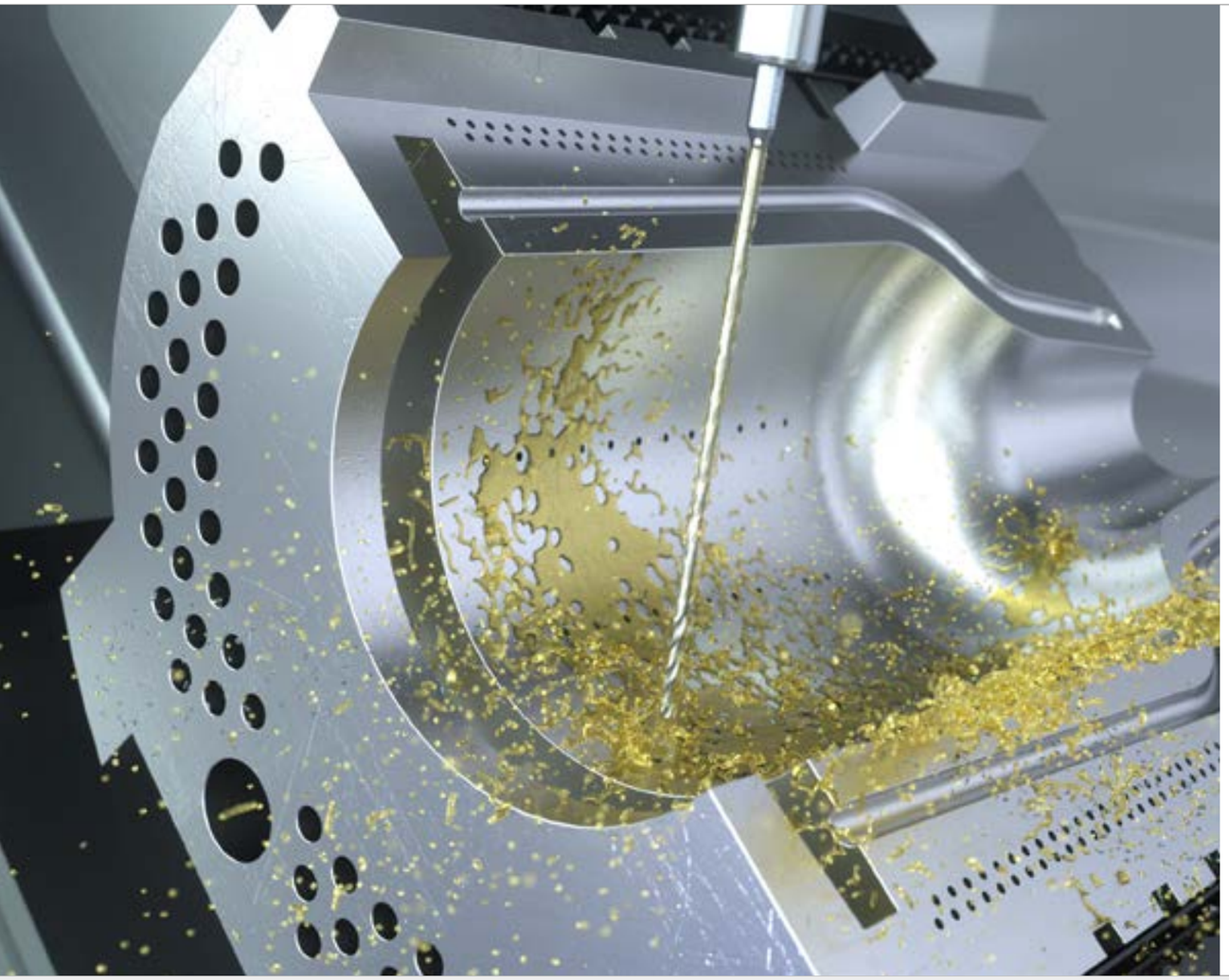
DRILLING TOOLS
CRAZYDRILL FLEX

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 steel, titanium and stainless materials. The drill versions 20 x d and 30 x d (for steel and titanium) are cooled externally. The drill version 50 x d has through coolant channels integrated in the shank same as the version 30 x d for stainless steel (CrazyDrill Flex SST-Inox).

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.

Depending on the material processed, one of three variants with their geometries adapted to the respective materials, will work:

- 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. Thanks to the special web thinning, a feed force reduced by 50% is achieved. An important requirement to realize straight deep hole drilling.
- In the variant for non-corrosive materials, the degressive helical groove ensures good chip breaking and removal. The cutting geometry is specially designed for CrNi alloys. Thanks to the special web thinning, a feed force reduced by up to 50% is achieved. An important requirement to realize straight deep hole drilling.

CRAZYDRILL™ by Mikron Tool Flex

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DRILLING TOOLS
CRAZYDRILL FLEX

Flexible and deep

MICRO DEEP HOLE DRILLING UP TO 50 X D

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 steel, titanium and stainless materials. The drill versions 20 x d and 30 x d (for steel and titanium) are cooled externally. The drill version 50 x d has through coolant channels integrated in the shank same as the version 30 x d for stainless steel (CrazyDrill Flex SST-Inox).

- CrazyDrill Flex Steel, drilling depth 20 x d, 30 x d, 50 x d, external cooling up to 30 x d / integrated cooling for 50 x d, coated and uncoated
- CrazyDrill Flex Titanium, drilling depth 30 x d, 50 x d, external cooling up to 30 x d / through coolant channels integrated in the shank for 50 x d
- CrazyDrill Flex SST-Inox, drilling depth 30 x d, 50 x d, through coolant channels integrated in the shank

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

CRAZYDRILL™ by Mikron Tool Flex

DRILLING TOOLS
CRAZYDRILL 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

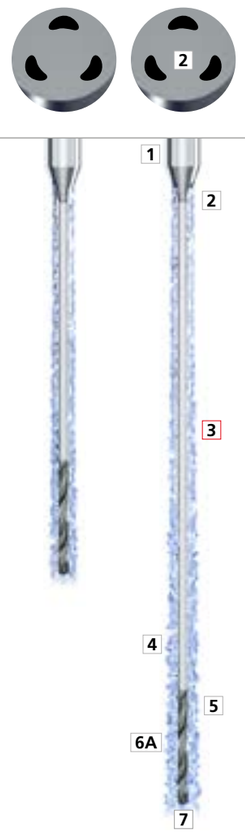
- Integrated / External cooling
- Uncoated
- Ø0.1 - 1.2 mm

page 423 | page 429

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.

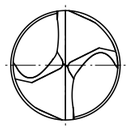
5 | COATING
The high-performance coating eXedur RIP is resistant to heat and wear. It prevents chips from adhering and supports their smooth removal. The result is a long tool life.

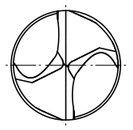
6A | DEGRESSIVE HELICAL GROOVE - PATENTED
The degressive helical groove of the CrazyDrill Flex SST-Inox with its unique and patented geometry guarantees high tool stability. It ensures good chip breaking in the front part and quick chip removal in the rear.

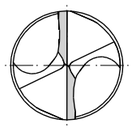
6B | HELICAL GROOVES
The geometry of the helical grooves for the steel and titanium versions are adapted to the materials machined. Good chip breaking and quick chip removal are guaranteed.

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.

Drill tip


CrazyDrill Flex Steel


CrazyDrill Flex Titanium


CrazyDrill Flex SST-Inox

CRAZYDRILL™ by Mikron Tool Flex

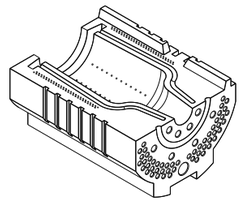
CRAZYDRILL™ by Mikron Tool Flex

DRILLING TOOLS
CRAZYDRILL FLEX

Benefits and applications

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

APPLICATION DOMAINS	COMPONENTS EXAMPLES
Dental	Dental implant
Aerospace industry	Injection nozzle
Medical technology	Surgical instrument
Tool and mold making	Air vent hole for glass form mould
Automotive industry	Turned part
Mechanical engineering	Drilling holes in Plexiglass
Watches	Bracelet components
Electronics / Electrical	Solenoid contactor

MATERIALS GROUPS	EXAMPLES		
	Mat. no.	DIN	AISI / ASTM / UNS
Group P Unalloyed and alloyed steel	1.0401	C15	1015
	1.3505	100Cr6	52100
	1.2436	X210CrW12	D4 / D6
Group M Stainless steel	1.4105	X6CrMoS17	430F
	1.4112	X46Cr13	420C
	1.4542	X5CrNiCuNb 16-4	630
	1.4301	X5CrNi 18-10	304
Group K Cast iron	0.7040	GGG40	60-40-18
Group N Non ferrous metals	3.2315	AlMgSi1	6351
	3.2163	GD-AlSi9Cu3	A380
	2.004	Cu-OF / CW008A	C10100
	2.102	CuSn6	C51900
	2.096	CuAl9Mn2	C63200
Group S1 Super alloys	2.4856		INCONEL 625
	2.4665	NiCr22Fe18Mo	HASTELLOY X
Group S2 Titanium (pure and alloyed)	3.7035	Gr.2	B348 / F67
	3.7165	TiAl6V4	B348 / F136
Group S3 CrCo alloys	2.4964	CoCr20W15Ni	HAYNES 25
Group H1 Hardened steel <55 HRC	1.2510	100MnCrMoW4	O1

CRAZYDRILL by Mikron Tool Flex STEEL

CRAZYDRILL by Mikron Tool Flex STEEL

DRILLING TOOLS
CRAZYDRILL FLEX

Steel - 20 x d - coated / uncoated

Carbide | 20xd1 | 140° | Z2

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

DRILLING WITH EXTERNAL COOLING

Coated Uncoated

The solid carbide micro-drill CrazyDrill Flex Steel is mainly designed for steels, cast iron, aluminum alloys, brass and bronze. It has a high flexibility thanks to a long and "flexible" section between the tip and the shaft. So the tool is adapted for drilling with process reliability also under difficult conditions. It is able to flex effortlessly 40% of its diameter. This drill is also perfect for deep hole drilling from diameter 0.1 mm with a significantly shorter drilling time compared to the single-lip drill, electro-erosion or laser method.

CrazyDrill Flex Steel 20 x d is used with external cooling. The coated version (eXedur RIP), compared to the uncoated one, is perfect for drilling larger series. Also the surface quality profits from the high-performance coating.

We recommend pilot drilling with CrazyDrill Flexpilot Steel or CrazyDrill Crosspilot on inclined surfaces. For details see drilling process.

Coolant type, pressure and filtration

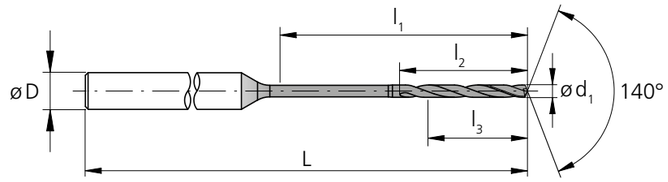
Recommendations for coolant type, pressure and filtration are on page "drilling process".

Please note

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

Regrinding: This product is not suitable for regrinding.

.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
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

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

Complementary products	
CrazyDrill Flexpilot Steel	p.129
CrazyDrill Crosspilot	p.175

CRAZYDRILL™ by Mikron Tool Flex STEEL

CRAZYDRILL™ by Mikron Tool Flex STEEL

DRILLING TOOLS
CRAZYDRILL FLEX

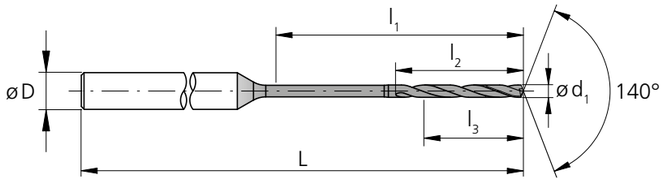
Steel - 20 x d - coated / uncoated

Carbide | 20xd$_1$ | 140° | Z2

Ø d$_1$ 0.1 - 1.2 mm
Tolerance - 0.003 mm - 0.006 mm

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
0.47		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
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

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

d$_1$ [mm]	l$_1$ [mm]	l$_2$ [mm]	l$_3$ [mm]	D (h6) [mm]	L [mm]	Item number	Coated	Uncoated	Availability
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
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	■

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

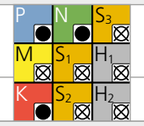
Complementary products

CrazyDrill Flexpilot Steel p.129
CrazyDrill Crosspilot p.175

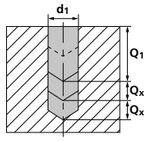
DRILLING TOOLS
CRAZYDRILL FLEX

Steel - 20 x d - uncoated

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



DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min] Ød1 ≤ 0.4	v_c [m/min] Ød1 > 0.4	Q_1	Q_x	f [mm/rev] Ød1 0.1 mm f	0.2 mm f	0.3 mm f	0.4 mm f	0.6 mm f	0.8 mm f	1.0 mm – 1.2 mm f
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	5 – 40	40 – 60	7xd1	0.5xd1	0.002	0.005	0.010	0.015	0.030	0.040	0.060
		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	7xd1	0.5xd1	0.002	0.003 – 0.005	0.008 – 0.010	0.012 – 0.015	0.020 – 0.025	0.035	0.050
		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	7xd1	1xd1	0.0005	0.004	0.008	0.010	0.015	0.025	0.040
		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					Recommended: CrazyDrill Flex SST-Inox 30 x d1						
		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	7xd1	1xd1	0.002	0.005	0.010	0.015	0.020	0.035	0.050
		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	7xd1	1xd1	0.003	0.015	0.040	0.050	0.080	0.100	0.120
		3.4365	AlZnMgCu1.5	ASTM 7075											
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	5 – 40	50 – 80	7xd1	1xd1	0.003	0.015	0.040	0.050	0.080	0.100	0.120
		3.2381	GD-AlSi10Mg	UNS A03590											
	Copper	2.004	Cu-OF / CW008A	UNS C10100					Recommended: CrazyDrill Flex Titanium 30 x d1						
		2.0065	Cu-ETP / CW004A	UNS C11000											
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400					Recommended: CrazyDrill Flex SST-Inox 30 x d1						
		2.036	CuZn40 CW509L	UNS C28000											
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	5 – 40	60 – 100	7xd1	1xd1	0.004	0.010	0.030	0.040	0.060	0.080	0.100
		2.102	CuSn6	UNS C51900		40 – 60									
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	5 – 20	20 – 40	2.5xd1	0.5xd1	0.002	0.004	0.006	0.010	0.015	0.025	0.040
		2.096	CuAl9Mn2	UNS C63200											
S_1	Super alloys	2.4856		Inconel 625					Recommended: CrazyDrill Flex SST-Inox 30 x d1						
		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					Recommended: CrazyDrill Flex Titanium 30 x d1						
		3.7065	Gr.4	ASTM B348 / F68											
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136					Recommended: CrazyDrill Flex Titanium 30 x d1						
		9.9367	TiAl6Nb7	ASTM F1295											
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25					Recommended: CrazyDrill Flex SST-Inox 30 x d1						
			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											

CRAZYDRILL Flex

DRILLING TOOLS
CRAZYDRILL FLEX

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".

CRAZYDRILL Flex

DRILLING TOOLS
CRAZYDRILL FLEX

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

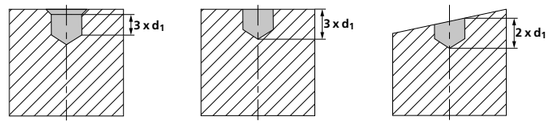
Drilling as per DIN 66025 / PAL

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

Q = depth of the respective peck

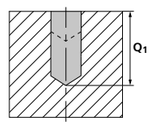
1 | PILOT DRILLING

- 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.

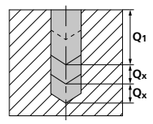


2 | DRILLING

- 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.