GÜHRING

2020 Newsletter Special 電子報專刊

Helical drill thread milling cutter 鑽孔銑牙刀	7月刊
【世界首創】螺旋凸型刃口、倒角刀、除毛邊刀	8月刊
90度 鎢鋼螺旋切削刃倒角銑刀	
GU500PM 加強柄 PM鑽頭	9月刊
高效能纖維與複合材料加工刀具	10月刊
GROOVING SYSTEMS 切槽及切斷刀 System 222	11月刊
THE SMALLEST DIVER IN THE WORLD 小徑Diver銑刀	12月刊

減少庫存50%

刀具支出30%

人力成本90%

Powerline

Made by GÜHRING

德國鈷領庫存管理機

工業 4.0 智慧管理的好幫手

自動化 智慧化 數據化 雲端物聯網

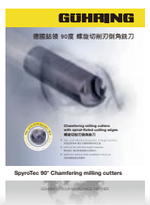
德國鈷領獨立開發管理軟體，經過多國企業使用，是目前市場上最精確，功能最豐富的管理系統。
適用產業：電子、半導體、航空、醫療、航太、汽機車、自行車、機械、能源工業等...

Helical drill thread milling cutter 鑽孔銑牙刀 | 1 ~ 8

新設計的螺旋下刀鑽孔銑牙同時完成，
可加工高抗張強度材質及HRC66度的高硬度材質，
此刀具MTMH3-Z加工過程穩定、可信賴度高，
並符合牙規公差要求。

【世界首創】螺旋凸型刃口、倒角刀、除毛邊刀 | 9 ~ 15

降低軸向阻力20%，徑向阻力25%，
相較一般倒角刀只需60%軸向力量、50%徑向力量，
倒角粗面優良，
CNC、旋臂鑽床、小型鑽床、手提電鑽皆能使用。



90度 鎢鋼螺旋切削刃倒角銑刀 | 16 ~ 18

採最堅固的細顆粒碳化鎢材質和TiAlN塗層相結合，延長刀具壽命，
快速且效率高，適合大量倒角需求的生產，
輕切削力，適合軟質與韌性材質加工，
切削的面粗度品質優良。

GU500PM 加強柄 PM鑽頭 | 19 ~ 30

高效率、高壽命、使用範圍廣泛，
頂角四面磨法定位、孔徑準確，118頂角，
較長的主切刃，降低切削阻力，
精密研磨幾何設計，切削阻力、扭力較低。

高效能纖維與複合材料加工刀具 | 31 ~ 57

加工時不會造成纖維磨損和分層破壞，可以獲得最佳的零件表面光潔度與品質，
纖維不會有破損、表面沒有分層的現象，
表面不能有 "剝離" 或 "推出" 纖維沒有分裂現象、
毛邊最少沒有因加工而造成的熱損傷。

GROOVING SYSTEMS 切槽及切斷刀 System 222 | 58 ~ 72

按尺寸製造的刀片，刃口凹槽切屑成形設計和幾何形狀，
具有很高的加工可靠性，3mm的凹槽寬度，
切屑成形凹槽和幾何形狀適用於鋼材的加工，
另提供各種帶有內部和外部冷卻刀架。

THE SMALLEST DIVER IN THE WORLD 小徑Diver銑刀 | 73 ~ 80

僅使用此刀具即可進行插銑和一般銑削，
可廣泛應用於各種材料加工應用。
在乾式和濕式加工中具有出色的抗磨損和抗氧化性能
尺寸Ø0.79 ~ Ø3.175、長度2.5xD及5xD

GÜHRING

MTMH3-Z

HELICAL DRILL THREAD MILLING INTO SOLID MATERIAL UP TO 66 HRC

螺旋下刀加工、同時鑽孔銑牙
可加工材質硬度達 HRC 66 度

PROMOTION VALID UNTIL 31.12.2020

Helical drill thread milling cutter　鑽孔銑牙刀

GÜHRING – YOUR WORLDWIDE PARTNER

MTMH3-Z 2.5xD

HELICAL DRILL THREAD MILLING INTO SOLID MATERIAL UP TO 66 HRC

The new helical drill thread milling cutter for high-strength and hardened steels up to 66 HRC combines core hole and thread production in one tool. The MTMH3-Z guarantees process reliability and true to gauge threads.

新設計的螺旋下刀鑽孔銑牙同時完成，可以加工高抗張強度材質及 HRC66 度的高硬度材質
此刀具 MTMH3-Z 加工過程穩定、可信賴度高，並符合牙規公差要求

Two oil grooves on the shaft ensure optimum cooling with emulsion or air.
柄部雙油溝設計，幫助切削液與空氣能確實達到最佳冷卻

Thanks to the special face geometry with hollow grinding, the process-safe core hole and thread milling in almost all steels is possible.
特殊端面設計及精細的研磨、幾乎所有鋼料都能鑽孔銑牙同時完成

Thanks to the **left cutting geometry** the tool stabilises itself during the climb milling process – perfect, true to gauge threads up to 66 HRC are guaranteed.
由於是左旋切削設計、在螺旋切削過程中相對穩定牙型符合牙規要求、並保證可以加工至 HRC66 度

Thanks to the **temperature-resistant TiSiN coating,** dry and wet machining is possible.
TiSiN 耐熱性佳的鍍層，乾、濕式加工皆可以使用

The MTMH3-Z is made of a **special fine-grained carbide,** which is characterised by its high hardness and is optimally suited for hard machining.
特殊極細顆粒鎢鋼材質、硬度高、特別適合高硬度材質加工

- process reliability guaranteed 保證加工過程可靠穩定
- excellent machining results in dry and wet machining 乾、濕式加工皆可以達到優越的結果
- core holes and threads in one step: significantly shorter cycle and setting time
  鑽孔銑牙同時完成：大大節省加工時間、提昇效率
- universally applicable in unhardened and hardened materials up to 66 HRC
  應用範圍廣泛、有、無硬化之材質皆能使用，加工最高硬度達 HRC66 度

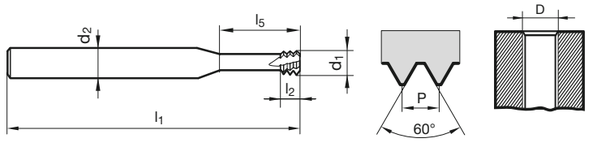
Micro thread milling cutters

2,5xD 可加工深度2.5D

Tool material	**Solid carbide**
Surface	●
Type	MTMH3-Z
Shank form	HB 側固

刀具為左旋刃口
只能逆時針轉動切削
M4 counter clockwise

P	●
M	●
K	●
N	●
S	●
H	≤ 65 with cooling grooves



Article no. 編號 **4002**

D	P	d1	d2	l1	l2	l5	Z	Code no.	價格
加工規格	mm	mm	mm	mm	mm	mm			
M2	0.400	1.400	3.000	39.000	1.200	5.000	4	2.000	*10,000*
M2,5	0.450	1.800	3.000	39.000	1.300	6.500	4	2.500	*10,000*
M3	0.500	2.400	6.000	58.000	1.500	7.500	4	3.000	*11,000*
M3,5	0.600	2.700	6.000	58.000	1.800	9.000	4	3.500	*11,000*
M4	0.700	3.100	6.000	58.000	2.100	10.000	4	4.000	*11,000*
M5	0.800	3.800	6.000	58.000	2.400	12.500	4	5.000	*11,000*
M6 + M7	1.000	4.600	8.000	64.000	3.000	15.000	4	6.000	*12,000*
M8 + M9	1.250	6.200	8.000	64.000	3.600	20.000	4	8.000	*12,000*
M10 + M12	1.500	7.500	10.000	73.000	4.500	25.000	4	10.000	*13,000*
M12	1.750	9.000	10.000	73.000	5.200	30.000	4	12.000	*13,000*
M16	2.000	11.500	12.000	90.000	6.000	40.000	4	16.000	*16,000*

1、右螺旋：刀具逆時針旋轉，順時針螺旋往下銑孔及銑牙。
2、左螺旋：刀具逆時針旋轉，逆時針螺旋往下銑孔及銑牙。

Youtube 實際加工影片
https://www.youtube.com/watch?v=EUYUX8xvGSw

一般右螺旋銑牙刀加工方式如下：

一般銑牙刀皆為右螺旋切削，下孔徑皆已經加工完成，銑牙方式如下：
1、右螺旋通孔：刀具順時針旋轉，順時針螺旋往下銑牙。
2、右螺旋盲孔：刀具順時針旋轉，由底部逆時針螺旋往上銑牙。
3、左螺旋通孔：刀具順時針旋轉，逆時針螺旋往下銑牙。
4、左螺旋盲孔：刀具順時針旋轉，由底部順時針螺旋往上銑牙。

（詳細資訊與其他銑牙刀產品資訊請參考第8頁，或洽詢鈷領業務技術人員）

APPLICATION EXAMPLE 實際應用案例

Component 工件： Injection moulding tool 模具射出工具
Thread dimension 牙尺寸： M8x(1.25), 深度 16 mm, 盲孔
Tool 使用刀具編號： Article 4002 MTMH3-Z M8 2.5xD SP
Material 工件材質： 1.2379 / 60+2 HRC
Parameter 加工參數： v_c = 30 m/min, f_z = 0.02 mm (climb milling, M4 counter clockwise 左旋逆時針旋轉切削)
Coolant 冷卻： dry (with air) 乾式空氣

60+2 HRC

› ***Tool life 壽命：138 threads incl. core holes***

APPLICATION EXAMPLE 實際應用案例

Component 工件： Holder 刀桿
Thread dimension 牙尺寸： M6x(1), 深度 13 mm, 盲孔
Tool 使用刀具編號： Article 4002 MTMH3-Z M6 2.5xD SP
Material 工件材質： 1.4301 不銹鋼
Parameter 加工參數： v_c = 50 m/min, f_z = 0.02 mm (climb milling M4 counter clockwise 左旋逆時針旋轉切削)
Coolant 冷卻： Emulsion 8% 水溶性 8%

VA 1.4301

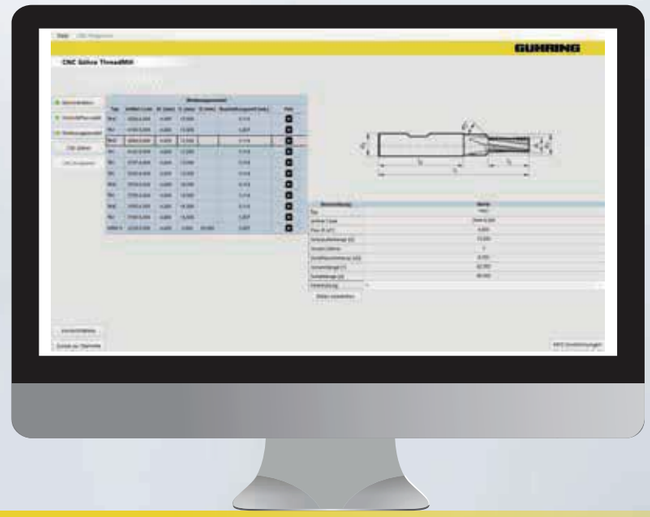
› ***Tool life 壽命：618 threads incl. core holes***

CNC Gühro ThreadMill

Free programming software

for thread milling cutters and drill thread milling cutters
CNC 程式免費提供、線上下載

NEW VERSION v 2.0



In order to make the machining with Gühring thread milling cutters even more user friendly, we have developed the intuitive "CNC Gühro ThreadMill".

"CNC Gühro ThreadMill" is available free-of-charge. Simply download it from our homepage www.guehring.com.
德國鈷領網頁即可免費下載

To the optimal CNC programme in five steps

1. Specify the thread data 選擇螺紋尺寸
   Select from all current thread standards
2. Select the material 選擇工件材質
   You are always referred to the optimal parameters 選擇最佳加工參數
3. Select the tool 選擇刀具編號
   Technical data, drawing, machining time and video simplify selection
   技術資料、圖面、加工時間，選用圖片上加工方式，選擇適合之加工方式
4. Record CNC data CNC 程式資料紀錄
   Enter required milling strategy and parameters 輸入參數
5. Receive CNC programme with code and data sheet
   Programming data (Sinumerik, Haidenhain, Fanuc, Philips, Mazatrol or Hurco) are imported and automatically recognised
   選取 CNC 機台控制器廠牌，下載 CNC 程式資料

APPLICATION RECOMMENDATIONS 加工參數推薦

MTMH3-Z 2.5xD [Please note, M4 counter clockwise 左旋逆時針旋轉切削]

ISO		Material group 材質	Hardness 硬度	Example materials 材質範例	Material no. 材質編號	Cutting speed v_c (m/min) 切削速度
P	P1	Structural and free cutting steels, heat-treatable steels unalloyed	< 800 N/mm²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	80
	P2	Free-cutting steels, unalloyed case hardened steels, nitriding steels	800-1000 N/mm²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	70
	P3	Alloyed heat-treatable steels, tool steels, high speed steels	800-1200 N/mm²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	70
M	M1	Stainless steels, sulphured, austenitic	< 1000 N/mm²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	55
	M2	Stainless- and acidresistant steels, martensitic	< 1000 N/mm²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	50
	M3	Duplex and Super Duplex	< 1300 N/mm²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWn25-7-4	1.4462 1.441 1.4501	50
K	K1	Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.603	80
	K2	Spheroidal graphite iron and malleable cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.704 0.706 0.707	75
	K3	ADI, GGV	1000 N/mm² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		65
N	N1	Aluminium and wrought alloys	< 450 N/mm²	Al99,5H AlMgSi1 AlZn4,5Mg	3.025 3.2315 3.4335	x
	N2	Al cast alloys	< 600 N/mm²	GD-AlSi5Cu1Mg GD-AlSi8Cu3 G-AlSi9Mg G-AlSi12	3.2134 3.2162 3.2373 3.2581	120
	N3	Magnesium alloys	< 500 N/mm²	GDMgAl8Zn1	3.5812.08	x
	N4	Copper and copper alloys	long-chipping short-chipping	CuZn20 CuZn37Pb0,5 CuZn39Pb2 CuZn43Pb2	2.025 2.0332 2.038 2.041	80
	N5	Copper special alloys	< 1400 N/mm²	Ampco		65
	N6	Plastics [Thermoplastics, Duroplastics]	long-chipping short-chipping	PMMA, POM,PVC Pertinax		x
S	S1	Ti and Ti alloys	< 1200 N/mm²	Titanium TiAl5Sn2 TiAl6V4	3.7025 3.7115 3.7165	45
	S2	Nickel, cobalt and iron alloys	< 1400 N/mm²	Hasteloy C4 Inconel 718 Nimonic	2.461 2.4668 2.4634	45
H	H1 H2	High tensile steels, hardened steels	45-55 HRC 55-66 HRC	Hardox PM30		40 30

Please note:
The cutting values specified in the respective columns are guide values, they have to be adapted according to application conditions (material, lubrication, tool clamping, machine etc.)
上述加工參數推薦，仍須視實際加工情況調整，例如工件材質與夾持情況、冷卻潤滑情形、刀具夾持與刀桿型式、機台條件

Depending on the machining task the optimal cutting values can differ from those in the table by up to ±30%!
加工條件仍可以微調±30％，需視上述之工況

參考資料 右螺旋銑牙刀兩種不同順、逆銑牙方式

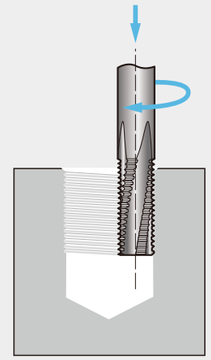
Milling part diameter [d1] / feed per tooth [f_z] 銑孔每刃進給 [climb milling] 螺旋銑孔											MTMH3-Z
M2	**M2,5**	**M3**	**M3,5**	**M4**	**M5**	**M6**	**M8**	**M10**	**M12**	**M16**	
0.4	**0.45**	**0.5**	**0.6**	**0.7**	**0.8**	**1.0**	**1.25**	**1.5**	**1.75**	**2**	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
0.008	0.008	0.012	0.014	0.018	0.026	0.028	0.030	0.035	0.040	0.048	●●
0.008	0.008	0.012	0.014	0.018	0.026	0.028	0.030	0.035	0.040	0.048	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.005	0.005	0.007	0.008	0.010	0.014	0.016	0.018	0.020	0.026	0.033	●●
0.008	0.008	0.012	0.014	0.016	0.020	0.024	0.030	0.036	0.040	0.048	●●
0.008	0.008	0.012	0.014	0.016	0.020	0.024	0.030	0.036	0.040	0.048	●●
0.007	0.007	0.011	0.013	0.015	0.018	0.022	0.028	0.033	0.038	0.046	●●
x	x	x	x	x	x	x	x	x	x	x	○
0.007	0.007	0.011	0.013	0.015	0.018	0.022	0.028	0.033	0.038	0.046	●●
x	x	x	x	x	x	x	x	x	x	x	○
0.008	0.008	0.012	0.014	0.016	0.020	0.024	0.030	0.036	0.040	0.048	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.048	●●
x	x	x	x	x	x	x	x	x	x	x	○
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007 0.005	0.007 0.005	0.010 0.008	0.011 0.009	0.012 0.010	0.016 0.014	0.020 0.018	0.025 0.022	0.030 0.028	0.036 0.033	0.044 0.042	●● ●●

●● optimally suited 非常適用
● suited 適用
○ not suitable 不適用

Technical section

Reverse rotation milling 逆銑削

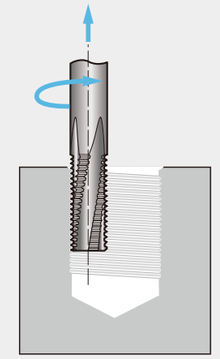
clockwise, with G02 G02 順時針螺旋下刀



Reverse rotation milling is preferentially applied for the machining of harder materials or to remedy taper threads.
逆銑削優先用於較硬材料的加工或修補錐度螺紋

Synchronous milling 順銑削

anticlockwise, with G03 G03 逆時針螺旋下刀

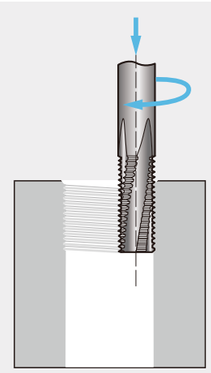


Synchronous milling is applied with thread depths smaller than 1.5xD.
Advantage: A better surface finish is achieved.
順銑削的螺紋深度小於1.5xD，優點是獲得更好的牙表面光潔度

Thread production with one tool 銑牙刀加工方式

Right-hand thread 右螺紋（通孔）

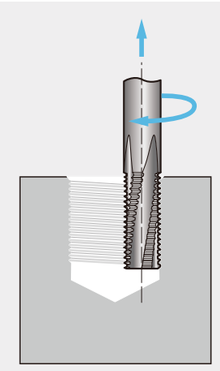
Reverse rotation milling 逆銑削



Tool rotates clockwise from top to bottom
刀具順時針轉動切削、由上順時針螺旋往下銑牙

Left-hand thread 左螺紋（盲孔）

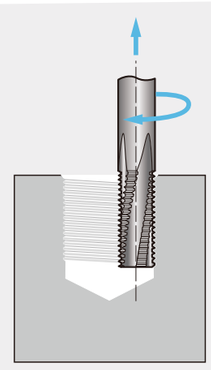
Reverse rotation milling 逆銑削



Tool rotates clockwise from bottom to top
刀具順時針轉動切削、由孔底順時針螺旋往上銑牙

Right-hand thread 右螺紋（盲孔）

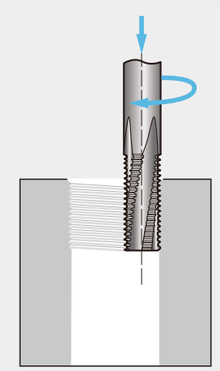
Synchronous milling 順銑削



Tool rotates clockwise from bottom to top
刀具順時針轉動切削、由孔底逆時針螺旋往上銑牙

Left-hand thread 左螺紋（通孔）

Synchronous milling 順銑削



Tool rotates clockwise from top to bottom
刀具順時針轉動切削、由上逆時針螺旋往下銑牙

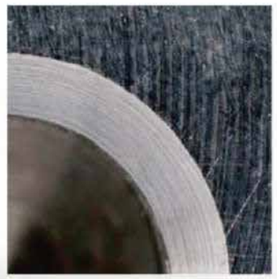
GÜHRING

—世界首創—

螺旋凸型刃口　倒角刀 除毛邊刀

用一般倒角刀
工件面粗度

使用本產品倒角刀
工件面粗度



倒角面粗度優良

有90˚/ 60˚/ 82˚三種角度選擇

降低軸向阻力20%
降低徑向阻力25%

90° 倒角刀，螺旋凸型切削刃，降低切削阻力60%、避免震刀、面粗度佳 — **DIN335**

全圓柄部無側固面，詳細規格請參考#5500

材質	HSCO
鑽領編號	5538
柄部	直柄
表面處裡	TiALN

直徑 mm 範圍 6.3/ 8.3/ 10.4/ 12.4/ 16.5/ 20.5 六支一組	價格
	9,520

90° 倒角刀，螺旋凸型切削刃，降低切削阻力60%、避免震刀、面粗度佳 — **DIN335**

有三個側固面，供三爪鑽夾使用，詳細規格請參考 #5501

材質	HSCO
鑽領編號	5539
柄部	直柄
表面處裡	TiALN

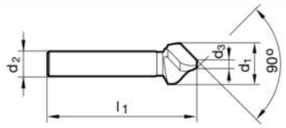
直徑 mm 範圍 6.3/ 8.3/ 10.4/ 12.4/ 16.5/ 20.5 六支一組	價格
	10,210

90° 倒角刀，螺旋凸型切削刃，降低切削阻力60%、避免震刀、面粗度佳 — **DIN335**

加長型

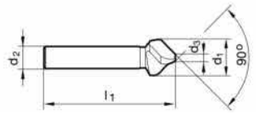
材質	HSS
鑽領編號	5503
form	C
表面處理	TiALN
刃數	3

直徑 mm 範圍
6.3~ 31.00



d1 mm	d2 mm	d3 mm	l_1 mm	應用於螺絲倒角	價格
6.30	5.00	1.50	104	M3	1,690
8.30	6.00	2.00	105	M4	1,900
10.40	6.00	2.50	107	M5	2,080
12.40	8.00	2.80	108	M6	2,130
16.50	10.00	3.20	111	M8	2,570
20.50	10.00	3.50	114	M10	3,630
25.00	10.00	3.80	118	M12	4,830
31.00	12.00	4.20	140	M16	7,850

90° 倒角刀，螺旋凸型切削刃，降低切削阻力60%、避免震刀、面粗度佳　DIN335

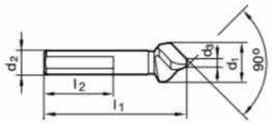


材質	HSCO
鉆領編號	5500
form	C
表面處理	TiALN
刃數	3

全圓柄

直徑 mm 範圍 6.3~ 31.00					
d1 mm	d2 mm	d3 mm	l_1 mm	應用於螺絲倒角	價格
6.30	5.00	1.50	45	M3	1,150
8.00	6.00	2.00	50	M4	1,360
8.30	6.00	2.00	50	M4	1,290
10.00	6.00	2.50	50	M5	1,380
10.40	6.00	2.50	50	M5	1,400
11.50	8.00	2.80	56	M6	1,610
12.40	8.00	2.80	56	M6	1,440
15.00	10.00	3.20	60	M8	1,750
16.50	10.00	3.20	60	M8	1,750
19.00	10.00	3.50	63	M10	2,540
20.50	10.00	3.50	63	M10	2,470
23.00	10.00	3.80	67	M12	3,740
25.00	10.00	3.80	67	M12	3,280
31.00	12.00	4.20	71	M16	5,330

90° 倒角刀，螺旋凸型切削刃，降低切削阻力60%、避免震刀、面粗度佳　DIN335



材質	HSCO
鉆領編號	5501
form	C
表面處理	TiALN
刃數	3

l_2 側固面長度皆為30mm，有三個側固面，供三爪鑽夾使用

直徑 mm 範圍 6.3~ 31.00					
d1 mm	d2 mm	d3 mm	l_1 mm	應用於螺絲倒角	價格
6.30	5.00	1.50	45	M3	1,230
8.00	6.00	2.00	50	M4	1,460
8.30	6.00	2.00	50	M4	1,380
10.00	6.00	2.50	50	M5	1,480
10.40	6.00	2.50	50	M5	1,510
11.50	8.00	2.80	56	M6	1,720
12.40	8.00	2.80	56	M6	1,550
15.00	10.00	3.20	60	M8	1,870
16.50	10.00	3.20	60	M8	1,870
19.00	10.00	3.50	63	M10	2,720
20.50	10.00	3.50	63	M10	2,650
23.00	10.00	3.80	67	M12	4,010
25.00	10.00	3.80	67	M12	3,520
31.00	12.00	4.20	71	M16	5,710

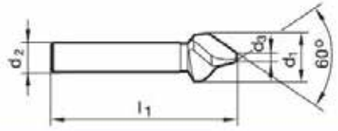
60° 倒角刀，螺旋凸型切削刃，降低切削阻力60%、避免震刀、面粗度佳

60° Countersinks, spiral-fluted

DIN 334 | 60° | C

材質	HSS
表面處理	A
柄部型式	cyl.

NEW



全圓柄

鉆領編號 5670

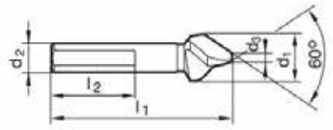
d1 mm	d2 mm	d3 mm	l1 mm	Z	價格
6.3	5	1.6	45	3	1,310
8	6	2	50	3	1,550
10	6	3.2	56	3	1,570
12.5	8	3.2	56	3	1,640
16	10	4	63	3	1,990
20	10	5	67	3	2,810
25	10	6.3	71	3	3,730

60° 倒角刀，螺旋凸型切削刃，降低切削阻力60%、避免震刀、面粗度佳

DIN 334 | 60° | C

材質	HSS
表面處理	A
柄部型式	3-flats

NEW



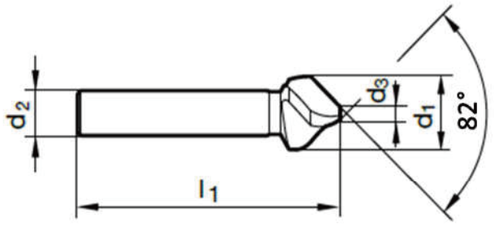
有三個側固面，供三爪鑽夾使用

鑽領編號 5671

d1	d2	d3	l1	l2	Z	價格
mm	mm	mm	mm	mm		
6.3	5	1.6	45	30	3	1,400
8	6	2	50	30	3	1,660
10	6	3.2	56	30	3	1,680
12.5	8	3.2	56	30	3	1,770
16	10	4	63	30	3	2,130
20	10	5	67	30	3	3,010
25	10	6.3	71	30	3	4,010

82° 倒角刀，螺旋凸型切削刃，降低切削阻力60%、避免震刀、面粗度佳

材質	HSCO
表面處理	TiAlN
柄部型式	cyl.
刃數	3



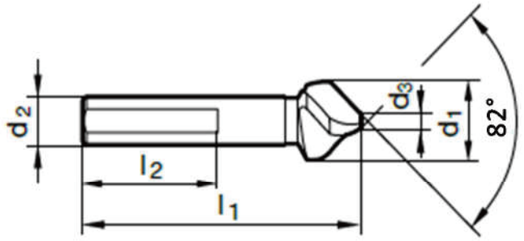
全圓柄

鑽領編號 5674

Code	d1 frac.	d1 inch	d1 mm	d2 inch	d2 mm	d3 inch	d3 mm	l1 inch	l1 mm	價格
6.350	1/4	0.2500	6.350	0.250	6.350	0.060	1.524	2.000	50.800	1,380
7.938	5/16	0.3125	7.938	0.250	6.350	0.080	2.032	2.000	50.800	1,640
9.525	3/8	0.3750	9.525	0.250	6.350	0.090	2.286	2.000	50.800	1,660
12.700	**1/2**	**0.5000**	**12.700**	**0.375**	**9.525**	**0.150**	**3.810**	**2.250**	**57.150**	**1,740**
15.875	**5/8**	**0.6250**	**15.875**	**0.375**	**9.525**	**0.180**	**4.572**	**2.250**	**57.150**	**2,100**
19.050	**3/4**	**0.7500**	**19.050**	**0.500**	**12.700**	**0.210**	**5.334**	**2.750**	**69.850**	**3,070**
22.225	7/8	0.8750	22.225	0.500	12.700	0.230	5.842	2.750	69.850	2,980
25.400	1	1.0000	25.400	0.500	12.700	0.250	6.350	2.750	69.850	3,960
31.750	1 1/4	1.2500	31.750	0.500	12.700	0.370	9.398	3.000	76.200	6,310

整組編號5676 1.000，內含1/4, 5/16, 3/8, 1/2, 5/8, 3/4各一支 **11,600**

材質	HSCO
表面處理	TiAlN
柄部型式	3-flats
刃數	3



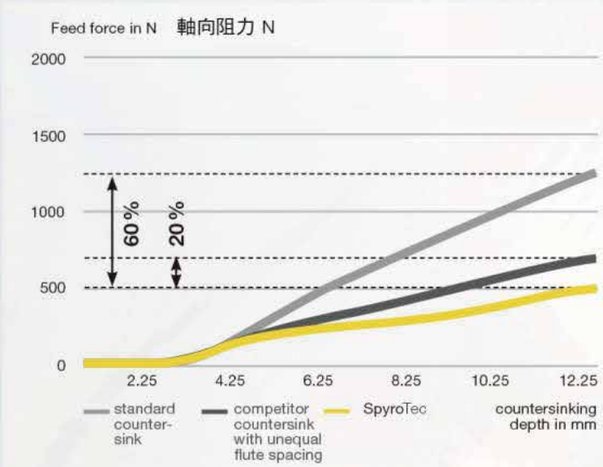
有三個側固面，供三爪鑽夾使用

鑽領編號 5675

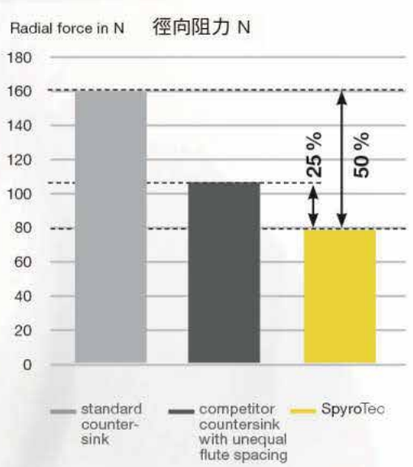
Code	d1 frac.	d1 inch	d1 mm	d2 inch	d2 mm	d3 inch	d3 mm	l1 inch	l1 mm	價格
6.350	1/4	0.2500	6.350	0.250	6.350	1.524	38.710	2.000	50.800	1,480
7.938	5/16	0.3125	7.938	0.250	6.350	2.032	51.613	2.000	50.800	1,750
9.525	3/8	0.3750	9.525	0.250	6.350	2.286	58.064	2.000	50.800	1,780
12.700	**1/2**	**0.5000**	**12.700**	**0.375**	**9.525**	**3.810**	**96.774**	**2.250**	**57.150**	**1,870**
15.875	**5/8**	**0.6250**	**15.875**	**0.375**	**9.525**	**4.572**	**116.129**	**2.250**	**57.150**	**2,260**
19.050	**3/4**	**0.7500**	**19.050**	**0.500**	**12.700**	**5.334**	**135.484**	**2.750**	**69.850**	**3,290**
22.225	7/8	0.8750	22.225	0.500	12.700	5.842	148.387	2.750	69.850	3,190
25.400	1	1.0000	25.400	0.500	12.700	6.350	161.290	2.750	69.850	4,250
31.750	1 1/4	1.2500	31.750	0.500	12.700	9.398	238.709	3.000	76.200	6,760

整組編號5677 1.000，內含1/4, 5/16, 3/8, 1/2, 5/8, 3/4各一支 **12,440**

SuperLine



LOWER FEED FORCE BY APPROX. 60%
COMPARED TO STANDARD COUNTERSINKS
跟一般的倒角刀比只需要60%的軸向力量



LOWER RADIAL FORCE BY APPROX. 50%
COMPARED TO STANDARD COUNTERSINKS
跟一般的倒角刀比只需要50%的徑向力量

90° 螺旋凸型刃口倒角刀 整組

DIN 335

- 規格請參考產品＃5500
- 3 刃為不同凸型切削刀口
- 切削時低震動
- 倒角面無震刀痕跡
- 低的切削阻力
- 應用範圍廣泛

P	•
M	•
K	•
N	○
S	○
H	

Tool material	HSCO
Surface	A
Shank form	cyl.

CNC、旋臂鑽床、小型鑽床、手提電鑽 皆能使用

Katalog-Nr. 6000

Ø-range	Pieces/set	Code no.
mm		
6.3/8.3/10.4/12.4/16.5/20.5	6	1.000

整組共六支

價格11,850

GÜHRING

90度 螺旋切削刃倒角銑刀

NEW • spiral-fluted geometry • NEW
CHAMFERING MILLING CUTTERS

Chamfering milling cutters with spiral-fluted cutting edges
螺旋切削刃倒角銑刀

- fast, cost-effective production of large chamfers
  快速且效率高 適合大量倒角需求的生產
- soft cut for soft and tough materials
  輕切削力 適合軟質與韌性材質加工
- optimum surface finish qualities in one cut
  切削的面粗度品質優良

SpyroTec 90° Chamfering milling cutters

GÜHRING – YOUR WORLDWIDE PARTNER

SpyroTec

THE SPIRAL-FLUTED 90° CHAMFERING MILLING CUTTER, 5 CUTTING EDGES

90度螺旋切削刃倒角銑刀 具有 5個切削刃

依照工件加工長度
可以使用切削刃至端面處

Face cutting for use of the full cutting edge length up to the base of components.

5 different spiral angles (20°-24°) and an **uneven cutting edge spacing** reliably reduce vibrations.

5個不等螺旋(20~24度)與
不等分切設計，
可以有效降低切削時的震動

The **spiral cutting edge geometry with a positive rake angle** ensures a smooth cutting and optimum surface finish with large chamfers.

螺旋切刃採用正向的溝槽內凹角
在大量的倒角切削過程中確保了加工平順
與良好的面粗度

The combination of robust **finest grain carbide and TiAlN coating** results in a long tool life.

採用最堅固的細顆粒碳化鎢材質和
TiAlN塗層相結合，延長刀具壽命。

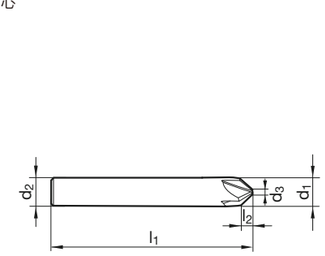
90° Chamfering milling cutters, spiral-fluted　90度螺旋切削刃倒角銑刀

WN | N | 5 | 20°-24° | 90° | 7°

P	●
M	●
K	○
N	●
S	●
H	

- face cutting 端面銑削
- without centre cutting 端面切刃沒有過中心

刀具材質	Solid carbide 鎢鋼	
鍍層	A	A
Type	N	N
柄部	HA 全圓	HB 側固
	NEW	NEW



柄徑	刃徑	前端小徑	總長	刃長	刃數	編號	6992	6993
d1 js9	d2 h6	d3	l1	l2	Z	價 格		
mm	mm	mm	mm	mm				
6.000	6.000	1.500	57.000	2.250	5		1,100	1,200
8.000	8.000	2.000	63.000	3.000	5		1,500	1,600
10.000	10.000	2.500	72.000	3.750	5		1,800	1,900
12.000	12.000	3.000	83.000	4.500	5		2,800	2,900
16.000	16.000	4.000	92.000	6.000	5		4,600	4,700
20.000	20.000	5.000	104.000	7.500	5		6,100	6,200

ISO	Hardness	v_c	f_z (mm/z) / Ø						
			3	6	8	10	12	16	20
			Chamfering				a_p/a_e max = 0,25xD		
P	≤850 N/mm²	**192**	0,018	0,036	0,048	0,06	0,08	0,10	0,13
	≥850 N/mm²	**140**	0,016	0,032	0,042	0,06	0,07	0,09	0,12
M	≤750 N/mm²	**120**	0,013	0,025	0,034	0,05	0,05	0,07	0,09
	≥750 N/mm²	**80**	0,009	0,019	0,025	0,04	0,04	0,06	0,07
K	≤240 HB	**170**	0,017	0,033	0,044	0,06	0,07	0,09	0,12
N	≥7 % Si	**250**	0,023	0,047	0,062	0,08	0,10	0,13	0,17

v_c	f_z (mm/z) / Ø						
	3	6	8	10	12	16	20
	De-burring				a_p/a_e max = 0,05xD		
250	0,030	0,060	0,080	0,11	0,13	0,17	0,21
180	0,026	0,053	0,070	0,10	0,12	0,16	0,20
160	0,021	0,042	0,056	0,08	0,09	0,12	0,15
100	0,016	0,032	0,042	0,06	0,07	0,10	0,12
230	0,028	0,056	0,074	0,10	0,12	0,16	0,20
330	0,039	0,078	0,104	0,14	0,17	0,22	0,28

其他角度需求亦可以訂製
例如：60 / 82 / 100 / 120度

GÜHRING

SuperLine

HIGH PERFORMANCE

EFFICIENT MACHINING AND LONG TOOL LIFE
IN A WIDE RANGE OF PROCESSES

高效率 高壽命 使用範圍廣泛

GU 500 PM 加強柄 PM 鑽頭

GÜHRING – YOUR WORLDWIDE PARTNER

GU 500
UNIVERSAL DRILLS

GU 500
UNIVERSAL APPLICATION
IN MOST MATERIALS

Structural steels and carbon steels, high-alloyed steels up to 1200 N/mm², stainless steels, cast materials, non-ferrous metals, aluminium, magnesium alloys, plastics

GU 500
適用範圍廣泛
結構鋼、碳鋼
抗拉強度低於1200N/mm²之高合金鋼
不鏽鋼、鑄鐵
非鐵金屬、鋁合金
鎂合金、塑膠

16MnCr5 機械構造用鉻錳鋼

11SMn30+C 易削鋼

St37 一般結構用軋鋼料

GG 鑄鐵

GGG 球墨鑄鐵

C45 中碳鋼

VA 不鏽鋼

Aluminium 鋁

Copper 銅

Bronze 青銅

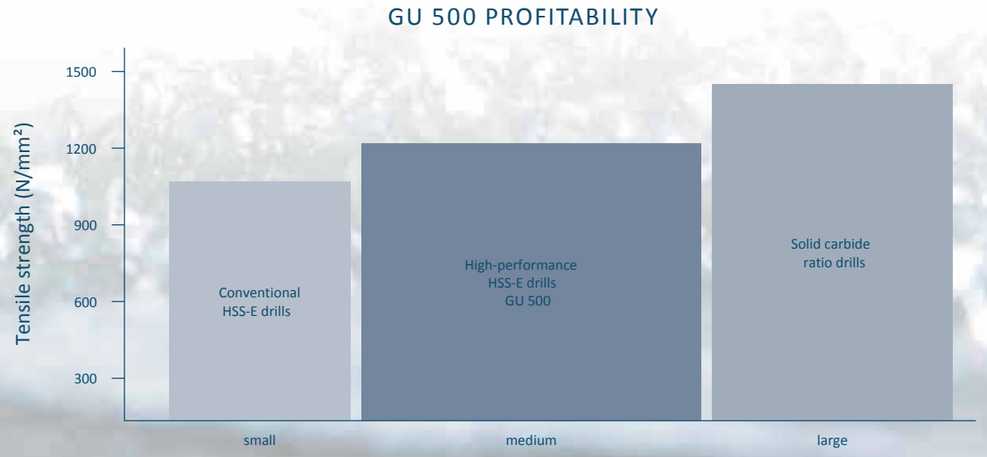
Brass 黃銅

Plexiglass 壓克力

PVC 塑膠

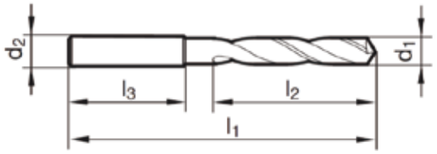
PE 1000 高拉力緩凝型植筋膠

Makrolon 樹脂



3D短刃 加強柄鑽頭、Nano Fire鍍層、HSS-PM 材質

鈷領編號： # 6005



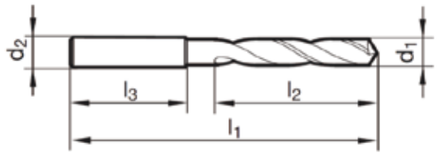
適用材質：
結構鋼、碳鋼、不銹鋼、鑄鐵、鑄鋁、鋁合金、鎂合金、銅合金、塑膠、無調質硬化處理之各種合金鋼材。

刃徑 d_1	英吋	柄徑 d_2	全長 l_1	溝長 l_2	柄長 l_3	價格
1.00		3	38	6	28	310
1.10		3	39	7	28	290
1.20		3	40	8	28	290
1.30		3	40	8	28	290
1.40		3	41	9	28	290
1.50		3	41	9	28	290
1.60		3	42	10	28	260
1.70		3	42	10	28	260
1.80		3	43	11	28	260
1.90		3	43	11	28	260
2.00		3	44	12	28	260
2.10		3	44	12	28	300
2.20		3	45	13	28	300
2.30		3	45	13	28	300
2.38	3/32	3	46	14	28	300
2.40		3	46	14	28	300
2.50		3	46	14	28	300
2.60		3	46	14	28	320
2.70		3	48	16	28	320
2.78	7/64	3	48	16	28	370
2.80		3	48	16	28	320
2.90		3	48	16	28	320
3.00		3	48	16	28	320
3.10		4	50	18	28	350
3.17	1/8	4	50	18	28	350
3.20		4	50	18	28	350
3.30		4	50	18	28	350
3.40		4	52	20	28	350
3.50		4	52	20	28	350
3.57	9/64	4	52	20	28	350
3.60		4	52	20	28	390
3.70		4	52	20	28	390
3.80		4	54	22	28	390
3.90		4	54	22	28	390
3.97	5/32	4	54	22	28	390
4.00		4	54	22	28	390
4.10		6	66	22	36	440
4.20		6	66	22	36	440
4.30		6	68	24	36	440
4.37	11/64	6	68	24	36	510
4.40		6	68	24	36	440
4.50		6	68	24	36	440
4.60		6	68	24	36	500

刃徑 d_1	英吋	柄徑 d_2	全長 l_1	溝長 l_2	柄長 l_3	價格
4.65		6	68	24	36	550
4.70		6	68	24	36	500
4.76	3/16	6	70	26	36	550
4.80		6	70	26	36	500
4.90		6	70	26	36	500
5.00		6	70	26	36	500
5.10		6	70	26	36	580
5.16	13/64	6	70	26	36	640
5.20		6	70	26	36	580
5.30		6	70	26	36	580
5.40		6	72	28	36	580
5.50		6	72	28	36	580
5.55		6	72	28	36	700
5.56	7/32	6	72	28	36	700
5.60		6	72	28	36	630
5.70		6	72	28	36	630
5.80		6	72	28	36	630
5.90		6	72	28	36	630
5.95	15/64	6	72	28	36	630
6.00		6	72	28	36	670
6.10		8	75	31	36	670
6.20		8	75	31	36	670
6.30		8	75	31	36	670
6.35	1/4	8	75	31	36	670
6.40		8	75	31	36	670
6.50		8	75	31	36	670
6.60		8	75	31	36	690
6.70		8	75	31	36	690
6.75	17/64	8	78	34	36	690
6.80		8	78	34	36	690
6.90		8	78	34	36	690
7.00		8	78	34	36	690
7.10		8	78	34	36	720
7.14	9/32	8	78	34	36	720
7.20		8	78	34	36	720
7.30		8	78	34	36	720
7.40		8	78	34	36	720
7.50		8	78	34	36	720
7.54	19/64	8	81	37	36	770
7.55		8	81	37	36	770
7.60		8	81	37	36	770
7.70		8	81	37	36	770
7.80		8	81	37	36	770

3D短刃 加強柄鑽頭、Nano Fire鍍層、HSS-PM 材質

鈷領編號：＃6005



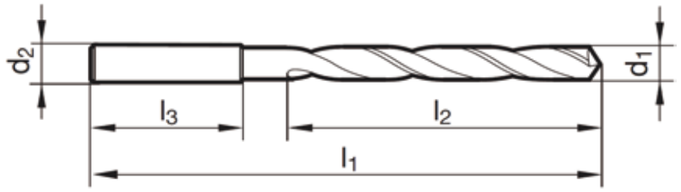
適用材質：
結構鋼、碳鋼、不銹鋼、鑄鐵、鑄鋁、鋁合金、鎂合金、銅合金、塑膠、無調質硬化處理之各種合金鋼材。

刃徑 d_1	英吋	柄徑 d_2	全長 l_1	溝長 l_2	柄長 l_3	價格
7.90		8	81	37	36	770
7.94	5/16	8	81	37	36	770
8.00		8	81	37	36	770
8.10		10	87	37	40	820
8.20		10	87	37	40	820
8.30		10	87	37	40	820
8.33	21/64	10	87	37	40	820
8.40		10	87	37	40	820
8.50		10	87	37	40	820
8.60		10	91	40	40	880
8.70		10	91	40	40	880
8.73	11/32	10	91	40	40	950
8.80		10	91	40	40	880
8.90		10	91	40	40	880
9.00		10	91	40	40	880
9.10		10	91	40	40	950
9.13	23/64	10	91	40	40	1,000
9.20		10	91	40	40	950
9.30		10	91	40	40	950
9.40		10	91	40	40	950
9.50		10	91	40	40	950
9.52	3/8	10	93	43	40	1,000
9.55		10	93	43	40	1,000
9.60		10	93	43	40	1,000
9.70		10	93	43	40	1,000
9.80		10	93	43	40	1,000
9.90		10	93	43	40	1,000
9.92	25/64	10	93	43	40	1,080
10.00		10	93	43	40	1,000
10.10		12	100	43	45	1,100
10.20		12	100	43	45	1,100
10.30		12	100	43	45	1,100
10.32	13/32	12	100	43	45	1,200
10.40		12	100	43	45	1,100
10.50		12	100	43	45	1,100
10.60		12	100	43	45	1,200
10.70		12	104	47	45	1,200
10.72	27/64	12	104	47	45	1,200
10.80		12	104	47	45	1,200
10.90		12	104	47	45	1,200
11.00		12	104	47	45	1,200
11.10		12	104	47	45	1,370
11.11	7/16	12	104	47	45	1,480

刃徑 d_1	英吋	柄徑 d_2	全長 l_1	溝長 l_2	柄長 l_3	價格
11.20		12	104	47	45	1,370
11.30		12	104	47	45	1,370
11.40		12	104	47	45	1,370
11.50		12	104	47	45	1,370
11.51	29/64	12	104	47	45	1,470
11.60		12	104	47	45	1,470
11.70		12	104	47	45	1,470
11.80		12	104	47	45	1,470
11.90		12	108	51	45	1,470
11.91	15/32	12	108	51	45	1,470
12.00		12	108	51	45	1,470
12.10		16	111	51	48	1,580
12.20		16	111	51	48	1,580
12.30	0.48	16	111	51	48	1,580
12.40		16	111	51	48	1,580
12.50		16	111	51	48	1,580
12.60		16	111	51	48	1,740
12.70	1/2	16	111	51	48	1,740
12.80		16	111	51	48	1,740
12.90		16	111	51	48	1,740
13.00		16	111	51	48	1,740
13.10	33/64	16	111	51	48	2,650
13.49	17/32	16	114	54	48	2,650
13.50		16	114	54	48	2,370
13.89	35/64	16	114	54	48	2,370
14.00		16	114	54	48	2,370
14.29	9/16	16	116	56	48	2,630
14.50		16	116	56	48	2,630
15.00		16	116	56	48	3,150
15.50		16	118	58	48	3,400
15.87	5/8	16	118	58	48	3,400
16.00		16	118	58	48	3,400
16.50		20	126	60	50	3,500
16.67	21/32	20	126	60	50	3,850
17.00		20	126	60	50	3,500
17.50		20	128	62	50	3,800
18.00		20	128	62	50	3,800
18.50		20	130	64	50	4,000
19.00		20	130	64	50	4,000
19.50		20	132	66	50	4,950
20.00		20	132	66	50	4,950

5D標準長 加強柄鑽頭、Nano Fire鍍層、HSS-PM 材質

鈷領編號：＃6006



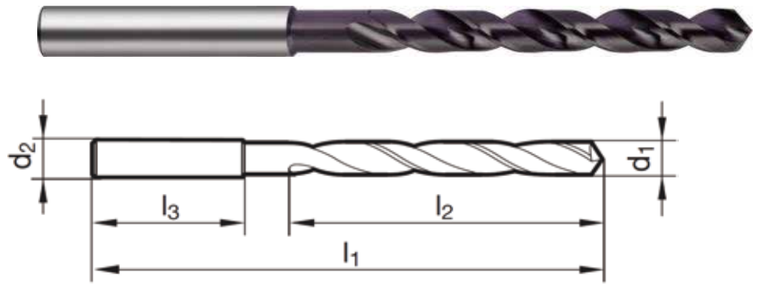
適用材質：結構鋼、碳鋼、不銹鋼、鑄鐵、鑄鋁、鋁合金、鎂合金、銅合金、塑膠、無調質硬化處理之各種合金鋼材。

刃徑 d_1	英吋	柄徑 d_2	全長 l_1	溝長 l_2	柄長 l_3	價格
2.00		3	56	24	28	320
2.10		3	56	24	28	330
2.20		3	59	27	28	330
2.30		3	59	27	28	330
2.38	3/32	3	62	30	28	390
2.40		3	62	30	28	330
2.50		3	62	30	28	320
2.60		3	62	30	28	330
2.70		3	65	33	28	330
2.78	7/64	3	65	33	28	390
2.80		3	65	33	28	330
2.90		3	65	33	28	330
3.00		3	65	33	28	320
3.10		4	68	36	28	390
3.17	1/8	4	68	36	28	390
3.20		4	68	36	28	390
3.30		4	68	36	28	390
3.40		4	71	39	28	390
3.50		4	71	39	28	370
3.57	9/64	4	71	39	28	410
3.60		4	71	39	28	420
3.70		4	71	39	28	420
3.80		4	75	43	28	420
3.90		4	75	43	28	420
3.97	5/32	4	75	43	28	470
4.00		4	75	43	28	400
4.10		6	87	43	36	460
4.20		6	87	43	36	460
4.30		6	91	47	36	460
4.37	11/64	6	91	47	36	520
4.40		6	91	47	36	460
4.50		6	91	47	36	450
4.60		6	91	47	36	530
4.65		6	91	47	36	530
4.70		6	91	47	36	530
4.76	3/16	6	96	52	36	630
4.80		6	96	52	36	530
4.90		6	96	52	36	530
5.00		6	96	52	36	510
5.10		6	96	52	36	630
5.16	13/64	6	96	52	36	670

刃徑 d_1	英吋	柄徑 d_2	全長 l_1	溝長 l_2	柄長 l_3	價格
5.20		6	96	52	36	630
5.30		6	96	52	36	630
5.40		6	101	57	36	630
5.50		6	101	57	36	610
5.55		6	101	57	36	680
5.56	7/32	6	101	57	36	680
5.60		6	101	57	36	680
5.70		6	101	57	36	680
5.80		6	101	57	36	680
5.90		6	101	57	36	680
5.95	15/64	6	101	57	36	680
6.00		6	101	57	36	660
6.10		8	107	63	36	770
6.20		8	107	63	36	770
6.30		8	107	63	36	770
6.35	1/4	8	107	63	36	810
6.40		8	107	63	36	770
6.50		8	107	63	36	720
6.60		8	107	63	36	790
6.70		8	107	63	36	790
6.75	17/64	8	113	69	36	840
6.80		8	113	69	36	790
6.90		8	113	69	36	790
7.00		8	113	69	36	740
7.10		8	113	69	36	840
7.14	9/32	8	113	69	36	870
7.20		8	113	69	36	840
7.30		8	113	69	36	840
7.40		8	113	69	36	840
7.50		8	113	69	36	800
7.54	19/64	8	119	75	36	910
7.55		8	119	75	36	910
7.60		8	119	75	36	870
7.70		8	119	75	36	870
7.80		8	119	75	36	870
7.90		8	119	75	36	870
7.94	5/16	8	119	75	36	870
8.00		8	119	75	36	820
8.10		10	125	75	40	950
8.20		10	125	75	40	950
8.30		10	125	75	40	950

5D標準長 加強柄鑽頭、Nano Fire鍍層、HSS-PM 材質

鈷領編號：＃6006



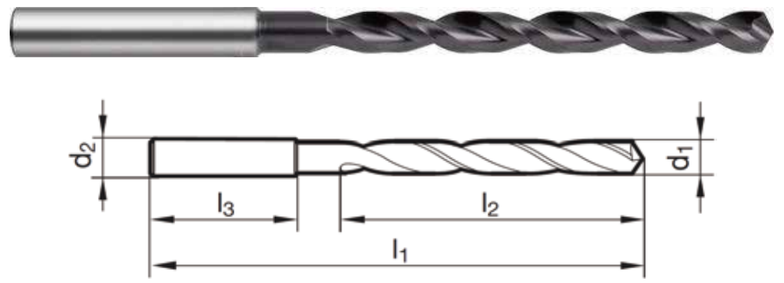
適用材質：結構鋼、碳鋼、不銹鋼、鑄鐵、鑄鋁、鋁合金、鎂合金、銅合金、塑膠、無調質硬化處理之各種合金鋼材。

刃徑 d_1	英吋	柄徑 d_2	全長 l_1	溝長 l_2	柄長 l_3	價格
8.33	21/64	10	125	75	40	1,010
8.40		10	125	75	40	950
8.50		10	125	75	40	930
8.60		10	131	81	40	1,050
8.70		10	131	81	40	1,050
8.73	11/32	10	131	81	40	1,120
8.80		10	131	81	40	1,050
8.90		10	131	81	40	1,050
9.00		10	131	81	40	980
9.10		10	131	81	40	1,050
9.13	23/64	10	131	81	40	1,050
9.20		10	131	81	40	1,050
9.30		10	131	81	40	1,050
9.40		10	131	81	40	1,050
9.50		10	131	81	40	1,050
9.52	3/8	10	137	87	40	1,200
9.55		10	137	87	40	1,200
9.60		10	137	87	40	1,200
9.70		10	137	87	40	1,200
9.80		10	137	87	40	1,200
9.90		10	137	87	40	1,200
9.92	25/64	10	137	87	40	1,200
10.00		10	137	87	40	1,150
10.10		12	144	87	45	1,250
10.20		12	144	87	45	1,250
10.30		12	144	87	45	1,250
10.32	13/32	12	144	87	45	1,250
10.40		12	144	87	45	1,250
10.50		12	144	87	45	1,200
10.60		12	144	87	45	1,400
10.70		12	151	94	45	1,400
10.72	27/64	12	151	94	45	1,400
10.80		12	151	94	45	1,400
10.90		12	151	94	45	1,400
11.00		12	151	94	45	1,350
11.10		12	151	94	45	1,600
11.11	7/16	12	151	94	45	1,600
11.20		12	151	94	45	1,600
11.30		12	151	94	45	1,600
11.40		12	151	94	45	1,600
11.50		12	151	94	45	1,550

刃徑 d_1	英吋	柄徑 d_2	全長 l_1	溝長 l_2	柄長 l_3	價格
11.51	29/64	12	151	94	45	1,550
11.60		12	151	94	45	1,750
11.70		12	151	94	45	1,750
11.80		12	151	94	45	1,750
11.90		12	158	101	45	1,750
11.91	15/32	12	158	101	45	1,750
12.00		12	158	101	45	1,700
12.10		16	161	101	48	1,850
12.20		16	161	101	48	1,850
12.30	31/64	16	161	101	48	1,850
12.40		16	161	101	48	1,850
12.50		16	161	101	48	1,800
12.60		16	161	101	48	2,000
12.70	1/2	16	161	101	48	2,000
12.80		16	161	101	48	2,000
12.90		16	161	101	48	2,000
13.00		16	161	101	48	1,900
13.10	33/64	16	166	106	48	3,000
13.49	17/32	16	166	106	48	3,000
13.50		16	166	106	48	3,970
13.89	35/64	16	166	106	48	3,450
14.00		16	166	106	48	3,000
14.29	9/16	16	169	109	48	3,300
14.50		16	169	109	48	3,300
15.00		16	169	109	48	3,450
15.50		16	172	112	48	3,800
15.87	5/8	16	172	112	48	3,800
16.00		16	172	112	48	3,800
16.50		20	181	115	50	3,950
16.67	21/32	20	181	115	50	3,950
17.00		20	181	115	50	3,950
17.46	11/16	20	184	118	50	4,300
17.50		20	184	118	50	4,300
18.00		20	184	118	50	4,300
18.50		20	188	122	50	5,000
19.00		20	188	122	50	5,000
19.50		20	191	125	50	5,250
20.00		20	191	125	50	5,250

5D標準長 加強柄鑽頭、Fire鍍層、HSS-PM 材質

鈷領編號：＃513



適用材質：調質後的各種碳鋼及合金鋼，軟材料不適用。

刃徑 d_1	溝長 l_2	全長 l_1	柄徑 d_2	柄長 l_3	價格	
2.00	24	56	3	28	320	●
2.10	24	56	3	28	330	●
2.20	27	59	3	28	330	●
2.30	27	59	3	28	330	●
2.38	30	62	3	28	390	×
2.40	30	62	3	28	330	●
2.50	30	62	3	28	320	●
2.60	30	62	3	28	330	●
2.70	33	65	3	28	330	●
2.78	33	65	3	28	390	●
2.80	33	65	3	28	330	●
2.90	33	65	3	28	330	×
3.00	33	65	3	28	320	●
3.10	36	68	4	28	380	×
3.17	36	68	4	28	450	●
3.20	36	68	4	28	390	●
3.30	36	68	4	28	390	●
3.40	39	71	4	28	390	●
3.50	39	71	4	28	370	●
3.57	39	71	4	28	410	●
3.60	39	71	4	28	420	●
3.70	39	71	4	28	420	●
3.80	43	75	4	28	420	●
3.90	43	75	4	28	420	×
3.97	43	75	4	28	470	●
4.00	43	75	4	28	400	●
4.10	43	87	6	36	460	×
4.20	43	87	6	36	460	●
4.30	47	91	6	36	460	●
4.37	47	91	6	36	520	●
4.40	47	91	6	36	460	●
4.50	47	91	6	36	450	●
4.60	47	91	6	36	530	●
4.65	47	91	6	36	530	●
4.70	47	91	6	36	530	●
4.76	52	96	6	36	630	●

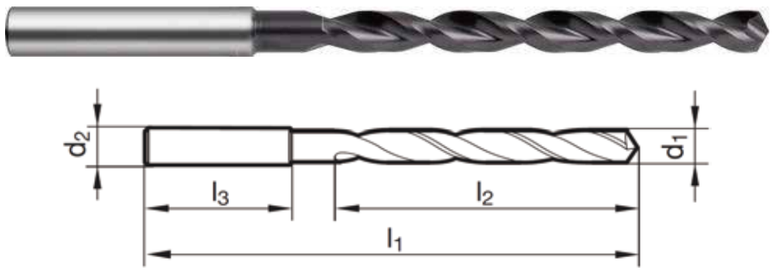
刃徑 d_1	溝長 l_2	全長 l_1	柄徑 d_2	柄長 l_3	價格	
4.80	52	96	6	36	530	×
4.90	52	96	6	36	530	●
5.00	52	96	6	36	510	●
5.10	52	96	6	36	630	●
5.16	52	96	6	36	680	●
5.20	52	96	6	36	630	●
5.30	52	96	6	36	630	●
5.40	57	101	6	36	630	×
5.50	57	101	6	36	610	●
5.55	57	101	6	36	650	●
5.56	57	101	6	36	650	×
5.60	57	101	6	36	680	×
5.70	57	101	6	36	680	●
5.80	57	101	6	36	680	●
5.90	57	101	6	36	680	●
5.95	57	101	6	36	740	×
6.00	57	101	6	36	660	●
6.10	63	107	8	36	770	×
6.20	63	107	8	36	770	●
6.30	63	107	8	36	770	●
6.35	63	107	8	36	800	●
6.40	63	107	8	36	770	×
6.50	63	107	8	36	720	●
6.60	63	107	8	36	790	●
6.70	63	107	8	36	790	×
6.75	69	113	8	36	840	●
6.80	69	113	8	36	790	●
6.90	69	113	8	36	790	●
7.00	69	113	8	36	740	●
7.10	69	113	8	36	840	×
7.14	69	113	8	36	870	●
7.20	69	113	8	36	840	●
7.30	69	113	8	36	840	×
7.40	69	113	8	36	840	●
7.50	69	113	8	36	800	●
7.54	75	119	8	36	910	×

●：現有標準規格

×：非標準規格 On Request 需詢問

5D標準長 加強柄鑽頭、Nano Fire鍍層、HSS-PM 材質

鈷領編號： **＃513**



適用材質：調質後的各種碳鋼及合金鋼，軟材料不適用。

刃徑 d_1	溝長 l_2	全長 l_1	柄徑 d_2	柄長 l_3	價格	
7.55	75	119	8	36	910	×
7.60	75	119	8	36	870	●
7.70	75	119	8	36	870	×
7.80	75	119	8	36	870	●
7.90	75	119	8	36	870	●
7.94	75	119	8	36	960	●
8.00	75	119	8	36	820	●
8.10	75	125	10	40	950	●
8.20	75	125	10	40	950	●
8.30	75	125	10	40	950	×
8.33	75	125	10	40	1,010	●
8.40	75	125	10	40	950	●
8.50	75	125	10	40	930	●
8.60	81	131	10	40	1,050	●
8.70	81	131	10	40	1,050	×
8.73	81	131	10	40	1,120	●
8.80	81	131	10	40	1,050	●
8.90	81	131	10	40	1,050	●
9.00	81	131	10	40	980	●
9.10	81	131	10	40	1,050	●
9.13	81	131	10	40	1,160	●
9.20	81	131	10	40	1,050	●
9.30	81	131	10	40	1,050	●
9.40	81	131	10	40	1,050	●
9.50	81	131	10	40	1,050	●
9.52	87	137	10	40	1,250	●
9.55	87	137	10	40	1,200	×
9.60	87	137	10	40	1,200	●
9.70	87	137	10	40	1,200	●
9.80	87	137	10	40	1,200	●
9.90	87	137	10	40	1,200	×
9.92	87	137	10	40	1,290	●
10.00	87	137	10	40	1,150	●
10.10	87	144	12	45	1,250	●
10.20	87	144	12	45	1,250	●
10.30	87	144	12	45	1,250	●

刃徑 d_1	溝長 l_2	全長 l_1	柄徑 d_2	柄長 l_3	價格	
10.32	87	144	12	45	1,350	×
10.40	87	144	12	45	1,250	×
10.50	87	144	12	45	1,200	●
10.60	87	144	12	45	1,400	●
10.70	94	151	12	45	1,400	●
10.72	94	151	12	45	1,500	×
10.80	94	151	12	45	1,400	×
10.90	94	151	12	45	1,400	●
11.00	94	151	12	45	1,350	●
11.10	94	151	12	45	1,600	●
11.11	94	151	12	45	1,740	×
11.20	94	151	12	45	1,600	●
11.30	94	151	12	45	1,600	●
11.40	94	151	12	45	1,600	●
11.50	94	151	12	45	1,550	●
11.51	94	151	12	45	1,750	×
11.60	94	151	12	45	1,750	●
11.70	94	151	12	45	1,750	×
11.80	94	151	12	45	1,750	●
11.90	101	158	12	45	1,750	●
11.91	101	158	12	45	1,950	×
12.00	101	158	12	45	1,700	●
12.10	101	161	14	45	1,850	●
12.20	101	161	14	45	1,850	●
12.30	101	161	14	45	1,850	×
12.40	101	161	14	45	1,850	●
12.50	101	161	14	45	1,800	●
12.60	101	161	14	45	2,000	●
12.70	101	161	14	45	2,000	●
12.80	101	161	14	45	2,000	●
12.90	101	161	14	45	2,000	●
13.00	101	161	14	45	1,900	●

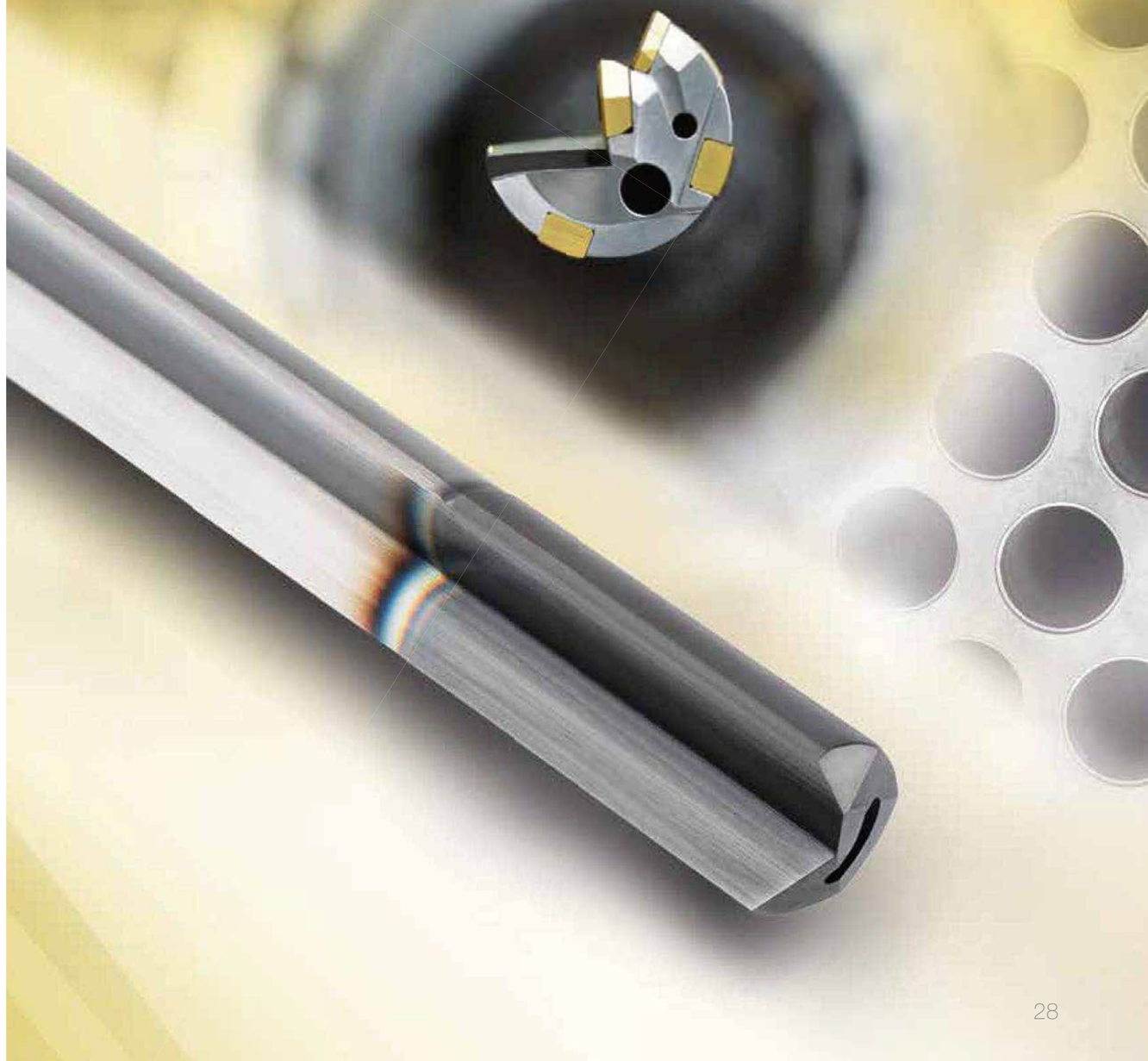
●：現有標準規格

×：非標準規格 On Request 需詢問

GÜHRING

DEEP HOLE DRILLING TOOLS

焊刃式、全鎢鋼、刀片替換式槍鑽



All data are approximate values. The actually achievable cuttng speeds and feed rates depend on the respective machining conditions. We recommend suitable drilling trials.

To select the optimal tool and the recommended machining parameters for your application, please also use the electronic version of the GühringNavigator on the internet: www.guehring.com.

Drill Ø mm	Feed column no.								
	1	2	3	4	5	6	7	8	9
	f (mm/rev.)								
5.00	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250
6.30	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.315
8.00	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.315
10.00	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.400
12.50	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.500
16.00	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.500	0.630
20.00	0.125	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.630
25.00	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.800	0.800
31.50	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.800	1.000
40.00	0.200	0.250	0.315	0.400	0.500	0.630	0.800	1.000	1.250
50.00	0.250	0.310	0.400	0.500	0.630	0.800	1.000	1.250	1.250
63.00	0.315	0.400	0.500	0.630	0.800	1.000	1.250	1.600	1.600
80.00	0.400	0.500	0.630	0.800	1.000	1.250	1.600	1.600	2.000

Coolant:
○ Air
● Oil
◍ Soluble oil

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tensile strength (N/mm²)	Hardness	Coolant
Common structural steels	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2)	≤500		◍
一般結構用鋼	1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤1000		◍
Free-cutting steels	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36)	≤850		◍
易削鋼	1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤1000		◍
Unalloyed heat-treatable steels	1.0402 C22, 1.1178 C30E (Ck30)	≤700		◍
	1.0503 C45, 1.1191 C45E (Ck45)	≤850		◍
碳鋼	1.0601 C60, 1.1221 C60E (Ck60)	≤1000		◍
Alloyed heat-treatable steels	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4	≤1000		◍
合金鋼	1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1400		◍
Unalloyed case hard. steels	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		◍
Alloyed case hardened steels	1.7276 10CrMo11, 1.5125 11MnSi6	≤1000		●
合金鋼 表面硬化	1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1400		●
Nitriding steels	1.8504 34CrAl6	≤1000		◍
氮化鋼	1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1400		●
Tool steels	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9	≤850		◍
工具鋼	1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤1400		●
High speed steels 高速鋼	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		●
Spring steels 彈簧鋼	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	●
Hardened steels	–		≤48 HRC	●
高度硬鋼			≤66 HRC	●
Stainless steels, sulphured	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9	≤900		●
austenitic 不鏽鋼	1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitic	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		●
Cast iron iron	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20)		≤240 HB	◍ ○
鑄鐵	0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤350 HB	◍ ○
Spheroidal graphite iron and	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35)		≤240 HB	◍
malleable cast iron 球墨鑄鐵	0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤350 HB	◍
Chilled cast iron 冷鍛鑄鐵	–		≤350 HB	◍
New cast materials GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35)		≤220 HB	◍ ○
蠕墨鑄鐵	EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤300 HB	◍ ○
New cast materials ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000)	≤1000		◍ ○
等溫淬火球墨鑄鐵	EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1400		◍ ○
Special alloys 特殊合金	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Ti and Ti alloys	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2	≤850		●
鈦及鈦合金	3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium and Al alloys 鋁及鋁合金	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		◍
Al wrought alloys 鍛造鋁合金	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		◍
Al cast alloys ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		◍
≤ 24 % Si 鑄鋁	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Magnesium alloys 鎂合金	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		○
Copper, low-alloyed 純銅 紅銅	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		◍
Brass, short-chipping	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		◍
long-chipping 黃銅	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		◍
Bronze, short-chipping	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn	≤600		◍ ●
青銅 短屑型	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, long-chipping	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤850		●
青銅 長屑型	2.0980 CuAl11Ni, 2.1247 CuBe2	≤1000		●
Duroplastics 硬質塑膠	Bakelit, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastics 熱塑性塑膠	Plexiglass, Hostalen, Novodur, Makralon	≤100		◍ ○
Kevlar 杜邦 克維拉纖維	Kevlar	≤1000		○
Glass, carbon concent. plastics	GRP/CFRP 玻璃纖維 碳纖維	≤1000		○

	≤3xD			≤5xD			≤10xD	
Article no.	5524	5520	6005	5523	5519	6006	5536	5537
Standard/DIN	1897	1897	WN	338	338	WN	340	340
Tool material	HSCO	HSCO	HSS-E-PM	HSCO	HSCO	HSS-E-PM	HSCO	HSCO
Surface	○	S	F	○	S	F	○	S
Type	GU 500 DZ	GU 500 DZ	GU 500	GU 500 DZ	GU 500 DZ	GU 500	GU 500 DZ	GU 500 DZ
Std. range page	9	9	5	11	11	7	13	13

v_c m/min	Feed col. no.	v_c m/min	Feed col. no.	v_c m/min	Feed col. no.	v_c m/min	Feed col. no.	v_c m/min	Feed col. no.	v_c m/min	Feed col. no.	v_c m/min	Feed col. no.	v_c m/min	Feed col. no.
35	6	45	6	47	6	35	6	45	6	47	6	29	5	32	5
30	5	35	5	37	5	30	5	35	5	37	5	22	4	25	4
40	6	50	6	53	6	40	6	50	6	53	6	32	5	35	5
30	6	40	6	42	6	30	6	40	6	42	6	25	5	28	5
32	6	44	6	46	6	32	6	44	6	46	6	25	5	28	5
28	6	44	6	46	6	28	6	44	6	46	6	22	5	25	5
20	5	40	5	42	5	20	5	40	5	42	5	13	4	15	4
15	4	27	4	28	4	15	4	27	4	28	4	12	3	13	3
13	3	22	3	23	3	13	3	22	3	23	3	11	2	12	2
30	6	44	6	46	6	30	6	44	6	46	6	25	5	28	5
16	4	22	4	23	4	16	4	22	4	23	4	12	3	14	3
12	3	18	3	19	3	12	3	18	3	19	3	11	2	12	2
15	4	22	4	23	4	15	4	22	4	23	4	12	3	13	3
10	3	16	3	17	3	10	3	16	3	17	3	7	2	8	2
15	4	20	4	21	4	15	4	20	4	21	4	12	3	13	3
10	3	15	3	16	3	10	3	15	3	16	3	9	2	10	2
10	3	13	2	14	2	10	3	13	3	14	2	9	2	10	2
		9	2	9	2			9	2	9	2				
14	4	20	4	21	4	14	4	20	4	21	4	12	3	13	3
10	4	16	4	17	4	10	4	16	4	17	4	7	3	8	3
12	4	18	4	19	4	12	4	18	4	19	4	11	3	12	3
36	6	45	6	47	6	36	6	45	6	47	6	29	6	32	6
30	6	40	6	42	6	30	6	40	6	42	6	23	6	26	6
30	6	40	6	42	6	30	6	40	6	42	6	25	6	28	6
22	6	30	6	32	6	22	6	30	6	32	6	18	6	20	6
				5	2					5	2				
50	7	70	7	74	7	50	7	70	7	74	7	45	7	50	7
50	7	70	7	74	7	50	7	70	7	74	7	45	7	50	7
65	7	85	7	89	7	65	7	85	7	89	7	54	7	60	7
60	6	70	6	74	6	60	6	70	6	74	6	45	6	50	6
60	6	80	6	84	6	60	6	80	6	84	6	45	6	50	6
70	5	80	5	84	5	70	5	80	5	84	5	60	5	70	5
45	5	77	5	81	5	45	5	77	5	81	5	40	5	50	5
30	5	44	5	46	5	30	5	44	5	46	5	25	5	28	5
36	4	50	4	53	4	36	4	50	4	53	4	31	4	35	4
30	4	40	4	42	4	30	4	40	4	42	4	22	4	25	4
30	4	32	4	34	4	30	4	32	4	34	4	22	4	24	4
25	4	28	4	29	4	25	4	28	4	29	4	18	4	20	4
20	4	25	4	26	4	20	4	25	4	26	4	16	4	18	4
15	4	27	4	28	4	15	4	27	4	28	4	11	4	12	4

GÜHRING

GÜHRING HIGH-PERFORMANCE TOOLS FOR
MACHINING FIBRE COMPOSITE MATERIALS
高效能纖維與複合材料加工刀具

- without fraying of fibres and delamination
  不會造成纖維磨損和分層破壞
- for optimal component surface finish quality
  可以獲得最佳的零件表面光潔度與品質

Machining modern composite materials
加工現代複合材料、碳纖維、玻璃纖維、克維拉纖維的最佳選擇

GÜHRING – YOUR WORLDWIDE PARTNER

MACHINING MODERN
COMPOSITE MATERIALS

Modern fibre reinforced plastics (FRP's) are making an entry into a broad range of industrial applications for reasons of efficiency, weight reduction, strength and dynamics. With their specific properties they extend the group of conventional metal lightweight construction materials such as aluminium- and titanium-alloys. FRP's or multi-material combinations, ie. a mixture of FRP and metallic materials, are therefore no longer exclusively retained for the aerospace industry, motorsport and other high-end applications. It is especially worth high-lighting the great growth in the general automotive and commercial vehicle technology.

現代纖維強化塑料(FRP)由於重量輕、強度佳的特性，應用時效率高與動力性好，正廣泛地應用於工業之中。憑藉其特殊的性能，用途擴展到常用的輕質結構金屬的種類材料，例如鋁和鈦合金。纖維材料或是多種材料的合成組合，例如FRP和金屬材料的混合物不再專門保留用於航空航天工業，賽車運動和其他高端的應用。已經廣泛應用於汽車和商用車之中。

FRP's are applied where high specific strength and low weight as well as high dynamic or energy efficient processes can be found. For the machining of CFRP, GFRP and stacks (FRP-metal-layer composite) without component damage, cutting edge quality and wear resistance of the tool material are of absolute importance. Guhring provides special solid carbide, coated carbide and PCD tooling solutions for these demanding materials. They are specially adapted to the respective material structure and ensure optimum chip evacuation as well as uniform hole diameters across all materials.

纖維材料適用於高強度，低重量的場合以及需要高動態或高效能的場合。加工CFRP，GFRP的堆疊（FRP-金屬層複合材料），不能造成工件的損壞與毛邊產生，刀具的刃口與耐磨性至關重要。德國鈷領提供特殊的鎢鋼刀具與塗層以及PCD鑽石刀具，為這些嚴苛的加工提供解決方案，特別適用於這些特殊的材料結構加工，確保最佳的排屑性以及均勻的孔徑。

CHALLENGES

- components without fraying of fibres
- delamination-free component surface finish
- no component damage through "peel-up" or "push-out"
- prevention of split fibres on component
- minimising burr development
- prevention of thermal damage

- 纖維不能有破損
- 表面不能有分層的現象
- 表面不能有“剝離”或“推出”
- 不能有纖維分裂
- 毛邊必須最少
- 防止因加工而造成的熱損傷

TOOLS

FOR THE MACHINING OF MODERN COMPOSITE MATERIALS
各式加工現代複合材料刀具

SOLID CARBIDE DRILLS
from Ø2.50mm to Ø12.70mm
鎢鋼鑽頭（頁次6,7）

Solid carbide

END MILLS
from Ø8.00mm to Ø12.70mm
四刃型PCD焊刃式銑刀（頁次24）

PCD

END MILLS Z=1
from Ø2.00mm to Ø16.00mm
鎢鋼單刃式銑刀/鑽頭（頁次8）

Solid carbide

可應用於加工壓克力

PCD DRILLS
from Ø2.70mm to Ø12.70mm
PCD鑽石焊刃式鑽頭（頁次18,19）

PCD

※ 羽球 / 網球拍，鑽孔有高壽命表現

TAPS
from M3mm to M16mm
鎢鋼絲攻（頁次14,15）

Solid carbide

THREAD MILLING CUTTERS
from M1.6mm to M20x1.5mm
鎢鋼銑牙刀（頁次16,17）

Solid carbide

KEVLAR END MILLS FR 100
from Ø4.00mm to Ø12.70mm
克維拉纖維材料加工用
銑刀 / 鑽石鍍膜銑刀（頁次12,13）

Solid carbide

"克維拉" 可以說是高科技的材料，它耐高溫，強度與硬度比鋼鐵高 5 倍，質量比玻璃纖維還輕。可用於用防彈背心、保護手套、安全帽、消防隊用的衣服、汽車剎車墊、汽車與腳踏車的輪胎、輪船、輕便飛行器、海底電纜、橋梁等。

KEVLAR END MILLS CR 100
from Ø4.00mm to Ø16.00mm
克維拉纖維材料加工用銑刀 / 鑽石鍍膜銑刀（頁次9,10,11）

Solid carbide

SLOT DRILLS Z=2
from Ø4.00mm to Ø20.00mm
PCD鑽石焊刃式銑刀/ 2刃式（頁次20,21）

PCD

SLOT DRILLS Z=3
from Ø14.00mm to Ø20.00mm
PCD鑽石焊刃式銑刀/ 3刃式（頁次22,23）

PCD

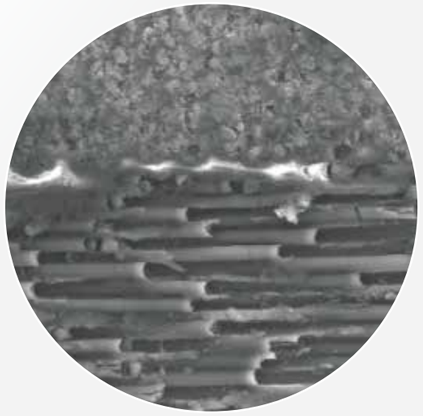
PCD COMPRESSION MILLING CUTTERS
from Ø12.70mm to Ø16.00mm
PCD鑽石焊刃式銑刀/ 三刃交錯齒型（頁次25）

PCD

RESULT OF A DRILLING OPERATION
WITH SPECIALISED GUHRING TOOLING SOLUTIONS
使用德國鈷領特殊鑽頭加工碳纖維材質的結果

Machining with a Guhring tool retains the structure and direction of the fibres in the component, as the REM examination shows. The fibres are neither pressed into the matrix or ripped out of the composite.

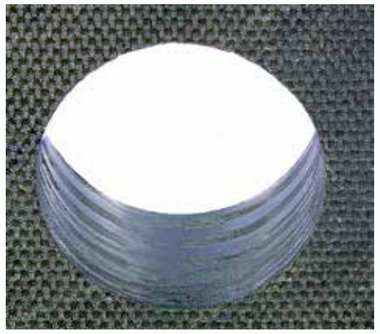
如REM檢查所示，使用德國鈷領刀具加工可保留工件中的纖維結構和方向性。
纖維既不會被壓入基體，也不會被撕裂。



CFRP cut surface with 500-fold magnification
CFRP加工後表面500倍放大顯示

Optimal machining results in CFRP
碳纖維最佳的加工結果

no peel-up – no push-out
孔內壁沒有 "剝離" / 也沒有 "推出"



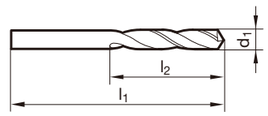
hole exit in CFRP with woven cover layer
hole d = 6.35 mm
帶有編織覆蓋層CFRP中的孔出口
孔徑＝ 6.35mm

hole exit in unidirectional CFRP
hole d = 6.35 mm
單向性的CFRP孔出口
孔徑＝ 6.35mm

Stub drills 鎢鋼短刃鑽頭

3xD | DIN 6539 | N | 118° | h7

Tool material	solid carbide
Surface finish	○
Cutting direction	R



編號： **730**

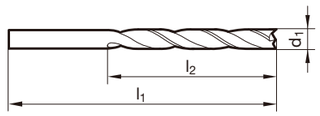
d1 mm	d1 inch	l1 mm	l2 mm	價 格
2.500		43.00	14.00	390
3.000		46.00	16.00	470
3.200		49.00	18.00	560
3.260		49.00	18.00	920
3.300		49.00	18.00	590
3.500		52.00	20.00	620
3.570	9/64	52.00	20.00	840
3.600		52.00	20.00	740
4.000		55.00	22.00	720
4.100		55.00	22.00	760
4.500		58.00	24.00	830
4.760	3/16	62.00	26.00	1,180
4.800		62.00	26.00	1,010
5.000		62.00	26.00	940
5.500		66.00	28.00	1,230
6.000		66.00	28.00	1,360
6.350	1/4	70.00	31.00	1,830
6.400		70.00	31.00	1,750
6.500		70.00	31.00	1,550
7.000		74.00	34.00	1,830
7.500		74.00	34.00	2,440
8.000		79.00	37.00	2,200
8.500		79.00	37.00	2,760
9.000		84.00	40.00	2,710
9.500		84.00	40.00	3,210
10.000		89.00	43.00	3,210
12.700	1/2	102.00	51.00	9,070

碳纖維/玻璃纖維	鑽孔	切削米數	每轉進給
CFRP GFRP aramid		40-130 m/min	0.03 - 0.15 f (mm/rev)

Kevlar drills 克維拉纖維材料用短刃鑽頭

WN | FK | h8

Tool material: **solid carbide**
Surface finish: ○
Cutting direction: R



編號： **1149**

d1 mm	d1 inch	l1 mm	l2 mm	價 格
2.500		43.00	14.00	2,500
3.200		49.00	18.00	2,900
3.570	9/64	52.00	20.00	2,600
4.000		55.00	22.00	2,800
4.760	3/16	62.00	26.00	3,200
5.000		62.00	26.00	3,200
6.000		66.00	28.00	3,100
8.000		79.00	37.00	4,600
10.000		89.00	43.00	5,900

碳纖維/玻璃纖維	鑽孔	切削米數	每轉進給
CFRP GFRP aramid		40-130 m/min	0.03 - 0.15 f (mm/rev.)

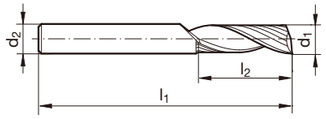
End mills Z=1 鎢鋼單刃式銑刀/鑽頭

WN | W | 1 | 30° | 25°

Tool material: **solid carbide**
Surface finish: D
Cutting direction: R

polished flutes, centre cutting
端面刃口有過中心

壓克力加工效果佳

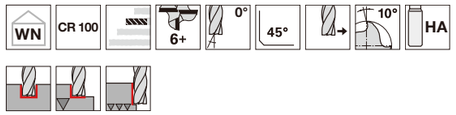


編號： **6793**

d1 h10 mm	d2 h6 mm	l1 mm	l2 mm	Z	價 格
2.000	2.00	38	10.0	1	700
3.000	3.00	39	12.0	1	800
4.000	4.00	40	15.0	1	800
5.000	5.00	50	16.0	1	1,000
6.000	6.00	57	20.0	1	1,100
8.000	8.00	63	22.0	1	1,500
10.000	10.00	73	25.0	1	2,300
12.000	12.00	83	30.0	1	3,200
16.000	16.00	92	35.0	1	5,800

碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFK GFK aramid		100-250 m/min	0,03 - 0,12 f_z (mm/z)
CFK GFK aramid		80-150 m/min	0,03 - 0,2 f (mm/rev.)

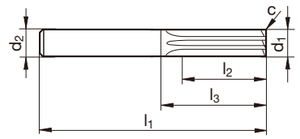
Kevlar CR 100 end mills　克維拉纖維材料用 CR100鎢鋼鑽石鍍膜銑刀



Tool material	solid carbide
Surface finish	D
Cutting direction	R

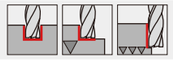
Solid carbide ultra-finest grain, diamond-coated,
without face cutting, for slotting and trimming

刀口端面無過中心，不能往下鑽銑

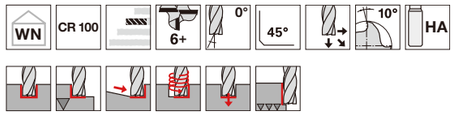


編號：**6717**

d1 e10	d2 h6	l1	l2	l3	c	Z	價 格
mm	mm	mm	mm	mm	mm x 45°		
4.000	6.00	57.00	10.00	19.40	0.10	6	3,750
6.000	6.00	65.00	15.00	29.00	0.15	8	4,110
8.000	8.00	75.00	20.00	39.00	0.15	10	5,910
10.000	10.00	80.00	25.00	40.00	0.15	12	7,450
12.000	12.00	93.00	32.00	48.00	0.15	14	9,120
16.000	16.00	108.00	34.00	60.00	0.15	14	12,720

碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFRP GFRP aramid		250-500 m/min	0.03 - 0.12 f_z (mm/z)

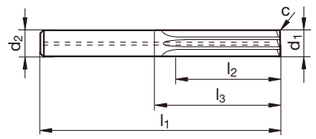
CR 100 Kevlar end mills　克維拉纖維材料用 CR100鎢鋼鑽石鍍膜銑刀



Tool material	solid carbide
Surface finish	D
Cutting direction	R

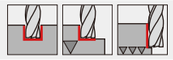
Solid carbide ultra-finest grain, diamond-coated,
with centre cutting, for slotting and trimming as well as oblique plunging

刀口端面有過中心，可以往下鑽銑

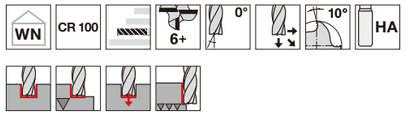


編號：**6719**

d1 e10	d2 h6	l1	l2	l3	c	Z	價 格
mm	mm	mm	mm	mm	mm x 45°		
4.000	6.00	57.00	10.00	19.40	0.32	6	3,960
6.000	6.00	65.00	15.00	29.00	0.48	8	4,410
8.000	8.00	75.00	20.00	39.00	0.64	10	6,250
10.000	10.00	80.00	25.00	40.00	0.80	12	7,970
12.000	12.00	93.00	32.00	48.00	0.96	14	9,720
16.000	16.00	108.00	34.00	60.00	1.28	14	13,450

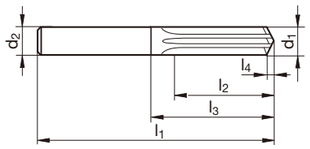
碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFRP GFRP aramid		250-500 m/min	0.03 - 0.12 f_z (mm/z)
CFRP GFRP aramid		100-250 m/min	0.05 - 0.2 f (mm/rev.)

CR 100 Kevlar end mills 克維拉纖維材料用 CR100鎢鋼鑽石鍍膜銑刀/鑽頭



Tool material	solid carbide
Surface finish	D
Cutting direction	R

Solid carbide ultra-finest grain, diamond-coated,
with drill point, especially for plunging and subsequent milling

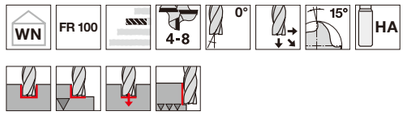


編號： **6720**

d1 (e10)	d2 (h6)	l1	l2	l3	l4	Z	價 格
mm	mm	mm	mm	mm	mm		
4.000	6.00	57.00	10.00	27.00	1.3	6	4,090
6.000	6.00	65.00	15.00	29.00	1.9	8	4,540
8.000	8.00	75.00	20.00	39.00	2.5	10	6,420
10.000	10.00	80.00	25.00	40.00	3.1	12	8,220
12.000	12.00	93.00	32.00	48.00	3.7	14	9,940
16.000	16.00	108.00	34.00	60.00	4.9	14	13,920

碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFRP GFRP aramid		250-500 m/min	0.03 - 0.12 f_z (mm/z)
CFRP GFRP aramid		100-250 m/min	0.05 - 0.20 f (mm/rev.)

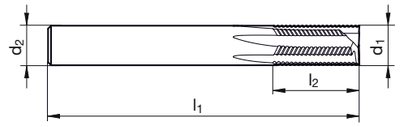
FR 100 Kevlar end mills 克維拉纖維材料用 FR100鎢鋼鑽石鍍膜銑刀



Tool material	solid carbide	
Surface finish	D	○
Cutting direction	R	R

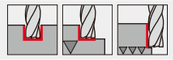
Solid carbide ultra-finest grain, diamond-coated,
with drill centre cutting, for slotting and trimming as well as oblique plunging

刀口端面有過中心，可以往下鑽銑

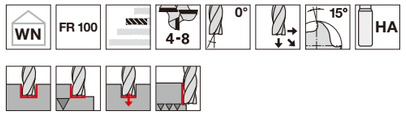


編號： **6769** **6805**

Code no.	d1 (e10)	d1 (e10)	d2 (h6)	l1	l1	l2	l2	Z	價 格	
	mm	inch	mm	mm	inch	mm	inch			
4.000	4.000		6.000	66.00		15.00		4	5,700	3,600
4.762	4.762	3/16	4.762	63.50	2.5	15.00	37/64	4	6,200	4,000
4.763	4.762	3/16	4.762	63.50	2.5	15.80	5/8	4	6,300	4,100
6.000	6.000		6.000	70.00		20.00		4	6,500	4,100
6.350	6.350	1/4	6.350	63.50	2.5	15.00	37/64	4	7,300	4,700
6.351	6.350	1/4	6.350	63.50	2.5	19.05	3/4	4	7,600	5,200
8.000	8.000		8.000	75.00		25.00		6	8,400	5,400
9.525	9.525	3/8	9.525	76.20	3.0	18.00	45/64	6	10,500	6,700
9.526	9.525	3/8	9.525	76.20	3.0	25.40	1	6	11,000	7,600
10.000	10.000		10.000	72.00		15.00		6	11,000	
12.000	12.000		12.000	83.00		20.00		6	12,400	
12.700	12.700	1/2	12.700	88.90	3.5	25.40	1	8	13,100	8,400
12.701	12.707	1/2	12.700	88.90	3.5	31.75	1.25	8	13,600	9,100

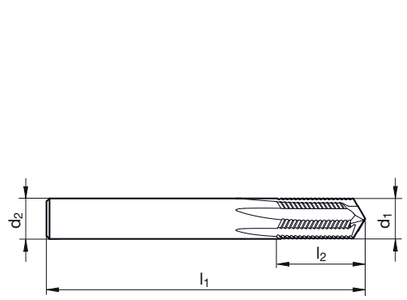
碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFRP GFRP aramid		150-450 m/min	0.03 - 0.12 f_z (mm/z)
CFRP GFRP aramid		125-150 m/min	0.05 - 0.20 f (mm/rev.)

FR 100 Kevlar end mills 克維拉纖維材料用 FR100鎢鋼鑽石鍍膜銑刀/鑽頭



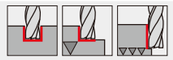
Tool material	solid carbide	
Surface finish	D	
Cutting direction	R	R

Solid carbide ultra-finest grain, diamond-coated,
with drill point, specially for plunging and subsequent milling



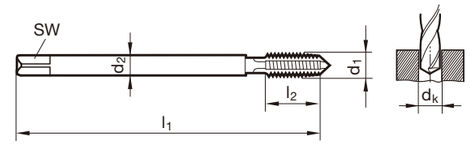
編號： **6770** **6806**

Code no.	d1 (e10)	d1 (e10)	d2 (h6)	l1	l1	l2	l2	Z	價 格	
	mm	inch	mm	mm	inch	mm	inch			
4.000	4.000		6.000	66.00		15.00		4	5,900	3,800
4.762	4.762	3/16	4.762	63.50	2.5	15.00	37/64	4	6,400	4,100
4.763	4.762	3/16	4.762	63.50	2.5	15.80	5/8	4	6,500	4,200
6.000	6.000		6.000	70.00		20.00		4	6,700	4,300
6.350	6.350	1/4	6.350	63.50	2.5	15.00	37/64	4	7,800	5,000
6.351	6.350	1/4	6.350	63.50	2.5	19.05	3/4	4	8,100	5,600
8.000	8.000		8.000	75.00		25.00		6	8,900	5,700
9.525	9.525	3/8	9.525	76.20	3.0	18.00	45/64	6	11,300	7,300
9.526	9.525	3/8	9.525	76.20	3.0	25.40	1	6	11,800	8,300
10.000	10.000		10.000	72.00		15.00		6		
12.000	12.000		12.000	83.00		20.00		6	13,200	
12.700	12.700	1/2	12.700	88.90	3.5	25.40	1	8	13,900	8,900
12.701	12.707	1/2	12.700	88.90	3.5	31.75	1.25	8	14,400	9,700

碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFRP GFRP aramid		150-450 m/min	0.03 - 0.12 f_z (mm/z)
CFRP GFRP aramid		125-150 m/min	0.05 - 0.18 f (mm/rev.)

Machine taps for ISO metric threads 鎢鋼絲攻

Tool material	solid carbide
Surface finish	C
Tolerance on Ø	ISO2/6H



編號： **2944**

d1	P	d2	SW	dk	l1	l2	價 格
	mm	mm	mm	mm	mm	mm	
M3	0.500	3.50	2.700	2.60	56.00	12.00	6,700
M4	0.700	4.50	3.400	3.40	63.00	14.00	6,400
M5	0.800	6.00	4.900	4.30	70.00	17.00	7,400
M6	1.000	6.00	4.900	5.10	80.00	20.00	8,900
M8	1.250	8.00	6.200	6.90	90.00	20.00	10,600
M10	1.500	10.00	8.000	8.60	100.00	24.00	13,000
M12	1.750	12.00	9.000	10.40	110.00	28.00	14,500
M16	2.000	16.00	12.000	14.10	110.00	40.00	17,100

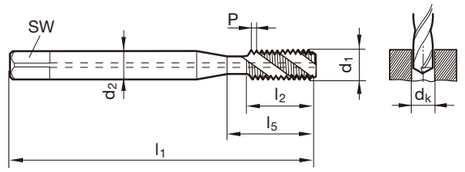
碳纖維/玻璃纖維	通 / 盲孔	切削米數
CFK GFK	blind hole through hole	10 - 20 m/min

Taps for ISO metric threads with internal cooling 中心出水 鎢鋼絲攻

DIN 371 | NR15 | C

Tool material: **solid carbide**
Surface finish: ○
Tolerance on Ø: 6HX

≥ M5 with internal cooling
≥ M5以上才有中心出水孔



編號： **971**

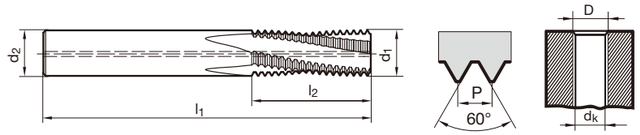
d1	P	d2	SW	dk	l1	l2	l5	價 格
	mm	mm	mm	mm	mm	mm	mm	
M3	0.500	3.500	2.700	2.50	56.000	8.000	18.000	5,100
M4	0.700	4.500	3.400	3.30	63.000	10.000	21.000	4,200
M5	0.800	6.000	4.900	4.20	70.000	10.000	25.000	6,000
M6	1.000	6.000	4.900	5.00	80.000	12.000	30.000	4,800
M8	1.250	8.000	6.200	6.80	90.000	16.000	35.000	6,800
M10	1.500	10.000	8.000	8.50	100.000	18.000	39.000	8,100

碳纖維/玻璃纖維	通 / 盲孔	切削米數
CFK GFK	blind hole through hole	10 - 20 m/min

Thread milling cutters without chamfer for ISO metric threads 中心出水 鎢鋼銑牙刀

WN | 2xD | TM SP

Tool material: **solid carbide**
Surface finish: Ⓒ
Cutting direction: HA



編號： **3737**

D	P	d1	d2	dk	l1	l2	Z	Code no.	價 格
	mm	mm	mm	mm	mm	mm			
M6	1.000	4.800	6.000	5.00	54.000	13.500	3	6.000	9,060
M8	1.250	6.400	8.000	6.80	62.000	18.100	3	8.000	10,030
M8 x 1	1.000	6.400	8.000	7.00	62.000	17.500	3	8.005	10,240
M10	1.500	7.950	10.000	8.50	74.000	21.800	3	10.000	11,080
M10 x 1	1.000	7.950	10.000	9.00	74.000	21.500	3	10.005	11,770
M10 x 1.25	1.250	7.950	10.000	8.80	74.000	21.900	3	10.006	11,980
M12	1.750	9.950	10.000	10.20	74.000	25.400	4	12.000	13,580
M12 x 1.5	1.500	9.950	10.000	10.50	74.000	26.300	4	12.007	14,280
M14	2.000	11.200	12.000	12.00	90.000	31.000	4	14.000	15,390
M14 x 1.5	1.500	11.200	12.000	12.50	90.000	30.800	4	14.007	15,050
M16	2.000	12.800	14.000	14.00	90.000	35.000	4	16.000	17,340
M16 x 1.5	1.500	12.800	14.000	14.50	90.000	33.800	4	16.007	18,110
M20	2.500	14.950	16.000	17.50	102.000	41.300	4	20.000	19,850
M20 x 1.5	1.500	14.950	16.000	18.50	102.000	42.800	4	20.007	20,200

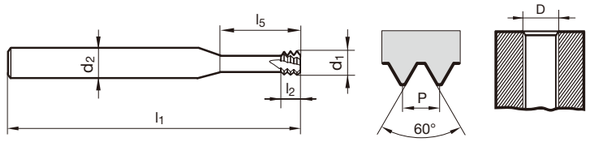
碳纖維/玻璃纖維	通 / 盲孔	切削米數	每轉進給
CFK GFK	blind hole through hole	50-80 m/min	0.01 - 0.10 f_z (mm/z)

The appropriate CNC programme with code and data sheet for the tool you can get for free with the free programming software CNC Gühro Thread Mill.
可以從德國鈷領網站下載銑牙刀CNC程式碼

Micro thread milling cutters 小尺寸鎢鋼銑牙刀

WN | R | 3xD | MTM3 SP

Tool material: **solid carbide**
Surface finish: C
Cutting direction: HA



編號： **4226**

D	P	d1	d2	l1	l2	l5	Z	Code no.	價 格
	mm	mm	mm	mm	mm	mm			
M1.6	0.350	1.200	3.000	39.000	1.100	4.800	3	1.600	4,460
M1.8	0.350	1.400	3.000	39.000	1.100	5.400	3	1.800	4,460
M2	0.400	1.550	3.000	39.000	1.200	6.000	4	2.000	4,460
M2.5	0.450	1.950	3.000	39.000	1.400	7.500	4	2.500	4,460
M3	0.500	2.400	6.000	58.000	1.500	9.500	4	3.000	4,630
M3.5	0.600	2.800	6.000	58.000	1.800	11.000	4	3.500	4,630
M4	0.700	3.200	6.000	58.000	2.100	12.500	4	4.000	4,630
M5	0.800	4.000	6.000	58.000	2.400	16.000	4	5.000	4,630
M6	1.000	4.800	6.000	58.000	3.000	20.000	4	6.000	4,630
M8	1.250	5.950	6.000	58.000	3.800	24.000	4	8.000	4,630
M10	1.500	7.800	8.000	73.000	4.500	33.000	4	10.000	5,470
M12	1.750	9.000	10.000	84.000	5.300	38.000	4	12.000	7,240
M16	2.000	11.800	12.000	84.000	6.000	35.000	5	16.000	8,430

碳纖維/玻璃纖維	通 / 盲孔	切削米數	每轉進給
CFK GFK	blind hole through hole	50-80 m/min	0.01 - 0.10 f_z (mm/z)

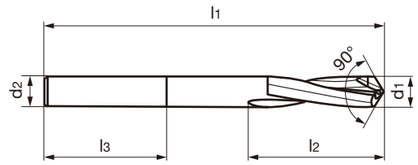
The appropriate CNC programme with code and data sheet for the tool you can get for free with the free programming software CNC Gühro Thread Mill.
可以從德國鈷領網站下載銑牙刀CNC程式碼

90° PCD drills 90° PCD焊刃式鑽頭

N | 3xD | m7 | 90°

Tool material: **PCD**
Cutting direction: R

羽球 / 網球拍 鑽孔有高壽命表現



d1	d1	d2 h6	l1	l2	l3	編號：
mm	inch	mm	mm	mm	mm	
2.700		4.00	60.00	18.00	28.00	303 209 684
3.000		4.00	60.00	18.00	28.00	303 209 685
3.250		4.00	60.00	18.00	28.00	303 420 038
3.572	9/64	4.00	60.00	18.00	28.00	303 209 686
4.000		5.00	60.00	20.00	28.00	303 209 802
4.170		5.00	75.00	25.00	28.00	303 420 039
4.762	3/16	5.00	75.00	25.00	28.00	303 209 803
4.830		5.00	75.00	25.00	28.00	303 420 040
5.000		6.00	75.00	25.00	36.00	303 209 804
6.000		8.00	75.00	30.00	36.00	303 209 805
6.350	1/4	8.00	75.00	35.00	36.00	303 209 806
7.937	5/16	10.00	75.00	30.00	40.00	303 209 807
8.000		10.00	75.00	30.00	40.00	303 209 808
9.525	3/8	10.00	100.00	50.00	40.00	303 209 809
10.000		12.00	125.00	50.00	45.00	303 209 810
12.000		14.00	125.00	60.00	45.00	303 209 811
12.700	1/2	14.00	150.00	65.00	45.00	303 209 812

依客戶需求報價
Price on request

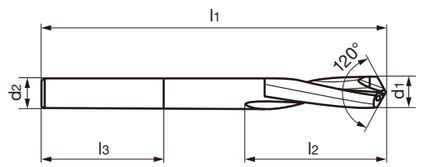
碳纖維/玻璃纖維	鑽孔	切削米數	每轉進給
CFRP GFRP aramid		75-200 m/min	0.05 - 0.2 f (mm/rev.)

120° PCD drills 120° PCD焊刃式鑽頭

N | 3xD | m7 | 120°

Tool material: PCD
Cutting direction: R

羽球 / 網球拍 鑽孔有高壽命表現



d1	d1	d2 h6	l1	l2	l3	編號：
mm	inch	mm	mm	mm	mm	
2.700		4.00	60.00	18.00	28.00	303 209 813
3.000		4.00	60.00	18.00	28.00	303 209 814
3.250		4.00	60.00	18.00	28.00	303 420 041
3.572	9/64	4.00	60.00	18.00	28.00	303 209 815
4.000		5.00	60.00	20.00	28.00	303 209 816
4.170		5.00	75.00	25.00	28.00	303 420 047
4.762	3/16	5.00	75.00	25.00	28.00	303 209 817
4.830		5.00	75.00	25.00	28.00	303 420 048
5.000		6.00	75.00	25.00	36.00	303 209 818
6.000		8.00	75.00	30.00	36.00	303 209 819
6.350	1/4	8.00	75.00	35.00	36.00	303 209 820
7.937	5/16	10.00	75.00	30.00	40.00	303 209 821
8.000		10.00	75.00	30.00	40.00	303 209 822
9.525	3/8	10.00	100.00	50.00	40.00	303 209 823
10.000		12.00	125.00	50.00	45.00	303 209 824
12.000		14.00	125.00	60.00	45.00	303 209 825
12.700	1/2	14.00	150.00	65.00	45.00	303 209 826

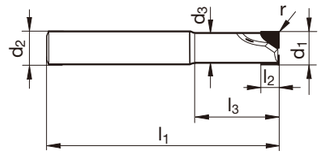
依客戶需求報價
Price on request

碳纖維/玻璃纖維	鑽孔	切削米數	每轉進給
CFRP GFRP aramid		100-250 m/min	0.05 - 0.20 f (mm/rev.)

PCD slot drills Z=2 兩刃式PCD鑽石焊刃式銑刀 中心出水

WN | H | 2 | 2-4° | R±0,05 | 0° | HA

Tool material: PCD
Surface finish: ○
Cutting direction: R

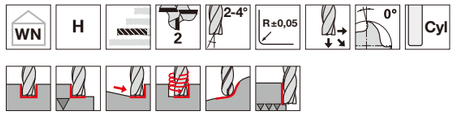


編號： 5492

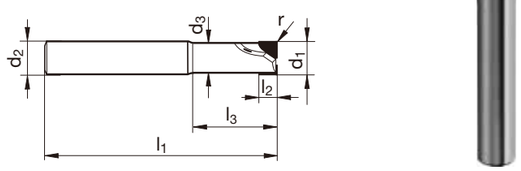
Code no.	d1	d1	d2 h6	d3	l1	l2	l3	r	Z	價 格
	mm		mm	mm	mm	mm	mm	mm		
4.000	4.000	± 0.02	6.00	3.70	51	6.0	14.0	0.1	2	9,750
5.000	5.000	± 0.02	6.00	4.70	51	8.0	14.5	0.1	2	9,750
6.000	6.000	± 0.02	6.00	5.70	57	8.0	20.0	0.1	2	9,750
8.000	8.000	± 0.02	8.00	7.40	63	8.0	26.0	0.1	2	10,300
8.001	8.000	± 0.02	8.00	7.40	63	12.0	26.0	0.1	2	12,220
10.000	10.000	± 0.02	10.00	9.40	72	8.0	30.0	0.1	2	13,530
10.001	10.000	± 0.02	10.00	9.40	72	16.0	30.0	0.1	2	15,860
12.000	12.000	± 0.02	12.00	11.20	83	8.0	36.0	0.1	2	15,150
12.001	12.000	± 0.02	12.00	11.20	83	16.0	36.0	0.1	2	17,270
14.000	14.000	± 0.02	14.00	13.00	83	8.0	36.0	0.1	2	15,660
14.001	14.000	± 0.02	14.00	13.00	83	16.0	36.0	0.1	2	17,780
16.000	16.000	± 0.02	16.00	15.00	100	12.0	50.0	0.1	2	19,800
16.001	16.000	± 0.02	16.00	15.00	100	20.0	50.0	0.1	2	23,940
18.000	18.000	± 0.02	18.00	17.00	100	12.0	50.0	0.1	2	22,320
18.001	18.000	± 0.02	18.00	17.00	100	20.0	50.0	0.1	2	29,290
20.000	20.000	± 0.02	20.00	19.00	100	12.0	48.0	0.1	2	23,530
20.001	20.000	± 0.02	20.00	19.00	100	20.0	48.0	0.1	2	29,800

碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFRP GFRP aramid		150-450 m/min	0.03 - 0.12 f_z (mm/z)
CFRP GFRP aramid		125-150 m/min	0.05 - 0.18 f (mm/rev.)

PCD slot drills Z=2 兩刃式PCD鑽石焊刃式銑刀 中心出水



Tool material	PCD
Surface finish	○
Cutting direction	R



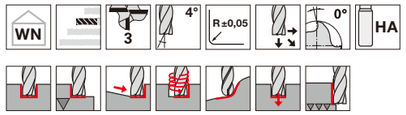
編號： **5493**

Code no.	d1	d1	d2 h6	d3	l1	l2	l3	r	Z	價 格
	mm		mm	mm	mm	mm	mm	mm		
4.000	4.000	± 0.02	6.00	3.70	70	6.0	14.0	0.1	2	9,800
5.000	5.000	± 0.02	6.00	4.70	70	8.0	14.5	0.1	2	9,800
6.000	6.000	± 0.02	6.00	5.70	75	8.0	20.0	0.1	2	9,850
8.000	8.000	± 0.02	8.00	7.40	100	8.0	26.0	0.1	2	10,400
8.001	8.000	± 0.02	8.00	7.40	100	12.0	26.0	0.1	2	12,320
10.000	10.000	± 0.02	10.00	9.40	100	8.0	30.0	0.1	2	13,740
10.001	10.000	± 0.02	10.00	9.40	100	16.0	30.0	0.1	2	15,960
12.000	12.000	± 0.02	12.00	11.20	100	8.0	36.0	0.1	2	15,350
12.001	12.000	± 0.02	12.00	11.20	100	16.0	36.0	0.1	2	17,370
14.000	14.000	± 0.02	14.00	13.00	100	8.0	36.0	0.1	2	15,860
14.001	14.000	± 0.02	14.00	13.00	100	16.0	36.0	0.1	2	17,980
16.000	16.000	± 0.02	16.00	15.00	150	12.0	50.0	0.1	2	20,000
16.001	16.000	± 0.02	16.00	15.00	150	20.0	50.0	0.1	2	24,140
18.000	18.000	± 0.02	18.00	17.00	125	12.0	50.0	0.1	2	22,520
18.001	18.000	± 0.02	18.00	17.00	125	20.0	50.0	0.1	2	29,590
18.002	18.000	± 0.02	18.00	17.00	150	12.0	50.0	0.1	2	22,320
18.003	18.000	± 0.02	18.00	17.00	150	20.0	50.0	0.1	2	29,800
20.000	20.000	± 0.02	20.00	19.00	150	12.0	48.0	0.1	2	23,740
20.001	20.000	± 0.02	20.00	19.00	150	20.0	48.0	0.1	2	30,300

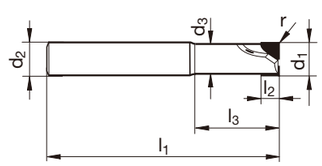
碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFK GFK aramid		150-450 m/min	0.03 - 0.12 f_z (mm/z)
CFK GFK aramid		125-150 m/min	0.05 - 0.18 f (mm/rev.)

PCD Slot drills

PCD slot drills Z=3 三刃式PCD鑽石焊刃式銑刀 中心出水



Tool material	PCD
Surface finish	○
Cutting direction	R

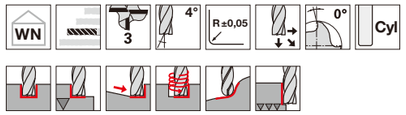


編號： **5495**

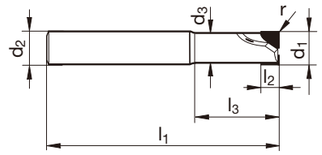
Code no.	d1	d1	d2 h6	d3	l1	l2	l3	r	Z	價 格
	mm		mm	mm	mm	mm	mm	mm		
14.000	14.000	± 0.02	14.00	13.00	83	8.0	38.0	0.1	3	21,210
14.001	14.000	± 0.02	14.00	13.00	83	16.0	38.0	0.1	3	24,040
16.000	16.000	± 0.02	16.00	15.00	100	12.0	52.0	0.1	3	25,760
16.001	16.000	± 0.02	16.00	15.00	100	20.0	52.0	0.1	3	31,110
18.000	18.000	± 0.02	18.00	17.00	100	12.0	52.0	0.1	3	30,300
18.001	18.000	± 0.02	18.00	17.00	100	20.0	52.0	0.1	3	39,390
20.000	20.000	± 0.02	20.00	19.00	100	12.0	50.0	0.1	3	30,600
20.001	20.000	± 0.02	20.00	19.00	100	20.0	50.0	0.1	3	38,680

碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFK GFK aramid		150-450 m/min	0.03 - 0.12 f_z (mm/z)
CFK GFK aramid		125-150 m/min	0.05 - 0.18 f (mm/rev.)

PCD Slot drills Z=3 三刃式PCD鑽石焊刃式銑刀 中心出水



Tool material	PCD
Surface finish	○
Cutting direction	R

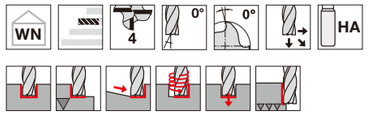


編號： **5496**

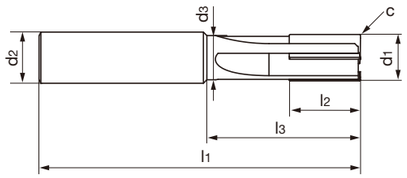
Code no.	d1	d1	d2 h6	d3	l1	l2	l3	r	Z	價 格
	mm		mm	mm	mm	mm	mm	mm		
14.000	14.000	± 0.02	14.00	13.00	100	8.0	38.0	0.1	3	21,410
14.001	14.000	± 0.02	14.00	13.00	100	16.0	38.0	0.1	3	24,240
16.000	16.000	± 0.02	16.00	15.00	150	12.0	52.0	0.1	3	26,260
16.001	16.000	± 0.02	16.00	15.00	150	20.0	52.0	0.1	3	31,310
18.000	18.000	± 0.02	18.00	17.00	150	12.0	52.0	0.1	3	30,810
18.001	18.000	± 0.02	18.00	17.00	150	20.0	52.0	0.1	3	39,900
20.000	20.000	± 0.02	20.00	19.00	150	12.0	50.0	0.1	3	30,810
20.001	20.000	± 0.02	20.00	19.00	150	20.0	50.0	0.1	3	38,890

碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFK GFK aramid		150-450 m/min	0.03 - 0.12 f_z (mm/z)
CFK GFK aramid		125-150 m/min	0.05 - 0.18 f (mm/rev.)

PCD End mills Z=4 四刃式PCD鑽石焊刃式銑刀



Tool material	PCD
Surface finish	○
Cutting direction	R

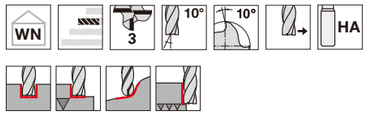


d1	d1	d2 h6	d3	l1	l2	l3	c	Z	編號：
mm	inch	mm	mm	mm	mm	mm	mm x 45°		
8.000		8.00	7.40	75.00	19.50	38.50	0.20	4	303 206 512
9.525	3/8	10.00	8.92	80.00	19.50	39.26	0.20	4	303 206 513
10.000		10.00	9.40	80.00	19.50	39.50	0.20	4	303 206 514
12.000		12.00	11.40	88.00	19.50	42.50	0.20	4	303 206 515
12.700	1/2	14.00	12.10	88.00	19.50	41.85	0.20	4	303 211 229
12.700	1/2	14.00	11.10	88.00	19.50	41.35	0.20	2+1	303 211 230

依客戶需求報價
Price on request

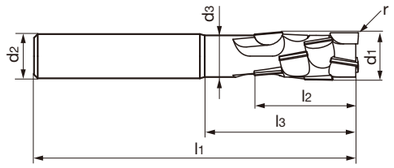
碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFK GFK aramid		150-500 m/min	0.03 - 0.12 f_z (mm/z)
CFK GFK aramid		125-200 m/min	0.05 - 0.20 f (mm/rev.)

PCD Compression milling cutters Z=3 三刃交錯齒型PCD鑽石焊刃式銑刀



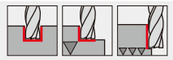
Tool material **PCD**

Cutting direction R

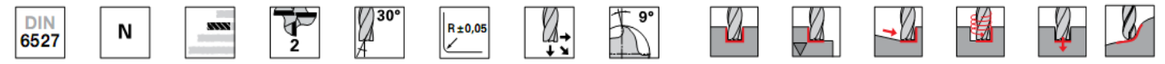


d1	d1	d2 h6	d3	l1	l2	l3	r	編號：
mm	inch	mm	mm	mm	mm	mm	mm	
12.700	1/2	12.00	11.30	88.00	28.00	41.49	0.10	303 211 231
14.000		14.00	12.60	88.00	28.00	40.19	0.10	
16.000		16.00	14.60	91.00	28.00	40.19	0.10	303 211 258

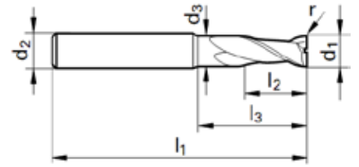
依客戶需求報價
Price on request

碳纖維/玻璃纖維	加工應用	切削米數	每轉進給
CFRP GFRP aramid		150-500 m/min	0.03 - 0.12 f_z (mm/z)

6722 鎢鋼圓鼻銑刀 石墨 / 碳纖維 / 鋁合金用

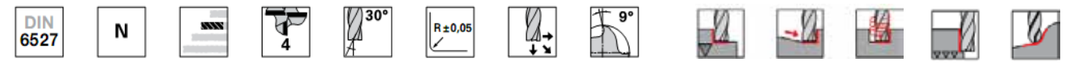


塗層:Cristall Coating



規格編號	d1(h10) 刃徑	d2(h6) 柄徑	d3 頸部	全長 l_1	刃長 l_2	可切削長 l_3	r	刃數	價格
Code no.	mm	mm	mm	mm	mm	mm	mm	Z	
6.005	6.00	6.00	5.70	57.00	10.00	20.00	0.50	2	1,910
6.010	6.00	6.00	5.70	57.00	10.00	20.00	1.00	2	1,930
8.005	8.00	8.00	7.70	63.00	16.00	26.00	0.50	2	2,850
8.010	8.00	8.00	7.70	63.00	16.00	26.00	1.00	2	2,910
10.005	10.00	10.00	9.50	72.00	19.00	30.00	0.50	2	5,830
10.010	10.00	10.00	9.50	72.00	19.00	30.00	1.00	2	5,830
12.005	12.00	12.00	11.50	83.00	22.00	36.00	0.50	2	6,850
12.010	12.00	12.00	11.50	83.00	22.00	36.00	1.00	2	6,940

6723 鎢鋼圓鼻銑刀 石墨 / 碳纖維 / 鋁合金用



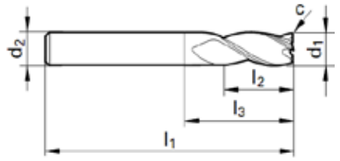
塗層:Cristall Coating

規格編號	d1(h10) 刃徑	d2(h6) 柄徑	d3 頸部	全長 l_1	刃長 l_2	可切削長 l_3	r	刃數	價格
Code no.	mm	mm	mm	mm	mm	mm	mm	Z	
6.005	6.00	6.00	5.70	57.00	13.00	20.00	0.50	4	1,990
6.010	6.00	6.00	5.70	57.00	13.00	20.00	1.00	4	2,010
8.005	8.00	8.00	7.70	63.00	19.00	26.00	0.50	4	3,020
8.010	8.00	8.00	7.70	63.00	19.00	26.00	1.00	4	3,040
10.005	10.00	10.00	9.50	72.00	22.00	30.00	0.50	4	5,950
10.010	10.00	10.00	9.50	72.00	22.00	30.00	1.00	4	6,000
12.005	12.00	12.00	11.50	83.00	26.00	36.00	0.50	4	6,980
12.010	12.00	12.00	11.50	83.00	26.00	36.00	1.00	4	7,110

6721 鎢鋼銑刀 石墨 / 碳纖維 / 鋁合金

塗層:Cristall Coating

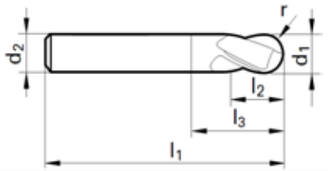
加長型



d1(h10) 刃徑	d2(h6) 柄徑	全長 l_1	刃長 l_2	可切削長 l_3	端刃倒角	刃數	價格
mm	mm	mm	mm	mm	mm x 45°	Z	
3.00	3.00	75.00	20.00	47.00	0.05	3	1,520
4.00	4.00	75.00	25.00	47.00	0.05	3	2,400
5.00	5.00	75.00	30.00	47.00	0.05	3	2,980
6.00	6.00	75.00	30.00	39.00	0.05	3	3,280
8.00	8.00	100.00	40.00	64.00	0.10	3	5,050
10.00	10.00	100.00	40.00	60.00	0.10	3	5,950
12.00	12.00	150.00	45.00	105.00	0.10	3	7,880
16.00	16.00	150.00	65.00	102.00	0.15	3	10,790

6724 鎢鋼球形銑刀 石墨 / 碳纖維 / 鋁合金

塗層:Cristall Coating

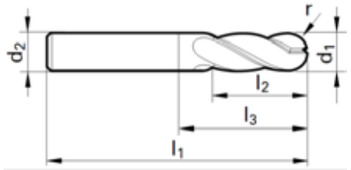


d1(h10) 刃徑	d2(h6) 柄徑	全長 l_1	刃長 l_2	可切削長 l_3	r	刃數	價格
mm	mm	mm	mm	mm	mm	Z	
3.00	6.00	57.00	7.00	11.90	1.50	2	1,860
4.00	6.00	57.00	8.00	13.40	2.00	2	2,610
5.00	6.00	57.00	10.00	16.90	2.50	2	3,080
6.00	6.00	57.00	10.00	21.00	3.00	2	3,320
8.00	8.00	63.00	16.00	27.00	4.00	2	4,800
10.00	10.00	72.00	19.00	32.00	5.00	2	5,780
12.00	12.00	83.00	22.00	38.00	6.00	2	6,940

6725 鎢鋼球形銑刀 石墨 / 碳纖維 / 鋁合金

塗層:Cristall Coating

加長型



d1(h10) 刃徑	d2(h6) 柄徑	全長 l_1	刃長 l_2	可切削長 l_3	r	刃數	價格
mm	mm	mm	mm	mm	mm	Z	
3.00	3.00	75.00	20.00	47.00	1.50	4	1,820
4.00	4.00	75.00	25.00	47.00	2.00	4	2,780
5.00	5.00	75.00	30.00	47.00	2.50	4	3,400
6.00	6.00	75.00	30.00	39.00	3.00	4	3,750
8.00	8.00	100.00	40.00	64.00	4.00	4	5,570
10.00	10.00	100.00	40.00	60.00	5.00	4	6,600
12.00	12.00	150.00	45.00	105.00	6.00	4	8,610

GÜHRING

GROOVINGSYSTEMS

切槽 切斷刀

INNOVATION

SYSTEM 222

NEW SYSTEM

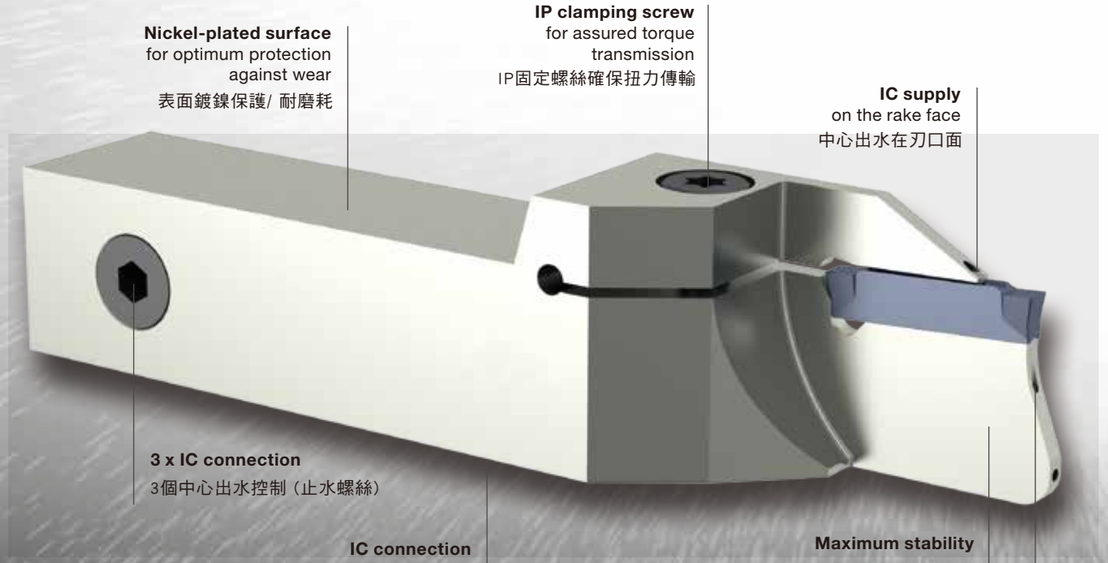
2 CUTTING EDGES | 22 MM LENGTH | FOR GROOVING AND PARTING OFF
雙頭刃口可使用 I 長度22mm I 可以切槽及切斷

With System 222, Gühring continues in the pursuit of completing its range of turning and grooving tools. With the so-called pressed-to-size inserts, the chip former and cutting geometry are pressed in directly - for particu larly high process reliability. The first step is the groove width of 3 mm. - Chip formers and geometry are suitable for general applications in steel materials. We also offer an extensive range of tool holders with and without internal cooling.

鈷領222系統，持續致力於追求完善車削和切槽刀具的範圍。
按尺寸製造的刀片，刃口凹槽的切屑成形設計和幾何形狀具有很高的加工可靠性，
首先是3 mm的凹槽寬度，切屑成形凹槽和幾何形狀適用於鋼材的加工，
我們還提供各種帶有內部冷卻和外部冷卻的刀架。

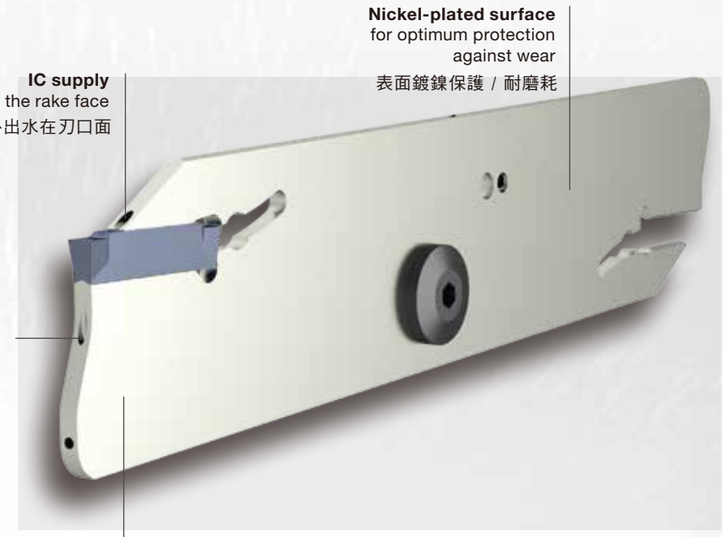
TOOL HOLDER, 刀把

WITH AND WITHOUT INTERNAL COOLANT SUPPLY 帶有內部冷卻和外部冷卻的刀架



PARTING OFF BLADE, 切斷刀

WITH AND WITHOUT INTERNAL COOLANT SUPPLY 帶有內部冷卻和外部冷卻的刀架

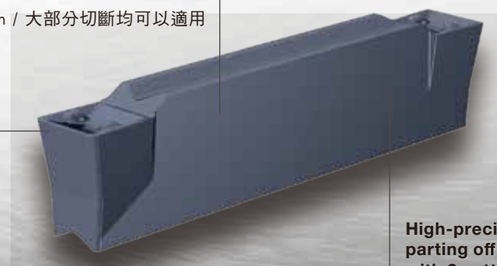


INDEXABLE INSERT,

VERSION NEUTRAL, RIGHT, LEFT

Length 22 mm
for parting off
the most common rod
diameter
長度22mm / 大部分切斷均可以適用

Chip former
for optimum chip breaking
and assured chip control
切屑成形特殊凹槽設計
最佳的斷屑效果與切屑控制



High-precision
parting off insert
with 2 cutting edges
高精密的切斷刀片/ 雙頭式

中性
左右切削使用

右手切削使用
（由右向左車削）

左手切削使用
（由左向右車削）

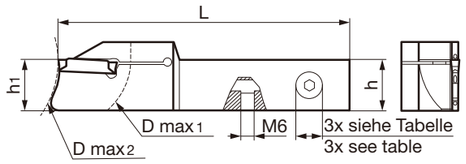
NEW SYSTEM

2 cutting edges | 22 mm length | for grooving and parting off
雙頭刃口可使用 I 長度22mm I 可以切槽及切斷

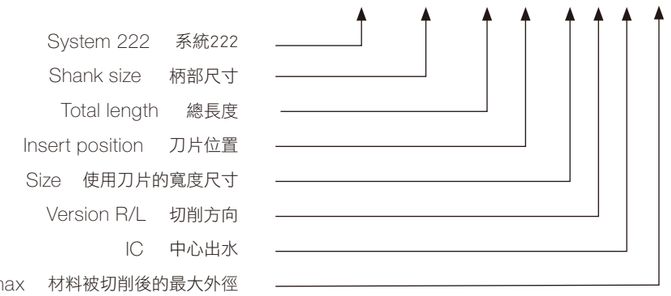
Explanation of the article description

System description 系統說明

Article description Tool holder 切槽刀刀把說明

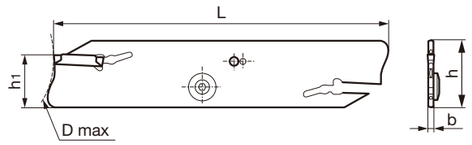


Tool description: Example: GH222.2020.109.00.03.R.IK.52

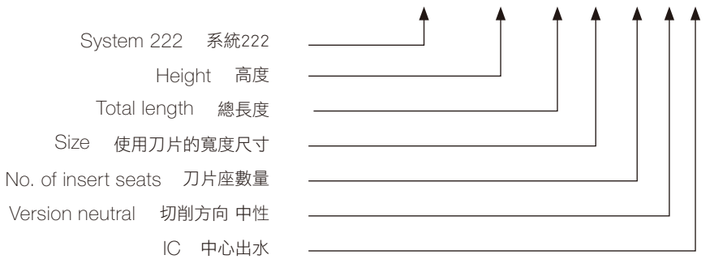


D max 2 ~ D max 1 為此刀把的工作範圍 D max 1 : 為切削後材料外徑 D max 2 : 材料切削前最大外徑

Article description Parting off blade 切斷刀刀把說明



Tool description: Example: GS222.0032.147.03.02.N.IK



D max : 材料切削前最大外徑

When ordering please always state the **Article No. and the Code No.** i.e.:
Article GZ222.0300.020.PM.01.R.08,
FIRE-coated = **26602 22.030**

訂購時請說明主要編號與編碼
例如：26602 22.030

Ordering example

Indexable inserts for parting off

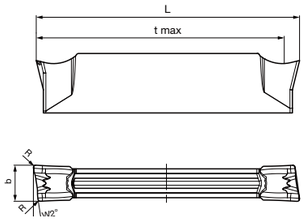
Indexable inserts for parting off

• with chip-former

for tool holders type GH222/GS222 see from page 6

Tool material	Solid carbide
Type	GZ222
Surface	FIRE

GÜHRING NAVIGATOR
Cutting data page 14



Right hand version shown
Left hand version mirror image

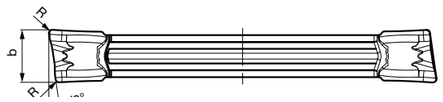
Article no.	26602
Version	right

Article no.
主要編號

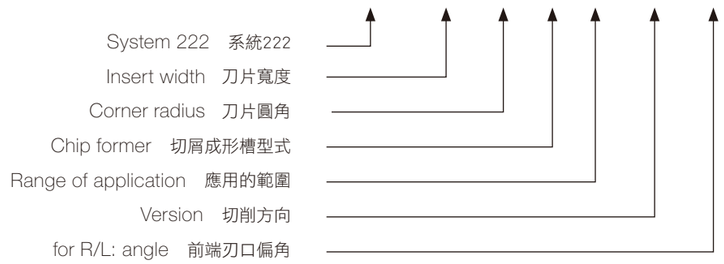
Code no.	Description	t max	b ±0.025	L ±0.1	R	W2
		mm	mm	mm	mm	°
22,030	GZ222.0300.020.PM.01.R.08	21.00	3.00	22.00	0.20	8

Code no.
編碼

Article description Indexable insert 刀片說明



Tool description: Example: GZ222.0300.020.PM.01.N/R/L.08

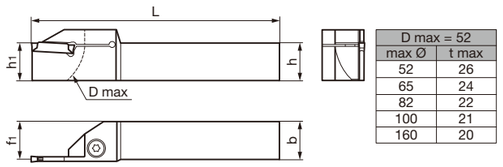


Square shank holders straight, external machining, without IC　方形直柄刀把 / 無中心出水

- **tmax: maximum grooving depth before 2nd cutting edge engages**
  tmax: 最大切槽深度為接近另一端刃口前之距離
- without internal coolant supply　無中心出水

Type　GH222

for indexable inserts type 222 see from page 10
使用刀片規格請參閱第10頁



D max = 52	
max Ø	t max
52	26
65	24
82	22
100	21
160	20

Right hand version shown　上面圖示為右手切削刀把
Left hand version mirror image　左手切削刀把則為鏡射相反方向

編號 Article no. **26100**

切削方向 Version　right 右手切削

			可切削深度	刀把高度	刀把寬度	總長	刃口高度	刀片/刀把寬度		使用刀片寬度
價格	Code no.	Description	t max	h	b	L	h1	f1	D max	Size
	編碼		mm	mm	mm	mm	mm	mm	mm	
6,500	22.020	GH222.1212.125.00.03.R.00.34	21.00	12.00	12.00	125.00	12.00	10.50	34.00	03
6,500	22.030	GH222.0500.500.00.03.R.00.34	21.00	12.70	12.70	127.00	12.70	11.20	34.00	03
7,000	22.040	GH222.0625.500.00.03.R.00.45	21.00	15.87	15.87	127.00	15.87	14.37	45.00	03
7,000	22.050	GH222.1616.125.00.03.R.00.45	21.00	16.00	16.00	125.00	16.00	14.50	45.00	03
7,500	22.060	GH222.0750.500.00.03.R.00.52	21.00	19.05	19.05	127.00	19.05	19.05	52.00	03
7,500	22.070	GH222.2020.125.00.03.R.00.52	21.00	20.00	20.00	125.00	20.00	20.00	52.00	03
7,800	22.080	GH222.2525.150.00.03.R.00.52	21.00	25.00	25.00	150.00	25.00	25.00	52.00	03
7,800	22.090	GH222.1000.600.00.03.R.00.52	21.00	25.40	25.40	152.40	25.40	25.40	52.00	03

D max 為材料被切削後的最大外徑

編號 Article no. **26101**

切削方向 Version　left 左手切削

			可切削深度	刀把高度	刀把寬度	總長	刃口高度	刀片/刀把寬度		使用刀片寬度
價格	Code no.	Description	t max	h	b	L	h1	f1	D max	Size
	編碼		mm	mm	mm	mm	mm	mm	mm	
6,500	22.020	GH222.1212.125.00.03.L.00.34	21.00	12.00	12.00	125.00	12.00	10.50	34.00	03
6,500	22.030	GH222.0500.500.00.03.L.00.34	21.00	12.70	12.70	127.00	12.70	11.20	34.00	03
7,000	22.040	GH222.0625.500.00.03.L.00.45	21.00	15.87	15.87	127.00	15.87	14.37	45.00	03
7,000	22.050	GH222.1616.125.00.03.L.00.45	21.00	16.00	16.00	125.00	16.00	14.50	45.00	03
7,500	22.060	GH222.0750.500.00.03.L.00.52	21.00	19.05	19.05	127.00	19.05	19.05	52.00	03
7,500	22.070	GH222.2020.125.00.03.L.00.52	21.00	20.00	20.00	125.00	20.00	20.00	52.00	03
7,800	22.080	GH222.2525.150.00.03.L.00.52	21.00	25.00	25.00	150.00	25.00	25.00	52.00	03
7,800	22.090	GH222.1000.600.00.03.L.00.52	21.00	25.40	25.40	152.40	25.40	25.40	52.00	03

D max 為材料被切削後的最大外徑

Spare parts 備品

價格	Article no.	Clamping screw	Tightening torque	Description
200	25906	固定螺絲	Nm 扭力	
	4.000	M4x15.5x15IP	3.5	GH222.1212.…; GH222.0500.…; GH222.0625.…; GH222.1616.…

價格	Article no.	Clamping screw	Tightening torque	Description
300	25907	固定螺絲	Nm 扭力	
	5.000	M5x18x25IP	6	GH222.0750.…; GH222.2020.…; GH222.2525.…; GH222.1000.…

價格	Article no.	Torx-Plus wrench
350	25904	T型扳手
	Code 15.001	T15IP

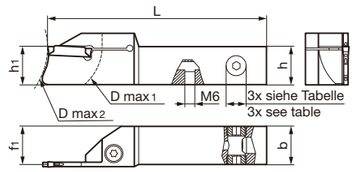
價格	Article no.	Torx-Plus wrench
350	25922	T型扳手
	Code 15.000	T25IP

Square shank holders straight, external machining, with IC　方形直柄刀把 / 中心出水

- **tmax: maximum grooving depth before 2nd cutting edge engages**
- with internal coolant supply from above and below
- TL (tubeless): tubeless coolant supply from location face from shank size 19.05x19.05
- **tmax:** 最大切槽深度為接近另一端刃口前之距離
- 刃口上下兩端有中心出水
- 無管式中心出水設計從尺寸19.05 x 19.05刀把開始

Type　GH222

for indexable inserts type 222 see from page 10
使用刀片規格請參閱第10頁



□	⌀
12/12	M8x1
12,7/12,7	M8x1
15,87/15,87	G1/8
16/16	G1/8
19,05/19,05	G1/8
20/20	G1/8
25/25	G1/8
25,4/25,4	G1/8

D max 1 = 52	
max Ø	t max
52	26
65	24
82	22
100	21
120	20

Right hand version shown　上面圖示為右手切削刀把
Left hand version mirror image　左手切削刀把則為鏡射相反方向

編號 Article no. **26102**

切削方向 Version　right 右手切削

			最大可切削深度	刀把高度	刀把寬度	總長	刃口高度	刀片/刀把寬度			使用刀片寬度	
價格	Code no.	Description	t max	h	b	L	h1	f1	TL	D max1	D max2	Size
	編碼		mm	mm	mm	mm	mm	mm		mm	mm	
11,000	22.020	GH222.1212.125.00.03.R.IK.34	21.00	12.00	12.00	125.00	12.00	10.50	-	34.00	65.00	03
11,000	22.030	GH222.0500.500.00.03.R.IK.34	21.00	12.70	12.70	127.00	12.70	11.20	-	34.00	65.00	03
11,000	22.040	GH222.0625.500.00.03.R.IK.45	21.00	15.87	15.87	127.00	15.87	14.37	-	45.00	82.00	03
11,000	22.050	GH222.1616.125.00.03.R.IK.45	21.00	16.00	16.00	125.00	16.00	14.50	-	45.00	82.00	03
10,000	22.060	GH222.0750.427.00.03.R.IK.52	21.00	19.05	19.05	108.50	19.05	19.05	M6	52.00	82.00	03
10,000	22.070	GH222.2020.109.00.03.R.IK.52	21.00	20.00	20.00	109.00	20.00	20.00	M6	52.00	82.00	03
11,000	22.080	GH222.2525.120.00.03.R.IK.52	21.00	25.00	25.00	120.50	25.00	25.00	M6	52.00	120.00	03
11,000	22.090	GH222.1000.474.00.03.R.IK.52	21.00	25.40	25.40	120.50	25.40	25.40	M6	52.00	120.00	03

D max1 為切削後的材料外徑　　D max2 材料切削前最大外徑

編號 Article no. **26103**

切削方向 Version　left 左手切削

			最大可切削深度	刀把高度	刀把寬度	總長	刃口高度	刀片/刀把寬度			使用刀片寬度	
價格	Code no.	Description	t max	h	b	L	h1	f1	TL	D max1	D max2	Size
	編碼		mm	mm	mm	mm	mm	mm		mm	mm	
11,000	22.020	GH222.1212.125.00.03.L.IK.34	21.00	12.00	12.00	125.00	12.00	10.50	-	34.00	65.00	03
11,000	22.030	GH222.0500.500.00.03.L.IK.34	21.00	12.70	12.70	127.00	12.70	11.20	-	34.00	65.00	03
11,000	22.040	GH222.0625.500.00.03.L.IK.45	21.00	15.87	15.87	127.00	15.87	14.37	-	45.00	82.00	03
11,000	22.050	GH222.1616.125.00.03.L.IK.45	21.00	16.00	16.00	125.00	16.00	14.50	-	45.00	82.00	03
10,000	22.060	GH222.0750.427.00.03.L.IK.52	21.00	19.05	19.05	108.50	19.05	19.05	M6	52.00	82.00	03
10,000	22.070	GH222.2020.109.00.03.L.IK.52	21.00	20.00	20.00	109.00	20.00	20.00	M6	52.00	82.00	03
11,000	22.080	GH222.2525.120.00.03.L.IK.52	21.00	25.00	25.00	120.50	25.00	25.00	M6	52.00	120.00	03
11,000	22.090	GH222.1000.474.00.03.L.IK.52	21.00	25.40	25.40	120.50	25.40	25.40	M6	52.00	120.00	03

D max 2 ~ D max 1 為此刀具的工作範圍　　D max1 為切削後的材料外徑　　D max2 材料切削前最大外徑

Spare parts 備品

價格	Article no.	Clamping screw	Tightening torque	Description
200	25906	固定螺絲	Nm 扭力	
	4.000	M4x15.5x15IP	3.5	GH222.1212.…; GH222.0500.…; GH222.0625.…; GH222.1616.…

價格	Article no.	Clamping screw	Tightening torque	Description
300	25907	固定螺絲	Nm 扭力	
	5.000	M5x18x25IP	6	GH222.0750.…; GH222.2020.…; GH222.2525.…; GH222.1000.…

價格	Article no.	Torx-Plus wrench
350	25904	T型扳手
	Code 15.001	T15IP

價格	Article no.	Torx-Plus wrench
350	25922	T型扳手
	Code 15.000	T25IP

Parting off blades, without IC　切斷刀刀把 / 無中心出水

- without internal coolant supply　無中心出水

Type　GS222

for indexable inserts type 222 see from page 10
使用刀片規格請參閱第10頁

編號 Article no. **26200**

切削方向 Version　neutral 中性

價格	Code no.	Description	可切削深度 t max	刀把寬度 b	刀把高度 h	刃口高度 h1	總長 L	使用刀片寬度 Size
	編碼		mm	mm	mm	mm	mm	
6,000	22.002	GS222.0026.120.03.02.N	35.00	2.25	26.00	21.40	120.00	03
6,800	22.003	GS222.0032.150.03.02.N	45.00	2.25	32.00	25.00	150.00	03

Spare parts　備品

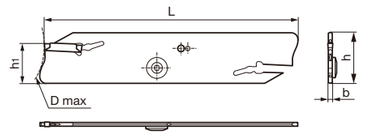
價格	Article no.	Mounting key
	25921	刀片安裝專用扳手
800	Code 15.000	

Parting off blades, with IC　切斷刀刀把 / 中心出水

- with internal coolant supply from above and below
  刃口上下兩端有中心出水

Type　GS222

for indexable inserts type 222 see from page 10
使用刀片規格請參閱第10頁



編號 Article no. **26201**

切削方向 Version　neutral 中性

價格	Code no.	Description	可切削深度 t max	刀把寬度 b	刀把高度 h	刃口高度 h1	總長 L	D max	使用刀片寬度 Size
	編碼		mm	mm	mm	mm	mm	mm	
9,500	22.002	GS222.0026.118.03.02.N.IK	35.00	2.25	26.00	21.40	118.00	70.00	03
10,000	22.003	GS222.0032.147.03.02.N.IK	45.00	2.25	32.00	25.00	147.50	90.00	03

Spare parts　備品

價格	Article no.	Mounting key
	25921	刀片安裝專用扳手
800	Code 15.000	

價格	Article no.	IC locking screw
	25909	刀片安裝專用扳手
600	Code 4.000	

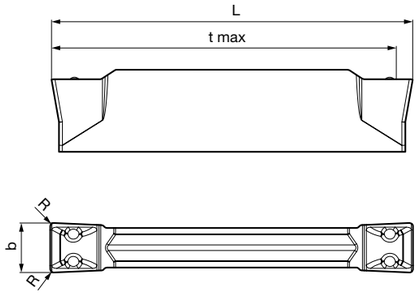
Indexable inserts for parting off　切斷刀片

• with chip former　刃口有特殊切削成形凹槽設計

Tool material	Solid carbide
Type	GZ222
Surface	F
	FIRE

for tool holders type GH222/GS222 see from page 6
使用刀把規格 GH222/GS222 請參閱第6頁

GÜHRINGNAVIGATOR
Cutting data page 14
切削參數請參閱第14頁



編號　Article no.　**26601**

切削方向　Version　neutral　中性

價格	Code no.	Description	可切削長度 t max	刀片寬度 b ±0.025	刀片長度 L ±0.1	圓角 R	前端刃口偏角 W2
	編碼		mm	mm	mm	mm	°
950	22.030	GZ222.0300.020.PP.02.N	21.00	3.00	22.00	0.20	0

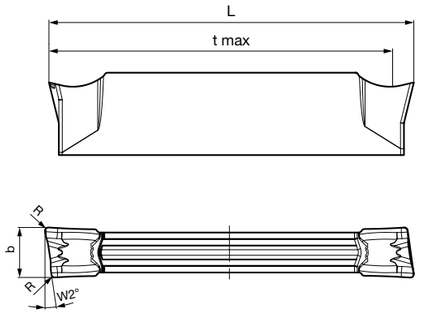
Indexable inserts for parting off　切斷刀片

• with chip former　刃口有特殊切削成形凹槽設計

Tool material	Solid carbide
Type	GZ222
Surface	F
	FIRE

for tool holders type GH222/GS222 see from page 6
使用刀把規格 GH222/GS222 請參閱第6頁

GÜHRINGNAVIGATOR
Cutting data page 14
切削參數請參閱第14頁



上面圖示為右手切削刀片
左手切削刀片則為鏡射相反方向
Right hand version shown
Left hand version mirror image

編號　Article no.　**26602**

切削方向　Version　right　右手切削

價格	Code no.	Description	可切削長度 t max	刀片寬度 b ±0.025	刀片長度 L ±0.1	圓角 R	前端刃口偏角 W2
	編碼		mm	mm	mm	mm	°
950	22.030	GZ222.0300.020.PM.01.R.08	21.00	3.00	22.00	0.20	8

編號　Article no.　**26603**

切削方向　Version　left　左手切削

價格	Code no.	Description	可切削長度 t max	刀片寬度 b ±0.025	刀片長度 L ±0.1	圓角 R	前端刃口偏角 W2
	編碼		mm	mm	mm	mm	°
950	22.030	GZ222.0300.020.PM.01.L.08	21.00	3.00	22.00	0.20	8

Clamping screw 固定螺絲

WN

- **Accessory for tool holders GH222**
  GH222刀把使用

Article no. 編號 **25906**

Size	d1	for shank size □	Code no. 編碼	價格
		mm		
15IP	M4	12/12 – 16/16	4.000	200

Clamping screw 固定螺絲

WN

- **Accessory for tool holders GH222**
  GH222刀把使用

Article no. 編號 **25907**

Size	d1	for shank size □	Code no. 編碼	價格
		mm		
25IP	M5	19.05/19.05 – 25.4/25.4	5.000	280

IC locking screw for tubeless coolant supply (TL) 無管式中心出水切換刀把使用螺絲

WN

- **Accessory for tool holders GH222**
  GH222刀把使用

Article no. 編號 **25910**

Size	d1	l1	Code no. 編碼	價格
		mm		
SW 3	M6	6.00	6.000	270

Set screw 設定螺絲(中心出水孔)

WN

- **Accessory for tool holders GH222 with IC**
  GH222刀把使用

Article no. 編號 **25905**

Size	d1	l1	Code no. 編碼	價格
		mm		
SW 4	G1/8	5.00	5.000	100

Set screw 設定螺絲(中心出水孔)

WN

- **Accessory for tool holders GH222 with IC**
  GH222刀把使用

Article no. 編號 **25913**

Size	d1	l1	Code no. 編碼	價格
		mm		
SW 4	M8 x 1	5.00	8.000	320

Torx-Plus wrench T形扳手

WN

- **Accessory for tool holders GH222**
  GH222刀把使用

Article no. 編號 **25904**

Size	l1	Code no. 編碼	價格
	mm		
15IP	65.00	15.001	340

Torx-Plus wrench T形扳手

WN

- **Accessory for tool holders GH222**
  GH222刀把使用

Article no. 編號 **25922**

Size	l1	Code no. 編碼	價格
	mm		
25IP	80.00	15.000	340

Mounting key 刀片安裝扳手

WN

- **Accessory for parting off blades GS222**
  GH222切斷刀把使用

Article no. 編號 **25921**

l1	Code no. 編碼	價格
mm		
120.00	15.000	780

IC locking screw 中心出水鎖固螺絲

WN

- **Accessory for parting off blades GS222**
  GH222切斷刀把使用

Article no. 編號 **25909**

Size	d1	l1	Code no. 編碼	價格
		mm		
SW 3	M4	4.60	4.000	580

GÜHRINGNAVIGATOR

System 222

Geometry .PP02

Feed rate f (mm / rev.)

↓ 0.06 - 0.18

Geometry .PM01

Feed rate f (mm / rev.)

↓ 0.04 - 0.10

General formulas

Cutting speed (v_c)

$$v_c = \frac{d_1 \cdot \pi \cdot n}{1000} \text{ [m/min]}$$

Revolutions per minute (n)

$$n = \frac{v_c \cdot 1000}{d_1 \cdot \pi} \text{ [U/min]}$$

Feed rate (v_f)

$v_f = f \cdot n$ [mm/min]

↓ = radial feed direction 徑向進給

ISO	Material 工件材質		Material examples/ material number 材質代號	Tensile strength (N/mm^2) 抗拉強度	Brinell-Hardness (HB) HB硬度	Cutting speed 切削速度 v_c (m/min) FIRE
P	Carbon steel 碳鋼	C < = 0,15 %	11SMn30+C / 1.0715 C15 / 1.0401	500 600	150 180	150-220
		C ≥ = 0,15 - 0,45 %	S235JR (ST37-2) / 1.0037 Ck22 / 1.1151	400 600	120 180	
		C > = 0,45 %	S355JO (St52-3) / 1.0553 C60 / 1.0601	600 900	180 270	130-180
	Low-alloyed steel alloy content ≤ 5 %) 低合金鋼	annealed 退火過	16MnCr5 / 1.7131 18CrNi8 / 1.5920	650 650	200 200	120-170
		heat-treatable 熱處理過	25CrMoV4 / 1.7218 42CrMo4V / 1.7225	900 1100	270 320	90-150
	High-alloyed steel alloy content > 5 %) 高合金鋼	annealed 退火過	X37CrMoV5-1 / 1.2343 X153CrMoV12 / 1.2379	750 850	220 250	130-180
		heat-treatable 熱處理過	55NiCrMoV7 / 1.2714	1200	350	70-120
	Cast steel 鑄鐵	un-alloyed, low-alloyed 低合金	GS52 / 1.0552	600	180	130-180
		high-alloyed 高合金	GX40CrNiSi22-10 / 1.4826	750	220	100-140
		martensitic, ferritic, tempered 麻田散鐵，肥粒鐵熱處理過	X14CrMoS17 / 1.4104 X4CrNiMo16-5-1 / 1.4418	800 1000	240 300	90-160
M	Stainless steel 不銹鋼	austenitic, Ni > 8% 含鎳超過8% SUS 304/ 316	X5CrNi18-10 / 1.4301 X2CrNiMo17-12-2 / 1.4404	650	200	90-160
		austenitic, ferritic (Duplex) 沃斯田鐵，肥粒鐵複合材	X2CrNiMoCuN25-6-3 / 1.4507 X2CrNiMoN25-7-4 / 1.4410	850	250	70-100

The specified values must be adapted to the machine and machining conditions.

General machining information 一般加工資訊

- The use of neutral indexable inserts is always preferable to the use of right-hand or left-hand cutting inserts:
  - better chip control
  - even wear on the cutting edge
  - higher process reliability
  - higher feed rates possible
  - even for parting off a neutral insert is first choice for reduced edge wear
- Reduce feed rate by approx. 40 % when using right or left-hand indexable inserts.
- Reduce the feed rate by approx. 50 %-60 % when the cutting edge reaches 2-3 mm from centre.

使用中性可轉換切削方向的刀片總是比使用單獨右手或左手切削刀片來的更好，原因如下：

- 更好的切屑控制。
- 刃口磨耗均勻。
- 切削過程可靠性高。
- 更高的進給速度。
- 即使是單獨用作切斷使用，中性刀片也是降低磨耗的首選。
- 當使用右手或左手切削刀片時，需降低進給速度約40%。
- 當切削時刃口逐漸接近工件中心 2~3mm時，需降低進給速度約50% ~ 60%。

SYSTEM OVERVIEW

SYSTEM 104

Micro-precision tools from Ø 0.7 mm
Broaching from Ø 1.5 mm

SYSTEM 106

Micro-precision tools from Ø 5 mm
Broaching from Ø 6 mm

SYSTEM 108

Micro-precision tools from Ø 7 mm
Broaching from Ø 9 mm

SYSTEM 110

Micro-precision tools for special solutions

SYSTEM 305

Indexable inserts and tool holders
for grooving and parting off

SYSTEM 222

New system
for grooving and parting off

GÜHRING

小徑Diver高效率銑刀

60° 插銑與高效能銑削

60° plunging and top-performance milling.

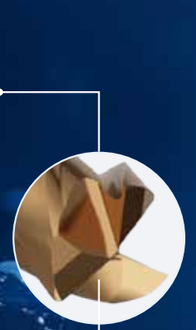
THE SMALLEST DIVER IN THE WORLD.

MICRO RF 100 diver

Diver 銑刀特色說明

SYMMETRICAL DRILLING FACE
optimised for drilling and ramping operations
excellent cutting edge stability

往下鑽銑與斜向進刀
有優越的性能表現與穩定性



THE HIPIMS COATING DUROX®
achieves a very high surface quality
for an optimal chip removal
as well as perfect protection against wear
and oxidation in dry and wet machining

非常高的表面質量要求，可以有效地幫助切屑，
在乾式和濕式加工中具有出色的抗磨損和抗氧化性能

DIMENSIONS
Ø 0.790 – 3.175

尺寸從 Ø0.79 ~ Ø3.175

LENGTHS
2.5xD and 5xD

長度有 2.5xD 及 5xD

innovative flute form
very high tool stability
low-vibration cutting
創新的溝槽形狀
切削時呈現高穩定性與低震動

new transition geometry
improves overall stability
新的幾何形狀設計 提高了整體穩定性

GührоJet coolant ducts
guided cooling & lubrication
directly in the cutting area
effective chip removal
鈷領特有的冷卻出水設計
直接在切削區域冷卻和潤滑
達到最佳排屑效果

new ultra fine carbide
optimum balance between
hardness and toughness
for micromachining applications
採用新的超細鎢鋼棒材，在精細的加工
應用中使硬度和韌性達到最佳的平衡

MICRO EVO 2020 LUTION

Plunging and milling with only one tool.
Universal, in every application, in every material.
Extreme cutting values and very high cutting depths,
which were previously not possible for micro-precision tools.
僅使用這支刀具即可進行插銑和一般銑削，可廣泛應用於各種材料加工應用。
高的切削參數和高的切削深度，是一般的精密刀具無法做到的。

Ratio end mills RF 100 Microdiver 高效率RF 100 Microdiver 銑刀

2.5D刃長

Tool material	Solid carbide
Surface	X
Type	NH
Shank form	cyl.

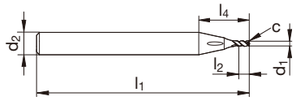
P	•
M	•
K	•
N	•
S	•
H	○

GÜHRINGNAVIGATOR

NEW

- for extreme cutting values and cutting performance
- with internal cooling: GühroJet peripheral cooling with 6 or 4 exits
- centre cutting
- with special drill face

- 高切削參數與高性能
- 鈷領特有4～6道平行中心出水
- 切刃過中心
- 端刃面可以鑽銑



編號 6808

d1 h8	d2 h5	l1	l2	l4	c	刃數	價格
mm	mm	mm	mm	mm	mm x 45°		
0.790	4.00	38.10	1.97	9.5	0.016	3	2,800
0.800	4.00	38.00	2.00	9.5	0.016	3	2,800
1.000	4.00	38.00	2.50	9.3	0.020	3	2,800
1.190	4.00	38.10	2.97	9.4	0.024	3	2,800
1.200	4.00	38.00	3.00	9.4	0.024	3	2,800
1.500	4.00	45.00	3.75	9.7	0.030	3	2,800
1.590	4.00	44.45	3.97	9.9	0.032	3	2,800
1.800	4.00	45.00	4.50	10.2	0.036	3	2,800
1.980	6.00	50.80	4.95	14.7	0.040	3	2,900
2.000	6.00	50.00	5.00	14.6	0.040	3	2,900
2.200	6.00	50.00	5.50	14.9	0.044	3	2,900
2.380	6.00	50.80	5.95	15.2	0.048	3	2,900
2.500	6.00	50.00	6.25	15.3	0.050	3	2,900
2.780	6.00	50.80	6.95	15.8	0.056	3	2,900
2.800	6.00	50.00	7.00	15.9	0.056	3	2,900
3.000	6.00	50.00	7.50	16.2	0.060	3	2,900
3.175	6.00	50.80	7.93	17.0	0.064	3	2,900

OPEN SLOTS AND HELIX 開放式槽與螺旋下刀銑削

Art. no. 6808

	Material/ISO material	a_e max	a_p max	v_c	f_z/Ø 0.8	f_z/Ø 1.0	f_z/Ø 1.2	v_c	f_z/Ø 1.5	f_z/Ø 1.8	v_c	f_z/Ø 2.0	f_z/Ø 2.2	f_z/Ø 2.5	v_c	f_z/Ø 2.8	f_z/Ø 3.0
P	Unalloyed steel	1.00xD	1.00xD	140	0.0072	0.0090	0.0108	168	0.0135	0.0162	182	0.0180	0.0198	0.0225	196	0.0252	0.0270
P	Low-alloyed steel	1.00xD	1.00xD	140	0.0064	0.0080	0.0096	168	0.0120	0.0144	182	0.0160	0.0176	0.0200	196	0.0224	0.0240
P	High-alloyed steel and tool steel	1.00xD	0.75xD	140	0.0048	0.0060	0.0072	168	0.0090	0.0108	182	0.0120	0.0132	0.0150	196	0.0168	0.0180
M	Stainless steel, ferritic, martensitic	1.00xD	1.00xD	140	0.0064	0.0080	0.0096	168	0.0120	0.0144	182	0.0160	0.0176	0.0200	196	0.0224	0.0240
M	Stainless steel, austenitic	1.00xD	1.00xD	120	0.0056	0.0070	0.0084	144	0.0105	0.0126	156	0.0140	0.0154	0.0175	168	0.0196	0.0210
M	Duplex steel, high strength stainless steels	1.00xD	0.75xD	90	0.0049	0.0061	0.0073	108	0.0092	0.0110	117	0.0122	0.0135	0.0153	126	0.0171	0.0184
K	Grey cast iron Cast iron with spheroidal graphite iron Malleable cast iron GJV & ADI	1.00xD	1.00xD	120	0.0056	0.0070	0.0084	144	0.0105	0.0126	156	0.0140	0.0154	0.0175	168	0.0196	0.0210
K	Grey cast iron Cast iron with spheroidal graphite iron Malleable cast iron GJV & ADI	1.00xD	1.00xD	100	0.0050	0.0062	0.0075	120	0.0093	0.0112	130	0.0124	0.0137	0.0156	140	0.0174	0.0187
N	Aluminium-wrought alloys Aluminium-cast alloys	1.00xD	1.00xD	170	0.0096	0.0120	0.0144	204	0.0180	0.0216	221	0.0240	0.0264	0.0300	238	0.0336	0.0360
N	Copper and copper alloys	1.00xD	1.00xD	125	0.0088	0.0110	0.0133	150	0.0166	0.0199	162.5	0.0221	0.0243	0.0276	175	0.0309	0.0331
S	Heat-resistant alloys, Fe-based	1.00xD	0.50xD	100	0.0036	0.0045	0.0054	120	0.0068	0.0081	130	0.0090	0.0099	0.0113	140	0.0126	0.0135
S	Heat-resistant alloys, Ni-based, CO-based	1.00xD	0.50xD	60	0.0029	0.0037	0.0044	72	0.0055	0.0066	78	0.0073	0.0080	0.0091	84	0.0102	0.0110
S	Titanium alloys & pure titanium	1.00xD	0.75xD	100	0.0060	0.0075	0.0090	120	0.0113	0.0135	130	0.0150	0.0165	0.0188	140	0.0210	0.0225
H	Hardened steel, hardened and tempered, < 55 HRC	1.00xD	0.25xD	35	0.0032	0.0040	0.0048	42	0.0060	0.0072	46	0.0080	0.0088	0.0100	49	0.0112	0.0120

RAMPING AND CLOSED SLOTS 開槽與斜向銑削

Art. no. 6808

	Material/ISO material	a_e max	a_p max	v_c	f_z/Ø 0.8	f_z/Ø 1.0	f_z/Ø 1.2	v_c	f_z/Ø 1.5	f_z/Ø 1.8	v_c	f_z/Ø 2.0	f_z/Ø 2.2	f_z/Ø 2.5	v_c	f_z/Ø 2.8	f_z/Ø 3.0
P	Unalloyed steel	1.00xD	1.00xD	100	0.0043	0.0054	0.0065	120	0.0081	0.0097	130	0.0108	0.0119	0.0135	140	0.0151	0.0162
P	Low-alloyed steel	1.00xD	1.00xD	100	0.0038	0.0048	0.0058	120	0.0072	0.0086	130	0.0096	0.0106	0.0120	140	0.0134	0.0144
P	High-alloyed steel and tool steel	1.00xD	0.75xD	100	0.0029	0.0036	0.0043	120	0.0054	0.0065	130	0.0072	0.0079	0.0090	140	0.0101	0.0108
M	Stainless steel, ferritic, martensitic	1.00xD	1.00xD	100	0.0038	0.0048	0.0058	120	0.0072	0.0086	130	0.0096	0.0106	0.0120	140	0.0134	0.0144
M	Stainless steel, austenitic	1.00xD	1.00xD	90	0.0034	0.0042	0.0050	108	0.0063	0.0076	117	0.0084	0.0092	0.0105	126	0.0118	0.0126
M	Duplex steel, high strength stainless steels	1.00xD	0.75xD	65	0.0029	0.0037	0.0044	78	0.0055	0.0066	85	0.0073	0.0081	0.0092	91	0.0103	0.0110
K	Grey cast iron Cast iron with spheroidal graphite iron Malleable cast iron GJV & ADI	1.00xD	1.00xD	90	0.0034	0.0042	0.0050	108	0.0063	0.0076	117	0.0084	0.0092	0.0105	126	0.0118	0.0126
K	Grey cast iron Cast iron with spheroidal graphite iron Malleable cast iron GJV & ADI	1.00xD	1.00xD	75	0.0030	0.0037	0.0045	90	0.0056	0.0067	98	0.0075	0.0082	0.0093	105	0.0105	0.0112
N	Aluminium-wrought alloys Aluminium-cast alloys	1.00xD	1.00xD	120	0.0058	0.0072	0.0086	144	0.0108	0.0130	156	0.0144	0.0158	0.0180	168	0.0202	0.0216
N	Copper and copper alloys	1.00xD	1.00xD	90	0.0053	0.0066	0.0080	108	0.0099	0.0119	117	0.0133	0.0146	0.0166	126	0.0186	0.0199
S	Heat-resistant alloys, Fe-based	1.00xD	0.50xD	75	0.0022	0.0027	0.0032	90	0.0041	0.0049	98	0.0054	0.0059	0.0068	105	0.0076	0.0081
S	Heat-resistant alloys, Ni-based, CO-based	1.00xD	0.50xD	45	0.0018	0.0022	0.0026	54	0.0033	0.0039	59	0.0044	0.0048	0.0055	63	0.0061	0.0066
S	Titanium alloys & pure titanium	1.00xD	0.75xD	70	0.0036	0.0045	0.0054	84	0.0068	0.0081	91	0.0090	0.0099	0.0113	98	0.0126	0.0135
H	Hardened steel, hardened and tempered, < 55 HRC	1.00xD	0.25xD	25	0.0019	0.0024	0.0029	30	0.0036	0.0043	33	0.0048	0.0053	0.0060	35	0.0067	0.0072

ROUGHING 粗加工

Art. no. 6808

	Material/ISO material	a_e max	a_p max	v_c	f_z/Ø 0.8	f_z/Ø 1.0	f_z/Ø 1.2	v_c	f_z/Ø 1.5	f_z/Ø 1.8	v_c	f_z/Ø 2.0	f_z/Ø 2.2	f_z/Ø 2.5	v_c	f_z/Ø 2.8	f_z/Ø 3.0
P	Unalloyed steel	0.25xD	2.00xD	170	0.0113	0.0142	0.0170	204	0.0213	0.0255	221	0.0284	0.0312	0.0354	238	0.0397	0.0425
P	Low-alloyed steel	0.25xD	2.00xD	170	0.0101	0.0126	0.0151	204	0.0189	0.0227	221	0.0252	0.0277	0.0315	238	0.0353	0.0378
P	High-alloyed steel and tool steel	0.20xD	2.00xD	170	0.0076	0.0095	0.0113	204	0.0142	0.0170	221	0.0189	0.0208	0.0236	238	0.0265	0.0284
M	Stainless steel, ferritic, martensitic	0.25xD	2.00xD	170	0.0101	0.0126	0.0151	204	0.0189	0.0227	221	0.0252	0.0277	0.0315	238	0.0353	0.0378
M	Stainless steel, austenitic	0.20xD	2.00xD	145	0.0088	0.0110	0.0132	174	0.0165	0.0198	189	0.0221	0.0243	0.0276	203	0.0309	0.0331
M	Duplex steel, high strength stainless steels	0.20xD	2.00xD	105	0.0077	0.0096	0.0116	126	0.0145	0.0174	137	0.0193	0.0212	0.0241	147	0.0270	0.0289
K	Grey cast iron Cast iron with spheroidal graphite iron Malleable cast iron GJV & ADI	0.25xD	2.00xD	145	0.0088	0.0110	0.0132	174	0.0165	0.0198	189	0.0221	0.0243	0.0276	203	0.0309	0.0331
K	Grey cast iron Cast iron with spheroidal graphite iron Malleable cast iron GJV & ADI	0.25xD	2.00xD	120	0.0078	0.0098	0.0118	144	0.0147	0.0176	156	0.0196	0.0216	0.0245	168	0.0274	0.0294
N	Aluminium-wrought alloys Aluminium-cast alloys	0.25xD	2.00xD	200	0.0151	0.0189	0.0227	240	0.0284	0.0340	260	0.0378	0.0416	0.0473	280	0.0529	0.0567
N	Copper and copper alloys	0.25xD	2.00xD	150	0.0139	0.0174	0.0209	180	0.0261	0.0313	195	0.0348	0.0383	0.0435	210	0.0487	0.0522
S	Heat-resistant alloys, Fe-based	0.15xD	2.00xD	120	0.0057	0.0071	0.0085	144	0.0106	0.0128	156	0.0142	0.0156	0.0177	168	0.0198	0.0213
S	Heat-resistant alloys, Ni-based, CO-based	0.15xD	2.00xD	70	0.0046	0.0058	0.0069	84	0.0086	0.0104	91	0.0115	0.0127	0.0144	98	0.0161	0.0173
S	Titanium alloys & pure titanium	0.20xD	2.00xD	115	0.0095	0.0118	0.0142	138	0.0177	0.0213	150	0.0236	0.0260	0.0295	161	0.0331	0.0354
H	Hardened steel, hardened and tempered, < 55 HRC	0.05xD	2.00xD	45	0.0050	0.0063	0.0076	54	0.0095	0.0113	59	0.0126	0.0139	0.0158	63	0.0176	0.0189

FINISHING 精加工

Art. no. 6808

	Material/ISO material	a_e max	a_p max	v_c	f_z/Ø 0.8	f_z/Ø 1.0	f_z/Ø 1.2	v_c	f_z/Ø 1.5	f_z/Ø 1.8	v_c	f_z/Ø 2.0	f_z/Ø 2.2	f_z/Ø 2.5	v_c	f_z/Ø 2.8	f_z/Ø 3.0
P	Unalloyed steel	0.03xD	2.00xD	180	0.0086	0.0108	0.0130	216	0.0162	0.0194	234	0.0216	0.0238	0.0270	252	0.0302	0.0324
P	Low-alloyed steel	0.03xD	2.00xD	180	0.0077	0.0096	0.0115	216	0.0144	0.0173	234	0.0192	0.0211	0.0240	252	0.0269	0.0288
P	High-alloyed steel and tool steel	0.03xD	2.00xD	180	0.0058	0.0072	0.0086	216	0.0108	0.0130	234	0.0144	0.0158	0.0180	252	0.0202	0.0216
M	Stainless steel, ferritic, martensitic	0.03xD	2.00xD	180	0.0077	0.0096	0.0115	216	0.0144	0.0173	234	0.0192	0.0211	0.0240	252	0.0269	0.0288
M	Stainless steel, austenitic	0.03xD	2.00xD	155	0.0067	0.0084	0.0101	186	0.0126	0.0151	202	0.0168	0.0185	0.0210	217	0.0235	0.0252
M	Duplex steel, high strength stainless steels	0.03xD	2.00xD	115	0.0059	0.0073	0.0088	138	0.0110	0.0132	150	0.0147	0.0162	0.0184	161	0.0206	0.0220
K	Grey cast iron Cast iron with spheroidal graphite iron	0.03xD	2.00xD	155	0.0067	0.0084	0.0101	186	0.0126	0.0151	202	0.0168	0.0185	0.0210	217	0.0235	0.0252
K	Malleable cast iron GJV & ADI	0.03xD	2.00xD	130	0.0060	0.0075	0.0090	156	0.0112	0.0134	169	0.0149	0.0164	0.0187	182	0.0209	0.0224
N	Aluminium-wrought alloys Aluminium-cast alloys	0.03xD	2.00xD	220	0.0115	0.0144	0.0173	264	0.0216	0.0259	286	0.0288	0.0317	0.0360	308	0.0403	0.0432
N	Copper and copper alloys	0.03xD	2.00xD	160	0.0106	0.0133	0.0159	192	0.0199	0.0239	208	0.0265	0.0292	0.0331	224	0.0371	0.0398
S	Heat-resistant alloys, Fe-based	0.03xD	2.00xD	130	0.0043	0.0054	0.0065	156	0.0081	0.0097	169	0.0108	0.0119	0.0135	182	0.0151	0.0162
S	Heat-resistant alloys, Ni-based, CO-based	0.03xD	2.00xD	75	0.0035	0.0044	0.0053	90	0.0066	0.0079	98	0.0088	0.0096	0.0110	105	0.0123	0.0132
S	Titanium alloys & pure titanium	0.03xD	2.00xD	120	0.0072	0.0090	0.0108	144	0.0135	0.0162	156	0.0180	0.0198	0.0225	168	0.0252	0.0270
H	Hardened steel, hardened and tempered, < 55 HRC	0.02xD	2.00xD	45	0.0038	0.0048	0.0058	54	0.0072	0.0086	59	0.0096	0.0106	0.0120	63	0.0134	0.0144

DRILLING 鑽銑加工

Art. no. 6808

	Material/ISO material	a_p max	v_c	f_z/Ø 0.8	f_z/Ø 1.0	f_z/Ø 1.2	v_c	f_z/Ø 1.5	f_z/Ø 1.8	v_c	f_z/Ø 2.0	f_z/Ø 2.2	f_z/Ø 2.5	v_c	f_z/Ø 2.8	f_z/Ø 3.0
P	Unalloyed steel	1.00xD	100	0.0014	0.0018	0.0022	120	0.0027	0.0032	130	0.0036	0.0040	0.0045	140	0.0050	0.0054
P	Low-alloyed steel	1.00xD	100	0.0013	0.0016	0.0019	120	0.0024	0.0029	130	0.0032	0.0035	0.0040	140	0.0045	0.0048
P	High-alloyed steel and tool steel	0.50xD	90	0.0010	0.0012	0.0014	108	0.0018	0.0022	117	0.0024	0.0026	0.0030	126	0.0034	0.0036
M	Stainless steel, ferritic, martensitic	0.75xD	90	0.0012	0.0015	0.0018	108	0.0023	0.0027	117	0.0030	0.0033	0.0038	126	0.0042	0.0045
M	Stainless steel, austenitic	0.50xD	85	0.0011	0.0014	0.0017	102	0.0021	0.0025	111	0.0028	0.0031	0.0035	119	0.0039	0.0042
M	Duplex steel, high strength stainless steels	0.25xD	65	0.0010	0.0012	0.0014	78	0.0018	0.0022	85	0.0024	0.0026	0.0030	91	0.0034	0.0036
K	Grey cast iron Cast iron with spheroidal graphite iron	1.00xD	90	0.0011	0.0014	0.0017	108	0.0021	0.0025	117	0.0028	0.0031	0.0035	126	0.0039	0.0042
K	Malleable cast iron GJV & ADI	1.00xD	75	0.0010	0.0012	0.0014	90	0.0018	0.0022	98	0.0024	0.0026	0.0030	105	0.0034	0.0036
N	Aluminium-wrought alloys Aluminium-cast alloys	0.50xD	125	0.0019	0.0024	0.0029	150	0.0036	0.0043	163	0.0048	0.0053	0.0060	175	0.0067	0.0072
N	Copper and copper alloys	0.50xD	90	0.0018	0.0022	0.0026	108	0.0033	0.0040	117	0.0044	0.0048	0.0055	126	0.0062	0.0066
S	Heat-resistant alloys, Fe-based	0.25xD	75	0.0007	0.0009	0.0011	90	0.0014	0.0016	98	0.0018	0.0020	0.0023	105	0.0025	0.0027
S	Heat-resistant alloys, Ni-based, CO-based	0.25xD	45	0.0006	0.0008	0.0009	54	0.0011	0.0014	59	0.0015	0.0017	0.0019	63	0.0021	0.0023
S	Titanium alloys & pure titanium	0.25xD	70	0.0012	0.0015	0.0018	84	0.0023	0.0027	91	0.0030	0.0033	0.0038	98	0.0042	0.0045

Ratio end mills RF 100 Microdiver 高效率RF 100 Microdiver 銑刀

5D刃長

WN NH 5xD 3 40° 45° 10° 48 HRC

P • M • K • N • S • H ○

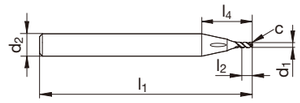
GÜHRINGNAVIGATOR

- for extreme cutting values and cutting performance
- with internal cooling: GühroJet peripheral cooling with 6 or 4 exits
- centre cutting
- with special drill face

- 高切削參數與高性能
- 鈷領特有4～6道平行中心出水
- 切刃過中心
- 端刃面可以鑽銑

Tool material	Solid carbide
Surface	X
Type	NH
Shank form	cyl.

NEW



d1 h8	d2 h5	l1	l2	l4	c	刃數	編號 6809 價格
mm	mm	mm	mm	mm	mm x 45°		
1.000	4.00	45.00	5.00	11.8	0.020	3	3,300
1.190	4.00	50.80	5.95	12.4	0.024	3	3,300
1.500	4.00	50.00	7.50	13.5	0.030	3	3,300
1.590	4.00	50.80	7.95	13.9	0.032	3	3,300
1.980	6.00	57.15	9.90	19.6	0.040	3	3,300
2.000	6.00	57.00	10.00	19.6	0.040	3	3,500
2.380	6.00	57.15	11.90	21.1	0.048	3	3,500
2.500	6.00	57.00	12.50	21.5	0.050	3	3,500
2.780	6.00	57.15	13.90	22.8	0.056	3	3,500
3.000	6.00	57.00	15.00	23.7	0.060	3	3,500
3.175	6.00	57.15	15.87	25.0	0.064	3	3,500

OPEN SLOTS AND HELIX 開放式槽與螺旋下刀銑削

Art. no. 6809

	Material/ISO material	a_e max	a_p max	v_c	f_z/Ø		v_c	f_z/Ø	v_c	f_z/Ø		v_c	f_z/Ø	
					1.0	1.2		1.5		2.0	2.5		2.8	3.0
P	Unalloyed steel	1.00xD	0.50xD	112	0.0081	0.0097	134	0.0122	146	0.0162	0.0203	157	0.0227	0.0243
P	Low-alloyed steel	1.00xD	0.50xD	112	0.0072	0.0086	134	0.0108	146	0.0144	0.0180	157	0.0202	0.0216
P	High-alloyed steel and tool steel	1.00xD	0.25xD	112	0.0054	0.0065	134	0.0081	146	0.0108	0.0135	157	0.0151	0.0162
M	Stainless steel, ferritic, martensitic	1.00xD	0.25xD	112	0.0072	0.0086	134	0.0108	146	0.0144	0.0180	157	0.0202	0.0216
M	Stainless steel, austenitic	1.00xD	0.25xD	96	0.0063	0.0076	115	0.0095	125	0.0126	0.0158	134	0.0176	0.0189
M	Duplex steel, high strength stainless steels	1.00xD	0.25xD	71	0.0055	0.0066	85	0.0083	92	0.0110	0.0138	99	0.0154	0.0165
K	Grey cast iron Cast iron with spheroidal graphite iron	1.00xD	0.50xD	96	0.0063	0.0076	115	0.0095	125	0.0126	0.0158	134	0.0176	0.0189
K	Malleable cast iron GJV & ADI	1.00xD	0.50xD	80	0.0056	0.0067	96	0.0084	104	0.0112	0.0140	112	0.0157	0.0168
N	Aluminium-wrought alloys Aluminium-cast alloys	1.00xD	0.50xD	136	0.0108	0.0130	163	0.0162	177	0.0216	0.0270	190	0.0302	0.0324
N	Copper and copper alloys	1.00xD	0.50xD	100	0.0099	0.0119	120	0.0149	130	0.0199	0.0249	140	0.0278	0.0298
S	Heat-resistant alloys, Fe-based	1.00xD	0.25xD	80	0.0041	0.0049	96	0.0061	104	0.0081	0.0101	112	0.0113	0.0122
S	Heat-resistant alloys, Ni-based, CO-based	1.00xD	0.25xD	46	0.0033	0.0039	55	0.0049	60	0.0066	0.0082	64	0.0092	0.0099
S	Titanium alloys & pure titanium	1.00xD	0.25xD	72	0.0068	0.0081	86	0.0101	94	0.0135	0.0169	101	0.0189	0.0203
H	Hardened steel, hardened and tempered, < 55 HRC	1.00xD	0.10xD	26	0.0036	0.0043	31	0.0054	34	0.0072	0.0090	36	0.0101	0.0108

RAMPING AND CLOSED SLOTS 開槽與斜向銑削

Art. no. 6809

	Material/ISO material	a_e max	a_p max	v_c	f_z/Ø		v_c	f_z/Ø	v_c	f_z/Ø		v_c	f_z/Ø	
					1.0	1.2		1.5		2.0	2.5		2.8	3.0
P	Unalloyed steel	1.00xD	0.50xD	78	0.0049	0.0058	94	0.0073	102	0.0097	0.0122	110	0.0136	0.0146
P	Low-alloyed steel	1.00xD	0.50xD	78	0.0043	0.0052	94	0.0065	102	0.0086	0.0108	110	0.0121	0.0130
P	High-alloyed steel and tool steel	1.00xD	0.25xD	78	0.0032	0.0039	94	0.0049	102	0.0065	0.0081	110	0.0091	0.0097
M	Stainless steel, ferritic, martensitic	1.00xD	0.25xD	78	0.0043	0.0052	94	0.0065	102	0.0086	0.0108	110	0.0121	0.0130
M	Stainless steel, austenitic	1.00xD	0.25xD	67	0.0038	0.0045	81	0.0057	87	0.0076	0.0095	94	0.0106	0.0113
M	Duplex steel, high strength stainless steels	1.00xD	0.25xD	50	0.0033	0.0040	60	0.0050	65	0.0066	0.0083	70	0.0093	0.0099
K	Grey cast iron Cast iron with spheroidal graphite iron	1.00xD	0.50xD	67	0.0038	0.0045	81	0.0057	87	0.0076	0.0095	94	0.0106	0.0113
K	Malleable cast iron GJV & ADI	1.00xD	0.50xD	56	0.0034	0.0040	67	0.0050	73	0.0067	0.0084	78	0.0094	0.0101
N	Aluminium-wrought alloys Aluminium-cast alloys	1.00xD	0.50xD	95	0.0065	0.0078	114	0.0097	124	0.0130	0.0162	133	0.0181	0.0194
N	Copper and copper alloys	1.00xD	0.50xD	70	0.0060	0.0072	84	0.0089	91	0.0119	0.0149	98	0.0167	0.0179
S	Heat-resistant alloys, Fe-based	1.00xD	0.25xD	56	0.0024	0.0029	67	0.0036	73	0.0049	0.0061	78	0.0068	0.0073
S	Heat-resistant alloys, Ni-based, CO-based	1.00xD	0.25xD	32	0.0020	0.0024	39	0.0030	42	0.0039	0.0049	45	0.0055	0.0059
S	Titanium alloys & pure titanium	1.00xD	0.25xD	50	0.0041	0.0049	60	0.0061	66	0.0081	0.0101	71	0.0113	0.0122
H	Hardened steel, hardened and tempered, < 55 HRC	1.00xD	0.10xD	18	0.0022	0.0026	22	0.0032	24	0.0043	0.0054	25	0.0060	0.0065

ROUGHING 粗加工

Art. no. 6809

	Material/ISO material	a_e max	a_p max	v_c	f_z/Ø		v_c	f_z/Ø	v_c	f_z/Ø		v_c	f_z/Ø	
					1.0	1.2		1.5		2.0	2.5		2.8	3.0
P	Unalloyed steel	0.10xD	5.00xD	134	0.0128	0.0153	161	0.0191	174	0.0255	0.0319	188	0.0357	0.0383
P	Low-alloyed steel	0.10xD	5.00xD	134	0.0113	0.0136	161	0.0170	174	0.0227	0.0284	188	0.0318	0.0340
P	High-alloyed steel and tool steel	0.08xD	5.00xD	134	0.0085	0.0102	161	0.0128	174	0.0170	0.0213	188	0.0238	0.0255
M	Stainless steel, ferritic, martensitic	0.10xD	5.00xD	134	0.0113	0.0136	161	0.0170	174	0.0227	0.0284	188	0.0318	0.0340
M	Stainless steel, austenitic	0.08xD	5.00xD	115	0.0099	0.0119	138	0.0149	150	0.0198	0.0248	161	0.0278	0.0298
M	Duplex steel, high strength stainless steels	0.05xD	5.00xD	86	0.0087	0.0104	103	0.0130	112	0.0174	0.0217	120	0.0243	0.0260
K	Grey cast iron Cast iron with spheroidal graphite iron	0.10xD	5.00xD	115	0.0099	0.0119	138	0.0149	150	0.0198	0.0248	161	0.0278	0.0298
K	Malleable cast iron GJV & ADI	0.10xD	5.00xD	96	0.0088	0.0106	115	0.0132	125	0.0176	0.0220	134	0.0247	0.0265
N	Aluminium-wrought alloys Aluminium-cast alloys	0.15xD	5.00xD	163	0.0170	0.0204	196	0.0255	212	0.0340	0.0425	228	0.0476	0.0510
N	Copper and copper alloys	0.12xD	5.00xD	120	0.0157	0.0188	144	0.0235	156	0.0313	0.0392	168	0.0438	0.0470
S	Heat-resistant alloys, Fe-based	0.08xD	5.00xD	96	0.0064	0.0077	115	0.0096	125	0.0128	0.0159	134	0.0179	0.0191
S	Heat-resistant alloys, Ni-based, CO-based	0.05xD	5.00xD	55	0.0052	0.0062	66	0.0078	72	0.0104	0.0130	77	0.0145	0.0155
S	Titanium alloys & Reintitan	0.08xD	5.00xD	86	0.0106	0.0128	103	0.0159	112	0.0213	0.0266	120	0.0298	0.0319
H	Hardened steel, hardened and tempered, < 55 HRC	0.03xD	5.00xD	31	0.0057	0.0068	37	0.0085	40	0.0113	0.0142	43	0.0159	0.0170

FINISHING 精加工

Art. no. 6809

	Material/ISO material	a_e max	a_p max	v_c	f_z/Ø		v_c	f_z/Ø	v_c	f_z/Ø		v_c	f_z/Ø	
					1.0	1.2		1.5		2.0	2.5		2.8	3.0
P	Unalloyed steel	0.02xD	5.00xD	146	0.0097	0.0117	175	0.0146	190	0.0194	0.0243	204	0.0272	0.0292
P	Low-alloyed steel	0.02xD	5.00xD	146	0.0086	0.0104	175	0.0130	190	0.0173	0.0216	204	0.0242	0.0259
P	High-alloyed steel and tool steel	0.02xD	5.00xD	146	0.0065	0.0078	175	0.0097	190	0.0130	0.0162	204	0.0181	0.0194
M	Stainless steel, ferritic, martensitic	0.02xD	5.00xD	146	0.0086	0.0104	175	0.0130	190	0.0173	0.0216	204	0.0242	0.0259
M	Stainless steel, austenitic	0.02xD	5.00xD	125	0.0076	0.0091	150	0.0113	163	0.0151	0.0189	175	0.0212	0.0227
M	Duplex steel, high strength stainless steels	0.02xD	5.00xD	93	0.0066	0.0079	112	0.0099	121	0.0132	0.0165	130	0.0185	0.0198
K	Grey cast iron Cast iron with spheroidal graphite iron	0.02xD	5.00xD	125	0.0076	0.0091	150	0.0113	163	0.0151	0.0189	175	0.0212	0.0227
K	Malleable cast iron GJV & ADI	0.02xD	5.00xD	104	0.0067	0.0081	125	0.0101	135	0.0134	0.0168	146	0.0188	0.0202
N	Aluminium-wrought alloys Aluminium-cast alloys	0.02xD	5.00xD	177	0.0130	0.0156	212	0.0194	230	0.0259	0.0324	248	0.0363	0.0389
N	Copper and copper alloys	0.02xD	5.00xD	130	0.0119	0.0143	156	0.0179	169	0.0239	0.0298	182	0.0334	0.0358
S	Heat-resistant alloys, Fe-based	0.02xD	5.00xD	104	0.0049	0.0058	125	0.0073	135	0.0097	0.0122	146	0.0136	0.0146
S	Heat-resistant alloys, Ni-based, CO-based	0.02xD	5.00xD	60	0.0039	0.0047	72	0.0059	78	0.0079	0.0099	84	0.0111	0.0118
S	Titanium alloys & pure titanium	0.02xD	5.00xD	94	0.0081	0.0097	113	0.0122	122	0.0162	0.0203	132	0.0227	0.0243
H	Hardened steel, hardened and tempered, < 55 HRC	0.01xD	5.00xD	34	0.0043	0.0052	41	0.0065	44	0.0086	0.0108	48	0.0121	0.0130

DRILLING 鑽銑加工

Art. no. 6809

	Material/ISO material	a_p max	v_c	f_z/Ø		v_c	f_z/Ø	v_c	f_z/Ø		v_c	f_z/Ø	
				1.0	1.2		1.5		2.0	2.5		2.8	3.0
P	Unalloyed steel	0.50xD	84	0.0014	0.0017	101	0.0022	109	0.0029	0.0036	118	0.0040	0.0043
P	Low-alloyed steel	0.50xD	84	0.0013	0.0015	101	0.0019	109	0.0026	0.0032	118	0.0036	0.0038
P	High-alloyed steel and tool steel	0.25xD	84	0.0010	0.0012	101	0.0014	109	0.0019	0.0024	118	0.0027	0.0029
M	Stainless steel, ferritic, martensitic	0.25xD	84	0.0013	0.0015	101	0.0019	109	0.0026	0.0032	118	0.0036	0.0038
M	Stainless steel, austenitic	0.25xD	72	0.0011	0.0013	86	0.0017	94	0.0022	0.0028	101	0.0031	0.0034
M	Duplex steel, high strength stainless steels	0.25xD	54	0.0010	0.0012	65	0.0015	70	0.0020	0.0024	76	0.0027	0.0029
K	Grey cast iron Cast iron with spheroidal graphite iron	0.50xD	72	0.0011	0.0013	86	0.0017	94	0.0022	0.0028	101	0.0031	0.0034
K	Malleable cast iron GJV & ADI	0.50xD	60	0.0010	0.0012	72	0.0015	78	0.0020	0.0025	84	0.0028	0.0030
N	Aluminium-wrought alloys Aluminium-cast alloys	0.50xD	102	0.0019	0.0023	122	0.0029	133	0.0038	0.0048	143	0.0054	0.0058
N	Copper and copper alloys	0.50xD	75	0.0018	0.0021	90	0.0027	97.5	0.0035	0.0044	105	0.0049	0.0053
S	Heat-resistant alloys, Fe-based	0.25xD	60	0.0007	0.0009	72	0.0011	78	0.0014	0.0018	84	0.0020	0.0022
S	Heat-resistant alloys, Ni-based, CO-based	0.25xD	34	0.0006	0.0007	41	0.0009	44	0.0012	0.0015	48	0.0016	0.0018
S	Titanium alloys & pure titanium	0.25xD	54	0.0012	0.0014	65	0.0018	70	0.0024	0.0030	76	0.0034	0.0036

GÜHRING

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