019
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.017	140	0.019
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.015	140	0.017
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.006	120	0.007
		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	0.014	120	0.015
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.014	120	0.015
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.006	140	0.007
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.009	100	0.010
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

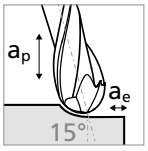
Ød1															
1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm–8.0 mm 7/32–1/4"	
v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
200	0.020	200	0.022	220	0.029	220	0.031	240	0.032	260	0.040	260	0.040	260	0.043
200	0.019	200	0.020	220	0.027	220	0.029	240	0.030	260	0.038	260	0.038	260	0.041
200	0.017	200	0.019	220	0.026	220	0.027	240	0.028	260	0.035	260	0.034	260	0.037
200	0.020	200	0.022	220	0.029	220	0.031	240	0.032	260	0.038	260	0.038	260	0.041
200	0.019	200	0.020	220	0.027	220	0.029	240	0.029	260	0.037	260	0.037	260	0.039
200	0.019	200	0.020	220	0.027	220	0.029	240	0.029	260	0.037	260	0.037	260	0.039
200	0.014	200	0.015	220	0.026	220	0.027	240	0.027	260	0.035	260	0.035	260	0.037
140	0.020	140	0.022	160	0.024	160	0.031	180	0.034	200	0.042	200	0.042	200	0.044
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
200	0.022	200	0.024	220	0.031	220	0.034	240	0.046	260	0.044	260	0.048	260	0.047
130	0.008	130	0.009	140	0.009	140	0.010	150	0.012	170	0.016	170	0.016	170	0.017
130	0.017	130	0.019	140	0.024	140	0.026	150	0.027	170	0.034	170	0.035	170	0.036
130	0.017	130	0.019	140	0.024	140	0.026	150	0.027	170	0.034	170	0.035	170	0.036
180	0.008	180	0.009	200	0.009	200	0.010	220	0.012	240	0.016	240	0.016	240	0.017
140	0.012	140	0.015	180	0.017	180	0.022	200	0.024	240	0.026	240	0.032	240	0.027

CRAZYMILL by Mikron Tool Cool

Type N - Finishing

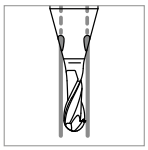
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

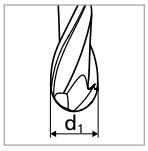
Inclination 15°



- $a_p = 0.1 \times d_1$
- $a_e = 0.05 - 0.1 \times d_1$

$n_{max} = 60'000$ rpm





Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	140	0.015	140	0.017
		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	0.014	140	0.016
		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	0.011	140	0.013
		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	0.016	140	0.018
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.015	140	0.017
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.015	140	0.017
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140	0.012	140	0.014
		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	0.011	120	0.022
		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	0.018	140	0.020
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	140	0.018	140	0.020
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	140	0.020	140	0.022
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	140	0.020	140	0.022
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	140	0.020	140	0.022
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	140	0.018	140	0.020
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	120	0.007	120	0.008
		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	0.016	120	0.018
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	120	0.016	120	0.018
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	140	0.007	140	0.008
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	100	0.010	100	0.012
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S3 ●
M ●	S1 ●	H1 ●
K ●	S2 ●	H2 ⊠

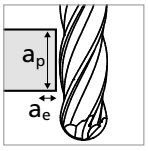
Ød1	1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm–8.0 mm 7/32–1/4"	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	200	0.024	200	0.026	220	0.034	220	0.036	240	0.035	260	0.044	260	0.044	260	0.047
	200	0.022	200	0.024	220	0.032	220	0.034	240	0.033	260	0.042	260	0.042	260	0.045
	200	0.020	200	0.022	220	0.030	220	0.032	240	0.031	260	0.039	260	0.037	260	0.041
	200	0.024	200	0.026	220	0.034	220	0.036	240	0.035	260	0.042	260	0.042	260	0.045
	200	0.022	200	0.024	220	0.032	220	0.034	240	0.032	260	0.040	260	0.040	260	0.043
	200	0.022	200	0.024	220	0.032	220	0.034	240	0.032	260	0.040	260	0.040	260	0.043
	200	0.016	200	0.018	220	0.030	220	0.032	240	0.030	260	0.039	260	0.039	260	0.041
	140	0.024	140	0.026	160	0.028	160	0.036	180	0.037	200	0.046	200	0.046	200	0.049
	200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
	200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
	200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
	200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
	200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
	200	0.026	200	0.028	220	0.036	220	0.040	240	0.051	260	0.048	260	0.053	260	0.051
	130	0.009	130	0.010	140	0.010	140	0.012	150	0.013	170	0.018	170	0.018	170	0.019
	130	0.020	130	0.022	140	0.028	140	0.030	150	0.030	170	0.037	170	0.039	170	0.039
	130	0.020	130	0.022	140	0.028	140	0.030	150	0.030	170	0.037	170	0.039	170	0.039
	180	0.009	180	0.010	200	0.010	200	0.012	220	0.013	240	0.018	240	0.018	240	0.019
	140	0.014	140	0.018	180	0.020	180	0.026	200	0.026	240	0.028	240	0.035	240	0.030

CRAZYMILL by Mikron Tool Cool

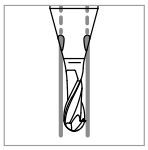
Type N - Side-finishing

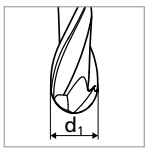
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

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		1.2 mm	
					v_c	f_z	v_c	f_z
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	130	0.008	130	0.009
		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	0.007	130	0.008
		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	0.006	130	0.007
		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	0.008	130	0.009
		1.4105	X6CrMoS17	AISI 430F				
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	130	0.008	130	0.009
		1.4112	X90CrMoV18	AISI 440B				
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	130	0.008	130	0.009
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH				
	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	130	0.006	130	0.007
		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	0.006	111	0.011
		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	0.009	130	0.010
		3.4365	AlZnMgCu1.5	ASTM 7075				
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	130	0.009	130	0.010
		3.2381	GD-AlSi10Mg	UNS A03590				
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	130	0.010	130	0.011
		2.0065	Cu-ETP / CW004A	UNS C11000				
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	130	0.010	130	0.011
		2.0360	CuZn40 CW509L	UNS C28000				
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	130	0.010	130	0.011
		2.1020	CuSn6	UNS C51900				
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	130	0.009	130	0.010
		2.0960	CuAl9Mn2	UNS C63200				
S_1	Super alloys	2.4856		Inconel 625	111	0.004	111	0.004
		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	0.008	111	0.009
		3.7065	Gr.4	ASTM B348 / F68				
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	111	0.008	111	0.009
		9.9367	TiAl6Nb7	ASTM F1295				
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	130	0.004	130	0.004
			CrCoMo28	ASTM F1537				
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	93	0.005	93	0.006
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

v_c [m/min]
f_z [mm]

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

P ●	N ●	S_3 ●
M ●	S_1 ●	H_1 ●
K ●	S_2 ●	H_2 ⊠

Ød1 1.5 mm 1/16"		1.8 mm		2.0 mm		2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm 5/32"		5.0 mm 3/16"		6.0 mm–8.0 mm 7/32–1/4"	
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	0.012	185	0.013	204	0.017	204	0.018	222	0.020	241	0.025	241	0.028	241	0.033
185	0.011	185	0.012	204	0.016	204	0.017	222	0.019	241	0.024	241	0.026	241	0.031
185	0.010	185	0.011	204	0.015	204	0.016	222	0.018	241	0.022	241	0.024	241	0.029
185	0.012	185	0.013	204	0.017	204	0.018	222	0.020	241	0.024	241	0.026	241	0.031
185	0.011	185	0.012	204	0.016	204	0.017	222	0.018	241	0.023	241	0.025	241	0.030
185	0.011	185	0.012	204	0.016	204	0.017	222	0.018	241	0.023	241	0.025	241	0.030
185	0.008	185	0.009	204	0.015	204	0.016	222	0.017	241	0.022	241	0.024	241	0.029
130	0.012	130	0.013	148	0.014	148	0.018	167	0.021	185	0.026	185	0.029	185	0.034
185	0.013	185	0.014	204	0.018	204	0.020	222	0.029	241	0.028	241	0.030	241	0.036
185	0.013	185	0.014	204	0.018	204	0.020	222	0.029	241	0.028	241	0.030	241	0.036
185	0.013	185	0.014	204	0.018	204	0.020	222	0.029	241	0.028	241	0.030	241	0.036
185	0.013	185	0.014	204	0.018	204	0.020	222	0.029	241	0.028	241	0.030	241	0.036
185	0.013	185	0.014	204	0.018	204	0.020	222	0.029	241	0.028	241	0.030	241	0.036
185	0.013	185	0.014	204	0.018	204	0.020	222	0.029	241	0.028	241	0.030	241	0.036
120	0.005	120	0.005	130	0.005	130	0.006	139	0.008	157	0.010	157	0.011	157	0.013
120	0.010	120	0.011	130	0.014	130	0.015	139	0.017	157	0.021	157	0.023	157	0.027
120	0.010	120	0.011	130	0.014	130	0.015	139	0.017	157	0.021	157	0.023	157	0.027
167	0.005	167	0.005	185	0.005	185	0.006	204	0.008	222	0.010	222	0.011	222	0.013
130	0.007	130	0.009	167	0.010	167	0.013	185	0.015	222	0.016	222	0.018	222	0.021

Process CrazyMill Cool Ball - Z4

ACCURATE AND EFFICIENT MILLING

Coolant type, pressure and filtration

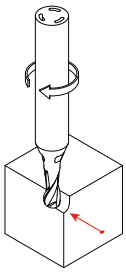
Coolant: for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used as well.

Filter: the large cooling channels permit the use of a standard filter with filter quality of ≤ 0.05 mm.

Coolant pressure: at least 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

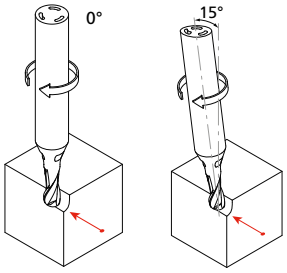
Climb milling and conventional milling



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

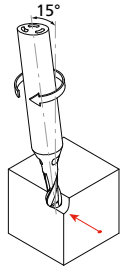


Mikron Tool recommends vertical machining with respect to the workpiece for semi-finishing with CrazyMill Cool Ball (machining angle 0°) or a machining angle of 15° or 75° with respect to the workpiece surface.

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).

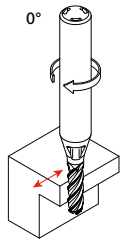
An angle of 15° of the milling body with respect to the workpiece brings certain advantages:

- 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

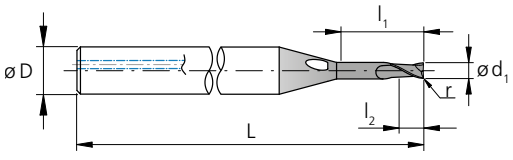
v_c and f_z = as specified in the cutting data table
End mill Type M: a_p = 3 x d, a_e = 0.02 – 0.1 x d
End mill Type N: a_p = 4 x d, a_e = 0.02 – 0.1 x d

Customized milling cutters

Mikron Tool produces solid carbide milling cutters according to your needs and requirements and within the following range:

CHARACTERISTICS

- Diameter min.: 0.2 mm
- Diameter max.: 32.0 mm, please contact us for larger diameters
- Maximum tool length: 330 mm
- Tool diameter tolerance max.: ± 5 µm
- Concentricity between shank and tool diameters max.: ≤ 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.: 5 mm – 200 mm
- Thickness: 0.1 mm – 30.0 mm
- Bore diameter (diameter of profile milling cutter holder): 2.0 mm – 40.0 mm
- Tolerance tool diameter max.: ± 0.01 mm
- Concentricity internal to external diameter: 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

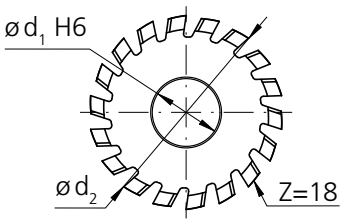
- Tools to be used with external coolant supply

MATERIAL TO BE MACHINED

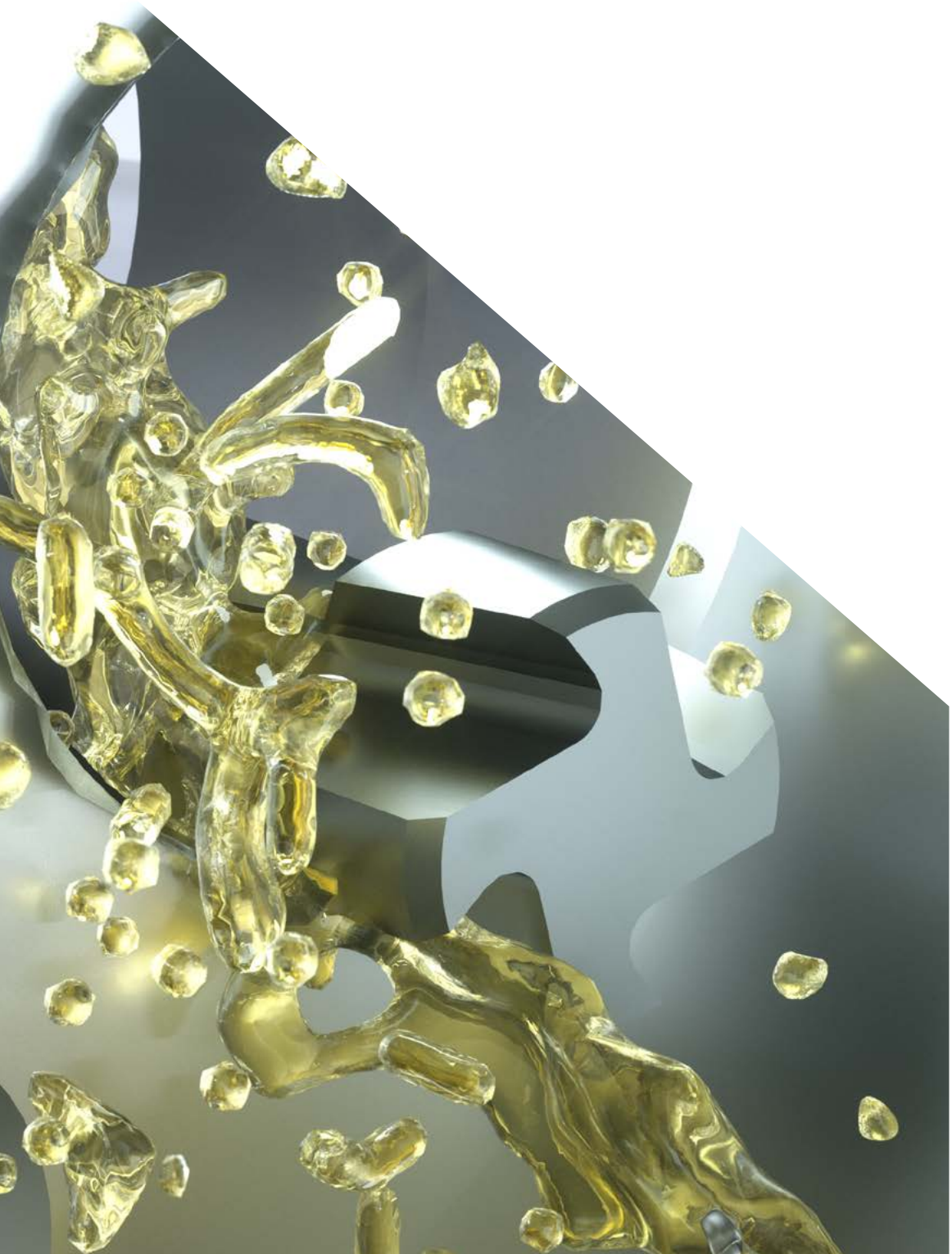
For steel, corrosion-resistant steel i.e. stainless steel, titanium / titanium alloys, super alloys i.e. heat-resistant steel such as Inconel or Hastelloy, CrCo alloys, hardened steel up to 55 HRC, aluminum / aluminum alloys, brass, copper, cast metals, etc.

TREATMENTS

Cutting edge preparation



crazy about deburring

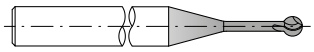


DEBURRING TOOLS

08

Overview

CUTTING TOOL SOLUTIONS

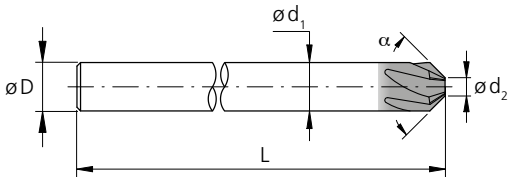
CRAZYMILL Chamfer	 Frontchamfer	
CRAZYMILL Chamfer	 Backchamfer	
CRAZYMILL Chamfer	 Doublechamfer	
CRAZYMILL Chamfer	 Radiuschamfer	
Customized Chamfer and Deburring Tools		

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

ø - range [mm]	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	–	–	✔	●	●	●	●	●	●	●	●	⊠	**646**
0.36 – 5.70	3 x d 5 x d	–	✔	●	●	●	●	●	●	●	●	⊠	**647**
0.9 – 5.7	3 x d 6 x d	–	✔	●	●	●	●	●	●	●	●	⊠	**648**
1.0 – 6.0	4 x d	–	✔	●	●	●	●	●	●	●	●	⊠	**649**
0.1 – 32.0	as required	✔	✔	●	●	●	●	●	●	●	●	⊠	**660**

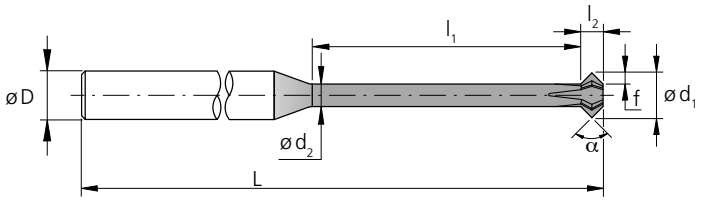
Codification key

ITEM NUMBER EASY TO UNDERSTAND



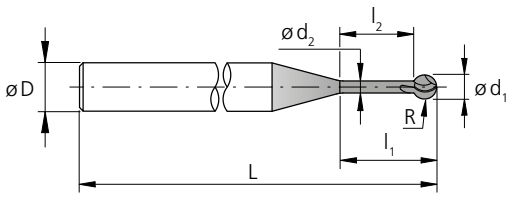
2.FC.100 300 90.1

- **2** — Division number: 2 = Mikron Tool SA Agno
- **FC** — CrazyMill Chamfer family: FC = CrazyMill Frontchamfer
- **100** — Second diameter d_2: ■ 100 = Ø 1 mm
- **300** — Cutting diameter d_1: ■ 300 = Ø 3 mm
- **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
- **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

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 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

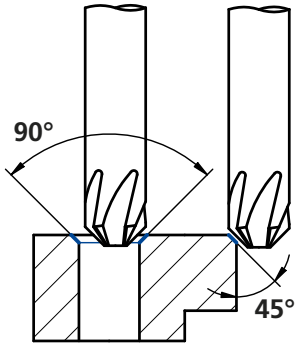
Perfect finished parts

CHAMFERING AND DEBURRING IN SMALL DIMENSIONS

All options with 4 versions

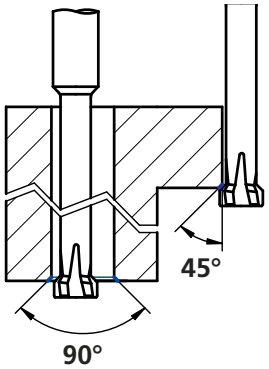
CrazyMill Frontchamfer

For front deburring and chamfering



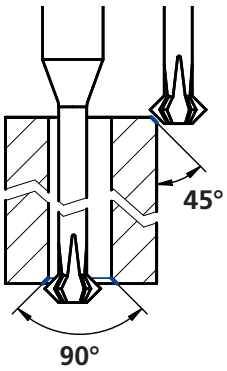
CrazyMill Backchamfer

For rear deburring



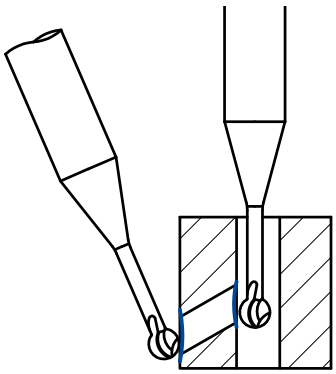
CrazyMill Doublechamfer

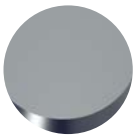
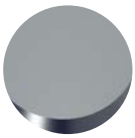
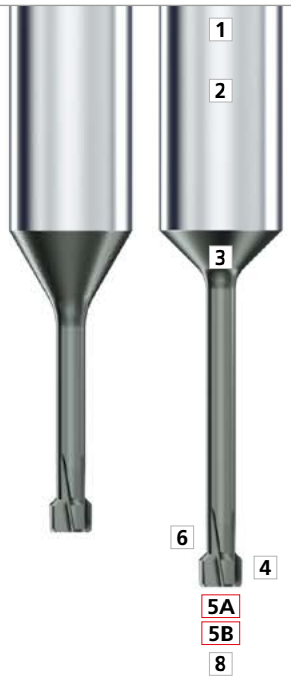
For front and rear deburring



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 ■ Coated ■ Ø1.0 - 6.0 mm	■ External cooling ■ Coated ■ Ø0.36 - 5.70 mm	■ External cooling ■ Coated ■ Ø0.9 - 5.7 mm	■ External cooling ■ Coated ■ Ø1.0 - 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.

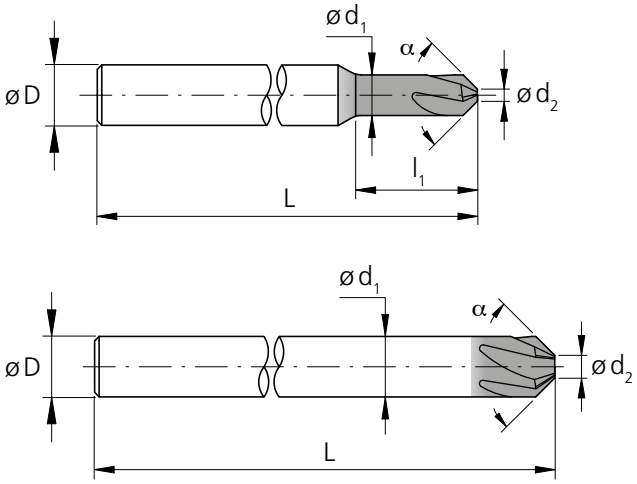
9 | CRAZYMILL DOUBLECHAMFER
Can deburr front and rear in a single clamping.

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 by Mikron Tool Frontchamfer

CrazyMill Frontchamfer

Carbide | 45° | Z 4-6 | eXedur RI

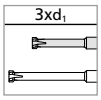


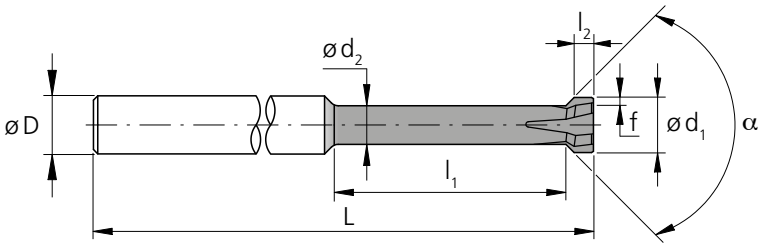
d_1 [mm]	l_1 [mm]	d_2 [mm]	D (h6) [mm]	L [mm]	Chamfer α	Z [Teeth]	Item number	Availability
1.0	3	0.3	3	40	90°	4	2.FC.03010090.1	■
2.0	6	0.6	3	40	90°	4	2.FC.06020090.1	■
3.0	-	1.0	3	50	90°	5	2.FC.10030090.1	■
4.0	-	1.5	4	50	90°	6	2.FC.15040090.1	■
6.0	-	2.0	6	50	90°	6	2.FC.20060090.1	■

■ Stock item

CrazyMill Backchamfer 3 x d / 5 x d

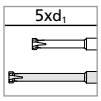
Carbide | 45° | Z 3-6 | eXedur RI

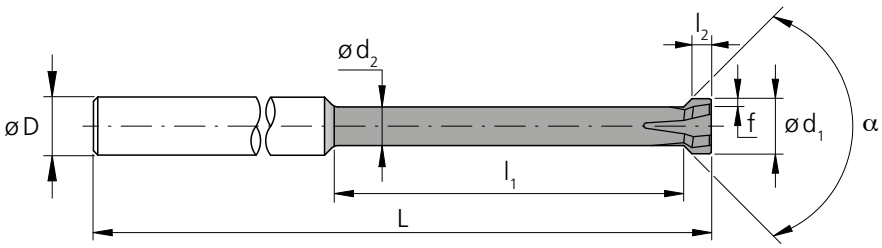




d_1 [mm]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer α	Z [Teeth]	f [mm]	Item number	Availability
0.36	1.6	0.22	0.20	3	50	90°	3	0.03	2.BC.03036090.1	■
0.46	2.0	0.30	0.25	3	50	90°	3	0.04	2.BC.03046090.1	■
0.65	2.8	0.40	0.35	3	50	90°	3	0.04	2.BC.03065090.1	■
0.90	4.0	0.60	0.50	4	50	90°	4	0.075	2.BC.03090090.1	■
1.40	6.0	0.95	0.90	4	50	90°	4	0.10	2.BC.03140090.1	■
1.90	8.0	1.40	1.00	4	50	90°	5	0.10	2.BC.03190090.1	■
2.90	12.0	2.10	1.50	4	60	90°	5	0.20	2.BC.03290090.1	■
3.70	16.0	2.70	2.00	4	60	90°	5	0.30	2.BC.03370090.1	■
4.70	20.0	3.30	2.00	6	70	90°	6	0.40	2.BC.03470090.1	■
5.70	24.0	4.00	2.00	6	70	90°	6	0.50	2.BC.03570090.1	■

■ Stock item



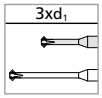


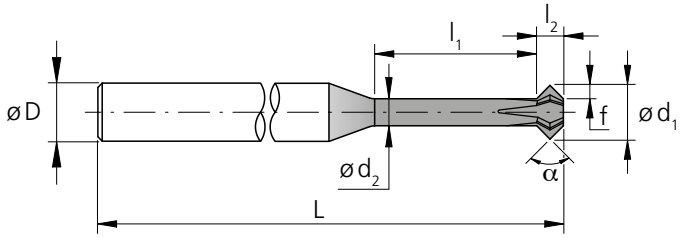
d_1 [mm]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer α	Z [Teeth]	f [mm]	Item number	Availability
0.36	2.4	0.22	0.20	3	50	90°	3	0.03	2.BC.05036090.1	■
0.46	3.0	0.30	0.25	3	50	90°	3	0.04	2.BC.05046090.1	■
0.65	4.2	0.40	0.35	3	50	90°	3	0.04	2.BC.05065090.1	■
0.90	6.0	0.60	0.50	4	60	90°	4	0.075	2.BC.05090090.1	■
1.40	9.0	0.95	0.90	4	60	90°	4	0.10	2.BC.05140090.1	■
1.90	12.0	1.40	1.00	4	60	90°	5	0.10	2.BC.05190090.1	■
2.90	18.0	2.10	1.50	4	70	90°	5	0.20	2.BC.05290090.1	■
3.70	24.0	2.70	2.00	4	70	90°	5	0.30	2.BC.05370090.1	■
4.70	30.0	3.30	2.00	6	80	90°	6	0.40	2.BC.05470090.1	■
5.70	36.0	4.00	2.00	6	80	90°	6	0.50	2.BC.05570090.1	■

■ Stock item

CrazyMill Doublechamfer 3 x d / 6 x d

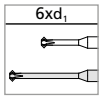
Carbide | 45° 45° | Z 4-6 | eXedur RI

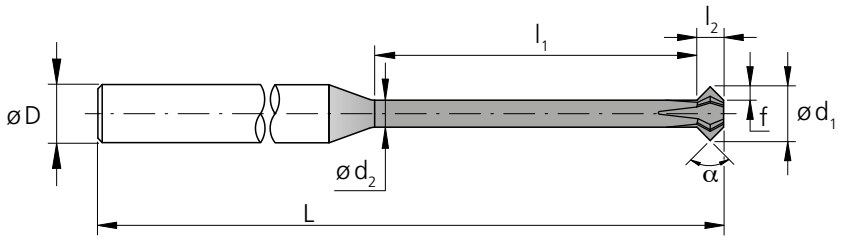




d_1 [mm]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer α	Z [Teeth]	f [mm]	Item number	Availability
0.9	2.7	0.45	0.45	3	53.5	90°	4	0.23	2.DC.03090090.1	■
1.4	4.2	0.70	0.70	3	53.5	90°	5	0.35	2.DC.03140090.1	■
1.8	5.4	0.90	0.90	4	55.0	90°	5	0.45	2.DC.03180090.1	■
2.8	8.4	1.40	1.40	4	60.0	90°	5	0.70	2.DC.03280090.1	■
3.7	11.1	1.85	1.85	4	60.0	90°	5	0.93	2.DC.03370090.1	■
4.7	14.1	2.35	2.35	6	70.0	90°	5	1.18	2.DC.03470090.1	■
5.7	17.1	2.85	2.85	6	70.0	90°	6	1.43	2.DC.03570090.1	■

■ Stock item





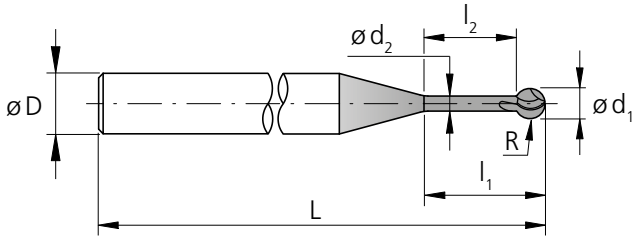
d_1 [mm]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Chamfer α	Z [Teeth]	f [mm]	Item number	Availability
0.9	5.4	0.54	0.36	3	60.0	90°	4	0.18	2.DC.06090090.1	■
1.4	8.4	0.84	0.56	3	60.0	90°	5	0.28	2.DC.06140090.1	■
1.8	10.8	1.08	0.72	4	60.0	90°	5	0.36	2.DC.06180090.1	■
2.8	16.8	1.68	1.12	4	60.0	90°	5	0.56	2.DC.06280090.1	■
3.7	22.2	2.22	1.48	4	60.0	90°	5	0.74	2.DC.06370090.1	■
4.7	28.2	2.82	1.88	6	80.0	90°	5	0.94	2.DC.06470090.1	■
5.7	34.2	3.42	2.28	6	80.0	90°	6	1.14	2.DC.06570090.1	■

■ Stock item

CrazyMill Radiuschamfer

Carbide	300°	Z3		eXedur RI

Ød_1	1 - 6 mm
Tolerance	0 - 0.04 mm

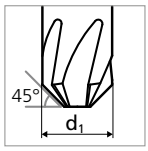


d_1 [mm]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Z [Teeth]	R (0/- 0.02) [mm]	Item number	Availability
1.0	4	0.50	3.0	4	50	3	0.50	2.RC.040100.1	■
1.5	6	0.75	4.5	4	50	3	0.75	2.RC.040150.1	■
2.0	8	1.00	6.0	4	60	3	1.00	2.RC.040200.1	■
2.5	10	1.25	7.5	4	60	3	1.25	2.RC.040250.1	■
3.0	12	1.50	9.0	4	60	3	1.50	2.RC.040300.1	■
4.0	16	2.00	12.0	6	70	3	2.00	2.RC.040400.1	■
6.0	24	3.00	18.0	6	70	3	3.00	2.RC.040600.1	■

■ Stock item

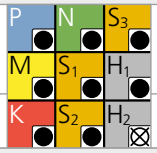
CrazyMill Frontchamfer

DEBURRING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	120
		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
		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
		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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	80
		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
		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
		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
		3.4365	AlZnMgCu1.5	ASTM 7075	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	200
		3.2381	GD-AlSi10Mg	UNS A03590	
	Copper	2.004	Cu-OF / CW008A	UNS C10100	40
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40
		2.036	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	200
		2.102	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	200
		2.096	CuAl9Mn2	UNS C63200	
S_1	Super alloys	2.4856		Inconel 625	40
		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
		3.7065	Gr.4	ASTM B348 / F68	
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	40
		9.9367	TiAl6Nb7	ASTM F1295	
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	50
			CrCoMo28	ASTM F1537	
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2	

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



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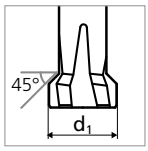
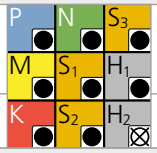
CrazyMill Backchamfer 3 x d / 5 x d

DEBURRING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	120
		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
		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
		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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	80
		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
		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
		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
		3.4365	AlZnMgCu1.5	ASTM 7075	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	200
		3.2381	GD-AlSi10Mg	UNS A03590	
	Copper	2.004	Cu-OF / CW008A	UNS C10100	40
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40
		2.036	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	200
		2.102	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	200
		2.096	CuAl9Mn2	UNS C63200	
S_1	Super alloys	2.4856		Inconel 625	40
		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
		3.7065	Gr.4	ASTM B348 / F68	
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	40
		9.9367	TiAl6Nb7	ASTM F1295	
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	50
			CrCoMo28	ASTM F1537	
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2	

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



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	0.020	0.030
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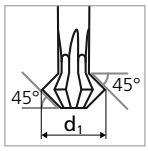
	0.015	0.020

CrazyMill Doublechamfer 3 x d / 6 x d

DEBURRING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	120
		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
		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
		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
		1.4105	X6CrMoS17	AISI 430F	
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	80
		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
		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
		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
		3.4365	AlZnMgCu1.5	ASTM 7075	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	200
		3.2381	GD-AlSi10Mg	UNS A03590	
	Copper	2.004	Cu-OF / CW008A	UNS C10100	40
		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40
		2.036	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	200
		2.102	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	200
		2.096	CuAl9Mn2	UNS C63200	
S_1	Super alloys	2.4856		Inconel 625	40
		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
		3.7065	Gr.4	ASTM B348 / F68	
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	40
		9.9367	TiAl6Nb7	ASTM F1295	
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	50
			CrCoMo28	ASTM F1537	
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2	

RECOMMENDATION FOR USE
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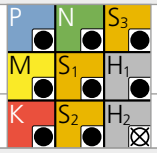

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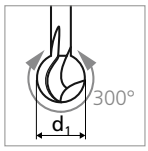
	0.015	0.020

CrazyMill Radiuschamfer

DEBURRING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



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		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
		1.2436	X210CrW12	AISI D4/D6	
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		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH	
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	50
		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
		0.6030	GG30	ASTM 40B	
		0.7040	GGG40	ASTM 60-40-18	
		0.7060	GGG60	ASTM 80-60-03	
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		3.2381	GD-AlSi10Mg	UNS A03590	
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		2.0065	Cu-ETP / CW004A	UNS C11000	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	40
		2.036	CuZn40 CW509L	UNS C28000	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	200
		2.102	CuSn6	UNS C51900	
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	200
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S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	50
			CrCoMo28	ASTM F1537	
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2	

RECOMMENDATION FOR USE
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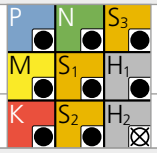

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	0.015	0.030
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	0.030	0.040
	0.020	0.030
	0.020	0.030
	0.020	0.030
	0.015	0.030
	0.015	0.020

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".

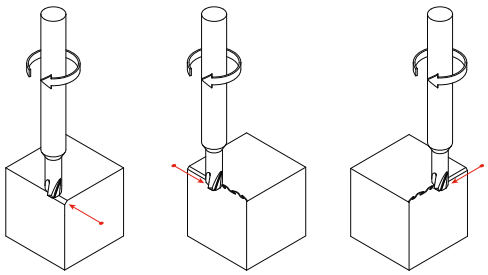
CrazyMill Chamfer

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

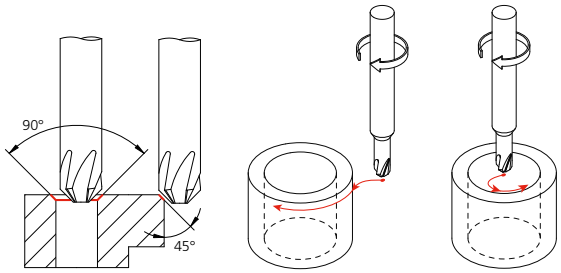
CHAMFERING AND DEBURRING PROCESS

1. Upcut milling and downcut milling



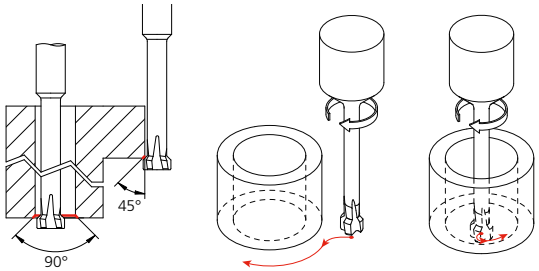
- Upcut milling is recommended for chamfering
- The machining direction for deburring depends on the direction of burr formation. Mikron Tool recommends using the milling tool in the opposite direction of the burr

2. Front deburring / chamfering of holes, pockets, and edges



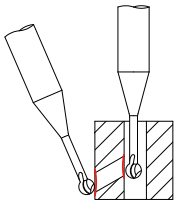
- Approach via spiral interpolation, rolling entry, or tangential entry

3. Back deburring / chamfering of holes, pockets, and edges



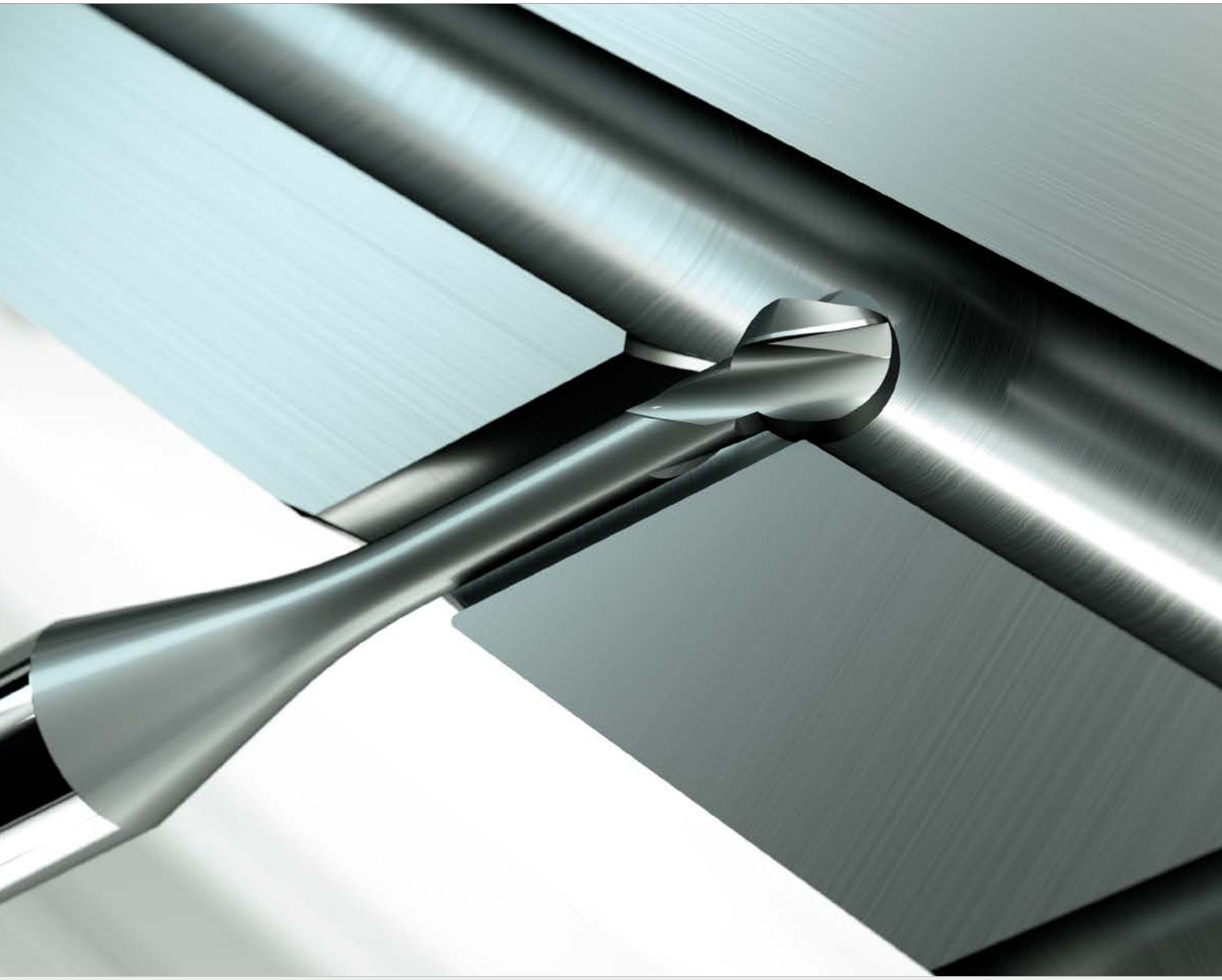
- Approach via spiral interpolation, rolling entry, or tangential entry

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: 0.36 mm
- Number of cutting edges: 1 up to 16

DRILLS FOR DEBURRING

- Diameter min: 0.1 mm
- Number of cutting edges 1 up to 4

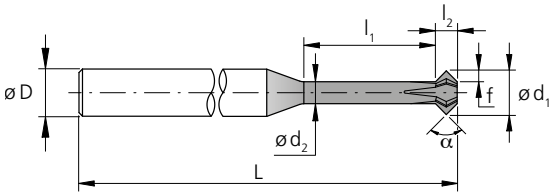
REAMERS FOR DEBURRING

- Diameter min: 0.4 mm
- Number of cutting edges 2 up to 8

DEBURRING TOOLS

GENERAL CHARACTERISTICS

- Maximum tool diameter: 32.0 mm, bigger as per specific request
- Maximum tool length: 330 mm
- Tool diameter tolerance max.: ± 0.5 µm
- Concentricity between shaft and tool diameters max.: ≤ 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

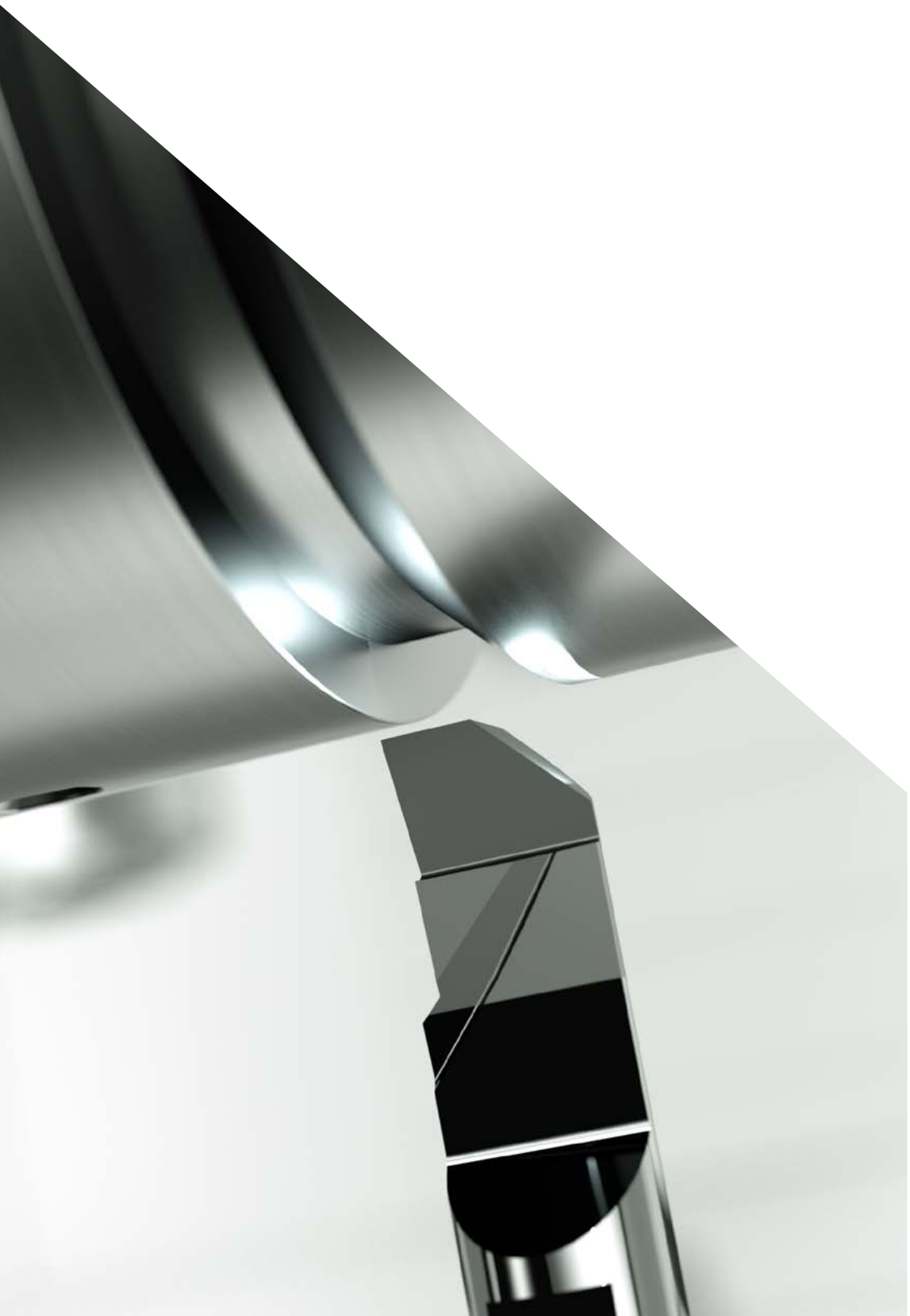
MATERIAL TO BE MACHINED

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

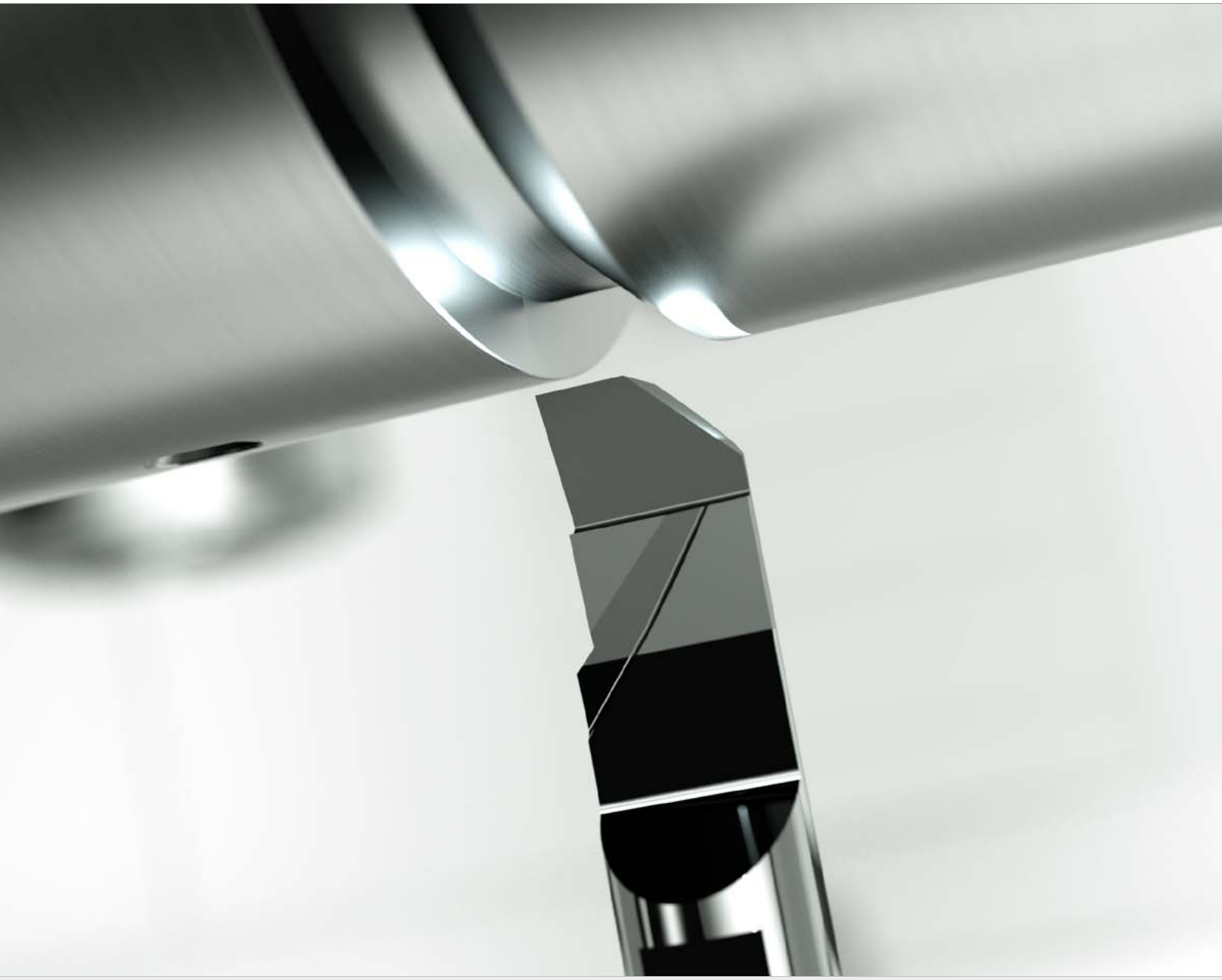
crazy about turning



TURNING TOOLS

09

Customized form turning tools



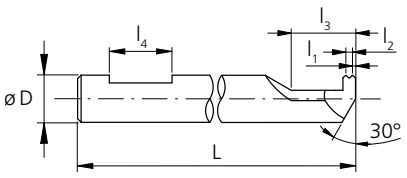
Mikron Tool produces solid carbide form turning tools according to your needs and requirements:

CHARACTERISTICS

- For internal and external machining
- Form tolerance max.: ± 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

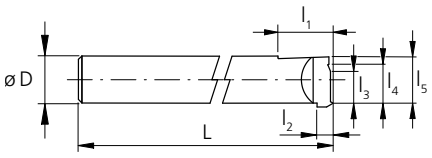
Mikron Tool produces solid carbide grooving tools according to your needs and requirements:

CHARACTERISTICS

- For internal or external machining
- Form tolerance max.: ± 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

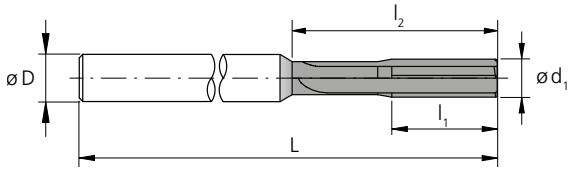
Customized reaming tools

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: 0.4 mm
- Diameter max: 32.0 mm, bigger following specific request
- Maximum tool length: 330 mm
- Tool diameter tolerance max.: ± 0.5 µm
- Concentricity with shaft max.: 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

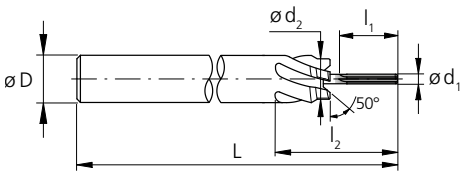
Customized multifuncinal tools

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: 1.0 mm
- Diameter max: 32.0 mm, bigger following specific requests
- Maximum tool length: 330 mm
- Tolerance of tool diameters max.: ± 0.5 µm
- Concentricity between shaft and cutting diameters.: 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

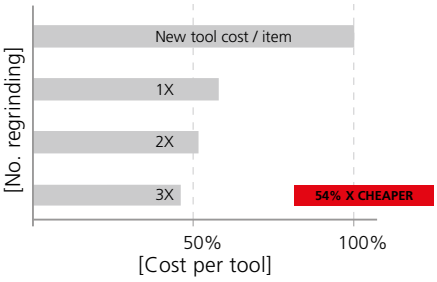
REGRINDING INCREASES SAVINGS

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 Ø2 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.

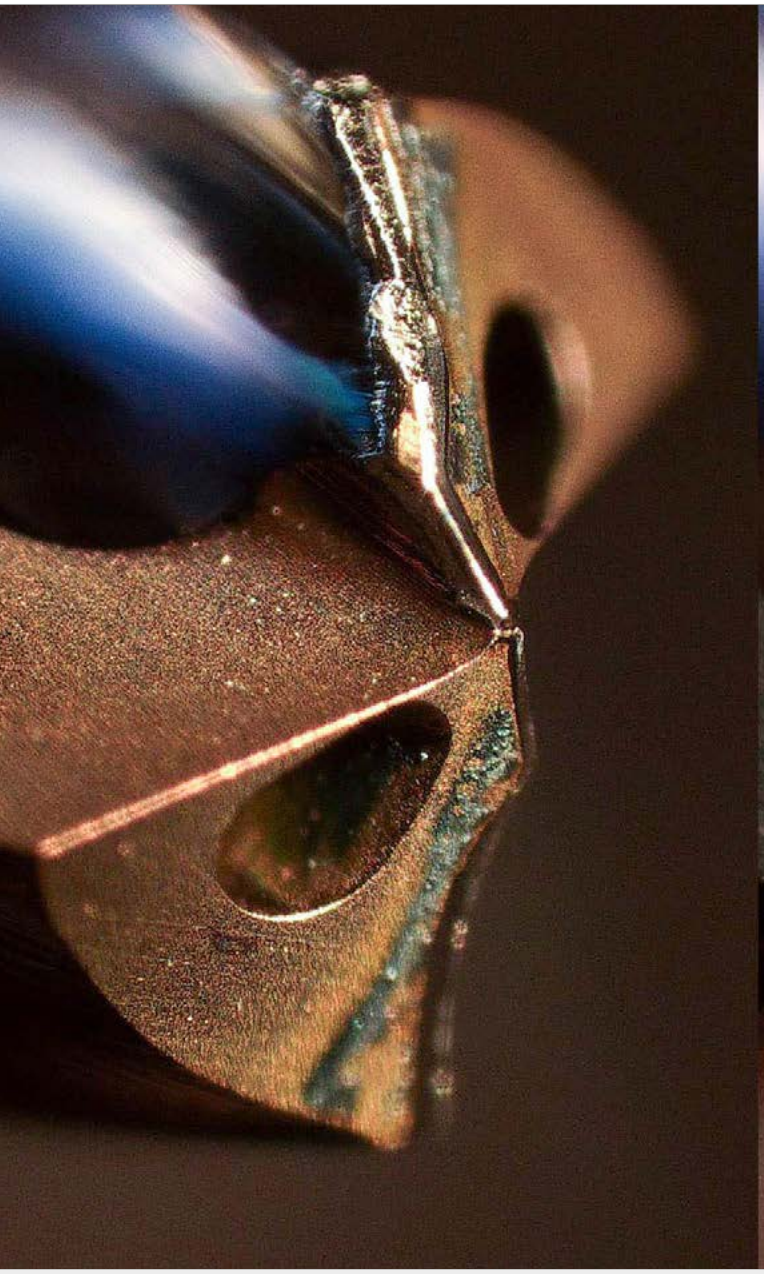
Customer specific tools

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

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.

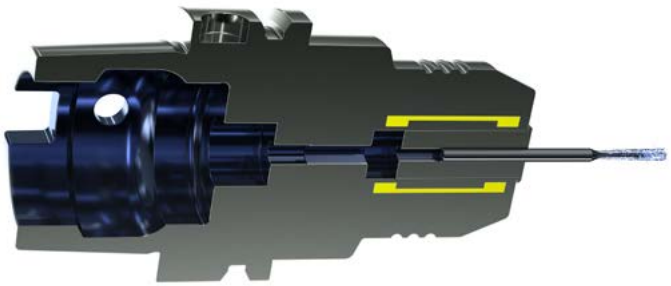
Tool holders

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: 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)

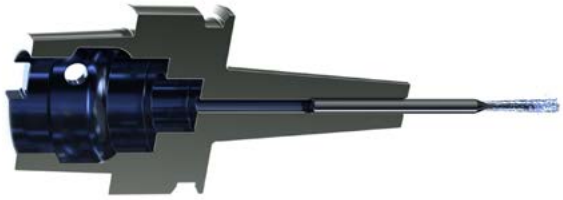
Application

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: ≤ 0.003 mm
Max. speed: 40'000 rpm
Absolutely secure friction-fit force transmission
Adequate for shaft diameter of 4 mm (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: 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 ≤ 0.050 mm. Tools with integrated cooling channels in the shaft require a minimum coolant pressure of at least 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 ≤ 0.050 mm. Tools with linear cooling channels require a minimum coolant pressure of at least 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 < 2 mm Filter quality ≤ 0.010 mm
Spiral drill types with diameter < 3 mm Filter quality ≤ 0.020 mm
Spiral drill types with diameter < 6 mm Filter quality ≤ 0.050 mm

At least 30 bar coolant pressure is requested for drilling diameter 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 < 2 mm Filter quality ≤ 0.010 mm
Spiral drill types with diameter < 3 mm Filter quality ≤ 0.020 mm
Spiral drill types with diameter < 6.35 mm Filter quality ≤ 0.050 mm

Tools with linear cooling channels require, at least, 30 bar coolant pressure for drilling diameter 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	$\left[\frac{m}{min}\right]$	**f_z** :	Feed per tooth and revolution	[mm]
d_1 :	Diameter of the cutting edge	[mm]	**a_p** :	Axial depth of cut	[mm]
v_f :	Feed rate	$\left[\frac{mm}{min}\right]$	**a_e** :	Radial depth of cut	[mm]
f :	Feed per revolution	$\left[\frac{mm}{rev}\right]$	**Q** :	Material removal rate	$\left[\frac{mm}{min}\right]$
Q_1 :	Depth of first peck	[mm]	**d_{eff}** :	Effective engagement diameter	[mm]
Q_x :	Depth of further pecks	[mm]	β :	Setting angle	[°]

Cutting speed

$$v_c = \frac{d_1 \cdot n \cdot \pi}{1000} \quad \left[\frac{m}{min}\right]$$

Revolution number

$$n = \frac{1000 \cdot v_c}{\pi \cdot d_1} \quad [rpm]$$

Feed per revolution

$$f = f_z \cdot z \quad \left[\frac{mm}{rev}\right]$$

Feed rate

$$v_f = f \cdot n = f_z \cdot z \cdot n \quad \left[\frac{mm}{min}\right]$$

Feed per tooth

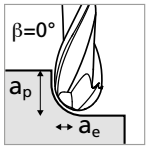
$$f_z = \frac{v_f}{z \cdot n} \quad [mm]$$

Material removal rate

$$Q = \frac{a_p \cdot a_e \cdot v_f}{1000} \quad \left[\frac{cm^3}{min}\right]$$

Effective engagement diameter

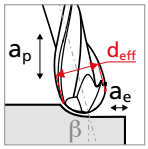
For ball end mills at a set angle β = 0°



$$d_{eff} = 2 \cdot \sqrt{d_1 \cdot a_p - a_p^2} \quad [mm]$$

Effective engagement diameter

For ball end mills at a set angle 0°< β > 15°



$$d_{eff} = d_1 \cdot \sin\left[\beta + \cos^{-1}\left(\frac{(d_1 - 2 \cdot a_p)}{d_1}\right)\right] \quad [mm]$$

Conversions between systems

1 [mm] = .0394 [inch] $1\left[\frac{m}{min}\right] = 3.28$ [SFM] 1 [bar] = 14.5 [psi]

crazy about first quality worldwide

GENERAL INFORMATION & ITEM INDEX

14

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

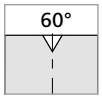
Mikron Tool is working worldwide with various partner companies. This way, we guarantee, along with the company-own locations, an efficient and competent technical support to our customers in the entire world.

Icons

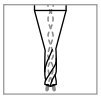
ICONS AT A GLANCE

Tool material

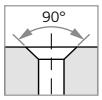
Integrated shaft coolant



Chamfer 60°



Twisted through tool coolant



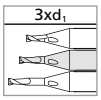
Pilot drilling with chamfer 90°

Tip angle 140°

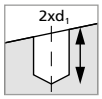
Tool without coating

Teeth number

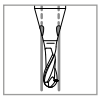
Coating eXedur RIP



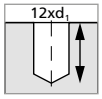
Max. machining depth 3 x d



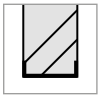
Max. drilling depth 2 x d
inclined surface



Mill with integrated
shaft coolant



Max. drilling depth 12 x d



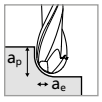
Square mill

Flood coolant

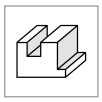
Corner radius mill

Linear through tool coolant

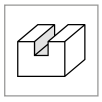
Ball mill



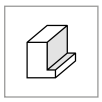
a_p = depth feed,
a_e = lateral feed



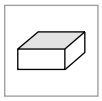
Slot and side milling



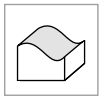
Slot milling



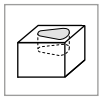
Side milling



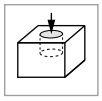
Face milling



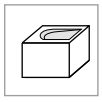
Copy milling



Pocket milling



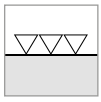
Plunge milling



Linear ramp milling

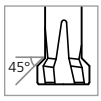
Helix angle 30°

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

Notes

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