

**powerMILL**

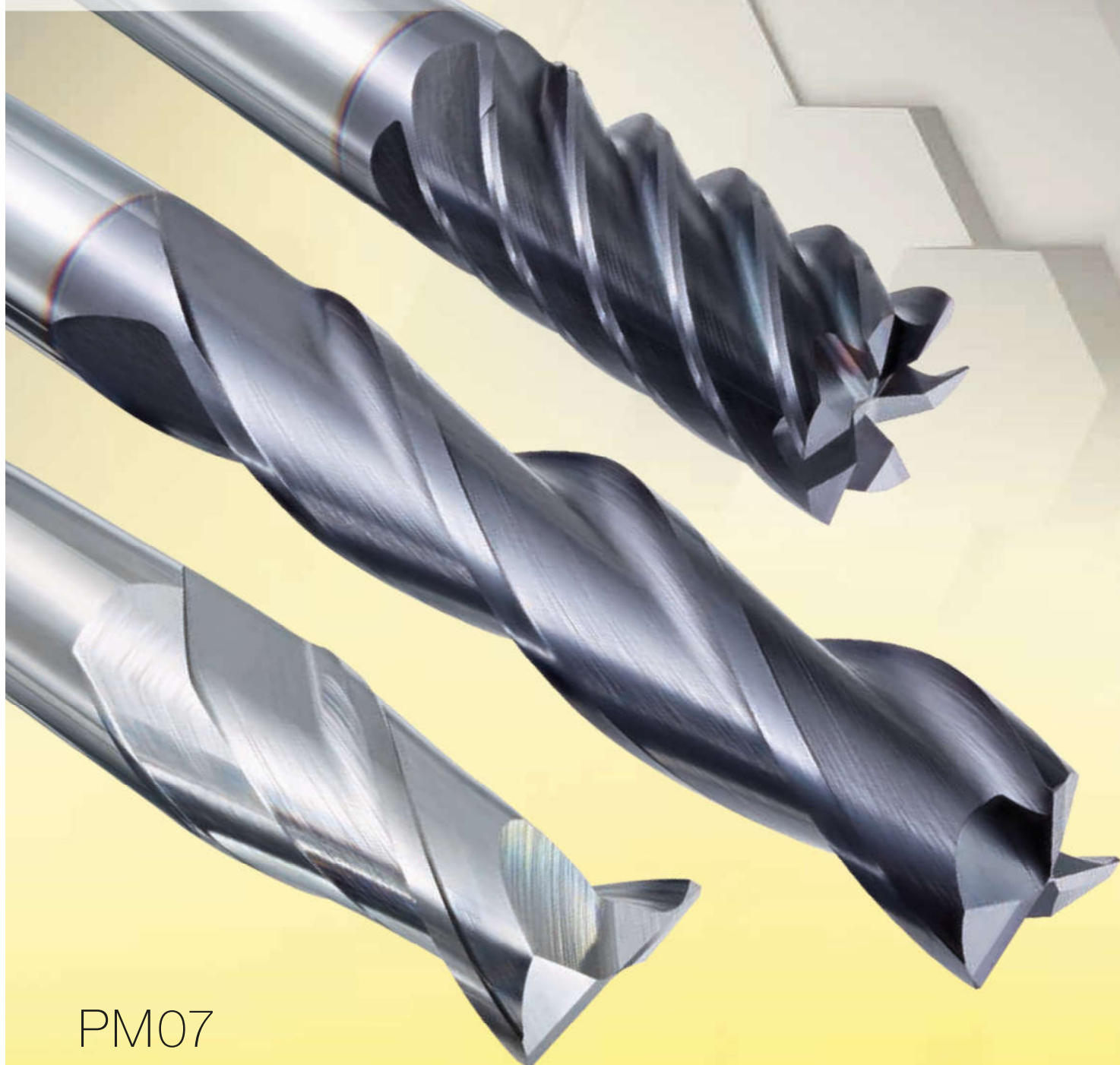
**GÜHRING**

UNIVERSAL MILLING CUTTER PROGRAMME

Unique in  
PRICE AND EFFICIENCY

泛用經濟型銑刀系列

物超所值 卓越的信價比



PM07

P	M	K	N	S	H	Tool illustration	Z	Feed	Shank form	Length	Tool material	Surface	d1/mm	Article no.	Cutting data page	Page
Al slot drills (2-fluted) 鋁合金 非鐵金屬 2刃 開槽端銑刀																
							2		HA		VHM	○	2.000 - 20.000	19994	32	6
							2		HB		VHM	○	2.000 - 20.000	19995	32	6
							2		HA		VHM	○	2.000 - 20.000	19996	32	7
							2		HB		VHM	○	2.000 - 20.000	19997	32	7
Slot drills (3-fluted) 鋁合金 非鐵金屬 3刃 開槽端銑刀																
							3		HA		VHM	○	2.000 - 20.000	19992	32	8
							3		HB		VHM	○	2.000 - 20.000	19993	32	8
Slot drills (2-fluted) 2刃 鋼用端銑刀																
							2		HA		VHM	Ⓡ	2.000 - 20.000	19988	32	9
							2		HB		VHM	Ⓡ	2.000 - 20.000	19989	32	9
							2		Cyl		VHM	Ⓐ	2.000 - 20.000	19962	32	10
							2		HA		VHM	Ⓡ	3.000 - 20.000	19990	32	11
							2		HB		VHM	Ⓡ	3.000 - 20.000	19991	32	11
Slot drills (3-fluted) 3刃 鋼用端銑刀																
							3		-HA		VHM	Ⓡ	2.000 - 20.000	19986	32	12
							3		-HB		VHM	Ⓡ	2.000 - 20.000	19987	32	12
							3		-HA		VHM	Ⓡ	2.000 - 20.000	19982	32	13
							3		HB		VHM	Ⓡ	2.000 - 20.000	19983	32	13
							3		Cyl		VHM	Ⓐ	2.000 - 20.000	19963	32	14
							3		HA		VHM	Ⓡ	3.000 - 20.000	19984	32	15
							3		HB		VHM	Ⓡ	3.000 - 20.000	19985	32	15
HPC end mills (4-fluted) 4刃 35/38度 不等螺旋、不等分割 高效率鋼用銑刀																
							4		HA		VHM	Ⓡ	3.000 - 20.000	19980	32	16
							4		HB		VHM	Ⓡ	3.000 - 20.000	19981	32	16
						頸部離隙	4		HA		VHM	Ⓡ	3.000 - 20.000	19940	32	17

P	M	K	N	S	H	Tool illustration	Z	Feed	Shank form	Length	Tool material	Surface	d1/mm	Article no.	Cutting data page	Page
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HPC end mills (4-fluted) 4刃 35/38度 不等螺旋、不等分割 高效率鋼用銑刀

•	•	•	•	•	•		頸部離除					F	3.000 - 20.000	19941	32	17
•	•	•	•	•	•		ALCrN 鍍層 標準長					P	3.000 - 20.000	19950	32	18
•	•	•	•	•	•		ALCrN 鍍層 加長型					P	3.000 - 20.000	19951	32	19

End mills (4-fluted) 4刃 鋼用端銑刀

•	•	•	•	•	•							F	2.000 - 20.000	19978	32	21
•	•	•	•	•	•							F	2.000 - 20.000	19979	32	21
•	•	•	•	•	•							A	2.000 - 20.000	19961	32	22
•	•	•	•	•	•							F	3.000 - 20.000	19976	32	23
•	•	•	•	•	•							F	3.000 - 20.000	19977	32	23

Multi-tooth end mills (6-fluted) 6刃 側銑 端銑刀

•	•	•	•	•	•							F	3.000 - 20.000	19972	32	24
•	•	•	•	•	•							F	3.000 - 20.000	19973	32	24
•	•	•	•	•	•							F	4.000 - 20.000	19974	32	25
•	•	•	•	•	•							F	4.000 - 20.000	19975	32	25

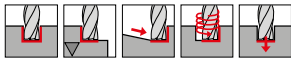
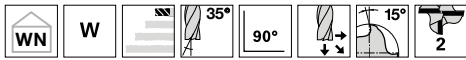
Ball nose slot drills (2-fluted) 2刃 球型銑刀

•	•	•	•	•	•							F	2.000 - 20.000	19968	32	26
•	•	•	•	•	•							F	2.000 - 20.000	19969	32	26
•	•	•	•	•	•							F	3.000 - 12.000	19970	32	27
•	•	•	•	•	•							F	3.000 - 12.000	19971	32	27

Roughing end mills with fine teeth 3~5刃 20度低螺旋 細圓齒型粗銑刀 熱處理高硬度材質用

•	•	•	•	•	•							F	4.000 - 20.000	19964	32	28
•	•	•	•	•	•							F	4.000 - 20.000	19965	32	28
•	•	•	•	•	•							F	5.000 - 25.000	19966	32	29
•	•	•	•	•	•							F	5.000 - 25.000	19967	32	29

Al slot drills (2-fluted) 鋁合金 非鐵金屬 使用



P	
M	
K	
N	•
S	
H	

**GUHRING NAVIGATOR**

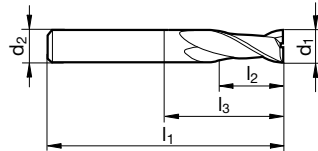
Cutting data page 32

- centre cutting
- with special drill face

Tool material **Solid carbide**

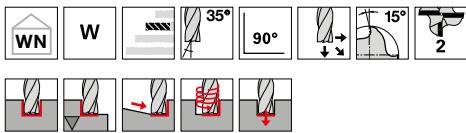
Surface	○	○
Type	W	W
Shank form	HA	HB

# 3310



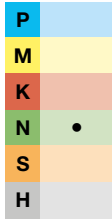
							Article no.	19994	19995
							Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	Z	Code no.	價格		
mm	mm	mm	mm	mm					
2.000	4.000	40.000	3.000	6.400	2	2.000	420		
3.000	4.000	40.000	4.000	8.900	2	3.000	420		
4.000	6.000	50.000	5.000	10.400	2	4.000	420	470	
5.000	6.000	50.000	6.000	12.900	2	5.000	420	470	
6.000	6.000	50.000	7.000	14.000	2	6.000	420	470	
8.000	8.000	58.000	9.000	22.000	2	8.000	510	550	
10.000	10.000	66.000	11.000	26.000	2	10.000	680	740	
12.000	12.000	73.000	12.000	28.000	2	12.000	1,100	1,150	
14.000	14.000	75.000	14.000	30.000	2	14.000	1,500	1,570	
16.000	16.000	82.000	16.000	34.000	2	16.000	1,630	1,730	
18.000	18.000	84.000	18.000	36.000	2	18.000	2,210	2,320	
20.000	20.000	92.000	20.000	42.000	2	20.000	2,950	3,050	

Al slot drills (2-fluted) 鋁合金 非鐵金屬 使用



Tool material **Solid carbide**

Surface	○	○
Type	W	W
Shank form	HA	HB

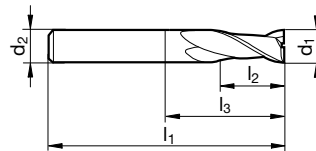


**GUHRING NAVIGATOR**

Cutting data page 32

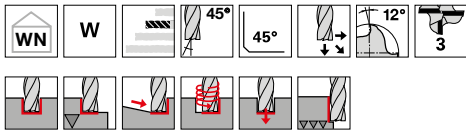
- centre cutting
- with special drill face

# 3309



							Article no.	19996	19997
							Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	Z	Code no.	價格		
mm	mm	mm	mm	mm					
2.000	4.000	40.000	7.000	10.400	2	2.000	550		
3.000	4.000	50.000	9.000	13.900	2	3.000	550		
4.000	6.000	57.000	11.000	16.400	2	4.000	550	590	
5.000	6.000	57.000	13.000	19.900	2	5.000	550	590	
6.000	6.000	57.000	13.000	21.000	2	6.000	550	590	
8.000	8.000	63.000	19.000	28.000	2	8.000	630	670	
10.000	10.000	72.000	22.000	33.000	2	10.000	1,100	1,150	
12.000	12.000	83.000	26.000	40.000	2	12.000	1,630	1,690	
14.000	14.000	83.000	26.000	41.000	2	14.000	1,990	2,050	
16.000	16.000	92.000	32.000	49.000	2	16.000	2,650	2,750	
18.000	18.000	92.000	32.000	50.000	2	18.000	3,160	3,260	
20.000	20.000	104.000	38.000	58.000	2	20.000	4,180	4,280	

Slot drills (3-fluted) 鋁合金 不銹鋼 非鐵金屬 使用



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

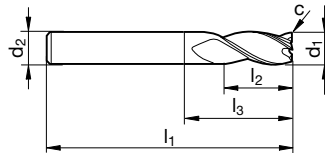
P	
M	○
K	
N	●
S	○
H	

**GUHRING NAVIGATOR**

Cutting data page 32

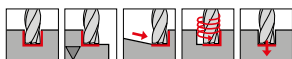
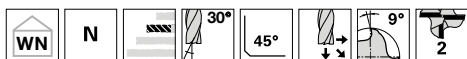
- high-performance slot drill with a quick helix for an especially smooth cutting operation
- centre cutting
- with special drill face

# 3196



								Article no.	19992	19993
								Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm x 45°					
2.000	4.000	50.000	6.000	8.900	0.030	3	2.000	580		
3.000	6.000	57.000	8.000	11.900	0.050	3	3.000	530	570	
4.000	6.000	57.000	11.000	14.900	0.060	3	4.000	500	540	
5.000	6.000	57.000	13.000	18.400	0.080	3	5.000	500	540	
6.000	6.000	57.000	13.000	21.000	0.090	3	6.000	530	570	
8.000	8.000	63.000	19.000	27.000	0.120	3	8.000	600	640	
10.000	10.000	72.000	22.000	32.000	0.150	3	10.000	1,020	1,080	
12.000	12.000	83.000	26.000	38.000	0.180	3	12.000	1,480	1,540	
14.000	14.000	83.000	26.000	38.000	0.210	3	14.000	1,830	1,900	
16.000	16.000	92.000	32.000	44.000	0.190	3	16.000	2,650	2,750	
20.000	20.000	104.000	38.000	54.000	0.240	3	20.000	4,280	4,380	

Slot drills (2-fluted) 2刃鋼用端銑刀



- P** •
- M** •
- K** •
- N** ○
- S** •
- H** •

**GUHRING NAVIGATOR**

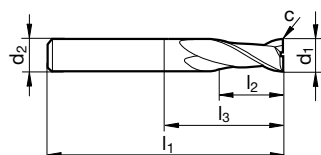
Cutting data page 32

- centre cutting
- with special drill face

# 3635

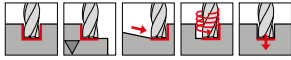
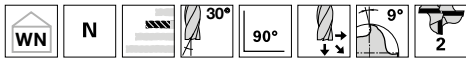
Tool material **Solid carbide**

Surface	<b>F</b>	<b>F</b>
Type	N	N
Shank form	HA	HB



								Article no.	19988	19989
								Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm x 45°					
2.000	4.000	40.000	6.000	9.000	0.020	2	2.000	650		
3.000	4.000	50.000	8.000	12.500	0.030	2	3.000	640		
4.000	6.000	50.000	11.000	16.400	0.040	2	4.000	630	670	
5.000	6.000	50.000	13.000	19.900	0.050	2	5.000	630	670	
6.000	6.000	50.000	13.000	20.000	0.060	2	6.000	610	650	
7.000	8.000	60.000	16.000	23.000	0.070	2	7.000	1,020	1,060	
8.000	8.000	60.000	19.000	27.000	0.080	2	8.000	820	860	
9.000	10.000	70.000	19.000	29.000	0.090	2	9.000	1,430	1,490	
10.000	10.000	70.000	22.000	30.000	0.100	2	10.000	1,200	1,260	
11.000	12.000	75.000	22.000	29.000	0.110	2	11.000	1,580	1,640	
12.000	12.000	75.000	26.000	39.000	0.120	2	12.000	1,710	1,770	
14.000	14.000	75.000	26.000	40.000	0.140	2	14.000	2,320	2,380	
16.000	16.000	75.000	26.000	43.000	0.160	2	16.000	3,410	3,510	
18.000	18.000	100.000	32.000	52.000	0.180	2	18.000	4,280	4,380	
20.000	20.000	100.000	32.000	50.000	0.200	2	20.000	4,480	4,580	

Slot drills (2-fluted) 2刃 鋼用 端銑刀



**P** • **GUHRING NAVIGATOR**  
**M** • Cutting data page 32  
**K** •  
**N** ○  
**S** •  
**H** • centre cutting

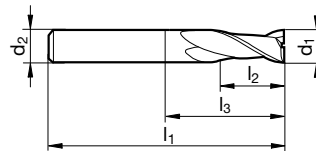
# 3635

Tool material **Solid carbide**

Surface **A**

Type **N**

Shank form **cyl.**

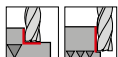
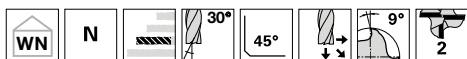


Article no. **19962**

Discount group **206**

d1 h8	d2 h6	l1	l2	l3	Z	Code no.	價格
mm	mm	mm	mm	mm			
2.000	4.000	40.000	6.000	9.400	2	2.000	570
3.000	6.000	45.000	8.000	12.900	2	3.000	500
4.000	6.000	45.000	11.000	16.400	2	4.000	570
5.000	6.000	50.000	13.000	19.900	2	5.000	480
6.000	6.000	50.000	13.000	20.000	2	6.000	610
8.000	8.000	60.000	19.000	27.000	2	8.000	820
10.000	10.000	70.000	22.000	32.000	2	10.000	1,210
12.000	12.000	75.000	26.000	39.000	2	12.000	1,710
16.000	16.000	75.000	32.000	48.000	2	16.000	2,850
20.000	20.000	100.000	40.000	59.000	2	20.000	4,500

**XL slot drills (2-fluted) 2刃 鋼用 端銑刀 長刃型**



- P** •
- M** •
- K** •
- N** ○
- S** •
- H** •

**GUHRING NAVIGATOR**

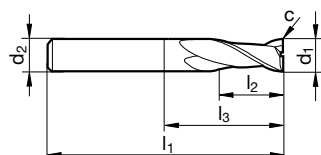
Cutting data page 32

- centre cutting
- with special drill face

# 3021

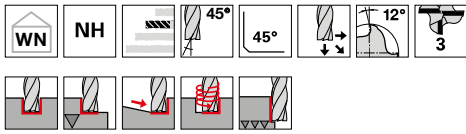
Tool material **Solid carbide**

Surface	<b>F</b>	<b>F</b>
Type	N	N
Shank form	HA	HB



								Article no.	19990	19991
								Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm x 45°					
3.000	3.000	60.000	20.000	32.000	0.030	2	3.000	770		
4.000	4.000	60.000	20.000	32.000	0.040	2	4.000	860		
5.000	5.000	75.000	25.000	47.000	0.050	2	5.000	910		
6.000	6.000	75.000	30.000	39.000	0.060	2	6.000	910	950	
8.000	8.000	75.000	30.000	39.000	0.080	2	8.000	1,730	1,770	
10.000	10.000	100.000	40.000	60.000	0.100	2	10.000	2,120	2,180	
12.000	12.000	100.000	45.000	55.000	0.120	2	12.000	3,260	3,320	
14.000	14.000	100.000	45.000	55.000	0.140	2	14.000	4,230	4,290	
16.000	16.000	100.000	45.000	62.000	0.160	2	16.000	5,250	5,350	
18.000	18.000	100.000	45.000	63.000	0.180	2	18.000	6,110	6,210	
20.000	20.000	100.000	45.000	62.000	0.200	2	20.000	7,080	7,180	

Slot drills (3-fluted) 3刃 鋼用 45度螺旋角 端銑刀



Tool material	Solid carbide	
Surface	<b>F</b>	<b>F</b>
Type	NH	NH
Shank form	~HA	~HB

**P** • **GUHRING NAVIGATOR**

**M** • Cutting data page 32

**K** •

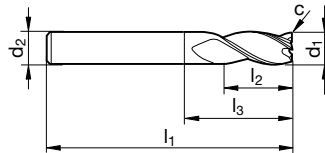
**N** ○

**S** •

**H**

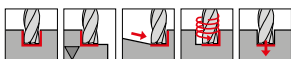
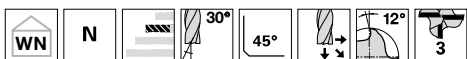
- high-performance slot drill with a quick helix for an especially smooth cutting operation
- centre cutting
- with special drill face

# 3636



								Article no.	19986	19987
								Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm x 45°					
2.000	4.000	50.000	6.000	8.900	0.030	3	2.000	690		
3.000	6.000	57.000	8.000	11.900	0.050	3	3.000	630	670	
4.000	6.000	57.000	11.000	14.900	0.060	3	4.000	620	660	
5.000	6.000	57.000	13.000	18.400	0.080	3	5.000	620	660	
6.000	6.000	57.000	13.000	21.000	0.090	3	6.000	640	680	
8.000	8.000	63.000	19.000	27.000	0.120	3	8.000	820	870	
10.000	10.000	72.000	22.000	32.000	0.150	3	10.000	1,170	1,230	
12.000	12.000	83.000	26.000	38.000	0.180	3	12.000	1,830	1,900	
14.000	14.000	83.000	26.000	38.000	0.210	3	14.000	2,240	2,300	
16.000	16.000	92.000	32.000	44.000	0.240	3	16.000	3,010	3,110	
20.000	20.000	104.000	38.000	54.000	0.300	3	20.000	4,840	4,940	

Slot drills (3-fluted) 3刃 鋼用 30度螺旋角 端銑刀



**P** • **GUHRING NAVIGATOR**

**M** • Cutting data page 32

**K** •

**N** ○

**S** •

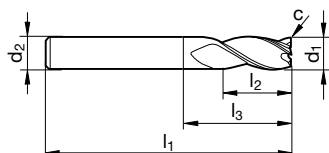
**H**

- centre cutting
- with special drill face

# 3560

Tool material **Solid carbide**

Surface	<b>F</b>	<b>F</b>
Type	N	N
Shank form	~HA	HB

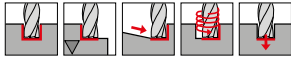
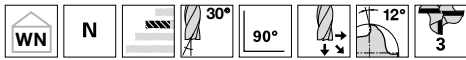


Article no. **19982** **19983**

Discount group **206** **206**

d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm x 45°				
2.000	4.000	50.000	6.000	9.400	0.030	3	2.000	640	
3.000	6.000	57.000	8.000	12.900	0.050	3	3.000	640	680
4.000	6.000	57.000	11.000	16.400	0.060	3	4.000	630	670
5.000	6.000	57.000	13.000	19.900	0.080	3	5.000	610	650
6.000	6.000	57.000	13.000	21.000	0.090	3	6.000	610	650
8.000	8.000	63.000	19.000	27.000	0.120	3	8.000	820	860
10.000	10.000	72.000	22.000	32.000	0.150	3	10.000	1,200	1,260
12.000	12.000	83.000	26.000	38.000	0.180	3	12.000	1,830	1,900
14.000	14.000	83.000	26.000	38.000	0.210	3	14.000	2,290	2,350
16.000	16.000	92.000	32.000	44.000	0.190	3	16.000	2,850	2,950
20.000	20.000	104.000	38.000	54.000	0.240	3	20.000	4,480	4,580

Slot drills (3-fluted) 3刃鋼用30度螺旋角端銑刀



**P** • **GUHRING NAVIGATOR**  
**M** • Cutting data page 32  
**K** •  
**N** ○  
**S** •  
**H** • centre cutting  
 • with special drill face

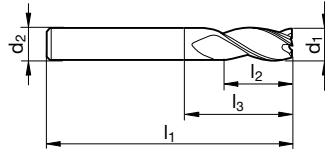
# 3560

Tool material **Solid carbide**

Surface **A**

Type **N**

Shank form **cyl.**

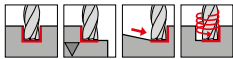
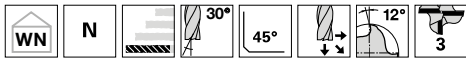


Article no. **19963**

Discount group **206**

d1 h8	d2 h6	l1	l2	l3	Z	Code no.	價格
mm	mm	mm	mm	mm			
2.000	4.000	40.000	6.000	9.400	3	2.000	570
3.000	6.000	45.000	8.000	12.900	3	3.000	570
4.000	6.000	45.000	11.000	16.400	3	4.000	550
5.000	6.000	50.000	13.000	19.900	3	5.000	550
6.000	6.000	50.000	13.000	19.000	3	6.000	610
8.000	8.000	60.000	19.000	25.500	3	8.000	820
10.000	10.000	70.000	22.000	30.000	3	10.000	1,210
12.000	12.000	75.000	26.000	36.000	3	12.000	1,710
16.000	16.000	75.000	32.000	44.000	3	16.000	2,850
20.000	20.000	100.000	40.000	54.000	3	20.000	4,500

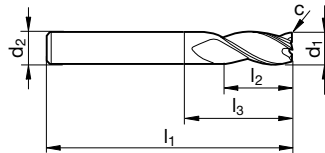
Slot drills XL (3-fluted) 3刃 鋼用 30度螺旋角 端銑刀 長刃型



**P** • **GUHRING NAVIGATOR**  
**M** • Cutting data page 32  
**K** •  
**N** ○  
**S** •  
**H** • centre cutting  
 • with special drill face

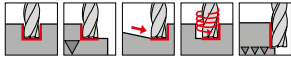
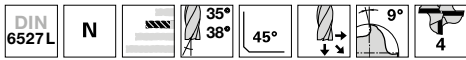
# 3680

Tool material	Solid carbide	
Surface	<b>F</b>	<b>F</b>
Type	N	N
Shank form	HA	HB



								Article no.	19984	19985
								Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm x 45°					
3.000	6.000	57.000	12.000	16.900	0.050	3	3.000	1,020	1,060	
4.000	6.000	63.000	19.000	24.400	0.060	3	4.000	1,100	1,140	
5.000	6.000	68.000	24.000	30.900	0.080	3	5.000	1,220	1,260	
6.000	6.000	72.000	24.000	36.000	0.090	3	6.000	1,600	1,650	
8.000	8.000	88.000	38.000	52.000	0.120	3	8.000	2,060	2,110	
10.000	10.000	95.000	45.000	55.000	0.150	3	10.000	2,700	2,760	
12.000	12.000	110.000	53.000	65.000	0.180	3	12.000	3,870	3,930	
14.000	14.000	110.000	53.000	65.000	0.210	3	14.000	5,550	5,620	
16.000	16.000	125.000	63.000	80.000	0.190	3	16.000	7,290	7,380	
20.000	20.000	141.000	75.000	95.000	0.240	3	20.000	9,530	9,630	

**HPC end mills (4-fluted) 4刃 35/38度 不等螺旋、不等分割 高效率鋼用銑刀**



- P** •
- M** •
- K** •
- N** ○
- S** •
- H** ○

**GUHRING NAVIGATOR**

Cutting data page 32

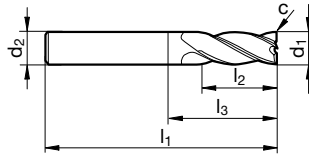
- high-performance end mills with variable helix angle
- centre cutting

# 3736

# 3629

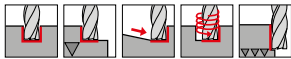
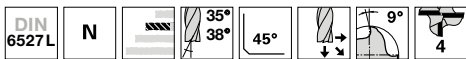
Tool material **Solid carbide**

Surface	<b>F</b>	<b>F</b>
Type	N	N
Shank form	HA	HB



								Article no.	19980	19981
								Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm x 45°					
3.000	6.000	57.000	8.000	11.400	0.060	4	3.000	780	820	
4.000	6.000	57.000	11.000	14.900	0.080	4	4.000	780	820	
5.000	6.000	57.000	13.000	17.400	0.100	4	5.000	780	820	
6.000	6.000	57.000	13.000	21.000	0.120	4	6.000	960	1,000	
8.000	8.000	63.000	19.000	27.000	0.160	4	8.000	1,320	1,370	
10.000	10.000	72.000	22.000	32.000	0.200	4	10.000	2,010	2,070	
12.000	12.000	83.000	26.000	38.000	0.240	4	12.000	2,540	2,610	
14.000	14.000	83.000	26.000	38.000	0.280	4	14.000	3,460	3,520	
16.000	16.000	92.000	32.000	44.000	0.320	4	16.000	4,430	4,530	
20.000	20.000	104.000	38.000	54.000	0.400	4	20.000	6,880	6,980	

HPC end mills (4-fluted) 4刃 35/38度 不等螺旋、不等分割 高效率鋼用銑刀



**P** • **GUHRING NAVIGATOR**

**M** • Cutting data page 32

**K** •

**N** ○

**S** •

**H** ○

- high-performance end mills with variable helix angle
- neck clearance
- centre cutting

# 3736

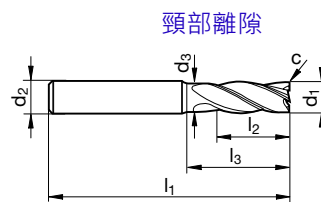
# 3629

Tool material **Solid carbide**

Surface **F** **F**

Type N N

Shank form HA HB

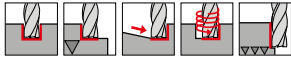
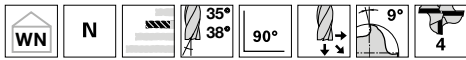


Article no. **19940** **19941**

Discount group **206** **206**

d1 e8	d2 h6	d3	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm x 45°	mm				
3.000	6.000	2.800	57.000	8.000	12.000	0.060	4	3.000	900	940
4.000	6.000	3.800	57.000	11.000	15.000	0.080	4	4.000	900	940
5.000	6.000	4.800	57.000	13.000	18.000	0.100	4	5.000	900	940
6.000	6.000	5.700	57.000	13.000	20.000	0.120	4	6.000	1,080	1,110
8.000	8.000	7.700	63.000	19.000	26.000	0.160	4	8.000	1,470	1,510
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000	2,140	2,200
12.000	12.000	11.500	83.000	26.000	36.000	0.240	4	12.000	2,710	2,760
14.000	14.000	13.500	83.000	26.000	36.000	0.280	4	14.000	3,740	3,800
16.000	16.000	15.500	92.000	32.000	42.000	0.320	4	16.000	4,570	4,680
20.000	20.000	19.500	104.000	38.000	52.000	0.400	4	20.000	7,130	7,240

HPC end mills (4-fluted) 4刃 35/38度 不等螺旋、不等分割 高效率鋼用銑刀



- P** •
- M** •
- K** •
- N** ○
- S** •
- H** ○

**GUHRING NAVIGATOR**

Cutting data page 32

- high-performance end mills with variable helix angle
- centre cutting

# 3736

# 3629

Tool material **Solid carbide**

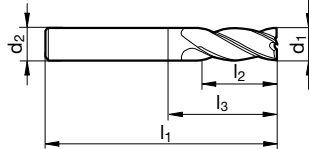
Surface **P**

Type **N**

Shank form ~HA



ALCrN 鍍層



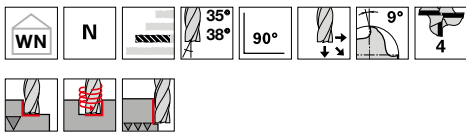
Article no. **19950**

Discount group **206**

d1 f8	d2 h6	l1	l2	l3	Z	Code no.	價格
mm	mm	mm	mm	mm			
3.000	4.000	50.000	8.000	11.400	4	3.000	810
4.000	4.000	50.000	11.000	18.000	4	4.000	810
5.000	5.000	50.000	13.000	18.000	4	5.000	810
6.000	6.000	50.000	15.000	20.000	4	6.000	1,010
8.000	8.000	60.000	20.000	29.000	4	8.000	1,380
10.000	10.000	70.000	27.000	34.000	4	10.000	2,020
12.000	12.000	75.000	30.000	39.000	4	12.000	2,910
14.000	14.000	75.000	30.000	39.000	4	14.000	3,670
16.000	16.000	75.000	30.000	39.000	4	16.000	4,610
20.000	20.000	100.000	40.000	54.000	4	20.000	7,470

HPC end mills (4-fluted) 4刃 35/38度 不等螺旋、不等分割 高效率鋼用銑刀

長刃型



Tool material	<b>Solid carbide</b>
Surface	<b>P</b>
Type	N
Shank form	~HA



**P** • **GUHRING NAVIGATOR**

**M** • Cutting data page 34

**K** •

**N** ○

**S** •

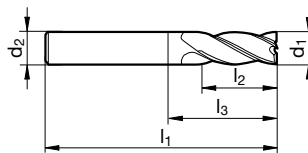
**H** ○

- high-performance end mills with variable helix angle
- centre cutting

# 3736

# 3629

ALCrN 鍍層



Article no.

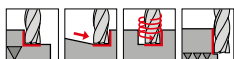
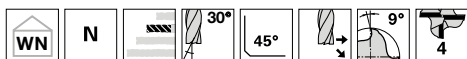
**19951**

Discount group

**206**

d1 f8	d2 h6	l1	l2	l3	Z	Code no.	價格
mm	mm	mm	mm	mm			
3.000	4.000	60.000	16.000	19.400	4	3.000	1,260
4.000	4.000	60.000	20.000	23.000	4	4.000	1,260
5.000	6.000	68.000	24.000	28.400	4	5.000	1,480
6.000	6.000	68.000	24.000	32.000	4	6.000	1,540
8.000	8.000	88.000	38.000	52.000	4	8.000	1,870
10.000	10.000	100.000	50.000	60.000	4	10.000	2,410
12.000	12.000	100.000	53.000	61.000	4	12.000	3,500
14.000	14.000	100.000	53.000	62.000	4	14.000	4,920
16.000	16.000	125.000	63.000	77.000	4	16.000	6,000
20.000	20.000	141.000	75.000	91.000	4	20.000	9,510

End mills (4-fluted) 4刃 鋼用端銑刀



**P** • **GUHRING NAVIGATOR**

**M** • Cutting data page 34

**K** •

**N** ○

**S** •

**H** ○

• centre cutting

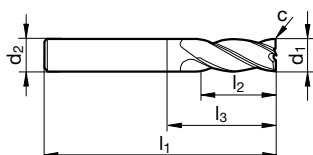
# 3649

Tool material **Solid carbide**

Surface **F** **F**

Type N N

Shank form HA HB

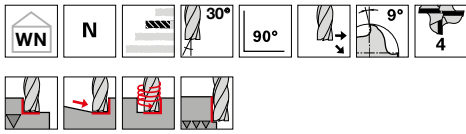


Article no. **19978** **19979**

Discount group **206** **206**

d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格	
mm	mm	mm	mm	mm	mm x 45°				
2.000	2.000	32.000	8.000	10.000	0.025	4	2.000	470	
3.000	3.000	38.000	12.000	15.000	0.050	4	3.000	470	
4.000	4.000	40.000	12.000	16.000	0.050	4	4.000	510	
5.000	5.000	50.000	15.000	20.000	0.050	4	5.000	510	
6.000	6.000	57.000	16.000	21.000	0.050	4	6.000	820	870
7.000	8.000	60.000	16.000	23.000	0.100	4	7.000	670	710
8.000	8.000	68.000	22.000	32.000	0.100	4	8.000	1,170	1,210
9.000	10.000	72.000	22.000	31.400	0.100	4	9.000	1,100	1,150
10.000	10.000	72.000	25.000	32.000	0.100	4	10.000	1,710	1,770
11.000	12.000	83.000	26.000	37.000	0.100	4	11.000	2,450	2,510
12.000	12.000	83.000	28.000	38.000	0.100	4	12.000	2,210	2,280
14.000	14.000	83.000	28.000	38.000	0.150	4	14.000	2,950	3,010
16.000	16.000	92.000	35.000	44.000	0.150	4	16.000	3,770	3,870
18.000	18.000	92.000	35.000	44.000	0.150	4	18.000	4,990	5,090
20.000	20.000	104.000	40.000	54.000	0.150	4	20.000	5,910	6,010

End mills (4-fluted) 4刃 鋼用端銑刀



- P** •
- M** •
- K** •
- N** ○
- S** •
- H** ○

**GUHRING NAVIGATOR**

Cutting data page 34

○ centre cutting

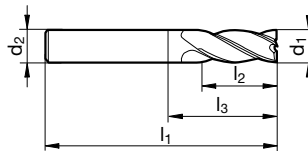
# 3649

Tool material **Solid carbide**

Surface **A**

Type **N**

Shank form **cyl.**



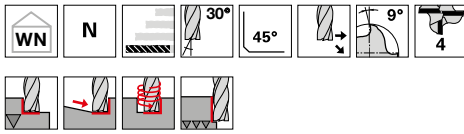
Article no. **19961**

Discount group **206**

d1 h8	d2 h6	l1	l2	l3	Z	Code no.	價格
mm	mm	mm	mm	mm			
2.000	4.000	40.000	6.000	8.900	4	2.000	610
3.000	6.000	45.000	8.000	11.900	4	3.000	610
4.000	6.000	45.000	11.000	15.900	4	4.000	610
5.000	6.000	50.000	13.000	18.900	4	5.000	510
6.000	6.000	50.000	13.000	19.000	4	6.000	820
8.000	8.000	60.000	19.000	25.500	4	8.000	1,160
10.000	10.000	70.000	22.000	30.000	4	10.000	1,710
12.000	12.000	75.000	26.000	36.000	4	12.000	2,200
16.000	16.000	75.000	32.000	44.000	4	16.000	3,190
20.000	20.000	100.000	40.000	54.000	4	20.000	5,800

**XL end mills (4-fluted) 4刃 鋼用端銑刀**

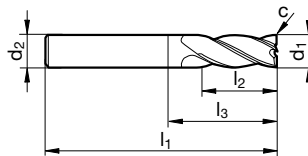
**長刃型**



Tool material	Solid carbide	
Surface	<b>F</b>	<b>F</b>
Type	N	N
Shank form	HA	HB

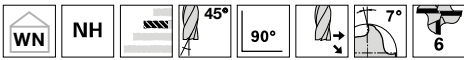
**P** • **GUHRING NAVIGATOR**  
**M** • Cutting data page 34  
**K** •  
**N** ○  
**S** •  
**H** ○ • centre cutting

#3023



								Article no.	19976	19977
								Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm x 45°					
3.000	6.000	57.000	15.000	18.900	0.050	4	3.000	910	950	
4.000	6.000	63.000	19.000	23.900	0.050	4	4.000	1,020	1,060	
5.000	6.000	68.000	24.000	29.900	0.050	4	5.000	1,100	1,140	
6.000	6.000	68.000	24.000	32.000	0.050	4	6.000	1,370	1,420	
8.000	8.000	88.000	38.000	52.000	0.100	4	8.000	1,430	1,460	
10.000	10.000	95.000	45.000	55.000	0.100	4	10.000	2,040	2,100	
12.000	12.000	110.000	53.000	65.000	0.100	4	12.000	3,260	3,320	
14.000	14.000	110.000	53.000	65.000	0.150	4	14.000	3,870	3,930	
16.000	16.000	125.000	63.000	77.000	0.150	4	16.000	4,890	4,990	
18.000	18.000	125.000	63.000	77.000	0.150	4	18.000	6,010	6,110	
20.000	20.000	141.000	75.000	91.000	0.150	4	20.000	6,420	6,520	

Multi-tooth end mills (6-fluted) 6刃側銑端銑刀



**P** • **GUHRING NAVIGATOR**

**M** • Cutting data page 34

**K** •

**N** •

**S** •

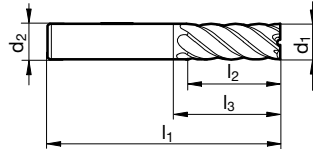
**H** ○ • without centre cutting

# 3689

端刃沒過中心  
側銑精修使用

Tool material **Solid carbide**

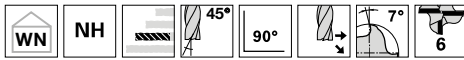
Surface	<b>F</b>	<b>F</b>
Type	NH	NH
Shank form	HA	HB



							Article no.	19972	19973
							Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	Z	Code no.	價格		
mm	mm	mm	mm	mm					
3.000	4.000	50.000	10.000	12.100	6	3.000	870		
4.000	6.000	57.000	11.000	15.900	6	4.000	820	870	
5.000	6.000	57.000	13.000	15.900	6	5.000	780	820	
6.000	6.000	57.000	13.000	21.000	6	6.000	780	820	
8.000	8.000	63.000	19.000	27.000	6	8.000	940	980	
10.000	10.000	72.000	22.000	32.000	6	10.000	1,500	1,570	
12.000	12.000	83.000	26.000	38.000	6	12.000	2,040	2,100	
14.000	14.000	83.000	26.000	38.000	6	14.000	2,800	2,860	
16.000	16.000	92.000	32.000	44.000	6	16.000	3,660	3,770	
18.000	18.000	92.000	32.000	44.000	6	18.000	4,280	4,380	
20.000	20.000	104.000	38.000	54.000	6	20.000	5,250	5,350	

Multi-tooth end mills (6-fluted) 6刃側銑端銑刀

頸部加長型



**P** • **GUHRING NAVIGATOR**

**M** • Cutting data page 34

**K** •

**N** •

**S** •

**H** ○

• without centre cutting 端刃沒過中心

# 3680

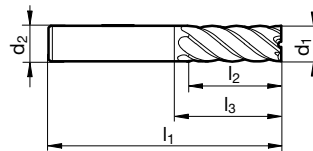
側銑精修使用

Tool material **Solid carbide**

Surface **F** **F**

Type NH NH

Shank form HA HB

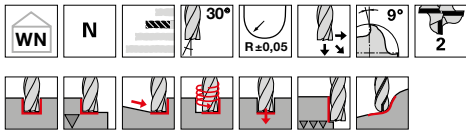


Article no. **19974** **19975**

Discount group **206** **206**

d1 e8	d2 h6	l1	l2	l3	Z	Code no.	價格	
mm	mm	mm	mm	mm				
4.000	6.000	63.000	16.000	18.500	6	4.000	1,220	1,260
5.000	6.000	63.000	18.000	20.500	6	5.000	1,220	1,260
6.000	6.000	63.000	18.000	27.000	6	6.000	1,120	1,160
8.000	8.000	68.000	24.000	32.000	6	8.000	1,300	1,340
10.000	10.000	80.000	30.000	40.000	6	10.000	2,290	2,350
12.000	12.000	93.000	36.000	48.000	6	12.000	3,210	3,270
14.000	14.000	100.000	42.000	55.000	6	14.000	4,480	4,540
16.000	16.000	108.000	48.000	60.000	6	16.000	5,760	5,860
18.000	18.000	114.000	54.000	66.000	6	18.000	7,230	7,340
20.000	20.000	126.000	60.000	76.000	6	20.000	8,760	8,870

**Ball nose slot drills (2-fluted) 2刃 球型銑刀**

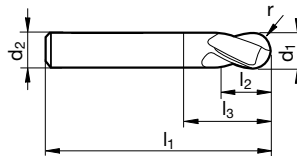


Tool material **Solid carbide**

Surface	<b>F</b>	<b>F</b>
Type	N	N
Shank form	HA	HB

**P** • **GUHRING NAVIGATOR**  
**M** • Cutting data page 34  
**K** •  
**N** •  
**S** •  
**H** ○ • centre cutting

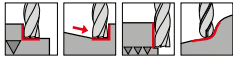
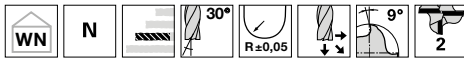
# 3679



								Article no.	19968	19969
								Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	r	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm					
2.000	4.000	40.000	6.000	9.400	1.000	2	2.000	720		
3.000	4.000	50.000	7.000	11.900	1.500	2	3.000	720		
4.000	6.000	50.000	8.000	13.400	2.000	2	4.000	720	750	
5.000	6.000	50.000	10.000	16.900	2.500	2	5.000	720	750	
6.000	6.000	50.000	10.000	20.000	3.000	2	6.000	720	750	
8.000	8.000	60.000	19.000	27.000	4.000	2	8.000	840	880	
10.000	10.000	70.000	22.000	30.000	5.000	2	10.000	1,100	1,150	
12.000	12.000	75.000	26.000	39.000	6.000	2	12.000	1,660	1,720	
14.000	14.000	75.000	26.000	40.000	7.000	2	14.000	2,140	2,200	
16.000	16.000	75.000	26.000	43.000	8.000	2	16.000	2,600	2,700	
18.000	18.000	100.000	32.000	52.000	9.000	2	18.000	3,160	3,260	
20.000	20.000	100.000	32.000	50.000	10.000	2	20.000	4,230	4,330	

**XL ball nose slot drills (2-fluted) 2刃 球型銑刀**

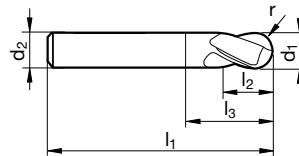
加長型



**P** • **GUHRING NAVIGATOR**  
**M** • Cutting data page 34  
**K** •  
**N** •  
**S** •  
**H** ○ • centre cutting

# 3030

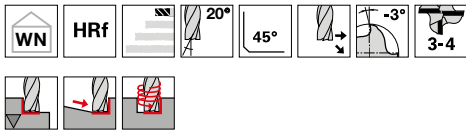
Tool material	Solid carbide	
Surface	<b>F</b>	<b>F</b>
Type	N	N
Shank form	HA	HB



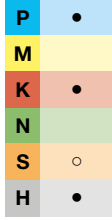
								Article no.	19970	19971
								Discount group	206	206
d1 e8	d2 h6	l1	l2	l3	r	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm					
3.000	3.000	60.000	20.000	32.000	1.500	2	3.000	1,430		
4.000	4.000	60.000	20.000	32.000	2.000	2	4.000	1,500		
5.000	5.000	75.000	25.000	47.000	2.500	2	5.000	1,660		
6.000	6.000	75.000	30.000	39.000	3.000	2	6.000	1,860	1,900	
8.000	8.000	75.000	30.000	39.000	4.000	2	8.000	2,120	2,150	
10.000	10.000	100.000	40.000	60.000	5.000	2	10.000	2,850	2,910	
12.000	12.000	100.000	45.000	55.000	6.000	2	12.000	3,770	3,830	

Roughing end mills with fine teeth 3~5刃 20度低螺旋 細圓齒型粗銑刀

短刃型



Tool material	Solid carbide	
Surface	F	F
Type	HRf	HRf
Shank form	HA	HB



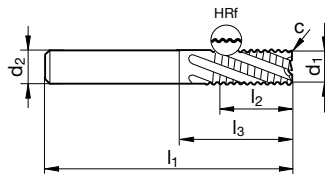
**GUHRING NAVIGATOR**

Cutting data page 32

• centre cutting

# 3682

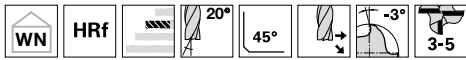
熱處理高硬度材質用



								Article no.	19964	19965
								Discount group	206	206
d1 h10	d2 h6	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm x 45°					
4.000	6.000	54.000	8.000	12.900	0.160	3	4.000	2,040	2,080	
5.000	6.000	54.000	8.000	14.400	0.200	3	5.000	2,040	2,080	
6.000	6.000	54.000	8.000	18.000	0.240	3	6.000	1,880	1,930	
8.000	8.000	58.000	11.000	22.000	0.320	3	8.000	2,190	2,230	
10.000	10.000	66.000	13.000	26.000	0.200	4	10.000	2,390	2,460	
12.000	12.000	73.000	16.000	28.000	0.240	4	12.000	2,800	2,860	
16.000	16.000	82.000	19.000	34.000	0.320	4	16.000	4,480	4,580	
20.000	20.000	92.000	19.000	42.000	0.400	4	20.000	6,670	6,770	

Roughing end mills with fine teeth 3~5刃 20度低螺旋 細圓齒型粗銑刀

標準長

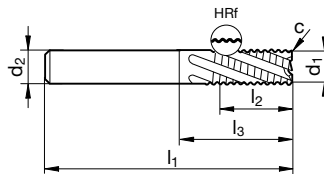


**P** • **GUHRING NAVIGATOR**  
**M** Cutting data page 32  
**K** •  
**N**  
**S** ○  
**H** • • centre cutting

# 3682

Tool material	Solid carbide	
Surface	F	F
Type	HRf	HRf
Shank form	HA	HB

熱處理高硬度材質用



								Article no.	19966	19967
								Discount group	206	206
d1 h10	d2 h6	l1	l2	l3	c	Z	Code no.	價格		
mm	mm	mm	mm	mm	mm x 45°					
5.000	6.000	57.000	16.000	19.000	0.200	3	5.000	2,290	2,330	
6.000	6.000	57.000	16.000	21.000	0.240	3	6.000	2,120	2,150	
8.000	8.000	63.000	19.000	27.000	0.320	3	8.000	2,450	2,480	
10.000	10.000	72.000	22.000	32.000	0.200	4	10.000	2,650	2,710	
12.000	12.000	83.000	26.000	38.000	0.240	4	12.000	3,160	3,220	
16.000	16.000	92.000	32.000	44.000	0.320	4	16.000	4,990	5,090	
20.000	20.000	104.000	38.000	54.000	0.400	4	20.000	7,490	7,590	
25.000	25.000	121.000	45.000	65.000	0.600	5	25.000	9,680	9,810	

**GÜHRING** NAVIGATOR Milling cutters

Tools with **bold** feed column no. (FC no.) are preferred choice.

$a_e$  = Width of cut  
 $a_p$  = Depth of cut

**Art. no.**

Comp. std.  
Comp. std.

\* For large cutting depths on unstable machines  $f_z$  and  $v_c$  must be reduced or a 4-flute tool must be applied.

Cutter-Ø mm	Feed column no.															
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	$f_z$ (mm/tooth)															
<b>2,00</b>	0,001	0,001	0,001	0,002	0,002	0,004	0,005	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,018	0,020
<b>3,00</b>	0,002	0,002	0,003	0,003	0,004	0,007	0,010	0,010	0,010	0,015	0,016	0,013	0,019	0,022	0,024	0,030
<b>5,00</b>	0,005	0,006	0,007	0,009	0,010	0,014	0,020	0,020	0,022	0,025	0,026	0,026	0,028	0,030	0,032	0,038
<b>6,00</b>	0,006	0,008	0,009	0,011	0,013	0,017	0,024	0,025	0,027	0,031	0,029	0,033	0,039	0,036	0,041	0,047
<b>8,00</b>	0,010	0,012	0,014	0,016	0,019	0,024	0,032	0,032	0,035	0,042	0,042	0,047	0,053	0,052	0,058	0,064
<b>10,00</b>	0,013	0,015	0,018	0,021	0,025	0,030	0,038	0,039	0,044	0,050	0,053	0,059	0,065	0,066	0,073	0,080
<b>12,00</b>	0,010	0,018	0,022	0,026	0,030	0,036	0,046	0,048	0,052	0,059	0,063	0,072	0,079	0,085	0,090	0,100
<b>16,00</b>	0,020	0,023	0,027	0,032	0,038	0,045	0,054	0,058	0,063	0,071	0,079	0,088	0,095	0,100	0,110	0,120
<b>20,00</b>	0,023	0,028	0,033	0,038	0,045	0,057	0,066	0,073	0,080	0,090	0,097	0,100	0,110	0,120	0,130	0,140
<b>25,00</b>	0,030	0,035	0,040	0,045	0,055	0,065	0,075	0,100	0,120	0,130	0,140	0,150	0,165	0,170	0,180	0,190

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tensile strength MPa (N/mm <sup>2</sup> )	Hardness
Common structural steels	<b>1.0035</b> S185(S133), <b>1.0486</b> P275N(S1E285), <b>1.0345</b> P235GH(H1), <b>1.0425</b> P265GH(H2) <b>1.0050</b> E295 (S150-2), <b>1.0070</b> E360 (S170-2), <b>1.8937</b> P500NH (WStE500)	≤500 ≤1000	
Free-cutting steels	<b>1.0718</b> 11SMnPb30 (9SMnPb28), <b>1.0736</b> 11SMn37 (9SMn36) <b>1.0727</b> 46S20 (45S20), <b>1.0728</b> (60S20), <b>1.0757</b> 46SPb20 (45SPb20)	≤850 ≤1000	
Unalloyed heat-treatable steels	<b>1.0402</b> C22, <b>1.1178</b> C30E (Ck30) <b>1.0503</b> C45, <b>1.1191</b> C45E (Ck45) <b>1.0601</b> C60, <b>1.1221</b> C60E (Ck60)	≤700 ≤850 ≤1000	
Alloyed heat-treatable steels	<b>1.5131</b> 50MnSi4, <b>1.7003</b> 38Cr2, <b>1.7030</b> 28Cr4 <b>1.5710</b> 36NiCr6, <b>1.7035</b> 41Cr4, <b>1.7225</b> 42CrMo4	≤1000 ≤1400	
Unalloyed case hard. steels	<b>1.0301</b> (C10), <b>1.1121</b> C10E (Ck10)	≤850	
Alloyed case hardened steels	<b>1.7276</b> 10CrMo11, <b>1.5125</b> 11MnSi6 <b>1.5752</b> 15NiCr13, <b>1.7131</b> 16MnCr5, <b>1.7264</b> 20CrMo5	≤1000 ≤1400	
Nitriding steels	<b>1.8504</b> 34CrAl6 <b>1.8519</b> 31CrMoV9, <b>1.8550</b> 34CrAlNi7	≤1000 ≤1400	
Tool steels	<b>1.1750</b> C75W, <b>1.2067</b> 102Cr6, <b>1.2307</b> 29CrMoV9 <b>1.2080</b> X210Cr12, <b>1.2083</b> X42Cr13, <b>1.2419</b> 105WCr6, <b>1.2767</b> X45NiCrMo4	≤850 ≤1400	
High speed steels	<b>1.3243</b> S 6-5-2-5, <b>1.3343</b> S 6-5-2, <b>1.3344</b> S 6-5-3	≤1400	
Spring steels	<b>1.5026</b> 55Si7, <b>1.7176</b> 55Cr3, <b>1.8159</b> 51CrV4 (51CrV4)		≤350 HB
Hardened steels	-		≤48 HRC ≤66 HRC
Stainless steels, sulphured austenitic martensitic	<b>1.4005</b> X12CrS13, <b>1.4104</b> X14CrMoS17, <b>1.4105</b> X6CrMoS17, <b>1.4305</b> X8CrNiS18-9 <b>1.4301</b> X5CrNi18-10 (V2A), <b>1.4541</b> X6CrNiTi18-10, <b>1.4571</b> X6CrNiMoTi 17-12-2 (V4A) <b>1.4057</b> X20CrNi172 (X17CrNi16-2), <b>1.4122</b> X39CrMo17-1, <b>1.4521</b> X2CrMoTi18-2	≤900 ≤1100 ≤1500	
Cast iron	<b>0.6010</b> EN-GJL-100 (GG10), <b>0.6020</b> EN-GJL-200 (GG20) <b>0.6025</b> EN-GJL-250 (GG25), <b>0.6035</b> EN-GJL-350 (GG35)		≤240 HB ≤350 HB
Spheroidal graphite iron and malleable cast iron	<b>0.7050</b> EN-GJS-500-7 (GGG50), <b>0.8035</b> EN-GJMW-350-4 (GTW35) <b>0.7070</b> EN-GJS-700-2 (GGG70), <b>0.8170</b> EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB
Chilled cast iron	-		≤350 HB
New cast materials GGV	<b>EN-GJV250</b> (GGV25), <b>EN-GJV350</b> (GGV35) <b>EN-GJV400</b> (GGV40), <b>EN-GJV500</b> (GGV50), SiMo 6		≤220 HB ≤300 HB
New cast materials ADI	<b>EN-GJS-800-8</b> (ADI800), <b>EN-GJS-1000-5</b> (ADI1000) <b>EN-GJS-1200-2</b> (ADI1200), <b>EN-GJS-1400-1</b> (ADI1400)	≤1000 ≤1400	
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000	
Ti and Ti-alloys	<b>3.7024</b> Ti99,5, <b>3.7114</b> TiAl5Sn2,5, <b>3.7124</b> TiCu2 <b>3.7154</b> TiAl6Zr5, <b>3.7165</b> TiAl6V4, <b>3.7184</b> TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400	
Aluminium and Al-alloys	<b>3.0255</b> Al99,5, <b>3.2315</b> AlMgSi1, <b>3.3515</b> AlMg1	≤400	
Al wrought alloys	<b>3.0615</b> AlMgSiPb, <b>3.1325</b> AlCuMg1, <b>3.3245</b> AlMg3Si, <b>3.4365</b> AlZnMgCu1,5	≤650	
Al cast alloys ≤ 10 % Si ≤ 24 % Si	<b>3.2131</b> G-AlSi5Cu1, <b>3.2153</b> G-AlSi7Cu3, <b>3.2573</b> G-AlSi9 <b>3.2581</b> G-AlSi12, <b>3.2583</b> G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600	
Magnesium alloys	<b>3.5200</b> MgMn2, <b>3.5812.05</b> G-MgAl8Zn1, <b>3.5612.05</b> G-MgAl6Zn1	≤400	
Copper, low-alloyed	<b>2.0070</b> SE-Cu, <b>2.1020</b> CuSn6, <b>2.1096</b> G-CuSn5ZnPb	≤500	
Brass, short-chipping long-chipping	<b>2.0380</b> CuZn39Pb2, <b>2.0401</b> CuZn39Pb3, <b>2.0410</b> CuZn43Pb2 <b>2.0250</b> CuZn20, <b>2.0280</b> CuZn33, <b>2.0332</b> CuZn37Pb0,5	≤600 ≤600	
Bronze, short-chipping	<b>2.1090</b> CuSn7ZnPb, <b>2.1170</b> CuPb5Sn5, <b>2.1176</b> CuPb10Sn <b>2.0790</b> CuNi18Zn19Pb	≤600 ≤850	
Bronze, long-chipping	<b>2.0916</b> CuAl5, <b>2.0960</b> CuAl9Mn, <b>2.1050</b> CuSn10 <b>2.0980</b> CuAl11Ni, <b>2.1247</b> CuBe2	≤850 ≤1000	
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren	≤150	
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100	
Kevlar	Kevlar	≤1000	
Glass, carbon concentr. plastics	GFK/CFK	≤1000	

Corrections  $v_c$  and  $f_z$

**Slot milling**

**Roughing**

Solid carbide    Solid carbide    Solid carbide    Solid carbide    Solid carbide    Solid carbide    Solid carbide    Solid carbide

N

N

N

N

NH

W

N

HRf

HA	19988/19962	19982/19963	19990	19984	19986	19994/19996	19980/19940	19964/19966
HB	19989	19983	19991	19985	19987	19995/19997 19992/19993	19981/19941 19950	19965/19967



$a_e = 1 \times D$



$a_e = 1 \times D$



$a_e = 1 \times D$



$a_e = 1 \times D$



$a_e = 1 \times D$



$a_e = 1 \times D$

**HPC**

54HRC

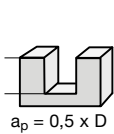


$a_e = 0,5-1,0 \times D$

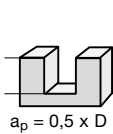
54HRC



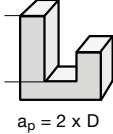
$a_e = 0,5-1,0 \times D$



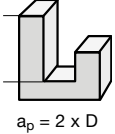
$a_p = 0,5 \times D$



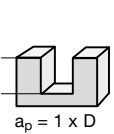
$a_p = 0,5 \times D$



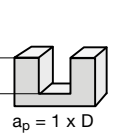
$a_p = 2 \times D$



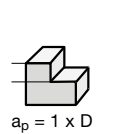
$a_p = 2 \times D$



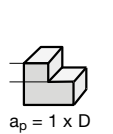
$a_p = 1 \times D$



$a_p = 1 \times D$



$a_p = 1 \times D$



$a_p = 1 \times D$

$v_c$ 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.
85 - 105	42	85 - 105	42	72 - 88	39	72 - 88	39	94 - 116	43			170 - 208	51		
81 - 99	41	81 - 99	41	67 - 83	38	67 - 83	38	89 - 109	42			157 - 193	50		
85 - 105	41	85 - 105	41	72 - 88	38	72 - 88	38	94 - 116	42			170 - 208	50		
63 - 77	42	63 - 77	42	54 - 66	39	54 - 66	39	69 - 85	43			126 - 154	49		
85 - 105	41	85 - 105	41	72 - 88	38	72 - 88	38	94 - 116	42			170 - 208	50		
76 - 94	41	76 - 94	41	63 - 77	38	63 - 77	38	84 - 104	42			151 - 185	50		
63 - 77	42	63 - 77	42	54 - 66	39	54 - 66	39	69 - 85	43			126 - 154	49		
76 - 94	42	76 - 94	42	63 - 77	39	63 - 77	39	84 - 104	43			151 - 185	49		
63 - 77	42	63 - 77	42	54 - 66	39	54 - 66	39	69 - 85	43			126 - 154	48	72 - 88	39
90 - 110	41	90 - 110	41	67 - 83	38	67 - 83	38	99 - 121	42			189 - 231	50		
76 - 94	41	76 - 94	41	63 - 77	38	63 - 77	38	84 - 104	42			151 - 185	50	86 - 106	41
54 - 66	42	54 - 66	42	45 - 55	39	45 - 55	39	59 - 73	43			113 - 139	49	64 - 80	40
85 - 105	41	85 - 105	41	72 - 88	38	72 - 88	38	94 - 116	42			170 - 208	50	97 - 119	41
76 - 94	40	76 - 94	40	63 - 77	37	63 - 77	37	84 - 104	41			151 - 185	48	86 - 106	39
76 - 94	41	76 - 94	41	63 - 77	38	63 - 77	38	84 - 104	42			151 - 185	50	86 - 106	41
63 - 77	40	63 - 77	40	54 - 66	37	54 - 66	37	69 - 85	41			126 - 154	48	72 - 88	39
45 - 55	42	45 - 55	42	40 - 50	39	40 - 50	39	49 - 61	43			94 - 116	49	54 - 66	47
45 - 55	40							49 - 61	41			94 - 116	48	54 - 66	26
45 - 55	40							49 - 61	41			44 - 54	46	25 - 31	38
														18 - 22	38
45 - 55	42	45 - 55	42					49 - 61	43			80 - 100	49		
40 - 50	40	40 - 50	40					45 - 55	41			70 - 90	48		
36 - 44	41	36 - 44	41					39 - 49	42			65 - 70	49	43 - 53	40
108 - 132	41	108 - 132	41	94 - 116	38	94 - 116	38	118 - 146	42			220 - 270	50	126 - 154	42
99 - 121	40	99 - 121	40	85 - 105	37	85 - 105	37	108 - 134	41			201 - 247	49	115 - 141	41
90 - 110	41	90 - 110	41	81 - 99	38	81 - 99	38	99 - 121	42			182 - 224	50	104 - 128	42
81 - 99	40	81 - 99	40	67 - 83	37	67 - 83	37	89 - 109	41			157 - 193	49	90 - 110	41
54 - 66	40	54 - 66	40					59 - 73	41			107 - 131	47	61 - 75	39
27 - 33	40	27 - 33	40					29 - 37	41			56 - 70	48		
45 - 55	40	45 - 55	40	58 - 72	37	58 - 72	37	49 - 61	41			54 - 86	43		
36 - 44	40	36 - 44	40	31 - 39	37	31 - 39	37	39 - 49	41			44 - 72	42		
405 - 495	43									297 - 363	46				
495 - 605	43									360 - 440	46				
198 - 242	42							217 - 267	43	144 - 176	45				
162 - 198	43							178 - 218	44	117 - 143	46				
225 - 275	44									171 - 209	47				
108 - 132	43							118 - 146	44	81 - 99	46				
90 - 110	43							99 - 121	44	72 - 88	46			117 - 143	42
81 - 99	42									67 - 83	45				
90 - 110	42							99 - 121	43	72 - 88	45			117 - 143	42
72 - 88	41							79 - 97	42	63 - 77	44			87 - 107	41
72 - 88	42									63 - 77	45				
63 - 77	40									54 - 66	43				
108 - 132	40									81 - 99	43				
99 - 121	40									72 - 88	43				

1 x D = 75%  
1,5 x D = 50%

1 x D = 75%  
1,5 x D = 50%

3 x D = 50%

3 x D = 50%

1,5 x D = 50%

1,5 x D = 50%

$a_e = 1,5 \times D = 50%$   
 $a_p = 0,25 \times D = 150%$

$a_e = 0,5 \times D = 120%$

**GÜHRING** NAVIGATOR Milling cutters

Tools with **bold** feed column no. (FC no.) are preferred choice.

$a_e$  = Width of cut  
 $a_p$  = Depth of cut

**Art. no.**

Comp. std.  
Comp. std.

\* For large cutting depths on unstable machines  $f_z$  and  $v_c$  must be reduced or a 4-flute tool must be applied.

Cutter-Ø mm	Feed column no.															
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	$f_z$ (mm/tooth)															
<b>2,00</b>	0,001	0,001	0,001	0,002	0,002	0,004	0,005	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,018	0,020
<b>3,00</b>	0,002	0,002	0,003	0,003	0,004	0,007	0,010	0,010	0,010	0,015	0,016	0,013	0,019	0,022	0,024	0,030
<b>5,00</b>	0,005	0,006	0,007	0,009	0,010	0,014	0,020	0,020	0,022	0,025	0,026	0,026	0,028	0,030	0,032	0,038
<b>6,00</b>	0,006	0,008	0,009	0,011	0,013	0,017	0,024	0,025	0,027	0,031	0,029	0,033	0,039	0,036	0,041	0,047
<b>8,00</b>	0,010	0,012	0,014	0,016	0,019	0,024	0,032	0,032	0,035	0,042	0,042	0,047	0,053	0,052	0,058	0,064
<b>10,00</b>	0,013	0,015	0,018	0,021	0,025	0,030	0,038	0,039	0,044	0,050	0,053	0,059	0,065	0,066	0,073	0,080
<b>12,00</b>	0,010	0,018	0,022	0,026	0,030	0,036	0,046	0,048	0,052	0,059	0,063	0,072	0,079	0,085	0,090	0,100
<b>16,00</b>	0,020	0,023	0,027	0,032	0,038	0,045	0,054	0,058	0,063	0,071	0,079	0,088	0,095	0,100	0,110	0,120
<b>20,00</b>	0,023	0,028	0,033	0,038	0,045	0,057	0,066	0,073	0,080	0,090	0,097	0,100	0,110	0,120	0,130	0,140
<b>25,00</b>	0,030	0,035	0,040	0,045	0,055	0,065	0,075	0,100	0,120	0,130	0,140	0,150	0,165	0,170	0,180	0,190

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tensile strength MPa (N/mm <sup>2</sup> )	Hardness
Common structural steels	<b>1.0035</b> S185(S133), <b>1.0486</b> P275N(S1E285), <b>1.0345</b> P235GH(H1), <b>1.0425</b> P265GH(H2) <b>1.0050</b> E295 (S150-2), <b>1.0070</b> E360 (S170-2), <b>1.8937</b> P500NH (WStE500)	≤500 ≤1000	
Free-cutting steels	<b>1.0718</b> 11SMnPb30 (9SMnPb28), <b>1.0736</b> 11SMn37 (9SMn36) <b>1.0727</b> 46S20 (45S20), <b>1.0728</b> (60S20), <b>1.0757</b> 46SPb20 (45SPb20)	≤850 ≤1000	
Unalloyed heat-treatable steels	<b>1.0402</b> C22, <b>1.1178</b> C30E (Ck30) <b>1.0503</b> C45, <b>1.1191</b> C45E (Ck45) <b>1.0601</b> C60, <b>1.1221</b> C60E (Ck60)	≤700 ≤850 ≤1000	
Alloyed heat-treatable steels	<b>1.5131</b> 50MnSi4, <b>1.7003</b> 38Cr2, <b>1.7030</b> 28Cr4 <b>1.5710</b> 36NiCr6, <b>1.7035</b> 41Cr4, <b>1.7225</b> 42CrMo4	≤1000 ≤1400	
Unalloyed case hard. steels	<b>1.0301</b> (C10), <b>1.1121</b> C10E (Ck10)	≤850	
Alloyed case hardened steels	<b>1.7276</b> 10CrMo11, <b>1.5125</b> 11MnSi6 <b>1.5752</b> 15NiCr13, <b>1.7131</b> 16MnCr5, <b>1.7264</b> 20CrMo5	≤1000 ≤1400	
Nitriding steels	<b>1.8504</b> 34CrAl6 <b>1.8519</b> 31CrMoV9, <b>1.8550</b> 34CrAlNi7	≤1000 ≤1400	
Tool steels	<b>1.1750</b> C75W, <b>1.2067</b> 102Cr6, <b>1.2307</b> 29CrMoV9 <b>1.2080</b> X210Cr12, <b>1.2083</b> X42Cr13, <b>1.2419</b> 105WCr6, <b>1.2767</b> X45NiCrMo4	≤850 ≤1400	
High speed steels	<b>1.3243</b> S 6-5-2-5, <b>1.3343</b> S 6-5-2, <b>1.3344</b> S 6-5-3	≤1400	
Spring steels	<b>1.5026</b> 55Si7, <b>1.7176</b> 55Cr3, <b>1.8159</b> 51CrV4 (51CrV4)		≤350 HB
Hardened steels	-		≤48 HRC ≤66 HRC
Stainless steels, sulphured austenitic martensitic	<b>1.4005</b> X12CrS13, <b>1.4104</b> X14CrMoS17, <b>1.4105</b> X6CrMoS17, <b>1.4305</b> X8CrNiS18-9 <b>1.4301</b> X5CrNi18-10 (V2A), <b>1.4541</b> X6CrNiTi18-10, <b>1.4571</b> X6CrNiMoTi 17-12-2 (V4A) <b>1.4057</b> X20CrNi172 (X17CrNi16-2), <b>1.4122</b> X39CrMo17-1, <b>1.4521</b> X2CrMoTi18-2	≤900 ≤1100 ≤1500	
Cast iron	<b>0.6010</b> EN-GJL-100 (GG10), <b>0.6020</b> EN-GJL-200 (GG20) <b>0.6025</b> EN-GJL-250 (GG25), <b>0.6035</b> EN-GJL-350 (GG35)		≤240 HB ≤350 HB
Spheroidal graphite iron and malleable cast iron	<b>0.7050</b> EN-GJS-500-7 (GGG50), <b>0.8035</b> EN-GJMW-350-4 (GTW35) <b>0.7070</b> EN-GJS-700-2 (GGG70), <b>0.8170</b> EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB
Chilled cast iron	-		≤350 HB
New cast materials GGV	<b>EN-GJV250</b> (GGV25), <b>EN-GJV350</b> (GGV35) <b>EN-GJV400</b> (GGV40), <b>EN-GJV500</b> (GGV50), SiMo 6		≤220 HB ≤300 HB
New cast materials ADI	<b>EN-GJS-800-8</b> (ADI800), <b>EN-GJS-1000-5</b> (ADI1000) <b>EN-GJS-1200-2</b> (ADI1200), <b>EN-GJS-1400-1</b> (ADI1400)	≤1000 ≤1400	
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000	
Ti and Ti-alloys	<b>3.7024</b> Ti99,5, <b>3.7114</b> TiAl5Sn2,5, <b>3.7124</b> TiCu2 <b>3.7154</b> TiAl6Zr5, <b>3.7165</b> TiAl6V4, <b>3.7184</b> TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400	
Aluminium and Al-alloys	<b>3.0255</b> Al99,5, <b>3.2315</b> AlMgSi1, <b>3.3515</b> AlMg1	≤400	
Al wrought alloys	<b>3.0615</b> AlMgSiPb, <b>3.1325</b> AlCuMg1, <b>3.3245</b> AlMg3Si, <b>3.4365</b> AlZnMgCu1,5	≤650	
Al cast alloys ≤ 10 % Si ≤ 24 % Si	<b>3.2131</b> G-AlSi5Cu1, <b>3.2153</b> G-AlSi7Cu3, <b>3.2573</b> G-AlSi9 <b>3.2581</b> G-AlSi12, <b>3.2583</b> G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600	
Magnesium alloys	<b>3.5200</b> MgMn2, <b>3.5812.05</b> G-MgAl8Zn1, <b>3.5612.05</b> G-MgAl6Zn1	≤400	
Copper, low-alloyed	<b>2.0070</b> SE-Cu, <b>2.1020</b> CuSn6, <b>2.1096</b> G-CuSn5ZnPb	≤500	
Brass, short-chipping long-chipping	<b>2.0380</b> CuZn39Pb2, <b>2.0401</b> CuZn39Pb3, <b>2.0410</b> CuZn43Pb2 <b>2.0250</b> CuZn20, <b>2.0280</b> CuZn33, <b>2.0332</b> CuZn37Pb0,5	≤600 ≤600	
Bronze, short-chipping	<b>2.1090</b> CuSn7ZnPb, <b>2.1170</b> CuPb5Sn5, <b>2.1176</b> CuPb10Sn <b>2.0790</b> CuNi18Zn19Pb	≤600 ≤850	
Bronze, long-chipping	<b>2.0916</b> CuAl5, <b>2.0960</b> CuAl9Mn, <b>2.1050</b> CuSn10 <b>2.0980</b> CuAl11Ni, <b>2.1247</b> CuBe2	≤850 ≤1000	
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren	≤150	
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100	
Kevlar	Kevlar	≤1000	
Glass, carbon concentr. plastics	GFK/CFK	≤1000	

Corrections  $v_c$  and  $f_z$

	Finishing		Fine finishing		Copying	
	Solid carbide	Solid carbide	Solid carbide	Solid carbide	Solid carbide	Solid carbide
	N	N	NH	NH	N	N
HA	19978/19961	19976	19972	19974*	19968	19970
HB	19979	19977	19973	19975*	19969	19971
		19951				



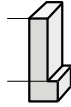
$a_e = 0,1 \times D$



$a_p = 1 \times D$



$a_e = 0,1 \times D$



$a_p = 2 \times D$



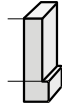
$a_e = 0,05 \times D$



$a_p = 1,5 \times D$



$a_e = 0,05 \times D$



$a_p = 3 \times D$



$a_e = 0,05 \times D$



$a_p = 0,05 \times D$



$a_e = 0,05 \times D$



$a_p = 0,05 \times D$

$V_c$ 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.
157 - 193	48	103 - 127	43	171 - 209	48	136 - 168	45	153 - 187	48	153 - 187	46
144 - 176	47	94 - 116	42	157 - 193	47	126 - 154	44	144 - 176	47	144 - 176	45
157 - 193	47	103 - 127	42	171 - 209	47	136 - 168	44	153 - 187	47	153 - 187	45
117 - 143	46	81 - 99	41	126 - 154	46	100 - 124	43	153 - 187	46	153 - 187	44
157 - 193	47	103 - 127	42	171 - 209	47	136 - 168	44	135 - 165	47	135 - 165	45
144 - 176	47	90 - 110	42	153 - 187	47	122 - 150	44	135 - 165	47	135 - 165	45
117 - 143	46	76 - 94	41	126 - 154	46	100 - 124	43	117 - 143	46	117 - 143	44
139 - 171	46	90 - 110	41	153 - 187	46	122 - 150	43	126 - 154	46	126 - 154	44
117 - 143	45	76 - 94	40	126 - 154	45	100 - 124	42	153 - 187	45	153 - 187	43
175 - 215	47	99 - 121	42	189 - 231	47	151 - 185	44	198 - 242	47	198 - 242	45
139 - 171	47	90 - 110	42	153 - 187	47	122 - 150	44	171 - 209	47	171 - 209	45
103 - 127	46	67 - 83	41	117 - 143	46	93 - 115	43	108 - 132	46	108 - 132	44
157 - 193	47	103 - 127	42	171 - 209	47	136 - 168	44	144 - 176	47	144 - 176	45
144 - 176	45	90 - 110	40	153 - 187	45	122 - 150	42	135 - 165	45	135 - 165	43
139 - 171	47	90 - 110	42	153 - 187	47	122 - 150	44	135 - 165	47	135 - 165	45
117 - 143	45	76 - 94	40	126 - 154	45	100 - 124	42	117 - 143	45	117 - 143	43
90 - 110	46	58 - 72	41	94 - 116	46	75 - 93	43	85 - 105	46	85 - 105	44
				94 - 116	45	75 - 93	42	85 - 105	45	85 - 105	43
				49 - 61	43	39 - 49	41	49 - 61	44	49 - 61	42
90 - 110	46			94 - 116	46	75 - 93	43	85 - 105	46	85 - 105	44
76 - 94	45			81 - 99	45	64 - 80	42	76 - 94	45	76 - 94	43
72 - 88	46			76 - 94	46	61 - 75	43	67 - 83	46	67 - 83	44
189 - 231	47	135 - 165	42	220 - 270	47	132 - 162	44	198 - 242	47	198 - 242	45
189 - 231	46	121 - 149	41	202 - 248	46	121 - 149	43	189 - 231	46	189 - 231	44
171 - 209	47	112 - 138	42	180 - 220	47	108 - 132	44	171 - 209	47	171 - 209	45
144 - 176	46	94 - 116	41	157 - 193	46	94 - 116	41	144 - 176	46	144 - 176	44
99 - 121	44							99 - 121	44	99 - 121	42
54 - 66	45			54 - 66	45	32 - 40	42	49 - 61	45	49 - 61	43
90 - 110	45	58 - 72	40	94 - 116	45	56 - 70	42				
72 - 88	44	45 - 55	39	76 - 94	44	45 - 57	41				
765 - 935	50	450 - 550	45	810 - 990	50	486 - 594	41	720 - 880	50	720 - 880	48
				720 - 880	50	432 - 528	41	855 - 1045	50	855 - 1045	48
373 - 457	48	225 - 275	43	405 - 495	48	243 - 297	45	342 - 418	48	342 - 418	46
306 - 374	49	180 - 220	44	324 - 396	49	194 - 238	46	288 - 352	49	288 - 352	47
				450 - 550	50			405 - 495	50	405 - 495	48
198 - 242	49	135 - 165	44	216 - 264	49			180 - 220	49	180 - 220	47
180 - 220	48	108 - 132	43	198 - 242	48	118 - 146	45	171 - 209	48	171 - 209	46
144 - 176	48	90 - 110	43	162 - 198	48			162 - 198	48	162 - 198	46
180 - 220	48	108 - 132	43	198 - 242	48	118 - 146	45	180 - 220	48	180 - 220	46
135 - 165	47			153 - 187	47	91 - 113	44	171 - 209	47	171 - 209	45
				153 - 187	47			198 - 242	47	198 - 242	45
				126 - 154	46	75 - 93	43	189 - 231	46	189 - 231	44
				216 - 264	46						
				198 - 242	46						

$a_p 2 \times D = 50\%$

$a_p 3 \times D = 50\%$

$a_p 0,1 \times D = 75\%$

**GTMS**  
Gühring Tool Management Software



**GUHRING**

# ISO codes

P	Steel, high-alloyed steel
M	Stainless steel Stainless
K	Grey cast iron, spher. graphite 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 following price and 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

# Surfaces

- bright
- A TiAlN
- P AlCrN
- F FIRE

# Pictograms

Tool material	<b>VHM</b>						
	Solid carbide finest grain (HM-UF)						
Shank form	HA	HB	-HA	-HB	Cyl		
	to DIN 6535				cylindrical		
Standard	DIN 6527L	WN					
	to DIN	to Guhring standard					
Type	N	W	NH	HRf			
Application	Slotting	Roughing	Ramping	Helix	Drilling	Finishing	Copying
Length	short (DIN)	long (DIN)	medium	extra length			
No. of cutting edges	2	3	4	6	3-4	3-5	
	no. of major cutting edges						
Helix angle	20°	30°	35°	45°	35°/38°		
	Size of helix angle / no. of different helix angles						
Rake angle	-3°	7°	9°	12°	15°		
	Rake angle of circumference cutting edges						
Cutting edge form	45°	90°	R±0,05				
	Corner chamfer		Radius with tolerance				
Feed	for lateral feed	for lateral feed and oblique plunging		for lateral feed, oblique plunging and drilling			

Drilling



Tapping/thread milling/fluteless tapping



Milling



Countersinking de-burring



PCD



Reaming



Tool restoration service



Special tooling solutions



Modular tooling systems



Grooving systems

