

GÜHRING

刀底端面出水

溝槽出水

效率高 就是 成本低

Strong in aluminium

- process-reliable machining of aluminium, non ferrous-metals and plastics
鋁合金、非鐵金屬、塑膠銑削加工穩定可靠
- unique cooling system and carbo-coating for longer tool life, improved chip evacuation and perfect surface finish quality
獨特的冷卻設計和碳基塗層，延長刀具壽命、改善排屑並得到完美的加工表面品質

Aluminium End Mills 鋁合金 非鐵金屬專用銑刀

GÜHRING – YOUR WORLDWIDE PARTNER
鈷領是您提升生產效率與整體解決方案的最佳伙伴

ISO code

P	Steel, high-alloyed steel
M	Stainless steel
K	Grey cast iron, spheroidal graphite iron and malleable cast iron
N	Aluminium and other non-ferrous metals
S	Special, super and titanium-alloys
H	Hardened steel and chilled cast iron

On the programme pages you will find for every tool recommendations regarding suitability for the application groups and details of max. tensile strength and hardness.

- optimal suitability
- limited suitability

Coatings

- bright
- Cb Carbo 碳基鍍層

Pictograms

Tool material

VHM

Solid carbide finest grain (carbide-UF)

Shank form



to DIN 6535

Standard



to DIN



to Gühring standard

Type

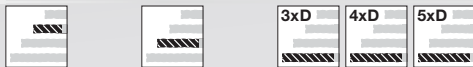


Application area similar to DIN 1836

Applications



Length



long (DIN) medium length extra length

Number of cutting edges



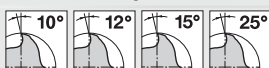
Number of major cutting edges

Helix angle



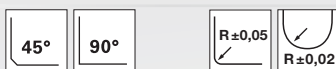
Size of helix angle/number of different helix angles

Rake angle



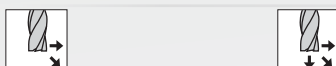
Rake angle of circumference cutting edges

Cutting edge form



Corner chamfer Radius with tolerance

Feed



for lateral feed and oblique plunging for lateral feed, oblique plunging and drilling

ALU END MILLS

Target 目標：在穩定可控制的刀具壽命下將加工效率提高、產能提升

Ratio® 效率高 就是 成本低

Aluminium end mill RF 100 A WF

Aluminium end mill RF 100 A



short chips thanks to innovative roughing geometry

創新的粗加工槽形使切屑短

optimal surface finish and low-vibration milling thanks to nano-polished cutting edges with micro guide chamfers

接近奈米級拋光切削刃帶有細微倒角可得到最佳表面光度和低振動銑削

larger flutes for optimal chip evacuation

排屑槽加大設計可實現最佳排屑

roughing geometry reduces the cutting pressure in comparison to smooth cutting milling cutters

與一般銑刀相比粗加工幾何形狀設計降低了切削壓力



For all aluminium cutters a symmetrical face geometry with increased chip space is standard, therefore ideal even for plunging operations.

對於所有鋁加工刀具而言具有更大容屑空間與對稱面幾何形狀是標準設計因此即使是插銑操作也是理想的



可加工材質種類



Tool illustration
刀具示意圖

Z
柄部

Shank form
刃數

Length
長度

Helix angle °
螺旋角

Tool material
材質

Surface
鍍層

d1/mm
尺寸範圍

Article no.
編號

Page
頁次

Ratio end mills Alu RF 100 A

•		NEW	3	HA		39° 40° 41°	VHM	Cb	5.000 - 20.000	6980	6
•		NEW	3	HB		39° 40° 41°	VHM	Cb	5.000 - 20.000	6981	6
•		NEW	3	HA		39° 40° 41°	VHM	Cb	3.000 - 20.000	6978	7
•		NEW	3	HB		39° 40° 41°	VHM	Cb	3.000 - 20.000	6979	7
•			3	HA		39° 40° 41°	VHM	○	3.000 - 20.000	3472	8
•			3	HB		39° 40° 41°	VHM	○	3.000 - 20.000	6702	8
•		NEW	3	HA		39° 40° 41°	VHM	Cb	6.000 - 20.000	6982	9
•		NEW	3	HB		39° 40° 41°	VHM	Cb	6.000 - 20.000	6983	9
•			3	HA		39° 40° 41°	VHM	○	6.000 - 25.000	3599	10
•			3	HB		39° 40° 41°	VHM	○	6.000 - 25.000	6729	10
•			3	HA		39° 40° 41°	VHM	○	6.000 - 20.000	3473	11
•			3	HB		39° 40° 41°	VHM	○	6.000 - 20.000	6703	11
•			3	HA	3xD	39° 40° 41°	VHM	○	5.000 - 20.000	6730	12
•			3	HB	3xD	39° 40° 41°	VHM	○	5.000 - 20.000	6731	12
•			3	HA	4xD	39° 40° 41°	VHM	○	6.000 - 20.000	6732	13
•			3	HB	4xD	39° 40° 41°	VHM	○	6.000 - 20.000	6733	13
•			3	HA	5xD	39° 40° 41°	VHM	○	6.000 - 20.000	6734	14
•			3	HB	5xD	39° 40° 41°	VHM	○	6.000 - 20.000	6735	14
○			4	HA		40° 42°	VHM	○	4.000 - 20.000	3202	15
○			4	HB		40° 42°	VHM	○	4.000 - 20.000	3319	15
•			4	HA		40° 42°	VHM	○	3.000 - 20.000	6762	16
•		NEW	3	HA		30° 29° 31°	VHM	Cb	6.000 - 20.000	6974	17
•		NEW	3	HB		30° 29° 31°	VHM	Cb	6.000 - 20.000	6975	17



可加工材質種類



Tool illustration
刀具示意圖

Z Shank form Length Helix angle ° Tool material Surface d1/mm Article no. Page
柄部 刃數 長度 螺旋角 材質 鍍層 尺寸範圍 編號 頁次

Ratio end mills Alu RF 100 A

•		NEW	3	HA		30° 29° 31°	VHM	Cb	6.000 - 20.000	6976	18
○		NEW	3	HB		30° 29° 31°	VHM	Cb	6.000 - 20.000	6977	18
•		NEW	3	HA	5xD	30° 29° 31°	VHM	Cb	10.000 - 25.000	6866	19
•			3	HA		30° 29° 31°	VHM	○	6.000 - 25.000	6868	20
•			3	HB		30° 29° 31°	VHM	○	6.000 - 25.000	6869	20
•			3	HA		30° 29° 31°	VHM	○	6.000 - 20.000	6870	21
•			3	HB		30° 29° 31°	VHM	○	6.000 - 20.000	6871	21

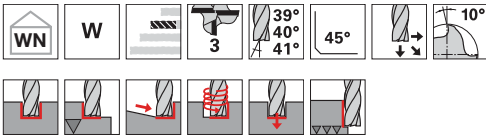
Ball nose hard profile cutters GA 200 A

•		NEW	2	HA		35°	VHM	Cb	3.000 - 16.000	6984	22
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End mills (single-fluted)

•			1	HA		30°	VHM	○	2.000 - 16.000	6793	23
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Ratio end mills Alu RF 100 A



P
M
K
N ●
S
H

GÜHRING NAVIGATOR

Cutting data page 24

切削參數24頁

- with internal cooling: Radial and axial exits
- nano polished cutting edges
- neck clearance
- centre cutting

- 徑向和軸向中心出水
- 奈米拋光刃口
- 縮頸設計
- 端刀過中心

Tool material

Solid carbide

Surface

Ⓞ_{cb}

Ⓞ_{cb}

Type

W

W

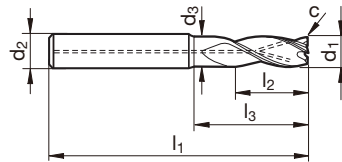
Shank form

HA

HB



刀底和溝槽皆有中心出水



編號

6980

6981

Discount group

106

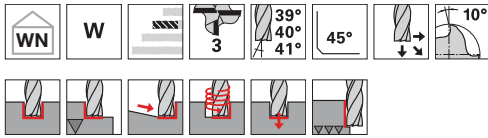
106

d1 e8	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm	mm x 45°	刀數			
5.00	6.00	4.80	57	13.0	18.0	0.05	3	5.00	1,300	1,400
6.00	6.00	5.70	57	13.0	20.0	0.06	3	6.00	1,400	1,600
8.00	8.00	7.70	63	19.0	26.0	0.08	3	8.00	1,600	1,700
10.00	10.00	9.50	72	22.0	30.0	0.10	3	10.00	2,700	2,900
12.00	12.00	11.50	83	26.0	36.0	0.12	3	12.00	4,000	4,200
16.00	16.00	15.50	92	32.0	42.0	0.16	3	16.00	7,100	7,400
20.00	20.00	19.50	104	38.0	52.0	0.20	3	20.00	11,500	11,800

材料 ISO	硬度 Hardness	切速 v _c	f _z (mm/z) / Ø 每刃進給 / 刃徑							切速 v _c	f _z (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	750	0,025	0,051	0,068	0,104	0,12	0,17	0,21
	≥ 5% Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12		345	0,021	0,043	0,057	0,078	0,09	0,12
NE	≤ 850 N/mm ²	250	0,017	0,033	0,044	0,060	0,07	0,10	0,12	375	0,021	0,043	0,057	0,078	0,09	0,12	0,16



Ratio end mills Alu RF 100 A



P	
M	
K	
N	•
S	
H	

GÜHRING NAVIGATOR

Cutting data page 24

切削參數24頁

- nano polished cutting edges
- neck clearance
- centre cutting

- 奈米拋光刃口
- 縮頸設計
- 端刃過中心

Tool material

Solid carbide

Surface

Ⓞ

Ⓞ

Type

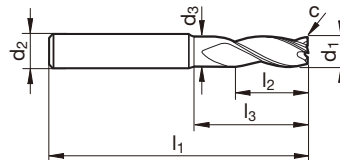
W

W

Shank form

HA

HB



編號

6978

6979

Discount group

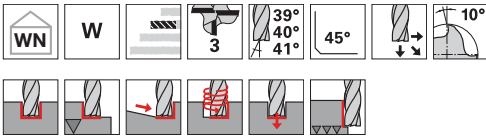
106

106

d1 e8	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm	mm x 45°	刀數			
3.000	6.000	2.800	57.000	8.000	15.000	0.030	3	3.000	1,100	1,200
4.000	6.000	3.800	57.000	11.000	18.000	0.040	3	4.000	1,000	1,100
5.000	6.000	4.800	57.000	13.000	18.000	0.050	3	5.000	1,000	1,100
6.000	6.000	5.700	57.000	13.000	20.000	0.060	3	6.000	1,100	1,200
8.000	8.000	7.700	63.000	19.000	26.000	0.080	3	8.000	1,200	1,300
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000	2,100	2,200
12.000	12.000	11.500	83.000	26.000	36.000	0.120	3	12.000	3,100	3,200
16.000	16.000	15.500	92.000	32.000	42.000	0.160	3	16.000	5,500	5,700
20.000	20.000	19.500	104.000	38.000	52.000	0.200	3	20.000	8,800	9,000

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	750	0,025	0,051	0,068	0,104	0,12	0,17	0,21
	≥ 5% Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12		345	0,021	0,043	0,057	0,078	0,09	0,12
NE	≤ 850 N/mm²	250	0,017	0,033	0,044	0,060	0,07	0,10	0,12	375	0,021	0,043	0,057	0,078	0,09	0,12	0,16

Ratio end mills Alu RF 100 A



P	
M	
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N	•
S	
H	

GÜHRING NAVIGATOR

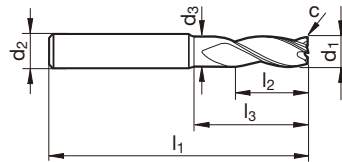
Cutting data page 24

切削參數24頁

- nano polished cutting edges
- neck clearance
- centre cutting

- 奈米拋光刃口
- 縮頸設計
- 端刃過中心

Tool material	Solid carbide	
Surface	○	○
Type	W	W
Shank form	HA	HB



編號 3472 6702

Discount group 106 106

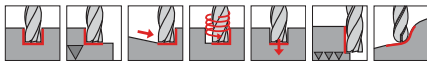
d1 e8	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm	mm x 45°	刀數			
3.000	6.000	2.800	57.000	8.000	15.000	0.030	3	3.000	900	900
4.000	6.000	3.800	57.000	11.000	18.000	0.040	3	4.000	800	900
5.000	6.000	4.800	57.000	13.000	18.000	0.050	3	5.000	800	900
6.000	6.000	5.700	57.000	13.000	20.000	0.060	3	6.000	900	900
8.000	8.000	7.700	63.000	19.000	26.000	0.080	3	8.000	1,000	1,000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000	1,600	1,700
12.000	12.000	11.500	83.000	26.000	36.000	0.120	3	12.000	2,400	2,500
16.000	16.000	15.500	92.000	32.000	42.000	0.160	3	16.000	4,200	4,400
20.000	20.000	19.500	104.000	38.000	52.000	0.200	3	20.000	6,800	7,000

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	750	0,025	0,051	0,068	0,104	0,12	0,17	0,21
	≥ 5% Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12		345	0,021	0,043	0,057	0,078	0,09	0,12
NE	≤ 850 N/mm²	250	0,017	0,033	0,044	0,060	0,07	0,10	0,12	375	0,021	0,043	0,057	0,078	0,09	0,12	0,16

Our Carbo-coating is available as an option to improve chip flow and tool life
 此銑刀若有碳基鍍層時，可以提升刀具壽命並幫助排屑。



Ratio end mills Alu RF 100 A



P **GÜHRING NAVIGATOR**

M Cutting data page 24

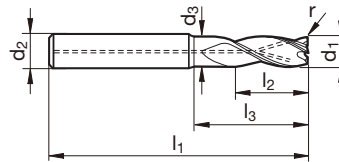
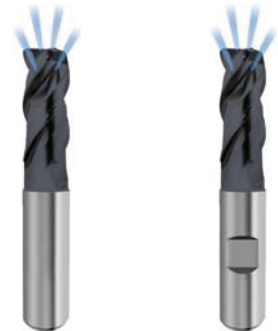
K 切削參數24頁

- N** ●
- with internal cooling: Radial and axial exits
 - nano polished cutting edges
 - neck clearance
 - centre cutting

- 徑向和軸向中心出水
- 奈米拋光刃口
- 縮頸設計
- 端刀過中心

Tool material	Solid carbide	
Surface	ⓐ	ⓑ
Type	W	W
Shank form	HA	HB

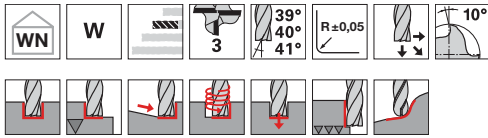
刀底和溝槽皆有中心出水



									編號	6982	6983
									Discount group	106	106
d1 e8	d2 h6	d3	l1	l2	l3	r	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm	mm	刀數				
6.000	6.000	5.700	57.000	13.000	20.000	0.500	3	6.005	2,000	2,100	
6.000	6.000	5.700	57.000	13.000	20.000	1.000	3	6.010	2,000	2,100	
8.000	8.000	7.700	63.000	19.000	26.000	0.500	3	8.005	2,200	2,300	
8.000	8.000	7.700	63.000	19.000	26.000	1.000	3	8.010	2,200	2,300	
10.000	10.000	9.500	72.000	22.000	30.000	0.500	3	10.005	3,700	3,900	
10.000	10.000	9.500	72.000	22.000	30.000	1.000	3	10.010	3,700	3,900	
10.000	10.000	9.500	72.000	22.000	30.000	1.500	3	10.015	3,700	3,900	
12.000	12.000	11.500	83.000	26.000	36.000	0.500	3	12.005	5,300	5,500	
12.000	12.000	11.500	83.000	26.000	36.000	1.000	3	12.010	5,300	5,500	
12.000	12.000	11.500	83.000	26.000	36.000	1.500	3	12.015	5,300	5,500	
12.000	12.000	11.500	83.000	26.000	36.000	2.000	3	12.020	5,300	5,500	
12.000	12.000	11.500	83.000	26.000	36.000	2.500	3	12.025	5,300	5,500	
12.000	12.000	11.500	83.000	26.000	36.000	3.000	3	12.030	5,300	5,500	
12.000	12.000	11.500	83.000	26.000	36.000	4.000	3	12.040	5,300	5,500	
16.000	16.000	15.500	92.000	32.000	42.000	1.000	3	16.010	9,100	9,400	
16.000	16.000	15.500	92.000	32.000	42.000	2.000	3	16.020	9,100	9,400	
16.000	16.000	15.500	92.000	32.000	42.000	2.500	3	16.025	9,100	9,400	
16.000	16.000	15.500	92.000	32.000	42.000	3.000	3	16.030	9,100	9,400	
16.000	16.000	15.500	92.000	32.000	42.000	4.000	3	16.040	9,100	9,400	
20.000	20.000	19.500	104.000	38.000	52.000	1.000	3	20.010	14,200	14,400	
20.000	20.000	19.500	104.000	38.000	52.000	2.000	3	20.020	14,200	14,400	
20.000	20.000	19.500	104.000	38.000	52.000	3.000	3	20.030	14,200	14,400	
20.000	20.000	19.500	104.000	38.000	52.000	4.000	3	20.040	14,200	14,400	

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	750	0,025	0,051	0,068	0,104	0,12	0,17	0,21
	≥ 5% Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12		345	0,021	0,043	0,057	0,078	0,09	0,12
NE	≤ 850 N/mm ²	250	0,017	0,033	0,044	0,060	0,07	0,10	0,12	375		0,021	0,043	0,057	0,078	0,09	0,12

Ratio end mills Alu RF 100 A



Tool material	Solid carbide	
Surface	○	○
Type	W	W
Shank form	HA	HB

P **GÜHRING NAVIGATOR**

M Cutting data page 24

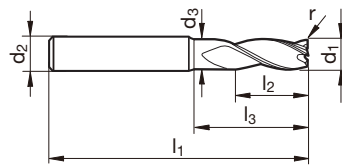
K 切削參數24頁

N ●

S

H

- nano polished cutting edges
- neck clearance
- centre cutting
- 奈米拋光刃口
- 縮頸設計
- 端刀過中心



編號 3599 6729

Discount group 106 106

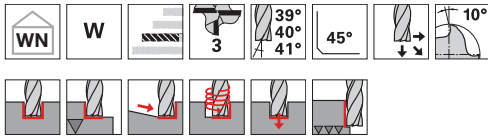
d1 e8	d2 h6	d3	l1	l2	l3	r	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm	mm	刃數			
6.000	6.000	5.700	57.000	13.000	20.000	0.500	3	6.005	1,200	1,300
6.000	6.000	5.700	57.000	13.000	20.000	1.000	3	6.010	1,200	1,300
8.000	8.000	7.700	63.000	19.000	26.000	0.500	3	8.005	1,300	1,400
8.000	8.000	7.700	63.000	19.000	26.000	1.000	3	8.010	1,300	1,400
10.000	10.000	9.500	72.000	22.000	30.000	0.500	3	10.005	2,200	2,300
10.000	10.000	9.500	72.000	22.000	30.000	1.000	3	10.010	2,200	2,300
10.000	10.000	9.500	72.000	22.000	30.000	1.500	3	10.015	2,200	2,300
12.000	12.000	11.500	83.000	26.000	36.000	0.500	3	12.005	3,200	3,300
12.000	12.000	11.500	83.000	26.000	36.000	1.000	3	12.010	3,200	3,300
12.000	12.000	11.500	83.000	26.000	36.000	1.500	3	12.015	3,200	3,300
12.000	12.000	11.500	83.000	26.000	36.000	2.000	3	12.020	3,200	3,300
12.000	12.000	11.500	83.000	26.000	36.000	2.500	3	12.025	3,200	3,300
12.000	12.000	11.500	83.000	26.000	36.000	3.000	3	12.030	3,200	3,300
12.000	12.000	11.500	83.000	26.000	36.000	4.000	3	12.040	3,200	3,300
16.000	16.000	15.500	92.000	32.000	42.000	1.000	3	16.010	5,400	5,500
16.000	16.000	15.500	92.000	32.000	42.000	2.000	3	16.020	5,400	5,500
16.000	16.000	15.500	92.000	32.000	42.000	2.500	3	16.025	5,400	5,500
16.000	16.000	15.500	92.000	32.000	42.000	3.000	3	16.030	5,400	5,500
16.000	16.000	15.500	92.000	32.000	42.000	4.000	3	16.040	5,400	5,500
20.000	20.000	19.500	104.000	38.000	52.000	1.000	3	20.010	8,400	8,500
20.000	20.000	19.500	104.000	38.000	52.000	2.000	3	20.020	8,400	8,500
20.000	20.000	19.500	104.000	38.000	52.000	2.500	3	20.025	8,400	8,500
20.000	20.000	19.500	104.000	38.000	52.000	3.000	3	20.030	8,400	8,500
20.000	20.000	19.500	104.000	38.000	52.000	4.000	3	20.040	8,400	8,500
25.000	25.000	24.000	121.000	45.000	63.000	2.000	3	25.020	13,400	13,700
25.000	25.000	24.000	121.000	45.000	63.000	3.000	3	25.030	13,400	13,700
25.000	25.000	24.000	121.000	45.000	63.000	4.000	3	25.040	13,400	13,700

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑								切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							
			3	6	8	10	12	16	20	3		6	8	10	12	16	20		
N	≤ 5% Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16		750	0,025	0,051	0,068	0,104	0,12	0,17	0,21	
	≥ 5% Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12			345	0,021	0,043	0,057	0,078	0,09	0,12	0,16
NE	≤ 850 N/mm²	250	0,017	0,033	0,044	0,060	0,07	0,10	0,12		375	0,021	0,043	0,057	0,078	0,09	0,12	0,16	

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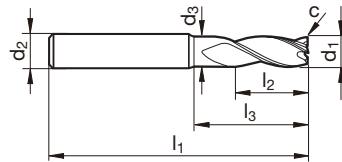
Ratio end mills Alu RF 100 A



Tool material	Solid carbide	
Surface	○	○
Type	W	W
Shank form	HA	HB

P	GÜHRING NAVIGATOR
M	Cutting data page 24
K	切削參數24頁
N	•
S	• nano polished cutting edges
H	• neck clearance

- 奈米拋光刃口
- 縮頸設計
- 端刀過中心

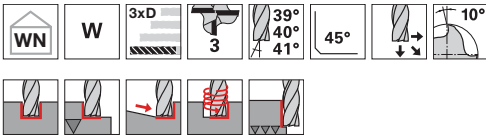


									編號	3473	6703
									Discount group	106	106
d1 e8	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm	mm x 45°	刀數				
6.000	6.000	5.500	65.000	13.000	28.000	0.060	3	6.000	900	1,000	
8.000	8.000	7.500	75.000	19.000	38.000	0.080	3	8.000	1,000	1,100	
10.000	10.000	9.200	80.000	22.000	38.000	0.100	3	10.000	1,700	1,900	
12.000	12.000	11.200	93.000	26.000	46.000	0.120	3	12.000	2,600	2,700	
16.000	16.000	15.000	108.000	32.000	58.000	0.160	3	16.000	4,600	4,800	
20.000	20.000	19.000	126.000	38.000	74.000	0.200	3	20.000	7,400	7,600	

材料 ISO	硬度 Hardness	切速 v _c	f _z (mm/z) / Ø 每刃進給 / 刃徑							切速 v _c	f _z (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	750	0,025	0,051	0,068	0,104	0,12	0,17	0,21
	≥ 5% Si	230	0,017	0,033	0,044	0,060	0,07	0,10	345		0,021	0,043	0,057	0,078	0,09	0,12	0,16
NE	≤ 850 N/mm ²	250	0,017	0,033	0,044	0,060	0,07	0,10	375	0,021	0,043	0,057	0,078	0,09	0,12	0,16	

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Ratio end mills Alu RF 100 A



P

M

K

N •

S

H

GÜHRING NAVIGATOR

Cutting data page 24

切削參數24頁

- nano polished cutting edges
- re-inforced core
- neck clearance
- centre cutting
- 奈米拋光刃口
- 加強柄
- 縮頸設計
- 端刀過中心

Tool material

Solid carbide

Surface



Type

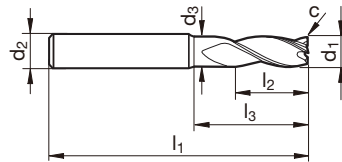
W

W

Shank form

HA

HB



編號

6730

6731

Discount group

106

106

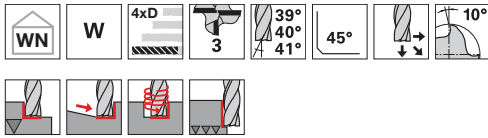
d1 e8	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm	mm x 45°	刀數			
5.000	6.000	4.800	57.000	15.000	19.400	0.050	3	5.000	1,000	1,100
6.000	6.000	5.700	65.000	18.000	28.000	0.060	3	6.000	1,000	1,100
8.000	8.000	7.700	75.000	24.000	38.000	0.080	3	8.000	1,100	1,200
10.000	10.000	9.500	80.000	30.000	38.000	0.100	3	10.000	1,900	2,000
12.000	12.000	11.500	93.000	36.000	46.000	0.120	3	12.000	2,900	3,000
16.000	16.000	15.500	108.000	48.000	58.000	0.160	3	16.000	5,100	5,200
20.000	20.000	19.500	126.000	60.000	74.000	0.200	3	20.000	8,100	8,300

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	900	0,045	0,090	0,120	0,184	0,221	0,294	0,368	1000							
	≥ 5% Si	400	0,038	0,076	0,101	0,138	0,166	0,221	0,276		0,021	0,043	0,057	0,088	0,106	0,141	0,176
NE	≤ 850 N/mm²	470	0,038	0,076	0,101	0,138	0,166	0,221	0,276	500	0,018	0,030	0,036	0,048	0,066	0,079	0,106

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 此銑刀若有碳基鍍層時，可以提升刀具壽命並幫助排屑。



Ratio end mills Alu RF 100 A



P	
M	
K	
N	•
S	
H	

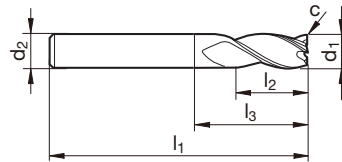
GÜHRING NAVIGATOR

Cutting data page 24

切削參數24頁

- nano polished cutting edges
- re-inforced core
- centre cutting
- 奈米拋光刃口
- 加強柄
- 端刀過中心

Tool material	Solid carbide	
Surface	○	○
Type	W	W
Shank form	HA	HB



編號 **6732** **6733**

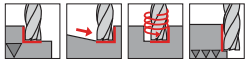
Discount group **106** **106**

d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm x 45°	刃數			
6.00	6.00	65	24.0	29.0	0.06	3	6.000	1,200	1,300
8.00	8.00	75	32.0	39.0	0.08	3	8.000	1,400	1,500
10.00	10.00	100	40.0	60.0	0.10	3	10.000	2,300	2,400
12.00	12.00	100	48.0	55.0	0.12	3	12.000	3,400	3,500
16.00	16.00	125	64.0	77.0	0.16	3	16.000	6,100	6,300
20.00	20.00	150	80.0	100.0	0.20	3	20.000	9,700	10,000

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	400	0,016	0,031	0,042	0,064	0,08	0,10	0,13	450	0,010	0,020	0,026	0,040	0,048	0,064	0,080
	≥ 5% Si	200	0,013	0,027	0,035	0,048	0,06	0,08	0,10		210	0,008	0,017	0,022	0,030	0,036	0,048
NE	≤ 850 N/mm ²	190	0,013	0,027	0,035	0,048	0,06	0,08	0,10	220	0,008	0,017	0,022	0,030	0,036	0,048	0,060

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 此銑刀若有碳基鍍層時，可以提升刀具壽命並幫助排屑。

Ratio end mills Alu RF 100 A



P **GÜHRING NAVIGATOR**

M Cutting data page 24

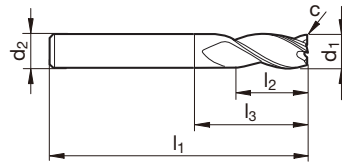
K 切削參數24頁

N •

- S** • nano polished cutting edges
- H** • re-inforced core
- centre cutting

- 奈米拋光刃口
- 加強柄
- 端刀過中心

Tool material	Solid carbide	
Surface	○	○
Type	W	W
Shank form	HA	HB



編號 **6734** **6735**

Discount group **106** **106**

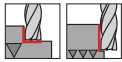
d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm x 45°	刃數			
6.00	6.00	75	30.0	39.0	0.06	3	6.000	1,300	1,400
8.00	8.00	86	40.0	50.0	0.08	3	8.000	1,500	1,600
10.00	10.00	100	50.0	60.0	0.10	3	10.000	2,500	2,600
12.00	12.00	120	60.0	75.0	0.12	3	12.000	3,700	3,800
16.00	16.00	150	80.0	102.0	0.16	3	16.000	6,600	6,700
20.00	20.00	175	100.0	125.0	0.20	3	20.000	10,500	10,700

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	400	0,016	0,031	0,042	0,064	0,08	0,10	0,13	450	0,010	0,020	0,026	0,040	0,048	0,064	0,080
	≥ 5% Si	200	0,013	0,027	0,035	0,048	0,06	0,08	0,10		210	0,008	0,017	0,022	0,030	0,036	0,048
NE	≤ 850 N/mm²	190	0,013	0,027	0,035	0,048	0,06	0,08	0,10	220	0,008	0,017	0,022	0,030	0,036	0,048	0,060

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此銑刀若有碳基鍍層時，可以提升刀具壽命並幫助排屑。



Ratio end mills Alu RF 100 A



P **GÜHRING NAVIGATOR**

M ○ Cutting data page 24

K 切削參數24頁

N ●

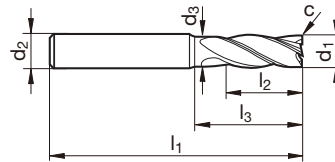
S ○

H ●

- neck clearance
- centre cutting

- 縮頸設計
- 端刃過中心

Tool material	Solid carbide	
Surface	○	○
Type	W	W
Shank form	HA	HB



編號 **3202** **3319**

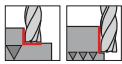
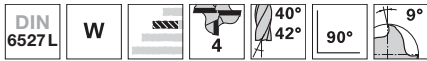
Discount group **106** **106**

d1 h10	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm	mm x 45°	刀數			
4.000	6.000	3.800	57.000	11.000	18.000	0.100	4	4.000	900	1,000
5.000	6.000	4.800	57.000	13.000	18.000	0.100	4	5.000	900	1,000
6.000	6.000	5.700	57.000	13.000	20.000	0.150	4	6.000	900	1,000
8.000	8.000	7.700	63.000	19.000	26.000	0.150	4	8.000	1,000	1,100
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000	1,700	1,800
12.000	12.000	11.500	83.000	26.000	36.000	0.200	4	12.000	2,400	2,500
16.000	16.000	15.500	92.000	32.000	42.000	0.350	4	16.000	4,000	4,200
20.000	20.000	19.500	104.000	38.000	52.000	0.450	4	20.000	6,800	7,000

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	400	0,016	0,031	0,042	0,064	0,08	0,10	0,13	450	0,010	0,020	0,026	0,040	0,048	0,064	0,080
	≥ 5% Si	200	0,013	0,027	0,035	0,048	0,06	0,08	0,10		210	0,008	0,017	0,022	0,030	0,036	0,048
NE	≤ 850 N/mm²	190	0,013	0,027	0,035	0,048	0,06	0,08	0,10	220	0,008	0,017	0,022	0,030	0,036	0,048	0,060

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Ratio end mills Alu RF 100 A 90°



P **GÜHRING NAVIGATOR**

M Cutting data page 24

K 切削參數24頁

N •

- S**
- without corner protection chamfer
 - neck clearance
 - centre cutting

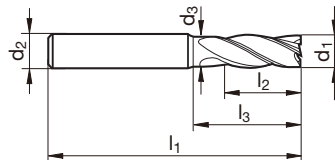
- H**
- 端刀90度銳利刀口無倒角
 - 縮頸設計
 - 端刀過中心

Tool material **Solid carbide**

Surface ○

Type W

Shank form HA



編號 **6762**

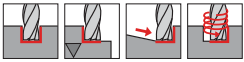
Discount group **106**

d1 h10	d2 h6	d3	l1	l2	l3	Z	Code no.	價格
mm	mm	mm	mm	mm	mm	刃數		
3.00	6.00	2.80	57	8.0	15.0	4	3.000	900
4.00	6.00	3.80	57	11.0	18.0	4	4.000	900
5.00	6.00	4.80	57	13.0	18.0	4	5.000	900
6.00	6.00	5.70	57	13.0	20.0	4	6.000	900
8.00	8.00	7.70	63	19.0	26.0	4	8.000	1,000
10.00	10.00	9.50	72	22.0	30.0	4	10.000	1,700
12.00	12.00	11.50	83	26.0	36.0	4	12.000	2,400
16.00	16.00	15.50	92	32.0	42.0	4	16.000	4,000
20.00	20.00	19.50	104	38.0	52.0	4	20.000	6,800

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	400	0,016	0,031	0,042	0,064	0,08	0,10	0,13	450	0,010	0,020	0,026	0,040	0,048	0,064	0,080
	≥ 5% Si	200	0,013	0,027	0,035	0,048	0,06	0,08	0,10		210	0,008	0,017	0,022	0,030	0,036	0,048
NE	≤ 850 N/mm ²	190	0,013	0,027	0,035	0,048	0,06	0,08	0,10	220	0,008	0,017	0,022	0,030	0,036	0,048	0,060



Ratio end mills Alu RF 100 A



P **GÜHRING NAVIGATOR**

M Cutting data page 24

K 切削參數24頁

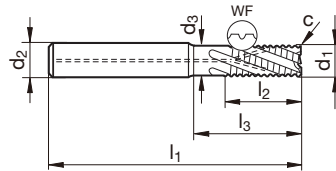
N •

- S**
- with internal cooling: Radial and axial exits
 - neck clearance
 - centre cutting

- H**
- 徑向和軸向中心出水
 - 縮頸設計
 - 端刀過中心

Tool material	Solid carbide	
Surface	ⓐ	ⓑ
Type	WF	WF
Shank form	HA	HB

刀底和溝槽皆有中心出水



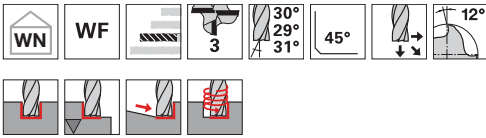
編號 **6974** **6975**

Discount group **106** **106**

d1 js9	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm	mm x 45°	刀數			
6.000	6.000	5.700	57.000	13.000	20.000	0.060	3	6.000	3,100	3,200
8.000	8.000	7.700	63.000	19.000	26.000	0.080	3	8.000	3,300	3,400
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000	4,000	4,200
12.000	12.000	11.500	83.000	26.000	36.000	0.120	3	12.000	5,000	5,100
16.000	16.000	15.500	92.000	32.000	42.000	0.160	3	16.000	7,600	7,900
20.000	20.000	19.500	104.000	38.000	52.000	0.200	3	20.000	14,300	14,600

材料 ISO	硬度 Hardness	切速 v_c	f_z (mm/z) / \varnothing 每刃進給 / 刃徑							切速 v_c	f_z (mm/z) / \varnothing 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	$\leq 5\% \text{ Si}$	375	0,011	0,021	0,028	0,037	0,044	0,059	0,074	440	0,012	0,024	0,032	0,043	0,051	0,068	0,085
	$\geq 5\% \text{ Si}$	180	0,010	0,019	0,026	0,035	0,042	0,056	0,070		210	0,011	0,022	0,029	0,040	0,048	0,064
NE	$\leq 850 \text{ N/mm}^2$	200	0,010	0,019	0,026	0,035	0,042	0,056	0,070	230	0,011	0,022	0,029	0,040	0,048	0,064	0,081

Ratio end mills Alu RF 100 A



P	
M	
K	
N	•
S	
H	

GÜHRING NAVIGATOR

Cutting data page 24

切削參數24頁

- with internal cooling: Radial and axial exits
- neck clearance
- centre cutting

- 徑向和軸向中心出水
- 縮頸設計
- 端刀過中心

Tool material

Solid carbide

Surface



Type

WF

W

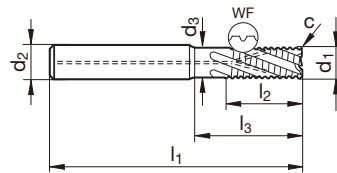
Shank form

HA

HB



刀底和溝槽皆有中心出水



編號

6976

6977

Discount group

106

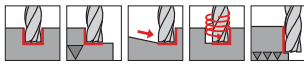
106

d1 js9	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm	mm x 45°	刀數			
6.000	6.000	5.700	65.000	13.000	28.000	0.060	3	6.000	3,400	3,400
8.000	8.000	7.700	75.000	19.000	38.000	0.080	3	8.000	3,700	3,800
10.000	10.000	9.500	80.000	22.000	38.000	0.100	3	10.000	4,300	4,500
12.000	12.000	11.500	93.000	26.000	46.000	0.120	3	12.000	5,500	5,600
16.000	16.000	15.500	108.000	32.000	58.000	0.160	3	16.000	8,400	8,600
20.000	20.000	19.500	126.000	38.000	74.000	0.200	3	20.000	15,600	16,000

材料 ISO	硬度 Hardness	切速 V _c	f _z (mm/z) / Ø 每刃進給 / 刃徑							切速 V _c	f _z (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	375	0,011	0,021	0,028	0,037	0,044	0,059	0,074	440	0,012	0,024	0,032	0,043	0,051	0,068	0,085
	≥ 5% Si	180	0,010	0,019	0,026	0,035	0,042	0,056	0,070		210	0,011	0,022	0,029	0,040	0,048	0,064
NE	≤ 850 N/mm ²	200	0,010	0,019	0,026	0,035	0,042	0,056	0,070	230	0,011	0,022	0,029	0,040	0,048	0,064	0,081



Ratio end mills Alu RF 100 A



P **GÜHRING NAVIGATOR**

M Cutting data page 24

K 切削參數24頁

N •

- S**
- with internal cooling: Radial and axial exits
 - neck clearance
 - centre cutting

- H**
- 徑向和軸向中心出水
 - 縮頸設計
 - 端刀過中心

Tool material **Solid carbide**

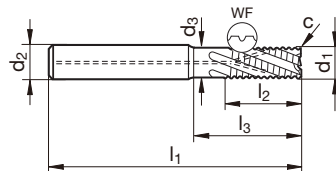
Surface **ⓐ**

Type **WF**

Shank form **HA**



刀底和溝槽皆有中心出水



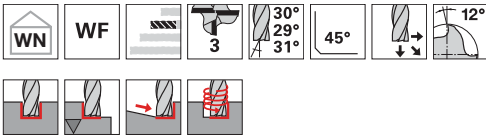
編號 **6866**

Discount group **106**

d1 js9	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格
mm	mm	mm	mm	mm	mm	mm x 45°	刀數		
10.000	10.000	9.500	100.000	22.000	58.000	0.100	3	10.000	4,600
12.000	12.000	11.500	108.000	26.000	61.000	0.120	3	12.000	5,900
16.000	16.000	15.500	132.000	32.000	82.000	0.160	3	16.000	9,100
20.000	20.000	19.500	154.000	38.000	102.000	0.200	3	20.000	17,100
25.000	25.000	24.000	185.000	45.000	127.000	0.250	3	25.000	21,300

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	375	0,011	0,021	0,028	0,037	0,044	0,059	0,074	440	切深 ap = 1,5 x D						
	≥ 5% Si	180	0,010	0,019	0,026	0,035	0,042	0,056	0,070		210	最大切寬 ae max = 0,75 x D					
NE	≤ 850 N/mm²	200	0,010	0,019	0,026	0,035	0,042	0,056	0,070	230	0,011	0,022	0,029	0,040	0,048	0,064	0,081

Ratio end mills Alu RF 100 A



Tool material	Solid carbide	
Surface	○	○
Type	WF	WF
Shank form	HA	HB

P **GÜHRING NAVIGATOR**

M Cutting data page 24

K 切削參數24頁

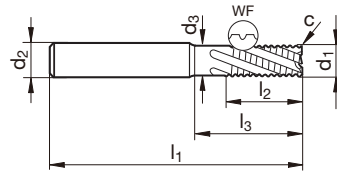
N ●

S

H

- neck clearance
- centre cutting

- 縮頸設計
- 端刀過中心



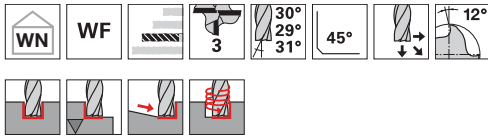
									編號	6868	6869
									Discount group	106	106
d1 js9	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm	mm x 45°	刀數				
6.000	6.000	5.700	57.000	13.000	20.000	0.060	3	6.000	1,800	1,900	
8.000	8.000	7.700	63.000	19.000	26.000	0.080	3	8.000	2,000	2,000	
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000	2,400	2,500	
12.000	12.000	11.500	83.000	26.000	36.000	0.120	3	12.000	3,000	3,000	
16.000	16.000	15.500	92.000	32.000	42.000	0.160	3	16.000	4,500	4,700	
20.000	20.000	19.500	104.000	38.000	52.000	0.200	3	20.000	8,500	8,600	
25.000	25.000	24.000	121.000	45.000	63.000	0.250	3	25.000	13,000	13,200	

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	375	0,011	0,021	0,028	0,037	0,044	0,059	0,074	440	0,012	0,024	0,032	0,043	0,051	0,068	0,085
	≥ 5% Si	180	0,010	0,019	0,026	0,035	0,042	0,056	0,070		210	0,011	0,022	0,029	0,040	0,048	0,064
NE	≤ 850 N/mm²	200	0,010	0,019	0,026	0,035	0,042	0,056	0,070	230	0,011	0,022	0,029	0,040	0,048	0,064	0,081

Our Carbo-coating is available as an option to improve chip flow and tool life
 此銑刀若有碳基鍍層時，可以提升刀具壽命並幫助排屑。



Ratio end mills Alu RF 100 A



Tool material	Solid carbide	
Surface	○	○
Type	WF	WF
Shank form	HA	HB

P **GÜHRING** NAVIGATOR

M Cutting data page 24

K 切削參數24頁

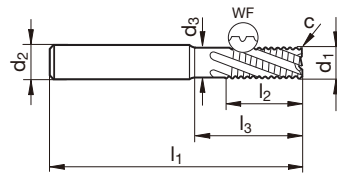
N ●

S

H

- neck clearance
- centre cutting

- 縮頸設計
- 端刀過中心



編號 **6870** **6871**

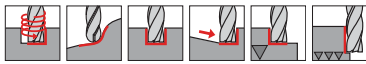
Discount group **106** **106**

d1 js9	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm	mm x 45°	刀數			
6.000	6.000	5.700	65.000	13.000	28.000	0.060	3	6.000	2,000	2,000
8.000	8.000	7.700	75.000	19.000	38.000	0.080	3	8.000	2,200	2,200
10.000	10.000	9.500	80.000	22.000	38.000	0.100	3	10.000	2,600	2,700
12.000	12.000	11.500	93.000	26.000	46.000	0.120	3	12.000	3,200	3,300
16.000	16.000	15.500	108.000	32.000	58.000	0.160	3	16.000	4,900	5,100
20.000	20.000	19.500	126.000	38.000	74.000	0.200	3	20.000	9,200	9,500

材料 ISO	硬度 Hardness	切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑							切速 Vc	fz (mm/z) / Ø 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5% Si	375	0,011	0,021	0,028	0,037	0,044	0,059	0,074	440	0,012	0,024	0,032	0,043	0,051	0,068	0,085
	≥ 5% Si	180	0,010	0,019	0,026	0,035	0,042	0,056	0,070		210	0,011	0,022	0,029	0,040	0,048	0,064
NE	≤ 850 N/mm²	200	0,010	0,019	0,026	0,035	0,042	0,056	0,070	230	0,011	0,022	0,029	0,040	0,048	0,064	0,081

Our Carbo-coating is available as an option to improve chip flow and tool life
 此銑刀若有碳基鍍層時，可以提升刀具壽命並幫助排屑。

Ball nose hard profile cutters GA 200 A



P **GÜHRING NAVIGATOR**

M Cutting data page 24

K 切削參數24頁

N •

S

H

- neck clearance
- centre cutting

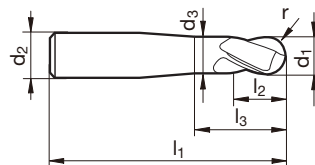
- 縮頸設計
- 端刀過中心

Tool material **Solid carbide**

Surface **ⓐ**

Type **W**

Shank form **HA**



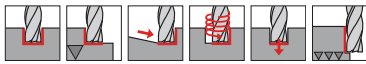
編號 **6984**

Discount group **106**

d1 h10	d2 h6	d3	l1	l2	l3	r	Z	Code no.	價格
mm	mm	mm	mm	mm	mm	mm	刃數		
3.000	6.000	2.800	57.000	4.000	15.000	1.500	2	3.000	1,000
4.000	6.000	3.800	57.000	5.000	18.000	2.000	2	4.000	1,000
5.000	6.000	4.800	57.000	6.000	18.000	2.500	2	5.000	1,000
6.000	6.000	5.700	57.000	7.000	20.000	3.000	2	6.000	1,200
8.000	8.000	7.700	63.000	9.000	26.000	4.000	2	8.000	1,700
10.000	10.000	9.500	72.000	11.000	30.000	5.000	2	10.000	2,500
12.000	12.000	11.500	83.000	12.000	36.000	6.000	2	12.000	3,200
16.000	16.000	15.500	92.000	16.000	42.000	8.000	2	16.000	5,500



End mills (single-fluted)


P **GÜHRING NAVIGATOR**
M Cutting data page 24

K 切削參數24頁

N •

S
H

- polished flutes
- centre cutting

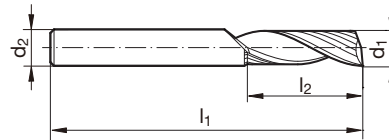
- 縮頸設計
- 端刀過中心

Tool material **Solid carbide**

Surface ○

Type W

Shank form HA



編號

6793

Discount group

117

d1 h10	d2 h6	l1	l2	Z	Code no.	價格
mm	mm	mm	mm	刀數		
2.000	2.000	38.000	10.000	1	2.000	800
3.000	3.000	39.000	12.000	1	3.000	800
4.000	4.000	40.000	15.000	1	4.000	900
5.000	5.000	50.000	16.000	1	5.000	1,100
6.000	6.000	57.000	20.000	1	6.000	1,200
8.000	8.000	63.000	22.000	1	8.000	1,700
10.000	10.000	73.000	25.000	1	10.000	2,600
12.000	12.000	83.000	30.000	1	12.000	3,600
16.000	16.000	92.000	35.000	1	16.000	6,600

材料 ISO	硬度 Hardness	切速 v_c	f_z (mm/z) / \varnothing 每刃進給 / 刃徑							切速 v_c	f_z (mm/z) / \varnothing 每刃進給 / 刃徑						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	$\leq 7\% \text{ Si}$	300	0,019	0,037	0,050	0,065	0,08	0,10	0,13	350	0,021	0,043	0,057	0,075	0,09	0,12	0,15
	$\geq 7\% \text{ Si}$	160	0,013	0,025	0,034	0,046	0,06	0,07	0,09		190	0,018	0,036	0,048	0,064	0,08	0,10
NE	$\leq 850 \text{ N/mm}^2$	175	0,013	0,025	0,034	0,046	0,06	0,07	0,09	290	0,014	0,029	0,039	0,053	0,06	0,08	0,11

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此銑刀若有碳基鍍層時，可以提升刀具壽命並幫助排屑。

Milling conditions : 銑削條件

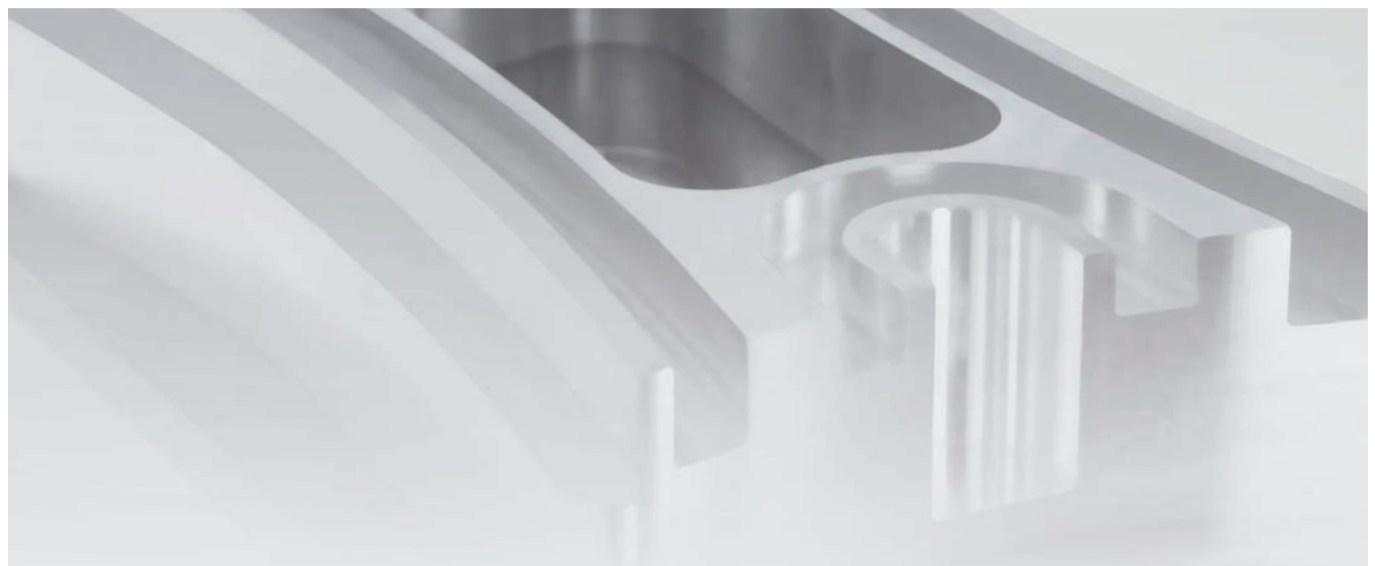
HPC	stable machining conditions 工況穩定 high drive power 高驅動馬力
	short tools
	long tools

Correction factors : 加減係數

	a_p roughing > 1.5xD	切速 v_c -25% 每刃進給 f_z -25%
	medium length tools	v_c -40% f_z -40%
	extra length tools	v_c -60% f_z -55%
	uncoated tools	v_c -50% f_z -25%



Material	Hardness	RF 100 Type	Application	a_e max	v_c	f_z (mm/z) with nom. ϕ 每刃進給/ 刃徑									
						3	4	6	8	10	12	16	20	25	
Aluminium, Al-wrought alloys, Al-alloys 3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1 3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	$\leq 7\% \text{ Si}$	A	Slotting	1xD	500	0.020	0.026	0.039	0.052	0.080	0.096	0.13	0.16	0.20	
		A	Roughing	0.75xD	600	0.022	0.030	0.045	0.060	0.092	0.110	0.15	0.18	0.23	
		A / SF	Finishing	0.02xD	1000	0.021	0.029	0.043	0.057	0.088	0.106	0.14	0.18	0.22	
Aluminium-cast alloys 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	$\geq 7\% \text{ Si}$	A	Slotting	1xD	230	0.017	0.022	0.033	0.044	0.060	0.072	0.10	0.12	0.15	
		A	Roughing	0.75xD	300	0.019	0.025	0.038	0.051	0.069	0.083	0.11	0.14	0.17	
		A / SF	Finishing	0.02xD	460	0.018	0.024	0.036	0.048	0.066	0.079	0.11	0.13	0.17	
Magnesium-alloys MgMn2, G-MgAl8Zn1, G-MgAl6Zn3	-	A	Slotting	1xD	180	0.015	0.020	0.030	0.040	0.055	0.066	0.09	0.11	0.14	
		A	Roughing	0.75xD	210	0.017	0.023	0.035	0.046	0.063	0.076	0.10	0.13	0.16	
		A / SF	Finishing	0.02xD	360	0.017	0.022	0.033	0.044	0.061	0.073	0.10	0.12	0.15	
Non-ferr. met. (copper, short-/long-chipp. brass/bronze) 2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb 2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 ... 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5 2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 ... 2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	$\leq 850 \text{ N/mm}^2$	A	Slotting	1xD	250	0.017	0.022	0.033	0.044	0.060	0.072	0.10	0.12	0.15	
		A	Roughing	0.75xD	290	0.019	0.025	0.038	0.051	0.069	0.083	0.11	0.14	0.17	
		A / SF	Finishing	0.02xD	500	0.018	0.024	0.036	0.048	0.066	0.079	0.11	0.13	0.17	



Application example 實際運用案例

RF 100 A, ϕ 20.0 mm

Slot milling in AlMg4.5Mn
 $a_e = 20\text{mm} / a_p = 11\text{mm}$
 $v_c = 753\text{m/min}$
 $f_z = 0.195\text{mm}$

$v_f = 7000\text{mm/min}$ 每分鐘進給
Metal removal rate $Q = 1540\text{cm}^3/\text{min}$

每分鐘移除率：
 $20 \times 11 \times 7000 / 1000 = 1540\text{ cm}^3/\text{min}$

RF 100 A, ϕ 16.0 mm

Slot milling in AlMgSi1
 $a_e = 7\text{mm} / a_p = 30\text{mm}$
 $v_c = 666\text{m/min}$
 $f_z = 0.23\text{mm}$

$v_f = 9140\text{mm/min}$ 每分鐘進給
Metal removal rate $Q = 1919\text{cm}^3/\text{min}$

每分鐘移除率：
 $20 \times 11 \times 7000 / 1000 = 1540\text{ cm}^3/\text{min}$

RPM = $753 / 3.14 / 20 * 1000 = 11990$
 Feed / 分 = $11990 * 3 * 0.195 = 7014$ (取7000)

RPM = $666 / 3.14 / 16 * 1000 = 13256$
 Feed / 分 = $13256 * 3 * 0.23 = 9147$ (取9140)



Milling conditions : 銑削條件

MTC unstable machining conditions
 low drive power
 工況不佳 / 工件形狀特殊 / 夾持不穩固
 機台馬力與扭力不足

long tools

Correction factors : 加減係數

	a_p roughing > 1.5xD	切速 v_c -25% 每刃進給 f_z -25%
	medium length tools	v_c -40% f_z -40%
	extra length tools	v_c -60% f_z -55%
	uncoated tools	v_c -50% f_z -25%



Material	Hardness	Type	Application	a_e max	v_c	f_z (mm/z) with nom. Ø 每刃進給 / 刃徑								
						3	4	6	8	10	12	16	20	25
Aluminium, Al-wrought alloys, Al-alloys 3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1 3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤ 7 % Si	A / WF	Slotting	1xD	375	0.011	0.014	0.021	0.028	0.037	0.044	0.06	0.07	0.09
		A / WF	Roughing	0.75xD	440	0.012	0.016	0.024	0.032	0.043	0.051	0.07	0.09	0.11
Aluminium-cast alloys 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≥ 7 % Si	A / WF	Slotting	1xD	180	0.010	0.013	0.019	0.026	0.035	0.042	0.06	0.07	0.09
		A / WF	Roughing	0.75xD	210	0.011	0.015	0.022	0.029	0.040	0.048	0.06	0.08	0.10
Magnesium-alloys MgMn2, G-MgAl8Zn1, G-MgAl6Zn3	-	VA / A	Slotting	1xD	140	0.010	0.013	0.019	0.026	0.035	0.042	0.06	0.07	0.09
		VA / A	Roughing	0.75xD	170	0.011	0.015	0.022	0.029	0.040	0.048	0.06	0.08	0.10
Non-ferr. met. (copper, short-/long-chipp. brass/bronze) 2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb 2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 ... 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5 2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 ... 2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤ 850 N/mm ²	VA / A	Slotting	1xD	200	0.010	0.013	0.019	0.026	0.035	0.042	0.06	0.07	0.09
		VA / A	Roughing	0.75xD	230	0.011	0.015	0.022	0.029	0.040	0.048	0.06	0.08	0.10



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