GUHRING

MICRO-PRECISION TOOLS


TOOL MATERIALS
Own carbide production
PLANT/MECHANICAL ENGINEERING
Own mechanical engineering and own plant development
OPTIMAL
ADAPTION OF
ALL PARAMETERS ...

... THANKS TO **OWN** R&D SECTORS

FIELDS OF **APPLICATION & PRODUCT** EXAMPLES

For increasingly smaller components and structures in the field of micro-precision for a wide variety of industries Guhring provides a complete range for all applications in micro-precision machining.
Specially adapted geometries substrates and surface finishes **guarantee optimal performance and process reliability** for the most varying of materials and machining applications in the micro-precision sector.

Impellers & rotors

Endoscope points

Gas and liquid
chromatography components

HIGH-**FREQUENCY**
TECHNOLOGY

Nanopositioner

AUTOMOTIVE

RESEARCH

MEDICAL
TECHNOLOGY

TOOLMANUFACTURE

JEWELLERY

WATCH &
MICROMECHANICS

Injector, texturing &
spinning nozzles

Watch parts

THE **DIVERSITY** OF OUR **MICRO**-PRECISION TOOLS

Our diversity in micro-precision tools ranges from micro-precision drills Ø 0.05 mm to special solutions in larger dimensions and from HSS to solid carbide. The micro-precision tool range covers 75 types in excess of 2,400 dimensions and therefore provides ex-stock tooling solutions for many applications.

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MICRO-PRECISION REAMING TOOLS

- in solid carbide from 0.98 mm
- in HSS from 0.95 mm

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MICRO-PRECISION MILLING TOOLS

- from 0.3 mm

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MICRO-PRECISION THREADING TOOLS

- in solid carbide M 1.4
- in HSS M 1

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MICRO-PRECISION DRILLING TOOLS

- in solid carbide from 0.2 mm
- in HSS from 0.05 mm

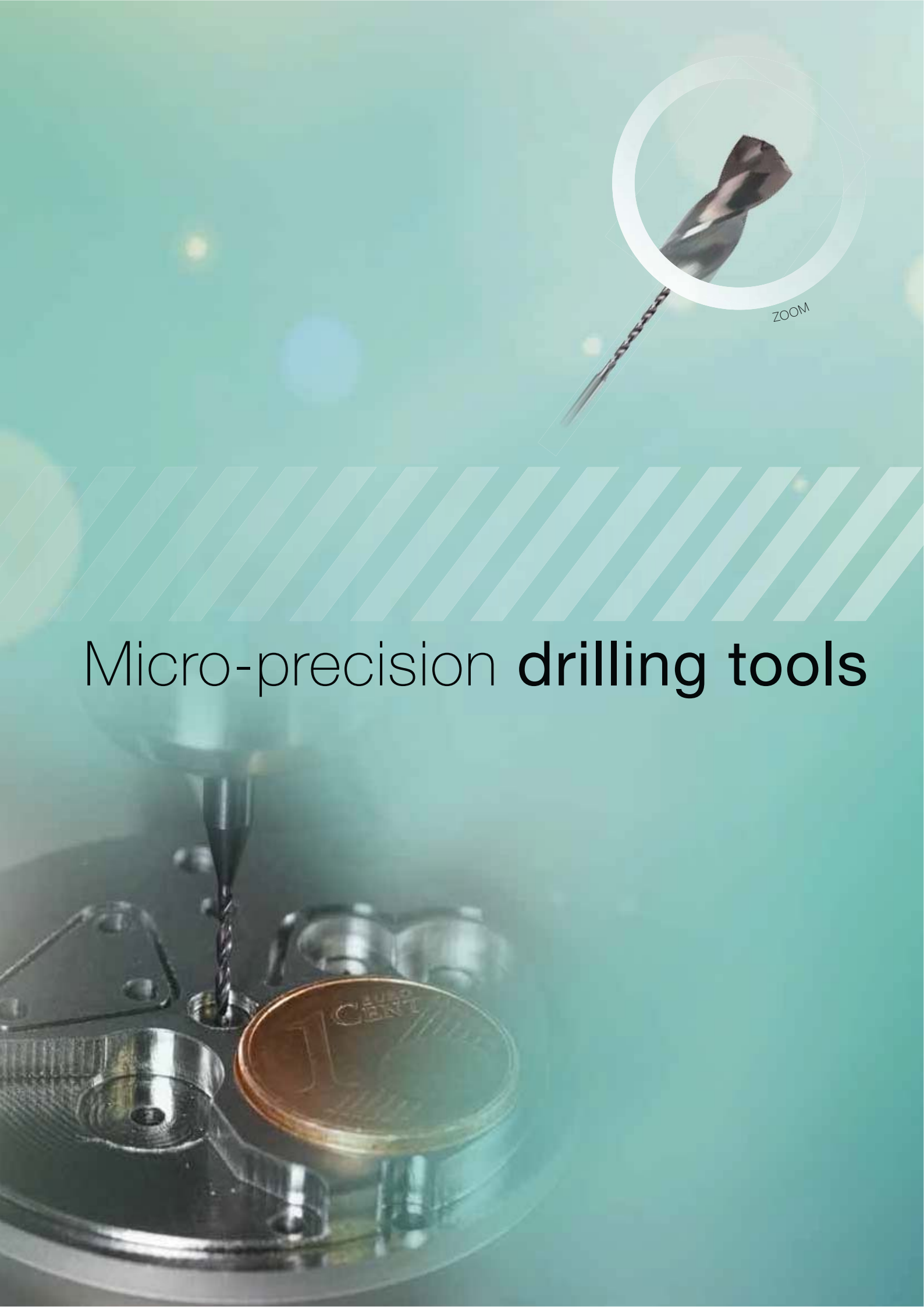
P	M	K	N	S	H	Tool illustration	Drilling depth	Shank form	Type	Standard	Tool material	Surface	d1/mm	Article no.	Cutting data page	Page
ExclusiveLine micro-precision drills without coolant ducts																
●	●	●	○	○			4xD	Cyl	N	WN	VHM	A	0.500 - 3.000	6400	62	17
●	●	●	○	○			7xD	Cyl	N	WN	VHM	A	0.500 - 3.000	6401	62	18
ExclusiveLine micro-precision drills with coolant ducts																
●	●	●	○	○			5xD	Cyl	N	WN	VHM	A	1.400 - 3.000	6405	62	19
●	●	●	○	○			8xD	Cyl	N	WN	VHM	A	1.400 - 3.000	6408	62	20
●	●	●	○	○			15xD	Cyl	N	WN	VHM	A	1.400 - 3.000	6412	62	21
EB 100 single-fluted gun drills																
○	○	○	●	●	○			HA	EB 100	WN	VHM		1.200 - 3.200	5024	66	22
●	○	●	○	○	○			HA	EB 100	WN	VHM	A	1.200 - 3.200	5632	66	23
○	○	○	●	●	○			HA	EB 100	WN	VHM		1.200 - 5.000	5020	66	24
●	○	●	○	○	○			HA	EB 100	WN	VHM	A	1.200 - 5.000	5633	66	25
○	○	○	●	●	○			HA	EB 100	WN	VHM		1.500 - 5.000	5026	66	26
●	○	●	○	○	○			HA	EB 100	WN	VHM	A	1.500 - 5.000	5637	66	27
○	○	○	●	●	○			HA	EB 100	WN	VHM		1.500 - 8.000	5021	66	28
●	○	●	○	○	○			HA	EB 100	WN	VHM	A	1.500 - 8.000	5638	66	29
Solid carbide micro-precision drills without coolant ducts																
●	○	●	○	○	○		~5xD	Cyl	N	WN	VHM		0.200 - 1.400	701	62	30
●		●						Cyl	N	WN	VHM	A	0.100 - 3.000	3899	62	31
HSS-E-PM micro-precision drills without coolant ducts																
●	●	●	●	○			~5xD	Cyl	N	DIN 1899	HSS-E-PM		0.050 - 1.930	301	62	33
●	●	●	●	○			~5xD	Cyl	N	DIN 1899	HSS-E-PM	S	0.160 - 1.900	660	62	36
●	●	●	●	○			~5xD	Cyl	N	DIN 1899	HSS-E-PM		0.130 - 1.850	303	62	38
Stub drills																
●	●	●	○	●	○		~3xD	Cyl	GV 120	DIN 1897	HSCO	S	0.500 - 3.000	659	64	40
●	●	●	○	●	○		~3xD	Cyl	GV 120	DIN 1897	HSCO	≥Ø 2,36	0.400 - 3.000	329	64	41

P	M	K	N	S	H	Tool illustration	Drilling depth	Shank form	Type	Standard	Tool material	Surface	d1/mm	Article no.	Cutting data page	Page
Jobber drills																
○	●			●			~5xD	Cyl	Ti	DIN 338	HSCO	S	0.500 - 3.000	657	64	43
○	●			●			~5xD	Cyl	Ti	DIN 338	HSCO		0.200 - 3.000	605	64	44
●	○	●	●				~5xD	Cyl	GT 100	DIN 338	HSCO	>Ø 2,36	1.000 - 3.000	622	64	46
●		●	○				~5xD	Cyl	N	DIN 338	HSS	>Ø 2,36	0.200 - 3.000	205	64	47
Long series twist drills																
●	●	●	●		○		~10xD	Cyl	GT 100	DIN 340	HSCO	>Ø 2,36	1.000 - 3.000	336	64	50
●		●	○				~10xD	Cyl	N	DIN 340	HSS	>Ø 2,36	1.000 - 3.000	217	64	51
90° NC-spotting drills																
○	○	○	○	○	○				N	WN	VHM		4.000 - 5.000	723		52
●	●	●	●	○					N	WN	HSCO	F	3.000 - 5.000	1133	68	53
120° NC-spotting drills																
○	○	○	○	○	○				N	WN	VHM		5.000 - 5.000	724		54
●	●	●	●	○					N	WN	HSCO	F	3.000 - 5.000	1135	68	55
142° NC-spotting drills																
○	○	○	○	○	○				N	WN	VHM		4.000 - 5.000	546		56
Centre drills without flat																
○	○	○	○	○	○			Cyl	N	WN	VHM		0.500 - 2.500	736		57
●	○	●	●	○				Cyl	N	DIN 333	HSS	S	0.500 - 2.500	613	68	58
●	○	●	●	○				Cyl	N	DIN 333	HSS	S	0.800 - 2.500	614	68	59
●	○	●	●	○				Cyl	N	DIN 333	HSS		1.000 - 2.500	585	68	60
90° Countersinks																
1000	○	●	○	●				Cyl		DIN 335	HSS	A	4.300 - 6.300	1326	68	61

P	M	K	N	S	H	Tool illustration	Standard	Type	Form	Toler-ance on Ø	Tool material	Sur-face	d1/mm	Article no.	Cutting data page	Page
Micro-thread milling cutters																
•	•	•	•	•			WN	MTM3 SP			VHM	C	M1,6 - M3	4226	80	74
•	•	•	•	•			WN	MTM1 SP			VHM	C	M1.4 - M1.8 - M2.5 - M3	4225	80	75
				○	•		WN	MTMH3 SP			VHM	A	M2 - M3	4227	80	76
Machine taps for ISO metric threads																
•	•	○	○	•			DIN 371/376	VA	B	6HX	HSS-E	S	M2 - M3	4218	80	78
•	•	○	○	•			DIN 371/376	VA R45	C	6HX	HSS-E	A	M2 - M3	393	80	77
Fluteless machine taps for ISO metric threads																
•	•		○				~DIN 371	N	C	6HX	HSS-E	S	M1 - M3	921	80	79

P	M	K	N	S	H	Tool illustration	Z	Hard-ness	Shank form	Length	Tool material	Sur-face	d1/mm	Article no.	Cutting data page	Page
Ball nose hard profile cutters GF 300 B																
○		•			•		2	63 HRC	HA		VHM	Y	0.500 - 8.000	**3359**	100	89
Ball nose slot drills (2-fluted)																
•	•	•	•	•	○		2	48 HRC	HA		VHM	F	0.500 - 8.000	**3679**	100	90
•	•		•	•			2		HA		VHM	◯	0.500 - 8.000	**3308**	100	91
HSC Torus end mills GF 500 T																
•	•	•	○	•	•		2	55 HRC	HA		VHM	Y	0.500 - 8.000	**3856**	100	92
•	•	•	○	•	•		2	55 HRC	~HA		VHM	Y	0.500 - 8.000	**3865**	100	93
Mini slot drills (3-fluted)																
•	•	○	•	○			3		HA/ HB		VHM	F	1.000 - 6.000	**3686**	100	94
•	•	○	•	•			3		HA/ HB		VHM	F	0.300 - 6.000	**3684**	100	95
Slot drills (2-fluted)																
•	•	•	•				2		HA		VHM	F	1.000 - 6.000	**3635**	100	96
•	•	•	•				2		HA		VHM	◯	1.000 - 6.000	**3195**	100	96
Pilot end mills RF 100 P																
•	○	•	•	○			4	48 HRC	HA		VHM	A	1.400 - 6.000	**6716**	100	97
Chamfering milling cutters																
•	•	•	•	•	○		4	55 HRC	HA		VHM	A	4.000 - 8.000	**6713**	100	98
Front/back deburrer 90°																
•	•	•	○	•	•			55 HRC	HA		VHM	a	3.000 - 8.000	**495**	100	99

P	M	K	N	S	H	Tool illustration	Standard	Form	Cutting direction	Tool material	Surface	d1/mm	Article no.	Cutting data page	Page
High performance reamers															
●	●	○		○	63		WN		R	VHM	a	2.000 - 3.000	**1685**	120	106
●	●	○		○	63		WN		R	VHM	a	2.000 - 3.000	**1686**	120	107
●	●	○		○	63		WN		R	VHM	a	1.970 - 3.030	**1675**	120	108
●	●	○		○	63		WN		R	VHM	a	1.970 - 3.030	**1676**	120	109
NC machine reamers															
●	○	●	●	●	52		WN	B	R	VHM	◯	0.980 - 3.030	**1427**	120	110
Machine reamers															
1400	○	●	●	●	48		~DIN 8093	A	R	HM	◯	1.000 - 3.000	**1408**	120	111
1400	○	●	●	●	48		~DIN 8093	B	R	HM	◯	1.000 - 3.000	**1409**	120	111
NC machine reamers															
1000	○	●	●	●			DIN 212-3	B	R	HSS-E	◯	1.000 - 3.030	**455**	120	112
1000	○	●	●	●			DIN 212-3	B	R	HSS-E	◯	1.500 - 3.000	**490**	120	113
Machine reamers															
1000	○	●	●	●			DIN 212	B	R	HSS-E	◯	0.950 - 3.030	**496**	120	114
Deburring forks															
●	●	●	○	○	○		WN		R	VHM	◯	2.000 - 3.000	**4100**	120	118
●	●	●	○	○	○		WN		R	VHM	◯	2.000 - 3.000	**4101**	120	119



Micro-precision **drilling tools**

MICRO-PRECISION **DRILLING TOOLS**

Micro-precision machining is continually gaining in importance in industries from mechanical to electronic engineering. Drilling operations are a central part. The smaller the components the higher the demands on precision become. Repeatable accuracy and economic efficiency of the process.

from page 30

Solid carbide micro-precision drills

Guhring' solid carbide micro-precision drills without coolant ducts cover the diameter range from 0.1 mm to 3.00 mm. With stable machining conditions and powerful machines solid carbide micro-precision drills can achieve extremely good cutting parameters and long tool life. The application of ultra fine carbide displaying a very high hardness and heat resistance as well as extreme wear resistance enables the enormous performance capability of solid carbide micro-precision drills.

- for stable machining conditions
- increased cutting parameters and tool life

Application example:
Series production on rotary transfer machine

Material: heat-treatable steel 42CrMo4
with external cooling 10% soluble oil

d = 1.2 mm
v_c = 65 m/min
n = 17,242 rev./min
f_n = 0.06 mm/rev.
v_f = 1,035 mm/min

from page 33

HSS-E-PM micro-precision drills

Guhring's micro-precision drills in high-performance powder metallurgical HSS-E steel excel thanks to very high wear resistance and high toughness as well as cutting edge stability which is especially important for unstable machining conditions.
The powder metallurgical manufactured HSS-E steel has a very homogeneous structure that has a positive effect on the consistently high-performance of the micro-precision drills.

- process reliable under unstable machining conditions
- wear resistant HSS-E-PM and high cutting edge stability

Application example:
Series production on multi-spindle machines

Material: stainless steel 1.4301
external cooling with 15% soluble oil

d = 2.0 mm
v_c = 15 m/min
n = 2,387 rev./min
f_n = 0.03 mm/rev.
v_f = 71.61 mm/min

from page 17

Solid carbide ExclusiveLine micro-precision drills also with internal cooling

Solid carbide ExclusiveLine micro-precision drills, with or without IC, enable high-performance machining of most materials, with stable machine conditions and powerful machines they really come into their own in terms of performance capability. The 2-facet point grind per cutting edge with ground cutting edge honing allows high cutting values and an optimal chip fracture.

- with stable machine conditions and powerful machines, i.e. in series production of large batch sizes
- high-performance machining, especially in stainless steels and special alloys

Application example 1:
Series production

Material: alloyed case hardened steel 16MnCr5
internal cooling with 8% soluble oil

d = 2.5 mm
v_c = 120 m/min
n = 15,279 rev./min
f_n = 0.14 mm/rev.
v_f = 2,139.06 mm/min

Application example 2:
Series production

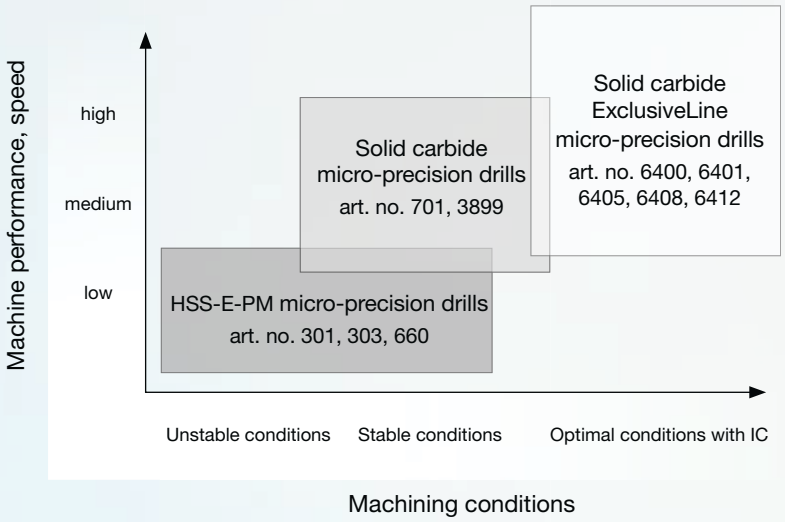
Material: stainless steel X6CrNiTi18 10
internal cooling with 12% soluble oil

d = 2.1 mm
v_c = 60 m/min
n = 9,095 rev./min
f_n = 0.03 mm/rev.
v_f = 273 mm/min

MICRO-PRECISION DRILL **TYPES**

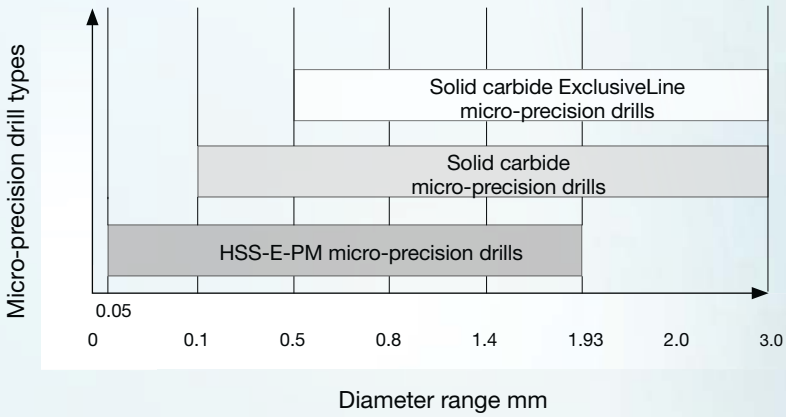
Advantages and fields of application

Guhring provides the optimal solution for the series production of large batch sizes on high-performance machines and with internal cooling as well as for machining tasks involving smaller batch sizes or limited machine performance and difficult machining conditions.



Scope of programme

Guhring's comprehensive micro-precision range of solid carbide and HSS-E-PM micro-precision drills covers the total diameter range from 0.05 mm to 3.0 mm.



Guhring's micro-precision range of solid carbide and powder metallurgical high speed steel (HSS-E-PM) is optimally suited for the production of very small holes in all fields of application. The production of highly-accurate very small holes requires maximum quality and is one of the most demanding drilling operations.

With Guhring's comprehensive standard range the optimal micro-precision drill is available for every user for such occasions. As well as the standard micro-precision drills listed Guhring also provides special solutions for HSS-E-PM micro-precision drills as well as for solid carbide micro-precision drills on customer request.

ExclusiveLine micro-precision drills without coolant ducts

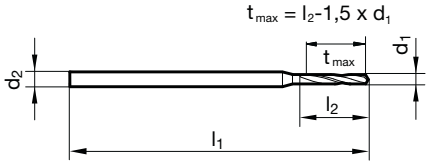
4xD | WN | N | 140° | m7

Tool material	Solid carbide
Surface	A
Cutting direction	R

P	•	web thinning ≥ Ø 0.500 • facet point grinding • main cutting edge form straight • edge preparation
M	•	
K	•	
N	○	structural and case hardened steels • free-cutting steels, heat-treatable steels • alloyed steels up to 1200 N/mm² • stainless steels • cast materials
S	○	
H		

GÜHRINGNAVIGATOR

Cutting data page 62



Article no. **6400**

d1	d2	l1	l2
mm	mm	mm	mm
0.500	3.000	47.000	3.000
0.550	3.000	47.000	3.300
0.600	3.000	47.000	3.600
0.650	3.000	47.000	3.900
0.700	3.000	47.000	4.200
0.750	3.000	47.000	4.500
0.800	3.000	47.000	4.800
0.850	3.000	47.000	5.100
0.900	3.000	47.000	5.400
0.950	3.000	47.000	5.700
1.000	3.000	47.000	6.000
1.050	3.000	47.000	6.300
1.100	3.000	47.000	6.600
1.150	3.000	47.000	6.900
1.200	3.000	47.000	7.200
1.250	3.000	47.000	7.500
1.300	3.000	47.000	7.800
1.350	3.000	47.000	8.100
1.400	3.000	47.000	8.400
1.450	3.000	47.000	8.700
1.500	3.000	47.000	9.000
1.550	3.000	47.000	9.300
1.590	3.000	47.000	9.600
1.600	3.000	47.000	9.600
1.650	3.000	47.000	9.900
1.700	3.000	47.000	10.200
1.750	3.000	47.000	10.500
1.800	3.000	52.000	10.800
1.850	3.000	52.000	11.100
1.900	3.000	52.000	11.400

d1	d2	l1	l2
mm	mm	mm	mm
1.950	3.000	52.000	11.700
1.980	4.000	59.000	12.000
2.000	4.000	59.000	12.000
2.050	4.000	59.000	12.300
2.100	4.000	59.000	12.600
2.150	4.000	59.000	12.900
2.200	4.000	59.000	13.200
2.250	4.000	59.000	13.500
2.300	4.000	59.000	13.800
2.350	4.000	59.000	14.100
2.380	4.000	59.000	14.400
2.400	4.000	59.000	14.400
2.450	4.000	59.000	14.700
2.500	4.000	59.000	15.000
2.550	4.000	59.000	15.300
2.600	4.000	59.000	15.600
2.650	4.000	59.000	15.900
2.700	4.000	59.000	16.200
2.750	4.000	59.000	16.500
2.780	4.000	59.000	16.800
2.800	4.000	59.000	16.800
2.850	4.000	59.000	17.100
2.900	4.000	59.000	17.400
2.950	4.000	59.000	17.700
3.000	4.000	59.000	18.000

ExclusiveLine micro-precision drills without coolant ducts

7xD | WN | N | 140° | m7

Tool material	**Solid carbide**
Surface	A
Cutting direction	R

P	•	web thinning ≥ Ø 0.500 • facet point grinding • main cutting edge form straight • edge preparation
M	•	
K	•	
N	○	structural and case hardened steels • free-cutting steels, heat-treatable steels • alloyed steels up to 1200 N/mm² • stainless steels • cast materials
S	○	
H		

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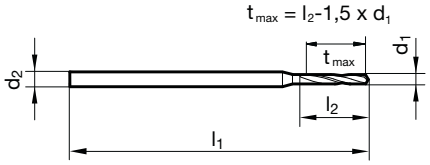
Cutting data page 62



Article no. **6401**

d1	d2	l1	l2
mm	mm	mm	mm
0.500	3.000	47.000	4.000
0.550	3.000	47.000	4.400
0.600	3.000	47.000	4.800
0.650	3.000	47.000	5.200
0.700	3.000	47.000	5.600
0.750	3.000	47.000	6.000
0.800	3.000	47.000	6.400
0.850	3.000	47.000	6.800
0.900	3.000	47.000	7.200
0.950	3.000	47.000	7.600
1.000	3.000	47.000	8.000
1.050	3.000	47.000	8.400
1.100	3.000	47.000	8.800
1.150	3.000	47.000	9.200
1.200	3.000	52.000	10.800
1.250	3.000	52.000	11.300
1.300	3.000	52.000	11.700
1.350	3.000	52.000	12.200
1.400	3.000	52.000	12.600
1.450	3.000	52.000	13.100
1.500	3.000	52.000	13.500
1.550	3.000	52.000	14.000
1.590	3.000	52.000	14.400
1.600	3.000	52.000	14.400
1.650	3.000	52.000	14.900
1.700	3.000	52.000	15.300
1.750	3.000	52.000	15.800
1.800	3.000	52.000	16.200
1.850	3.000	52.000	16.700
1.900	3.000	52.000	17.100

d1	d2	l1	l2
mm	mm	mm	mm
1.950	3.000	52.000	17.600
1.980	4.000	63.000	18.000
2.000	4.000	63.000	18.000
2.050	4.000	63.000	18.500
2.100	4.000	63.000	18.900
2.150	4.000	63.000	19.400
2.200	4.000	63.000	19.800
2.250	4.000	63.000	20.300
2.300	4.000	63.000	20.700
2.350	4.000	63.000	21.200
2.380	4.000	63.000	21.600
2.400	4.000	63.000	21.600
2.450	4.000	63.000	22.100
2.500	4.000	63.000	22.500
2.550	4.000	63.000	23.000
2.600	4.000	67.000	23.400
2.650	4.000	67.000	23.900
2.700	4.000	67.000	24.300
2.750	4.000	67.000	24.800
2.780	4.000	67.000	25.200
2.800	4.000	67.000	25.200
2.850	4.000	67.000	25.700
2.900	4.000	67.000	26.100
2.950	4.000	67.000	26.600
3.000	4.000	67.000	27.000

ExclusiveLine micro-precision drills with coolant ducts

5xD | WN | N | 140° | m7

Tool material	**Solid carbide**
Surface	A
Cutting direction	R

NEW

P	●	web thinning ≥ Ø 1.400 • facet point grinding • main cutting edge form straight • edge preparation
M	●	
K	●	
N	○	structural and case hardened steels • free-cutting steels, heat-treatable steels • alloyed steels up to 1200 N/mm² • stainless steels • cast materials
S	○	
H		

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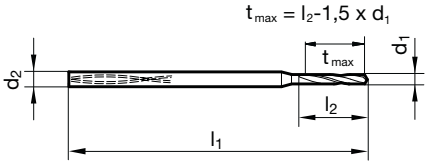
Cutting data page 62



Article no. **6405**

d1	d2	l1	l2
mm	mm	mm	mm
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1.450	4.000	52.000	12.000
1.500	4.000	52.000	12.000
1.550	4.000	52.000	12.000
1.590	4.000	52.000	13.000
1.600	4.000	52.000	13.000
1.650	4.000	52.000	13.000
1.700	4.000	56.000	14.000
1.750	4.000	56.000	14.000
1.800	4.000	56.000	14.000
1.850	4.000	56.000	15.000
1.900	4.000	56.000	15.000
1.950	4.000	56.000	16.000
1.980	4.000	56.000	16.000
2.000	4.000	56.000	16.000
2.050	4.000	56.000	16.000
2.100	4.000	62.000	17.000
2.150	4.000	62.000	17.000
2.200	4.000	62.000	18.000
2.250	4.000	62.000	18.000
2.300	4.000	62.000	18.000
2.350	4.000	62.000	19.000
2.380	4.000	62.000	19.000
2.400	4.000	62.000	19.000

d1	d2	l1	l2
mm	mm	mm	mm
2.450	4.000	62.000	20.000
2.500	4.000	62.000	20.000
2.550	4.000	62.000	20.000
2.600	4.000	66.000	21.000
2.650	4.000	66.000	21.000
2.700	4.000	66.000	22.000
2.750	4.000	66.000	22.000
2.780	4.000	66.000	22.000
2.800	4.000	66.000	22.000
2.850	4.000	66.000	23.000
2.900	4.000	66.000	23.000
2.950	4.000	66.000	24.000
3.000	4.000	66.000	24.000

ExclusiveLine micro-precision drills with coolant ducts

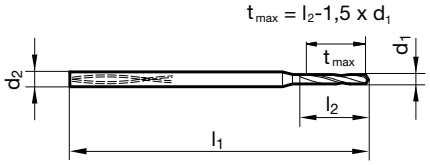
8xD | WN | N | 135° | h7

Tool material	Solid carbide
Surface	A
Cutting direction	R

P	•	web thinning ≥ Ø 1.400 • facet point grinding • main cutting edge form straight • edge preparation
M	•	
K	•	
N	○	structural and case hardened steels • free-cutting steels, heat-treatable steels • alloyed steels up to 1200 N/mm² • stainless steels • cast materials
S	○	
H		

GÜHRINGNAVIGATOR

Cutting data page 62



Article no. **6408**

d1	d2	l1	l2
mm	mm	mm	mm
1.400	4.000	52.000	15.000
1.450	4.000	52.000	16.000
1.500	4.000	52.000	17.000
1.550	4.000	52.000	17.000
1.590	4.000	52.000	18.000
1.600	4.000	52.000	18.000
1.650	4.000	52.000	18.000
1.700	4.000	56.000	19.000
1.750	4.000	56.000	19.000
1.800	4.000	56.000	20.000
1.850	4.000	56.000	20.000
1.900	4.000	56.000	21.000
1.950	4.000	56.000	21.000
1.980	4.000	56.000	22.000
2.000	4.000	56.000	22.000
2.050	4.000	56.000	23.000
2.100	4.000	62.000	23.000
2.150	4.000	62.000	24.000
2.200	4.000	62.000	24.000
2.250	4.000	62.000	25.000
2.300	4.000	62.000	25.000
2.320	4.000	62.000	26.000
2.350	4.000	62.000	26.000
2.380	4.000	62.000	26.000

d1	d2	l1	l2
mm	mm	mm	mm
2.400	4.000	62.000	26.000
2.450	4.000	62.000	27.000
2.500	4.000	62.000	28.000
2.550	4.000	62.000	28.000
2.600	4.000	66.000	29.000
2.650	4.000	66.000	29.000
2.700	4.000	66.000	30.000
2.750	4.000	66.000	30.000
2.780	4.000	66.000	31.000
2.800	4.000	66.000	31.000
2.850	4.000	66.000	31.000
2.900	4.000	66.000	32.000
2.950	4.000	66.000	32.000
3.000	4.000	66.000	33.000

ExclusiveLine micro-precision drills with coolant ducts

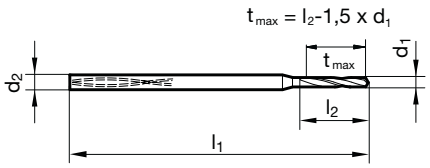
15xD | WN | N | 135° | h7

Tool material	**Solid carbide**
Surface	A
Cutting direction	R

P	•	web thinning ≥ Ø 1.400 • facet point grinding • main cutting edge form straight • edge preparation
M	•	
K	•	
N	○	structural and case hardened steels • free-cutting steels, heat-treatable steels • alloyed steels up to 1200 N/mm² • stainless steels • cast materials
S	○	
H		

GÜHRINGNAVIGATOR

Cutting data page 62



Article no. **6412**

d1	d2	l1	l2
mm	mm	mm	mm
1.400	4.000	62.000	25.000
1.500	4.000	62.000	27.000
1.590	4.000	62.000	29.000
1.600	4.000	62.000	29.000
1.700	4.000	70.000	31.000
1.800	4.000	70.000	32.000
1.900	4.000	70.000	34.000
1.980	4.000	70.000	36.000
2.000	4.000	70.000	36.000
2.100	4.000	78.000	38.000
2.200	4.000	78.000	40.000
2.300	4.000	78.000	42.000

d1	d2	l1	l2
mm	mm	mm	mm
2.380	4.000	78.000	44.000
2.400	4.000	78.000	44.000
2.500	4.000	78.000	45.000
2.600	4.000	87.000	47.000
2.700	4.000	87.000	48.000
2.780	4.000	87.000	50.000
2.800	4.000	87.000	50.000
2.900	4.000	87.000	52.000
3.000	4.000	87.000	54.000

EB 100 single-fluted gun drills

EB 100 | WN | R | h5

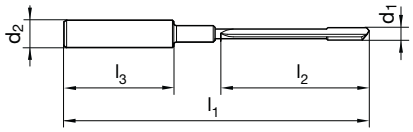
Tool material	**Solid carbide**
Surface	◯
Shank form	HA

P	○
M	○
K	○
N	•
S	•
H	○

flute length 45 mm • head form G

GÜHRINGNAVIGATOR

Cutting data page 66



Article no. **5024**

d1 h5		d2 h6	l1	l2	l3	Code no.
mm	inch	mm	mm	mm	mm	
1.200		4.000	90.000	45.000	28.000	1.200
1.500		4.000	90.000	45.000	28.000	1.500
1.590	1/16	4.000	90.000	45.000	28.000	1.590
1.600		4.000	90.000	45.000	28.000	1.600
1.980	5/64	4.000	90.000	45.000	28.000	1.980
2.000		4.000	90.000	45.000	28.000	2.000
2.500		10.000	100.000	45.000	40.000	2.500
2.700		10.000	100.000	45.000	40.000	2.700
3.000		10.000	100.000	45.000	40.000	3.000
3.200		10.000	100.000	45.000	40.000	3.200

EB 100 single-fluted gun drills

EB 100 | WN | R | h5

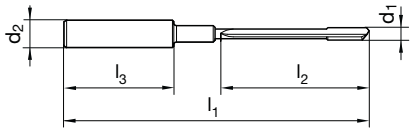
P	•
M	○
K	•
N	○
S	○
H	○

flute length 45 mm • head form G

Tool material	**Solid carbide**
Surface	A
Shank form	HA

GÜHRINGNAVIGATOR

Cutting data page 66



Article no. **5632**

d1 h5		d2 h6	l1	l2	l3	Code no.
mm	inch	mm	mm	mm	mm	
1.200		4.000	90.000	45.000	28.000	1.200
1.500		4.000	90.000	45.000	28.000	1.500
1.590	1/16	4.000	90.000	45.000	28.000	1.590
1.600		4.000	90.000	45.000	28.000	1.600
1.980	5/64	4.000	90.000	45.000	28.000	1.980
2.000		4.000	90.000	45.000	28.000	2.000
2.500		10.000	100.000	45.000	40.000	2.500
2.700		10.000	100.000	45.000	40.000	2.700
3.000		10.000	100.000	45.000	40.000	3.000
3.200		10.000	100.000	45.000	40.000	3.200

EB 100 single-fluted gun drills

EB 100 | WN | R | h5

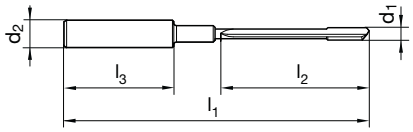
Tool material	**Solid carbide**
Surface	◯
Shank form	HA

P	○
M	○
K	○
N	•
S	•
H	○

flute length 80 mm • head form G

GÜHRINGNAVIGATOR

Cutting data page 66



Article no. **5020**

d1 h5		d2 h6	l1	l2	l3	Code no.
mm	inch	mm	mm	mm	mm	
1.200		4.000	125.000	80.000	28.000	1.200
1.500		4.000	125.000	80.000	28.000	1.500
1.590	1/16	4.000	125.000	80.000	28.000	1.590
1.600		4.000	125.000	80.000	28.000	1.600
1.980	5/64	4.000	125.000	80.000	28.000	1.980
2.000		4.000	125.000	80.000	28.000	2.000
2.500		10.000	135.000	80.000	40.000	2.500
2.700		10.000	135.000	80.000	40.000	2.700
3.000		10.000	135.000	80.000	40.000	3.000
3.200		10.000	135.000	80.000	40.000	3.200
3.500		10.000	135.000	80.000	40.000	3.500
4.000		10.000	135.000	80.000	40.000	4.000
4.200		10.000	135.000	80.000	40.000	4.200
4.500		10.000	135.000	80.000	40.000	4.500
5.000		10.000	135.000	80.000	40.000	5.000

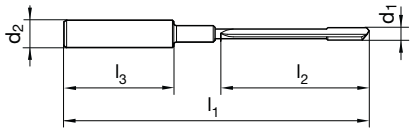
EB 100 single-fluted gun drills

EB 100 | WN | R | h5

P	•
M	○
K	•
N	○
S	○
H	○

flute length 80 mm • head form G

Tool material	**Solid carbide**
Surface	A
Shank form	HA



GÜHRINGNAVIGATOR

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Article no. **5633**

d1 h5		d2 h6	l1	l2	l3	Code no.
mm	inch	mm	mm	mm	mm	
1.200		4.000	125.000	80.000	28.000	1.200
1.500		4.000	125.000	80.000	28.000	1.500
1.590	1/16	4.000	125.000	80.000	28.000	1.590
1.600		4.000	125.000	80.000	28.000	1.600
1.980	5/64	4.000	125.000	80.000	28.000	1.980
2.000		4.000	125.000	80.000	28.000	2.000
2.500		10.000	135.000	80.000	40.000	2.500
2.700		10.000	135.000	80.000	40.000	2.700
3.000		10.000	135.000	80.000	40.000	3.000
3.200		10.000	135.000	80.000	40.000	3.200
3.500		10.000	135.000	80.000	40.000	3.500
4.000		10.000	135.000	80.000	40.000	4.000
4.200		10.000	135.000	80.000	40.000	4.200
4.500		10.000	135.000	80.000	40.000	4.500
5.000		10.000	135.000	80.000	40.000	5.000

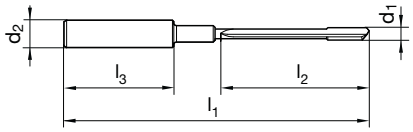
EB 100 single-fluted gun drills

EB 100 | WN | R | h5

Tool material	**Solid carbide**
Surface	◯
Shank form	HA

P	○
M	○
K	○
N	●
S	●
H	○

flute length 120 mm • head form G



GÜHRINGNAVIGATOR

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Article no. **5026**

d1 h5		d2 h6	l1	l2	l3	Code no.
mm	inch	mm	mm	mm	mm	
1.500		4.000	165.000	120.000	28.000	1.500
1.590	1/16	4.000	165.000	120.000	28.000	1.590
1.600		4.000	165.000	120.000	28.000	1.600
1.980	5/64	4.000	165.000	120.000	28.000	1.980
2.000		4.000	165.000	120.000	28.000	2.000
2.500		10.000	175.000	120.000	40.000	2.500
2.700		10.000	175.000	120.000	40.000	2.700
3.000		10.000	175.000	120.000	40.000	3.000
3.200		10.000	175.000	120.000	40.000	3.200
3.500		10.000	175.000	120.000	40.000	3.500
4.000		10.000	175.000	120.000	40.000	4.000
4.200		10.000	175.000	120.000	40.000	4.200
4.500		10.000	175.000	120.000	40.000	4.500
5.000		10.000	175.000	120.000	40.000	5.000

EB 100 single-fluted gun drills

EB 100 | WN | R | h5

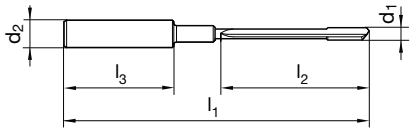
P	•
M	○
K	•
N	○
S	○
H	○

flute length 120 mm • head form G

Tool material	**Solid carbide**
Surface	A
Shank form	HA

GÜHRINGNAVIGATOR

Cutting data page 66



Article no. **5637**

d1 h5		d2 h6	l1	l2	l3	Code no.
mm	inch	mm	mm	mm	mm	
1.500		4.000	165.000	120.000	28.000	1.500
1.590	1/16	4.000	165.000	120.000	28.000	1.590
1.600		4.000	165.000	120.000	28.000	1.600
1.980	5/64	4.000	165.000	120.000	28.000	1.980
2.000		4.000	165.000	120.000	28.000	2.000
2.500		10.000	175.000	120.000	40.000	2.500
2.700		10.000	175.000	120.000	40.000	2.700
3.000		10.000	175.000	120.000	40.000	3.000
3.200		10.000	175.000	120.000	40.000	3.200
3.500		10.000	175.000	120.000	40.000	3.500
4.000		10.000	175.000	120.000	40.000	4.000
4.200		10.000	175.000	120.000	40.000	4.200
4.500		10.000	175.000	120.000	40.000	4.500
5.000		10.000	175.000	120.000	40.000	5.000

EB 100 single-fluted gun drills

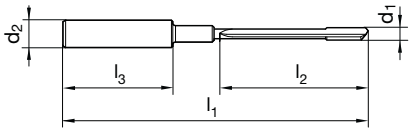
EB 100 | WN | R | h5

Tool material	**Solid carbide**
Surface	◯
Shank form	HA

P	○
M	○
K	○
N	•
S	•
H	○

flute length 160 mm • head form G

GÜHRINGNAVIGATOR
Cutting data page 66



Article no. **5021**

d1 h5		d2 h6	l1	l2	l3	Code no.
mm	inch	mm	mm	mm	mm	
1.500		4.000	205.000	160.000	28.000	1.500
1.590	1/16	4.000	205.000	160.000	28.000	1.590
1.600		4.000	205.000	160.000	28.000	1.600
1.980	5/64	4.000	205.000	160.000	28.000	1.980
2.000		4.000	205.000	160.000	28.000	2.000
2.500		10.000	215.000	160.000	40.000	2.500
2.700		10.000	215.000	160.000	40.000	2.700
3.000		10.000	215.000	160.000	40.000	3.000
3.200		10.000	215.000	160.000	40.000	3.200
3.500		10.000	215.000	160.000	40.000	3.500
4.000		10.000	215.000	160.000	40.000	4.000
4.200		10.000	215.000	160.000	40.000	4.200
4.500		10.000	215.000	160.000	40.000	4.500
5.000		10.000	215.000	160.000	40.000	5.000
6.000		16.000	225.000	160.000	48.000	6.000
8.000		16.000	225.000	160.000	48.000	8.000

EB 100 single-fluted gun drills

EB 100 | WN | R | h5

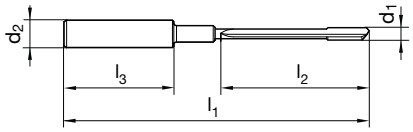
P	•
M	○
K	•
N	○
S	○
H	○

flute length 160 mm • head form G

Tool material	**Solid carbide**
Surface	A
Shank form	HA

GÜHRINGNAVIGATOR

Cutting data page 66



Article no. **5638**

d1 h5		d2 h6	l1	l2	l3	Code no.
mm	inch	mm	mm	mm	mm	
1.500		4.000	205.000	160.000	28.000	1.500
1.590	1/16	4.000	205.000	160.000	28.000	1.590
1.600		4.000	205.000	160.000	28.000	1.600
1.980	5/64	4.000	205.000	160.000	28.000	1.980
2.000		4.000	205.000	160.000	28.000	2.000
2.500		10.000	215.000	160.000	40.000	2.500
2.700		10.000	215.000	160.000	40.000	2.700
3.000		10.000	215.000	160.000	40.000	3.000
3.200		10.000	215.000	160.000	40.000	3.200
3.500		10.000	215.000	160.000	40.000	3.500
4.000		10.000	215.000	160.000	40.000	4.000
4.200		10.000	215.000	160.000	40.000	4.200
4.500		10.000	215.000	160.000	40.000	4.500
5.000		10.000	215.000	160.000	40.000	5.000
6.000		16.000	225.000	160.000	48.000	6.000
8.000		16.000	225.000	160.000	48.000	8.000

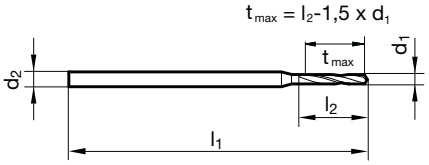
Solid carbide micro-precision drills without coolant ducts

Tool material	Solid carbide
Surface	◯
Cutting direction	Ⓡ

P	•	web thinning ≥ Ø 0.800 • facet point grinding • main cutting edge form straight
M	○	
K	•	
N	○	structural and case hardened steels • cast materials • bronze, brass • aluminium and Al-alloys • magnesium and magnesium alloys • plastics and fiber reinforced plastics
S	○	
H	○	

GÜHRINGNAVIGATOR

Cutting data page 62



Article no. **701**

d1	d2	l1	l2
mm	mm	mm	mm
0.200	1.000	25.000	1.500
0.220	1.000	25.000	1.500
0.250	1.000	25.000	1.900
0.260	1.000	25.000	1.900
0.280	1.000	25.000	1.900
0.300	1.000	25.000	1.900
0.330	1.000	25.000	2.400
0.350	1.000	25.000	2.400
0.400	1.000	25.000	3.000
0.450	1.000	25.000	3.000
0.500	1.000	25.000	3.400
0.600	1.000	25.000	3.900
0.650	1.000	25.000	4.200
0.700	1.000	25.000	4.800
0.750	1.000	25.000	4.800
0.800	1.500	25.000	5.300
0.810	1.500	25.000	5.300
0.830	1.500	25.000	5.300

d1	d2	l1	l2
mm	mm	mm	mm
0.850	1.500	25.000	5.300
0.900	1.500	25.000	6.000
1.000	1.500	25.000	6.800
1.050	1.500	25.000	6.800
1.100	1.500	25.000	7.600
1.150	1.500	25.000	7.600
1.200	1.500	25.000	8.500
1.250	1.500	25.000	8.500
1.300	1.500	25.000	8.500
1.350	1.500	25.000	9.500
1.400	1.500	25.000	9.500

Solid carbide micro-precision drills without coolant ducts

N | WN | 140° | ≥1,0 h7

Tool material	Solid carbide
Surface	A
Cutting direction	R

P	•
M	
K	•
N	
S	
H	

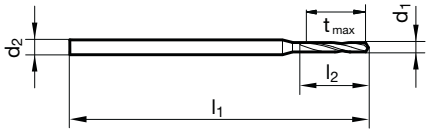
web thinning ≥ Ø 0.800 • facet point grinding

structural and case hardened steels • free-cutting steels, heat-treatable steels • alloyed steels up to 1200 N/mm² • cast materials

GÜHRINGNAVIGATOR

Cutting data page 62

$t_{max} = l_2\text{-}1{,}5 \times d_1$



Article no. **3899**

d1	d2 h6	l1	l2
mm	mm	mm	mm
0.100	3.000	38.000	1.200
0.150	3.000	38.000	2.000
0.200	3.000	38.000	2.500
0.250	3.000	38.000	3.000
0.260	3.000	38.000	3.000
0.270	3.000	38.000	3.000
0.280	3.000	38.000	3.000
0.300	3.000	38.000	5.000
0.310	3.000	38.000	5.000
0.330	3.000	38.000	5.000
0.350	3.000	38.000	6.000
0.360	3.000	38.000	6.000
0.370	3.000	38.000	6.000
0.380	3.000	38.000	6.000
0.400	3.000	38.000	7.000
0.410	3.000	38.000	7.000
0.430	3.000	38.000	7.000
0.440	3.000	38.000	7.000
0.450	3.000	38.000	7.000
0.480	3.000	38.000	7.000
0.500	3.000	38.000	7.000
0.510	3.000	38.000	7.000
0.530	3.000	38.000	7.000
0.550	3.000	38.000	7.000
0.570	3.000	38.000	7.000
0.600	3.000	38.000	7.000
0.640	3.000	38.000	7.000
0.650	3.000	38.000	7.000
0.660	3.000	38.000	7.000
0.680	3.000	38.000	7.000
0.700	3.000	38.000	8.000
0.710	3.000	38.000	8.000
0.720	3.000	38.000	8.000
0.740	3.000	38.000	8.000
0.750	3.000	38.000	8.000
0.760	3.000	38.000	8.000
0.770	3.000	38.000	8.000
0.780	3.000	38.000	8.000
0.790	3.000	38.000	8.000
0.800	3.000	38.000	10.000
0.810	3.000	38.000	10.000
0.820	3.000	38.000	10.000

d1	d2 h6	l1	l2
mm	mm	mm	mm
0.830	3.000	38.000	10.000
0.840	3.000	38.000	10.000
0.850	3.000	38.000	10.000
0.860	3.000	38.000	10.000
0.870	3.000	38.000	10.000
0.880	3.000	38.000	10.000
0.890	3.000	38.000	10.000
0.900	3.000	38.000	10.000
0.910	3.000	38.000	10.000
0.920	3.000	38.000	10.000
0.930	3.000	38.000	10.000
0.940	3.000	38.000	10.000
0.950	3.000	38.000	10.000
0.960	3.000	38.000	10.000
0.970	3.000	38.000	10.000
0.980	3.000	38.000	10.000
0.990	3.000	38.000	10.000
1.000	3.000	38.000	10.000
1.010	3.000	38.000	10.000
1.020	3.000	38.000	10.000
1.050	3.000	38.000	10.000
1.060	3.000	38.000	10.000
1.070	3.000	38.000	10.000
1.090	3.000	38.000	10.000
1.100	3.000	38.000	10.000
1.110	3.000	38.000	10.000
1.150	3.000	38.000	10.000
1.170	3.000	38.000	10.000
1.190	3.000	38.000	10.000
1.200	3.000	38.000	10.000
1.210	3.000	38.000	10.000
1.220	3.000	38.000	10.000
1.230	3.000	38.000	10.000
1.240	3.000	38.000	10.000
1.260	3.000	38.000	10.000
1.270	3.000	38.000	10.000
1.280	3.000	38.000	10.000
1.300	3.000	38.000	10.000
1.370	3.000	38.000	10.000
1.400	3.000	38.000	10.000
1.420	3.000	38.000	10.000
1.450	3.000	38.000	10.000

d1	d2 h6	l1	l2
mm	mm	mm	mm
1.490	3.000	38.000	10.000
1.500	3.000	38.000	10.000
1.510	3.000	38.000	10.000
1.520	3.000	38.000	10.000
1.550	3.000	38.000	10.000
1.560	3.000	38.000	10.000
1.580	3.000	38.000	10.000
1.590	3.000	38.000	10.000
1.600	3.000	38.000	12.000
1.630	3.000	38.000	12.000
1.650	3.000	38.000	12.000
1.700	3.000	38.000	12.000
1.750	3.000	38.000	12.000
1.800	3.000	38.000	12.000
1.810	3.000	38.000	12.000
1.820	3.000	38.000	12.000
1.830	3.000	38.000	12.000
1.840	3.000	38.000	12.000
1.850	3.000	38.000	12.000
1.860	3.000	38.000	12.000
1.900	3.000	38.000	12.000
1.920	3.000	38.000	12.000
1.950	3.000	38.000	12.000
1.980	3.000	38.000	12.000

d1	d2 h6	l1	l2
mm	mm	mm	mm
2.000	3.000	38.000	12.000
2.050	3.000	38.000	12.000
2.100	3.000	38.000	12.000
2.150	3.000	38.000	12.000
2.200	3.000	38.000	12.000
2.400	3.000	38.000	12.000
2.500	3.000	38.000	12.000
2.550	3.000	38.000	12.000
2.600	3.000	38.000	12.000
2.750	3.000	38.000	12.000
2.800	3.000	38.000	12.000
2.950	3.000	38.000	12.000
3.000	3.000	38.000	12.000

HSS-E-PM micro-precision drills without coolant ducts

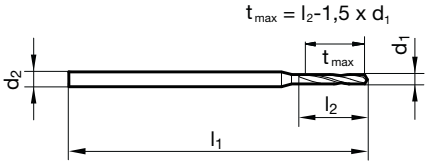
~5xD | DIN 1899 | N | 118° | 0/-0,004

Tool material	HSS-E-PM
Surface	◯
Cutting direction	Ⓡ

P	•	facet point grinding • with re-inforced shank • < Ø 0.15 mm Co-alloyed high speed steel
M	•	
K	•	
N	•	high-alloyed steels
S	○	
H		

GÜHRINGNAVIGATOR

Cutting data page 62



Article no. **301**

d1	d2	l1	l2
mm	mm	mm	mm
0.050	1.000	25.000	0.400
0.060	1.000	25.000	0.400
0.070	1.000	25.000	0.500
0.075	1.000	25.000	0.500
0.080	1.000	25.000	0.500
0.090	1.000	25.000	0.500
0.100	1.000	25.000	0.500
0.105	1.000	25.000	0.500
0.110	1.000	25.000	0.500
0.115	1.000	25.000	0.500
0.120	1.000	25.000	0.500
0.121	1.000	25.000	0.800
0.125	1.000	25.000	0.800
0.128	1.000	25.000	0.800
0.130	1.000	25.000	0.800
0.140	1.000	25.000	0.800
0.143	1.000	25.000	0.800
0.145	1.000	25.000	0.800
0.147	1.000	25.000	0.800
0.150	1.000	25.000	0.800
0.155	1.000	25.000	1.100
0.160	1.000	25.000	1.100
0.170	1.000	25.000	1.100
0.175	1.000	25.000	1.100
0.180	1.000	25.000	1.100
0.190	1.000	25.000	1.100
0.195	1.000	25.000	1.500
0.200	1.000	25.000	1.500
0.205	1.000	25.000	1.500
0.210	1.000	25.000	1.500
0.215	1.000	25.000	1.500
0.220	1.000	25.000	1.500
0.225	1.000	25.000	1.500
0.230	1.000	25.000	1.500
0.235	1.000	25.000	1.500
0.240	1.000	25.000	1.500
0.245	1.000	25.000	1.900
0.250	1.000	25.000	1.900
0.255	1.000	25.000	1.900
0.260	1.000	25.000	1.900
0.265	1.000	25.000	1.900
0.270	1.000	25.000	1.900

d1	d2	l1	l2
mm	mm	mm	mm
0.275	1.000	25.000	1.900
0.280	1.000	25.000	1.900
0.285	1.000	25.000	1.900
0.290	1.000	25.000	1.900
0.295	1.000	25.000	1.900
0.300	1.000	25.000	1.900
0.305	1.000	25.000	2.400
0.310	1.000	25.000	2.400
0.315	1.000	25.000	2.400
0.320	1.000	25.000	2.400
0.325	1.000	25.000	2.400
0.330	1.000	25.000	2.400
0.335	1.000	25.000	2.400
0.340	1.000	25.000	2.400
0.345	1.000	25.000	2.400
0.350	1.000	25.000	2.400
0.355	1.000	25.000	2.400
0.360	1.000	25.000	2.400
0.365	1.000	25.000	2.400
0.370	1.000	25.000	2.400
0.375	1.000	25.000	2.400
0.380	1.000	25.000	2.400
0.385	1.000	25.000	3.000
0.390	1.000	25.000	3.000
0.400	1.000	25.000	3.000
0.405	1.000	25.000	3.000
0.410	1.000	25.000	3.000
0.415	1.000	25.000	3.000
0.420	1.000	25.000	3.000
0.425	1.000	25.000	3.000
0.430	1.000	25.000	3.000
0.432	1.000	25.000	3.000
0.435	1.000	25.000	3.000
0.440	1.000	25.000	3.000
0.445	1.000	25.000	3.000
0.450	1.000	25.000	3.000
0.455	1.000	25.000	3.000
0.460	1.000	25.000	3.000
0.470	1.000	25.000	3.000
0.475	1.000	25.000	3.000
0.480	1.000	25.000	3.000
0.485	1.000	25.000	3.400

d1	d2	l1	l2
mm	mm	mm	mm
0.490	1.000	25.000	3.400
0.495	1.000	25.000	3.400
0.500	1.000	25.000	3.400
0.505	1.000	25.000	3.400
0.510	1.000	25.000	3.400
0.515	1.000	25.000	3.400
0.520	1.000	25.000	3.400
0.525	1.000	25.000	3.400
0.530	1.000	25.000	3.400
0.535	1.000	25.000	3.900
0.540	1.000	25.000	3.900
0.545	1.000	25.000	3.900
0.550	1.000	25.000	3.900
0.560	1.000	25.000	3.900
0.570	1.000	25.000	3.900
0.580	1.000	25.000	3.900
0.585	1.000	25.000	3.900
0.590	1.000	25.000	3.900
0.595	1.000	25.000	3.900
0.600	1.000	25.000	3.900
0.605	1.000	25.000	4.200
0.610	1.000	25.000	4.200
0.615	1.000	25.000	4.200
0.620	1.000	25.000	4.200
0.625	1.000	25.000	4.200
0.630	1.000	25.000	4.200
0.632	1.000	25.000	4.200
0.640	1.000	25.000	4.200
0.650	1.000	25.000	4.200
0.655	1.000	25.000	4.200
0.660	1.000	25.000	4.200
0.665	1.000	25.000	4.200
0.670	1.000	25.000	4.200
0.675	1.000	25.000	4.800
0.680	1.000	25.000	4.800
0.690	1.000	25.000	4.800
0.695	1.000	25.000	4.800
0.700	1.000	25.000	4.800
0.705	1.000	25.000	4.800
0.710	1.000	25.000	4.800
0.720	1.000	25.000	4.800
0.725	1.000	25.000	4.800
0.730	1.000	25.000	4.800
0.740	1.000	25.000	4.800
0.750	1.000	25.000	4.800
0.760	1.000	25.000	5.300
0.770	1.000	25.000	5.300
0.780	1.000	25.000	5.300
0.790	1.000	25.000	5.300
0.795	1.500	25.000	5.300
0.800	1.500	25.000	5.300
0.810	1.500	25.000	5.300
0.820	1.500	25.000	5.300
0.825	1.500	25.000	5.300
0.830	1.500	25.000	5.300
0.840	1.500	25.000	5.300
0.845	1.500	25.000	5.300
0.850	1.500	25.000	5.300
0.860	1.500	25.000	6.000
0.870	1.500	25.000	6.000
0.880	1.500	25.000	6.000
0.890	1.500	25.000	6.000
0.900	1.500	25.000	6.000
0.910	1.500	25.000	6.000
0.920	1.500	25.000	6.000
0.925	1.500	25.000	6.000
0.930	1.500	25.000	6.000
0.940	1.500	25.000	6.000
0.950	1.500	25.000	6.000
0.960	1.500	25.000	6.800
0.970	1.500	25.000	6.800
0.980	1.500	25.000	6.800

d1	d2	l1	l2
mm	mm	mm	mm
0.990	1.500	25.000	6.800
1.000	1.500	25.000	6.800
1.010	1.500	25.000	6.800
1.020	1.500	25.000	6.800
1.030	1.500	25.000	6.800
1.040	1.500	25.000	6.800
1.050	1.500	25.000	6.800
1.055	1.500	25.000	6.800
1.060	1.500	25.000	6.800
1.070	1.500	25.000	7.600
1.080	1.500	25.000	7.600
1.090	1.500	25.000	7.600
1.100	1.500	25.000	7.600
1.110	1.500	25.000	7.600
1.120	1.500	25.000	7.600
1.130	1.500	25.000	7.600
1.140	1.500	25.000	7.600
1.150	1.500	25.000	7.600
1.160	1.500	25.000	7.600
1.170	1.500	25.000	7.600
1.180	1.500	25.000	7.600
1.190	1.500	25.000	8.500
1.200	1.500	25.000	8.500
1.210	1.500	25.000	8.500
1.220	1.500	25.000	8.500
1.230	1.500	25.000	8.500
1.240	1.500	25.000	8.500
1.250	1.500	25.000	8.500
1.260	1.500	25.000	8.500
1.265	1.500	25.000	8.500
1.270	1.500	25.000	8.500
1.280	1.500	25.000	8.500
1.290	1.500	25.000	8.500
1.300	1.500	25.000	8.500
1.310	1.500	25.000	8.500
1.320	1.500	25.000	8.500
1.325	1.500	25.000	9.500
1.330	1.500	25.000	9.500
1.340	1.500	25.000	9.500
1.350	1.500	25.000	9.500
1.370	1.500	25.000	9.500
1.380	1.500	25.000	9.500
1.390	1.500	25.000	9.500
1.400	1.500	25.000	9.500
1.410	1.500	25.000	9.500
1.420	1.500	25.000	9.500
1.430	1.500	25.000	9.500
1.440	1.500	25.000	9.500
1.450	1.500	25.000	9.500
1.460	2.000	30.000	9.500
1.470	2.000	30.000	9.500
1.500	2.000	30.000	9.500
1.520	2.000	30.000	10.600
1.530	2.000	30.000	10.600
1.540	2.000	30.000	10.600
1.550	2.000	30.000	10.600
1.590	2.000	30.000	10.600
1.600	2.000	30.000	10.600
1.610	2.000	30.000	10.600
1.630	2.000	30.000	10.600
1.640	2.000	30.000	10.600
1.650	2.000	30.000	10.600
1.660	2.000	30.000	10.600
1.690	2.000	30.000	10.600
1.700	2.000	30.000	10.600
1.710	2.000	30.000	11.800
1.715	2.000	30.000	11.800
1.730	2.000	30.000	11.800
1.745	2.000	30.000	11.800
1.750	2.000	30.000	11.800
1.775	2.000	30.000	11.800
1.800	2.000	30.000	11.800

d1	d2	l1	l2
mm	mm	mm	mm
1.830	2.000	30.000	11.800
1.840	2.000	30.000	11.800
1.850	2.000	30.000	11.800
1.860	2.000	30.000	11.800
1.900	2.000	30.000	11.800
1.920	2.000	30.000	13.200

d1	d2	l1	l2
mm	mm	mm	mm
1.930	2.000	30.000	13.200

HSS-E-PM micro-precision drills without coolant ducts

~5xD | DIN 1899 | N | 118° | 0/-0,004

Tool material	HSS-E-PM
Surface	S
Cutting direction	R

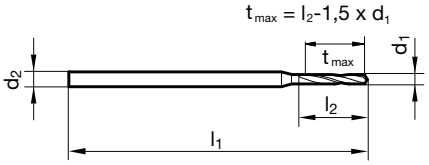
P	•
M	•
K	•
N	•
S	○
H	

facet point grinding • with re-inforced shank • increased wear resistance

high-alloyed steels

GÜHRINGNAVIGATOR

Cutting data page 62



Article no. **660**

d1	d2	l1	l2
mm	mm	mm	mm
0.160	1.000	25.000	1.100
0.170	1.000	25.000	1.100
0.180	1.000	25.000	1.100
0.190	1.000	25.000	1.100
0.200	1.000	25.000	1.500
0.210	1.000	25.000	1.500
0.220	1.000	25.000	1.500
0.230	1.000	25.000	1.500
0.240	1.000	25.000	1.500
0.250	1.000	25.000	1.900
0.255	1.000	25.000	1.900
0.260	1.000	25.000	1.900
0.265	1.000	25.000	1.900
0.270	1.000	25.000	1.900
0.280	1.000	25.000	1.900
0.290	1.000	25.000	1.900
0.295	1.000	25.000	1.900
0.300	1.000	25.000	1.900
0.305	1.000	25.000	2.400
0.310	1.000	25.000	2.400
0.320	1.000	25.000	2.400
0.325	1.000	25.000	2.400
0.330	1.000	25.000	2.400
0.340	1.000	25.000	2.400
0.350	1.000	25.000	2.400
0.360	1.000	25.000	2.400
0.370	1.000	25.000	2.400
0.380	1.000	25.000	2.400
0.390	1.000	25.000	3.000
0.400	1.000	25.000	3.000
0.410	1.000	25.000	3.000
0.420	1.000	25.000	3.000
0.430	1.000	25.000	3.000
0.440	1.000	25.000	3.000
0.450	1.000	25.000	3.000
0.460	1.000	25.000	3.000
0.470	1.000	25.000	3.000
0.480	1.000	25.000	3.000
0.490	1.000	25.000	3.400
0.500	1.000	25.000	3.400
0.510	1.000	25.000	3.400
0.520	1.000	25.000	3.400

d1	d2	l1	l2
mm	mm	mm	mm
0.530	1.000	25.000	3.400
0.540	1.000	25.000	3.900
0.550	1.000	25.000	3.900
0.560	1.000	25.000	3.900
0.570	1.000	25.000	3.900
0.580	1.000	25.000	3.900
0.590	1.000	25.000	3.900
0.600	1.000	25.000	3.900
0.610	1.000	25.000	4.200
0.620	1.000	25.000	4.200
0.630	1.000	25.000	4.200
0.640	1.000	25.000	4.200
0.650	1.000	25.000	4.200
0.660	1.000	25.000	4.200
0.670	1.000	25.000	4.200
0.680	1.000	25.000	4.800
0.690	1.000	25.000	4.800
0.700	1.000	25.000	4.800
0.710	1.000	25.000	4.800
0.720	1.000	25.000	4.800
0.730	1.000	25.000	4.800
0.740	1.000	25.000	4.800
0.750	1.000	25.000	4.800
0.760	1.000	25.000	5.300
0.770	1.000	25.000	5.300
0.780	1.000	25.000	5.300
0.790	1.000	25.000	5.300
0.800	1.500	25.000	5.300
0.810	1.500	25.000	5.300
0.820	1.500	25.000	5.300
0.830	1.500	25.000	5.300
0.840	1.500	25.000	5.300
0.850	1.500	25.000	5.300
0.860	1.500	25.000	6.000
0.870	1.500	25.000	6.000
0.880	1.500	25.000	6.000
0.900	1.500	25.000	6.000
0.910	1.500	25.000	6.000
0.920	1.500	25.000	6.000
0.940	1.500	25.000	6.000
0.950	1.500	25.000	6.000
0.960	1.500	25.000	6.800

d1	d2	l1	l2
mm	mm	mm	mm
0.970	1.500	25.000	6.800
0.980	1.500	25.000	6.800
1.000	1.500	25.000	6.800
1.020	1.500	25.000	6.800
1.040	1.500	25.000	6.800
1.050	1.500	25.000	6.800
1.070	1.500	25.000	7.600
1.080	1.500	25.000	7.600
1.100	1.500	25.000	7.600
1.150	1.500	25.000	7.600
1.180	1.500	25.000	7.600
1.190	1.500	25.000	8.500

d1	d2	l1	l2
mm	mm	mm	mm
1.200	1.500	25.000	8.500
1.220	1.500	25.000	8.500
1.250	1.500	25.000	8.500
1.300	1.500	25.000	8.500
1.350	1.500	25.000	9.500
1.390	1.500	25.000	9.500
1.400	1.500	25.000	9.500
1.420	1.500	25.000	9.500
1.450	1.500	25.000	9.500
1.500	2.000	30.000	9.500
1.800	2.000	30.000	11.800
1.900	2.000	30.000	11.800

HSS-E-PM micro-precision drills without coolant ducts

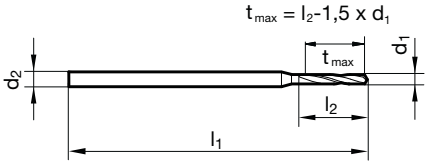
~5xD | DIN 1899 | N | 118° | 0/-0,004

Tool material	HSS-E-PM
Surface	◯
Cutting direction	(L)

P	•	facet point grinding • with re-inforced shank • < Ø 0.15 mm Co-alloyed high speed steel
M	•	
K	•	
N	•	high-alloyed steels
S	○	
H		

GÜHRINGNAVIGATOR

Cutting data page 62



Article no. **303**

d1	d2	l1	l2
mm	mm	mm	mm
0.130	1.000	25.000	0.800
0.140	1.000	25.000	0.800
0.150	1.000	25.000	0.800
0.155	1.000	25.000	1.100
0.160	1.000	25.000	1.100
0.170	1.000	25.000	1.100
0.175	1.000	25.000	1.100
0.180	1.000	25.000	1.100
0.185	1.000	25.000	1.100
0.190	1.000	25.000	1.100
0.195	1.000	25.000	1.500
0.200	1.000	25.000	1.500
0.210	1.000	25.000	1.500
0.215	1.000	25.000	1.500
0.220	1.000	25.000	1.500
0.225	1.000	25.000	1.500
0.230	1.000	25.000	1.500
0.235	1.000	25.000	1.500
0.240	1.000	25.000	1.500
0.245	1.000	25.000	1.900
0.250	1.000	25.000	1.900
0.255	1.000	25.000	1.900
0.260	1.000	25.000	1.900
0.265	1.000	25.000	1.900
0.270	1.000	25.000	1.900
0.275	1.000	25.000	1.900
0.280	1.000	25.000	1.900
0.290	1.000	25.000	1.900
0.295	1.000	25.000	1.900
0.300	1.000	25.000	1.900
0.310	1.000	25.000	2.400
0.315	1.000	25.000	2.400
0.330	1.000	25.000	2.400
0.340	1.000	25.000	2.400
0.345	1.000	25.000	2.400
0.350	1.000	25.000	2.400
0.355	1.000	25.000	2.400
0.360	1.000	25.000	2.400
0.370	1.000	25.000	2.400
0.380	1.000	25.000	2.400
0.390	1.000	25.000	3.000
0.400	1.000	25.000	3.000

d1	d2	l1	l2
mm	mm	mm	mm
0.410	1.000	25.000	3.000
0.415	1.000	25.000	3.000
0.420	1.000	25.000	3.000
0.430	1.000	25.000	3.000
0.435	1.000	25.000	3.000
0.440	1.000	25.000	3.000
0.450	1.000	25.000	3.000
0.460	1.000	25.000	3.000
0.465	1.000	25.000	3.000
0.470	1.000	25.000	3.000
0.480	1.000	25.000	3.000
0.485	1.000	25.000	3.400
0.490	1.000	25.000	3.400
0.495	1.000	25.000	3.400
0.500	1.000	25.000	3.400
0.510	1.000	25.000	3.400
0.520	1.000	25.000	3.400
0.525	1.000	25.000	3.400
0.540	1.000	25.000	3.900
0.545	1.000	25.000	3.900
0.550	1.000	25.000	3.900
0.555	1.000	25.000	3.900
0.565	1.000	25.000	3.900
0.570	1.000	25.000	3.900
0.580	1.000	25.000	3.900
0.590	1.000	25.000	3.900
0.600	1.000	25.000	3.900
0.615	1.000	25.000	4.200
0.620	1.000	25.000	4.200
0.630	1.000	25.000	4.200
0.640	1.000	25.000	4.200
0.650	1.000	25.000	4.200
0.660	1.000	25.000	4.200
0.670	1.000	25.000	4.200
0.675	1.000	25.000	4.800
0.680	1.000	25.000	4.800
0.685	1.000	25.000	4.800
0.690	1.000	25.000	4.800
0.695	1.000	25.000	4.800
0.700	1.000	25.000	4.800
0.710	1.000	25.000	4.800
0.720	1.000	25.000	4.800

d1	d2	l1	l2
mm	mm	mm	mm
0.740	1.000	25.000	4.800
0.750	1.000	25.000	4.800
0.760	1.000	25.000	5.300
0.770	1.000	25.000	5.300
0.780	1.000	25.000	5.300
0.790	1.000	25.000	5.300
0.800	1.500	25.000	5.300
0.805	1.500	25.000	5.300
0.810	1.500	25.000	5.300
0.820	1.500	25.000	5.300
0.830	1.500	25.000	5.300
0.840	1.500	25.000	5.300
0.850	1.500	25.000	5.300
0.855	1.500	25.000	6.000
0.860	1.500	25.000	6.000
0.870	1.500	25.000	6.000
0.880	1.500	25.000	6.000
0.885	1.500	25.000	6.000
0.890	1.500	25.000	6.000
0.900	1.500	25.000	6.000
0.910	1.500	25.000	6.000
0.915	1.500	25.000	6.000
0.920	1.500	25.000	6.000
0.925	1.500	25.000	6.000
0.935	1.500	25.000	6.000
0.940	1.500	25.000	6.000
0.950	1.500	25.000	6.000
0.960	1.500	25.000	6.800
0.970	1.500	25.000	6.800
0.975	1.500	25.000	6.800
0.980	1.500	25.000	6.800
0.985	1.500	25.000	6.800
0.990	1.500	25.000	6.800
1.000	1.500	25.000	6.800
1.005	1.500	25.000	6.800
1.020	1.500	25.000	6.800

d1	d2	l1	l2
mm	mm	mm	mm
1.030	1.500	25.000	6.800
1.040	1.500	25.000	6.800
1.050	1.500	25.000	6.800
1.060	1.500	25.000	6.800
1.080	1.500	25.000	7.600
1.085	1.500	25.000	7.600
1.090	1.500	25.000	7.600
1.100	1.500	25.000	7.600
1.110	1.500	25.000	7.600
1.120	1.500	25.000	7.600
1.125	1.500	25.000	7.600
1.150	1.500	25.000	7.600
1.160	1.500	25.000	7.600
1.170	1.500	25.000	7.600
1.180	1.500	25.000	7.600
1.200	1.500	25.000	8.500
1.250	1.500	25.000	8.500
1.270	1.500	25.000	8.500
1.280	1.500	25.000	8.500
1.285	1.500	25.000	8.500
1.290	1.500	25.000	8.500
1.310	1.500	25.000	8.500
1.330	1.500	25.000	9.500
1.350	1.500	25.000	9.500
1.360	1.500	25.000	9.500
1.375	1.500	25.000	9.500
1.400	1.500	25.000	9.500
1.405	1.500	25.000	9.500
1.425	1.500	25.000	9.500
1.450	1.500	25.000	9.500
1.460	2.000	30.000	9.500
1.500	2.000	30.000	9.500
1.600	2.000	30.000	10.600
1.615	2.000	30.000	10.600
1.800	2.000	30.000	11.800
1.850	2.000	30.000	11.800

Stub drills

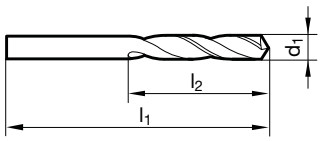
~3xD | DIN 1897 | GV 120 | 130° | h8

Tool material	HSCO
Surface	S
Cutting direction	R

P	•	web thinning ≥ Ø 1.000 • relieved cone • Co-alloyed high speed steel • increased wear resistance
M	•	
K	•	
N	○	acid resist./stainless steels • spring steels • austenitic stainless steels • Hastelloy, Inconel, Nimonic
S	•	
H	○	

GÜHRINGNAVIGATOR

Cutting data page 64



Article no. **659**

d1		l1	l2
mm	inch	mm	mm
0.500		20.000	3.000
0.600		21.000	3.500
0.650		22.000	4.000
0.700		23.000	4.500
0.740		23.000	4.500
0.750		23.000	4.500
0.780		24.000	5.000
0.790	1/32	24.000	5.000
0.800		24.000	5.000
0.850		24.000	5.000
0.900		25.000	5.500
0.950		25.000	5.500
1.000		26.000	6.000
1.020		26.000	6.000
1.070		28.000	7.000
1.090		28.000	7.000
1.100		28.000	7.000
1.150		28.000	7.000
1.190	3/64	30.000	8.000
1.200		30.000	8.000
1.250		30.000	8.000
1.300		30.000	8.000
1.320		30.000	8.000
1.400		32.000	9.000
1.450		32.000	9.000
1.500		32.000	9.000
1.510		34.000	10.000
1.530		34.000	10.000
1.550		34.000	10.000
1.570		34.000	10.000
1.590	1/16	34.000	10.000
1.600		34.000	10.000
1.610		34.000	10.000
1.700		34.000	10.000
1.780		36.000	11.000
1.800		36.000	11.000
1.850		36.000	11.000
1.900		36.000	11.000
1.930		38.000	12.000
1.970		38.000	12.000
1.980	5/64	38.000	12.000
1.990		38.000	12.000

d1		l1	l2
mm	inch	mm	mm
2.000		38.000	12.000
2.050		38.000	12.000
2.080		38.000	12.000
2.100		38.000	12.000
2.180		40.000	13.000
2.200		40.000	13.000
2.250		40.000	13.000
2.260		40.000	13.000
2.300		40.000	13.000
2.350		40.000	13.000
2.370		43.000	14.000
2.380	3/32	43.000	14.000
2.400		43.000	14.000
2.440		43.000	14.000
2.450		43.000	14.000
2.490		43.000	14.000
2.500		43.000	14.000
2.530		43.000	14.000
2.550		43.000	14.000
2.580		43.000	14.000
2.600		43.000	14.000
2.640		43.000	14.000
2.700		46.000	16.000
2.710		46.000	16.000
2.780	7/64	46.000	16.000
2.800		46.000	16.000
2.820		46.000	16.000
2.850		46.000	16.000
2.900		46.000	16.000
2.950		46.000	16.000
3.000		46.000	16.000

Stub drills

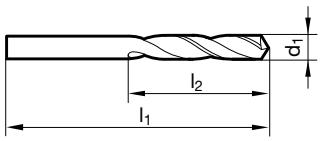
~3xD | DIN 1897 | GV 120 | 130° | h8

Tool material	HSCO	
Surface	>Ø 2,36	
Cutting direction	R	

P	•	web thinning ≥ Ø 1.000 • relieved cone • Co-alloyed high speed steel • increased wear resistance
M	•	
K	•	
N	○	acid resist./stainless steels • spring steels • austenitic stainless steels • Hastelloy, Inconel, Nimonic
S	•	
H	○	

GÜHRINGNAVIGATOR

Cutting data page 64



Article no. **329**

d1 mm	inch	l1 mm	l2 mm
0.400	1/64	19.000	2.500
0.500		20.000	3.000
0.510		20.000	3.000
0.520		20.000	3.000
0.550		21.000	3.500
0.570		21.000	3.500
0.580		21.000	3.500
0.590		21.000	3.500
0.600		21.000	3.500
0.610		22.000	4.000
0.640		22.000	4.000
0.650		22.000	4.000
0.700		23.000	4.500
0.730		23.000	4.500
0.740		23.000	4.500
0.750		23.000	4.500
0.790	1/32	24.000	5.000
0.800		24.000	5.000
0.810		24.000	5.000
0.820		24.000	5.000
0.840		24.000	5.000
0.850		24.000	5.000
0.860		25.000	5.500
0.870		25.000	5.500
0.900		25.000	5.500
0.910		25.000	5.500
0.940		25.000	5.500
0.950		25.000	5.500
0.960		26.000	6.000
0.970		26.000	6.000
0.990		26.000	6.000
1.000		26.000	6.000
1.020		26.000	6.000
1.030		26.000	6.000
1.050		26.000	6.000
1.070		28.000	7.000
1.090		28.000	7.000
1.100		28.000	7.000
1.150		28.000	7.000
1.170		28.000	7.000
1.180		28.000	7.000
1.190	3/64	30.000	8.000

d1 mm	inch	l1 mm	l2 mm
1.200		30.000	8.000
1.210		30.000	8.000
1.230		30.000	8.000
1.250		30.000	8.000
1.280		30.000	8.000
1.300		30.000	8.000
1.320		30.000	8.000
1.330		32.000	9.000
1.350		32.000	9.000
1.370		32.000	9.000
1.400		32.000	9.000
1.450		32.000	9.000
1.470		32.000	9.000
1.500		32.000	9.000
1.510		34.000	10.000
1.550		34.000	10.000
1.570		34.000	10.000
1.590	1/16	34.000	10.000
1.600		34.000	10.000
1.610		34.000	10.000
1.630		34.000	10.000
1.650		34.000	10.000
1.680		34.000	10.000
1.700		34.000	10.000
1.730		36.000	11.000
1.750		36.000	11.000
1.780		36.000	11.000
1.800		36.000	11.000
1.820		36.000	11.000
1.830		36.000	11.000
1.850		36.000	11.000
1.900		36.000	11.000
1.930		38.000	12.000
1.950		38.000	12.000
1.970		38.000	12.000
1.980	5/64	38.000	12.000
1.990		38.000	12.000
2.000		38.000	12.000
2.030		38.000	12.000
2.050		38.000	12.000
2.060		38.000	12.000
2.080		38.000	12.000

d1		l1	l2
mm	inch	mm	mm
2.100		38.000	12.000
2.150		40.000	13.000
2.180		40.000	13.000
2.200		40.000	13.000
2.250		40.000	13.000
2.260		40.000	13.000
2.300		40.000	13.000
2.320		40.000	13.000
2.350		40.000	13.000
2.360		40.000	13.000
2.370		43.000	14.000
2.380	3/32	43.000	14.000
2.400		43.000	14.000
2.420		43.000	14.000
2.440		43.000	14.000
2.450		43.000	14.000
2.470		43.000	14.000
2.490		43.000	14.000
2.500		43.000	14.000
2.520		43.000	14.000
2.530		43.000	14.000
2.550		43.000	14.000
2.580		43.000	14.000
2.600		43.000	14.000

d1		l1	l2
mm	inch	mm	mm
2.640		43.000	14.000
2.650		43.000	14.000
2.700		46.000	16.000
2.710		46.000	16.000
2.750		46.000	16.000
2.780	7/64	46.000	16.000
2.790		46.000	16.000
2.800		46.000	16.000
2.820		46.000	16.000
2.830		46.000	16.000
2.850		46.000	16.000
2.870		46.000	16.000
2.900		46.000	16.000
2.950		46.000	16.000
3.000		46.000	16.000

Jobber drills

~5xD | DIN 338 | Ti | 130° | h8

Tool material	HSCO
Surface	S
Cutting direction	R

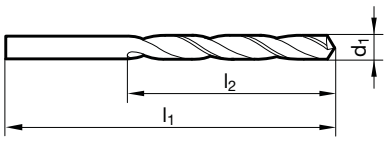
P	○
M	•
K	
N	
S	•
H	

web thinning ≥ Ø 1.000 • relieved cone • Co-alloyed high speed steel • increased wear resistance

Titanium and Titanium alloys • stainless/acid-/heat-resistant austenitic steels • high tensile/short chipping steels over 900 N/mm² • Hastelloy, Inconel, Nimonic

GÜHRINGNAVIGATOR

Cutting data page 64



Article no. **657**

d1 mm	inch	l1 mm	l2 mm
0.500		22.000	6.000
0.530		22.000	6.000
0.600		24.000	7.000
0.650		26.000	8.000
0.700		28.000	9.000
0.750		28.000	9.000
0.800		30.000	10.000
0.850		30.000	10.000
0.880		32.000	11.000
0.900		32.000	11.000
0.920		32.000	11.000
0.940		32.000	11.000
0.950		32.000	11.000
1.000		34.000	12.000
1.050		34.000	12.000
1.100		36.000	14.000
1.150		36.000	14.000
1.180		36.000	14.000
1.190	3/64	38.000	16.000
1.200		38.000	16.000
1.210		38.000	16.000
1.250		38.000	16.000
1.300		38.000	16.000
1.320		38.000	16.000
1.350		40.000	18.000
1.390		40.000	18.000
1.400		40.000	18.000
1.450		40.000	18.000
1.500		40.000	18.000
1.510		43.000	20.000
1.520		43.000	20.000
1.550		43.000	20.000
1.590	1/16	43.000	20.000
1.600		43.000	20.000
1.610		43.000	20.000
1.620		43.000	20.000

d1 mm	inch	l1 mm	l2 mm
1.650		43.000	20.000
1.700		43.000	20.000
1.750		46.000	22.000
1.780		46.000	22.000
1.800		46.000	22.000
1.850		46.000	22.000
1.900		46.000	22.000
1.950		49.000	24.000
1.980	5/64	49.000	24.000
2.000		49.000	24.000
2.050		49.000	24.000
2.100		49.000	24.000
2.150		53.000	27.000
2.200		53.000	27.000
2.250		53.000	27.000
2.260		53.000	27.000
2.300		53.000	27.000
2.350		53.000	27.000
2.380	3/32	57.000	30.000
2.400		57.000	30.000
2.440		57.000	30.000
2.500		57.000	30.000
2.530		57.000	30.000
2.550		57.000	30.000
2.600		57.000	30.000
2.700		61.000	33.000
2.750		61.000	33.000
2.780	7/64	61.000	33.000
2.800		61.000	33.000
2.820		61.000	33.000
2.900		61.000	33.000
2.950		61.000	33.000
3.000		61.000	33.000

Jobber drills

~5xD | DIN 338 | Ti | 130° | h8

Tool material	HSCO
Surface	○
Cutting direction	Ⓡ

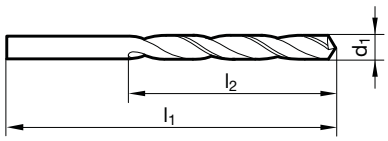
P	○
M	•
K	
N	
S	•
H	

web thinning ≥ Ø 0.970 • relieved cone • Co-alloyed high speed steel • increased wear resistance

Titanium and Titanium alloys • stainless/acid-/heat-resistant austenitic steels • high tensile/short chipping steels over 900 N/mm² • Hastelloy, Inconel, Nimonic

GÜHRINGNAVIGATOR

Cutting data page 64



Article no. **605**

d1 mm	inch	l1 mm	l2 mm
0.200		19.000	2.500
0.300		19.000	3.000
0.380		19.000	4.000
0.400	1/64	20.000	5.000
0.440		20.000	5.000
0.450		20.000	5.000
0.500		22.000	6.000
0.510		22.000	6.000
0.530		22.000	6.000
0.550		24.000	7.000
0.570		24.000	7.000
0.580		24.000	7.000
0.600		24.000	7.000
0.610		26.000	8.000
0.640		26.000	8.000
0.650		26.000	8.000
0.700		28.000	9.000
0.710		28.000	9.000
0.720		28.000	9.000
0.750		28.000	9.000
0.760		30.000	10.000
0.790	1/32	30.000	10.000
0.800		30.000	10.000
0.810		30.000	10.000
0.820		30.000	10.000
0.830		30.000	10.000
0.840		30.000	10.000
0.850		30.000	10.000
0.860		32.000	11.000
0.870		32.000	11.000
0.880		32.000	11.000
0.887		32.000	11.000
0.890		32.000	11.000
0.900		32.000	11.000
0.910		32.000	11.000
0.920		32.000	11.000
0.940		32.000	11.000
0.950		32.000	11.000
0.980		34.000	12.000
0.990		34.000	12.000
1.000		34.000	12.000
1.020		34.000	12.000

d1 mm	inch	l1 mm	l2 mm
1.040		34.000	12.000
1.050		34.000	12.000
1.070		36.000	14.000
1.080		36.000	14.000
1.090		36.000	14.000
1.100		36.000	14.000
1.140		36.000	14.000
1.150		36.000	14.000
1.160		36.000	14.000
1.180		36.000	14.000
1.190	3/64	38.000	16.000
1.200		38.000	16.000
1.210		38.000	16.000
1.220		38.000	16.000
1.230		38.000	16.000
1.250		38.000	16.000
1.290		38.000	16.000
1.300		38.000	16.000
1.320		38.000	16.000
1.350		40.000	18.000
1.400		40.000	18.000
1.450		40.000	18.000
1.460		40.000	18.000
1.500		40.000	18.000
1.510		43.000	20.000
1.520		43.000	20.000
1.530		43.000	20.000
1.550		43.000	20.000
1.570		43.000	20.000
1.590	1/16	43.000	20.000
1.600		43.000	20.000
1.610		43.000	20.000
1.620		43.000	20.000
1.650		43.000	20.000
1.680		43.000	20.000
1.700		43.000	20.000
1.730		46.000	22.000
1.750		46.000	22.000
1.780		46.000	22.000
1.800		46.000	22.000
1.820		46.000	22.000
1.850		46.000	22.000

d1		l1	l2
mm	inch	mm	mm
1.900		46.000	22.000
1.930		49.000	24.000
1.950		49.000	24.000
1.970		49.000	24.000
1.980	5/64	49.000	24.000
1.990		49.000	24.000
2.000		49.000	24.000
2.020		49.000	24.000
2.030		49.000	24.000
2.050		49.000	24.000
2.080		49.000	24.000
2.100		49.000	24.000
2.120		49.000	24.000
2.150		53.000	27.000
2.180		53.000	27.000
2.200		53.000	27.000
2.250		53.000	27.000
2.260		53.000	27.000
2.300		53.000	27.000
2.320		53.000	27.000
2.350		53.000	27.000
2.370		57.000	30.000
2.380	3/32	57.000	30.000
2.400		57.000	30.000

d1		l1	l2
mm	inch	mm	mm
2.450		57.000	30.000
2.490		57.000	30.000
2.500		57.000	30.000
2.530		57.000	30.000
2.550		57.000	30.000
2.600		57.000	30.000
2.650		57.000	30.000
2.700		61.000	33.000
2.710		61.000	33.000
2.750		61.000	33.000
2.780	7/64	61.000	33.000
2.790		61.000	33.000
2.800		61.000	33.000
2.810		61.000	33.000
2.820		61.000	33.000
2.850		61.000	33.000
2.870		61.000	33.000
2.900		61.000	33.000
2.950		61.000	33.000
3.000		61.000	33.000

Jobber drills

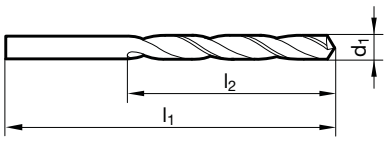
~5xD | DIN 338 | GT 100 | 130° | h8

Tool material	HSCO	
Surface	>Ø 2,36	
Cutting direction	R	

P	•	web thinning ≥ Ø 1.000 • relieved cone • Co-alloyed high speed steel • wide flutes • increased wear resistance • especially for drilling depths > 3xD
M	○	
K	•	
N	•	alloyed/unalloyed steel • cast materials over 800 N/mm² • hot and cold rolled steels • antifriction bearing steels • high-alloyed steels • heat treatable and case hardened steels
S		
H		

GÜHRINGNAVIGATOR

Cutting data page 64



Article no. **622**

d1 mm	inch	l1 mm	l2 mm
1.000		34.000	12.000
1.020		34.000	12.000
1.040		34.000	12.000
1.050		34.000	12.000
1.070		36.000	14.000
1.090		36.000	14.000
1.100		36.000	14.000
1.130		36.000	14.000
1.150		36.000	14.000
1.180		36.000	14.000
1.190	3/64	38.000	16.000
1.200		38.000	16.000
1.250		38.000	16.000
1.270		38.000	16.000
1.300		38.000	16.000
1.320		38.000	16.000
1.350		40.000	18.000
1.400		40.000	18.000
1.430		40.000	18.000
1.440		40.000	18.000
1.450		40.000	18.000
1.500		40.000	18.000
1.510		43.000	20.000
1.550		43.000	20.000
1.590	1/16	43.000	20.000
1.600		43.000	20.000
1.610		43.000	20.000
1.650		43.000	20.000
1.700		43.000	20.000
1.780		46.000	22.000
1.800		46.000	22.000
1.850		46.000	22.000
1.900		46.000	22.000
1.920		49.000	24.000
1.930		49.000	24.000
1.950		49.000	24.000
1.960		49.000	24.000
1.980	5/64	49.000	24.000
1.990		49.000	24.000
2.000		49.000	24.000
2.050		49.000	24.000
2.060		49.000	24.000

d1 mm	inch	l1 mm	l2 mm
2.080		49.000	24.000
2.100		49.000	24.000
2.150		53.000	27.000
2.180		53.000	27.000
2.200		53.000	27.000
2.250		53.000	27.000
2.260		53.000	27.000
2.300		53.000	27.000
2.350		53.000	27.000
2.370		57.000	30.000
2.380	3/32	57.000	30.000
2.400		57.000	30.000
2.420		57.000	30.000
2.440		57.000	30.000
2.450		57.000	30.000
2.490		57.000	30.000
2.500		57.000	30.000
2.530		57.000	30.000
2.550		57.000	30.000
2.580		57.000	30.000
2.600		57.000	30.000
2.640		57.000	30.000
2.650		57.000	30.000
2.700		61.000	33.000
2.710		61.000	33.000
2.750		61.000	33.000
2.780	7/64	61.000	33.000
2.790		61.000	33.000
2.800		61.000	33.000
2.820		61.000	33.000
2.850		61.000	33.000
2.870		61.000	33.000
2.900		61.000	33.000
2.950		61.000	33.000
3.000		61.000	33.000

Jobber drills

~5xD | DIN 338 | N | 118° | h8

Tool material	HSS	
Surface	>Ø 2,36	
Cutting direction	R	

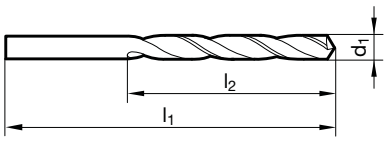
P	•
M	
K	•
N	○
S	
H	

web thinning ≥ Ø 1.000 • relieved cone

alloyed/unalloyed steel and cast steel • grey cast iron, malleable and spheroidal iron • sintered powder metal, German silver and graphite

GÜHRINGNAVIGATOR

Cutting data page 64



Article no. **205**

d1		l1	l2
mm	inch	mm	mm
0.200		19.000	2.500
0.210		19.000	2.500
0.220		19.000	2.500
0.230		19.000	2.500
0.240		19.000	2.500
0.250		19.000	3.000
0.260		19.000	3.000
0.270		19.000	3.000
0.280		19.000	3.000
0.290		19.000	3.000
0.300		19.000	3.000
0.310		19.000	4.000
0.320		19.000	4.000
0.330		19.000	4.000
0.340		19.000	4.000
0.350		19.000	4.000
0.360		19.000	4.000
0.370		19.000	4.000
0.380		19.000	4.000
0.390		20.000	5.000
0.400	1/64	20.000	5.000
0.410		20.000	5.000
0.420		20.000	5.000
0.430		20.000	5.000
0.440		20.000	5.000
0.450		20.000	5.000
0.460		20.000	5.000
0.470		20.000	5.000
0.480		20.000	5.000
0.490		22.000	6.000
0.500		22.000	6.000
0.510		22.000	6.000
0.520		22.000	6.000
0.530		22.000	6.000
0.540		24.000	7.000
0.550		24.000	7.000
0.560		24.000	7.000
0.570		24.000	7.000
0.580		24.000	7.000
0.590		24.000	7.000
0.600		24.000	7.000
0.610		26.000	8.000

d1		l1	l2
mm	inch	mm	mm
0.620		26.000	8.000
0.630		26.000	8.000
0.640		26.000	8.000
0.650		26.000	8.000
0.660		26.000	8.000
0.670		26.000	8.000
0.680		28.000	9.000
0.690		28.000	9.000
0.700		28.000	9.000
0.710		28.000	9.000
0.720		28.000	9.000
0.730		28.000	9.000
0.740		28.000	9.000
0.750		28.000	9.000
0.760		30.000	10.000
0.770		30.000	10.000
0.780		30.000	10.000
0.790	1/32	30.000	10.000
0.800		30.000	10.000
0.810		30.000	10.000
0.820		30.000	10.000
0.830		30.000	10.000
0.840		30.000	10.000
0.850		30.000	10.000
0.860		32.000	11.000
0.870		32.000	11.000
0.880		32.000	11.000
0.890		32.000	11.000
0.900		32.000	11.000
0.910		32.000	11.000
0.920		32.000	11.000
0.930		32.000	11.000
0.940		32.000	11.000
0.950		32.000	11.000
0.960		34.000	12.000
0.970		34.000	12.000
0.980		34.000	12.000
0.990		34.000	12.000
1.000		34.000	12.000
1.010		34.000	12.000
1.020		34.000	12.000
1.030		34.000	12.000

d1		l1	l2
mm	inch	mm	mm
1.040		34.000	12.000
1.050		34.000	12.000
1.060		34.000	12.000
1.070		36.000	14.000
1.080		36.000	14.000
1.090		36.000	14.000
1.100		36.000	14.000
1.110		36.000	14.000
1.120		36.000	14.000
1.130		36.000	14.000
1.140		36.000	14.000
1.150		36.000	14.000
1.160		36.000	14.000
1.170		36.000	14.000
1.180		36.000	14.000
1.190	3/64	38.000	16.000
1.200		38.000	16.000
1.210		38.000	16.000
1.220		38.000	16.000
1.230		38.000	16.000
1.240		38.000	16.000
1.250		38.000	16.000
1.260		38.000	16.000
1.270		38.000	16.000
1.280		38.000	16.000
1.290		38.000	16.000
1.300		38.000	16.000
1.310		38.000	16.000
1.320		38.000	16.000
1.330		40.000	18.000
1.340		40.000	18.000
1.350		40.000	18.000
1.360		40.000	18.000
1.370		40.000	18.000
1.380		40.000	18.000
1.390		40.000	18.000
1.400		40.000	18.000
1.410		40.000	18.000
1.420		40.000	18.000
1.430		40.000	18.000
1.440		40.000	18.000
1.450		40.000	18.000
1.460		40.000	18.000
1.470		40.000	18.000
1.480		40.000	18.000
1.490		40.000	18.000
1.500		40.000	18.000
1.510		43.000	20.000
1.520		43.000	20.000
1.530		43.000	20.000
1.540		43.000	20.000
1.550		43.000	20.000
1.560		43.000	20.000
1.570		43.000	20.000
1.580		43.000	20.000
1.590	1/16	43.000	20.000
1.600		43.000	20.000
1.610		43.000	20.000
1.620		43.000	20.000
1.630		43.000	20.000
1.640		43.000	20.000
1.650		43.000	20.000
1.660		43.000	20.000
1.670		43.000	20.000
1.680		43.000	20.000
1.690		43.000	20.000
1.700		43.000	20.000
1.710		46.000	22.000
1.720		46.000	22.000
1.730		46.000	22.000
1.740		46.000	22.000
1.750		46.000	22.000

d1		l1	l2
mm	inch	mm	mm
1.760		46.000	22.000
1.770		46.000	22.000
1.780		46.000	22.000
1.790		46.000	22.000
1.800		46.000	22.000
1.810		46.000	22.000
1.820		46.000	22.000
1.830		46.000	22.000
1.840		46.000	22.000
1.850		46.000	22.000
1.860		46.000	22.000
1.870		46.000	22.000
1.880		46.000	22.000
1.890		46.000	22.000
1.900		46.000	22.000
1.910		49.000	24.000
1.920		49.000	24.000
1.930		49.000	24.000
1.940		49.000	24.000
1.950		49.000	24.000
1.960		49.000	24.000
1.970		49.000	24.000
1.980	5/64	49.000	24.000
1.990		49.000	24.000
2.000		49.000	24.000
2.010		49.000	24.000
2.020		49.000	24.000
2.030		49.000	24.000
2.040		49.000	24.000
2.050		49.000	24.000
2.060		49.000	24.000
2.070		49.000	24.000
2.080		49.000	24.000
2.090		49.000	24.000
2.100		49.000	24.000
2.110		49.000	24.000
2.120		49.000	24.000
2.130		53.000	27.000
2.140		53.000	27.000
2.150		53.000	27.000
2.170		53.000	27.000
2.180		53.000	27.000
2.200		53.000	27.000
2.210		53.000	27.000
2.220		53.000	27.000
2.230		53.000	27.000
2.240		53.000	27.000
2.250		53.000	27.000
2.260		53.000	27.000
2.270		53.000	27.000
2.280		53.000	27.000
2.290		53.000	27.000
2.300		53.000	27.000
2.320		53.000	27.000
2.330		53.000	27.000
2.340		53.000	27.000
2.350		53.000	27.000
2.360		53.000	27.000
2.370		57.000	30.000
2.380	3/32	57.000	30.000
2.390		57.000	30.000
2.400		57.000	30.000
2.420		57.000	30.000
2.430		57.000	30.000
2.440		57.000	30.000
2.450		57.000	30.000
2.460		57.000	30.000
2.470		57.000	30.000
2.480		57.000	30.000
2.490		57.000	30.000
2.500		57.000	30.000
2.510		57.000	30.000

d1		l1	l2
mm	inch	mm	mm
2.520		57.000	30.000
2.530		57.000	30.000
2.540		57.000	30.000
2.550		57.000	30.000
2.570		57.000	30.000
2.580		57.000	30.000
2.600		57.000	30.000
2.610		57.000	30.000
2.620		57.000	30.000
2.630		57.000	30.000
2.640		57.000	30.000
2.650		57.000	30.000
2.660		61.000	33.000
2.670		61.000	33.000
2.680		61.000	33.000
2.700		61.000	33.000
2.710		61.000	33.000
2.720		61.000	33.000
2.730		61.000	33.000
2.750		61.000	33.000
2.760		61.000	33.000
2.780	7/64	61.000	33.000
2.790		61.000	33.000
2.800		61.000	33.000

d1		l1	l2
mm	inch	mm	mm
2.820		61.000	33.000
2.830		61.000	33.000
2.850		61.000	33.000
2.870		61.000	33.000
2.880		61.000	33.000
2.900		61.000	33.000
2.910		61.000	33.000
2.920		61.000	33.000
2.930		61.000	33.000
2.940		61.000	33.000
2.950		61.000	33.000
2.960		61.000	33.000
2.970		61.000	33.000
2.980		61.000	33.000
2.990		61.000	33.000
3.000		61.000	33.000

Long series twist drills

~10xD | DIN 340 | GT 100 | 130° | h8

Tool material	HSCO
Surface	>Ø 2,36
Cutting direction	R

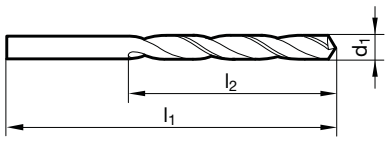
P	•
M	•
K	•
N	•
S	
H	○

web thinning ≥ Ø 1.000 • relieved cone • Co-alloyed high speed steel • wide flutes • increased wear resistance • in case of unsatisfactory chip evacuation

alloyed/unalloyed steels and castings over 800 N/mm² • hot and cold rolled steels • antifriction bearing steels • high-alloyed steels • heat treatable and case hardened steels

GÜHRINGNAVIGATOR

Cutting data page 64



Article no. **336**

d1		l1	l2
mm	inch	mm	mm
1.000		56.000	33.000
1.020		56.000	33.000
1.040		56.000	33.000
1.070		60.000	37.000
1.090		60.000	37.000
1.100		60.000	37.000
1.180		60.000	37.000
1.190	3/64	65.000	41.000
1.200		65.000	41.000
1.250		65.000	41.000
1.300		65.000	41.000
1.320		65.000	41.000
1.400		70.000	45.000
1.500		70.000	45.000
1.510		76.000	50.000
1.550		76.000	50.000
1.590	1/16	76.000	50.000
1.600		76.000	50.000
1.610		76.000	50.000
1.700		76.000	50.000
1.750		80.000	53.000
1.780		80.000	53.000
1.800		80.000	53.000
1.850		80.000	53.000
1.900		80.000	53.000
1.930		85.000	56.000
1.980	5/64	85.000	56.000
1.990		85.000	56.000
2.000		85.000	56.000
2.050		85.000	56.000
2.060		85.000	56.000
2.080		85.000	56.000
2.100		85.000	56.000
2.180		90.000	59.000
2.200		90.000	59.000
2.250		90.000	59.000

d1		l1	l2
mm	inch	mm	mm
2.260		90.000	59.000
2.300		90.000	59.000
2.350		90.000	59.000
2.370		95.000	62.000
2.380	3/32	95.000	62.000
2.400		95.000	62.000
2.440		95.000	62.000
2.450		95.000	62.000
2.490		95.000	62.000
2.500		95.000	62.000
2.530		95.000	62.000
2.550		95.000	62.000
2.580		95.000	62.000
2.600		95.000	62.000
2.640		95.000	62.000
2.700		100.000	66.000
2.710		100.000	66.000
2.750		100.000	66.000
2.780	7/64	100.000	66.000
2.790		100.000	66.000
2.800		100.000	66.000
2.820		100.000	66.000
2.850		100.000	66.000
2.870		100.000	66.000
2.900		100.000	66.000
2.950		100.000	66.000
3.000		100.000	66.000

Long series twist drills

~10xD | DIN 340 | N | 118° | h8

Tool material	HSS	
Surface	>Ø 2,36	
Cutting direction	R	

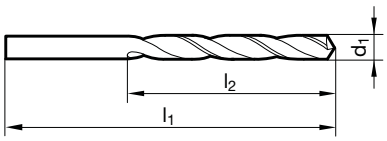
P	•
M	
K	•
N	○
S	
H	

web thinning ≥ Ø 1.000 • relieved cone • for deep holes

alloyed/unalloyed steel and cast steel • grey cast iron, malleable and spheroidal iron • sintered powder metal, German silver and graphite

GÜHRINGNAVIGATOR

Cutting data page 64



Article no. **217**

d1		l1	l2
mm	inch	mm	mm
1.000		56.000	33.000
1.040		56.000	33.000
1.050		56.000	33.000
1.080		60.000	37.000
1.090		60.000	37.000
1.100		60.000	37.000
1.120		60.000	37.000
1.130		60.000	37.000
1.150		60.000	37.000
1.180		60.000	37.000
1.190	3/64	65.000	41.000
1.200		65.000	41.000
1.250		65.000	41.000
1.300		65.000	41.000
1.350		70.000	45.000
1.400		70.000	45.000
1.450		70.000	45.000
1.490		70.000	45.000
1.500		70.000	45.000
1.510		76.000	50.000
1.550		76.000	50.000
1.590	1/16	76.000	50.000
1.600		76.000	50.000
1.610		76.000	50.000
1.650		76.000	50.000
1.700		76.000	50.000
1.750		80.000	53.000
1.780		80.000	53.000
1.800		80.000	53.000
1.850		80.000	53.000
1.900		80.000	53.000
1.930		85.000	56.000
1.950		85.000	56.000
1.980	5/64	85.000	56.000
2.000		85.000	56.000
2.030		85.000	56.000

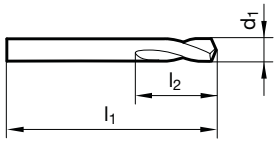
d1		l1	l2
mm	inch	mm	mm
2.050		85.000	56.000
2.060		85.000	56.000
2.080		85.000	56.000
2.100		85.000	56.000
2.150		90.000	59.000
2.200		90.000	59.000
2.250		90.000	59.000
2.260		90.000	59.000
2.300		90.000	59.000
2.350		90.000	59.000
2.370		95.000	62.000
2.380	3/32	95.000	62.000
2.400		95.000	62.000
2.420		95.000	62.000
2.440		95.000	62.000
2.450		95.000	62.000
2.490		95.000	62.000
2.500		95.000	62.000
2.550		95.000	62.000
2.580		95.000	62.000
2.600		95.000	62.000
2.620		95.000	62.000
2.640		95.000	62.000
2.650		95.000	62.000
2.700		100.000	66.000
2.710		100.000	66.000
2.750		100.000	66.000
2.780	7/64	100.000	66.000
2.790		100.000	66.000
2.800		100.000	66.000
2.820		100.000	66.000
2.850		100.000	66.000
2.870		100.000	66.000
2.900		100.000	66.000
2.950		100.000	66.000
3.000		100.000	66.000

90° NC-spotting drills

WN | N | 90° | h6

Tool material	**Solid carbide**
Surface	◯
Cutting direction	R

P	○	web thinning ≥ Ø 6.000 • facet point grinding • only suitable for spotting
M	○	
K	○	
N	○	universal material suitability
S	○	
H	○	



Article no. **723**

d1		l1	l2
mm	inch	mm	mm
4.000		55.000	12.000
5.000		62.000	14.000

d1		l1	l2
mm	inch	mm	mm

90° NC-spotting drills

WN | N | 90° | h6

Tool material	HSCO
Surface	F
Cutting direction	R

NEW

P	•
M	•
K	•
N	•
S	○
H	

relieved cone • only suitable for spotting • ≥ Ø 6.0 mm with driving face to DIN 1835-B • Co-alloyed high speed steel • increased wear resistance

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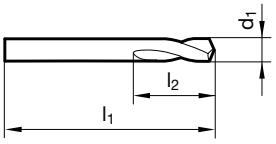
Cutting data page 68



Article no. **1133**

d1		l1	l2
mm	inch	mm	mm
3.000		46.000	12.000
4.000		55.000	12.000
5.000		62.000	14.000

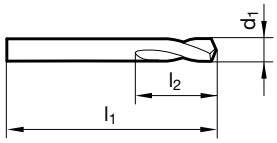
d1		l1	l2
mm	inch	mm	mm

120° NC-spotting drills

WN | N | 120° | h6

Tool material	**Solid carbide**
Surface	◯
Cutting direction	R

P	○	web thinning ≥ Ø 13.500 • facet point grinding • only suitable for spotting
M	○	
K	○	
N	○	universal material suitability
S	○	
H	○	



Article no. **724**

d1		l1	l2
mm	inch	mm	mm
5.000		62.000	14.000

d1		l1	l2
mm	inch	mm	mm

120° NC-spotting drills

WN | N | 120° | h6

Tool material	HSCO
Surface	F
Cutting direction	R

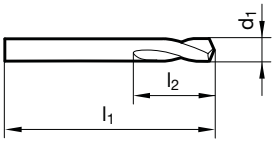
NEW

P	•
M	•
K	•
N	•
S	○
H	

relieved cone • only suitable for spotting • ≥ Ø 6.0 mm with driving face to DIN 1835-B • Co-alloyed high speed steel • increased wear resistance

GÜHRINGNAVIGATOR

Cutting data page 68



Article no. **1135**

d1		l1	l2
mm	inch	mm	mm
3.000		46.000	12.000
4.000		55.000	12.000
5.000		62.000	14.000

d1		l1	l2
mm	inch	mm	mm

142° NC-spotting drills

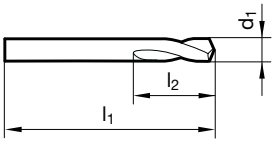
WN | N | 142° | h6

Tool material	**Solid carbide**
Surface	◯
Cutting direction	R

P	○
M	○
K	○
N	○
S	○
H	○

facet point grinding • only suitable for spotting • ≥ Ø 6.0 mm with clamping surface shank form HB

universal material suitability



Article no. **546**

d1		l1	l2
mm	inch	mm	mm
4.000		55.000	12.000
5.000		62.000	14.000

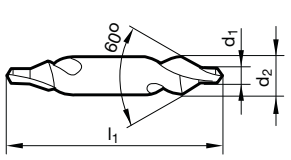
d1		l1	l2
mm	inch	mm	mm

Centre drills without flat

WN | A | N | 118°

Tool material	Solid carbide
Surface	◯
Cutting direction	R

P	○	web thinning ≥ Ø 2.000 • relieved cone • without protective countersink • for centre holes to DIN 332, part 1, form A • d1 ≤ 0.8 mm: not double ended
M	○	
K	○	
N	○	universal material suitability
S	○	
H	○	



Article no. **736**

d1	d2	l1
mm	mm	mm
0.500	3.150	25.000
0.800	3.150	25.000
1.000	3.150	31.500
1.250	3.150	31.500
1.600	4.000	35.500
2.000	5.000	40.000

d1	d2	l1
mm	mm	mm
2.500	6.300	45.000

Centre drills without flat

DIN 333 | A | N | 118°

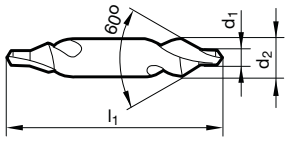
Tool material	HSS
Surface	S
Cutting direction	R

P	•
M	○
K	•
N	•
S	○
H	

web thinning ≥ Ø 2.000 • relieved cone • without protective countersink • for centre holes to DIN 332, part 1, form A • d1 ≤ 0.8 mm: not double ended • increased wear resistance

GÜHRINGNAVIGATOR

Cutting data page 68



Article no. **613**

d1	d2	l1
mm	mm	mm
0.500	3.150	25.000
0.800	3.150	25.000
1.000	3.150	31.500
1.250	3.150	31.500
1.600	4.000	35.500
2.000	5.000	40.000

d1	d2	l1
mm	mm	mm
2.500	6.300	45.000

Centre drills without flat

DIN 333 | R | N | 118°

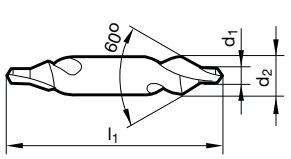
Tool material	HSS
Surface	S
Cutting direction	R

P	•
M	○
K	•
N	•
S	○
H	

web thinning ≥ Ø 2.000 • relieved cone • increased wear resistance • correct positioning between lathe centres • for centre holes acc. to DIN 332 part 1, form R • d1 ≤ 0.8 mm: not double ended

GÜHRINGNAVIGATOR

Cutting data page 68



Article no. **614**

d1	d2	l1
mm	mm	mm
0.800	3.150	25.000
1.000	3.150	31.500
1.250	3.150	31.500
1.600	4.000	35.500
2.000	5.000	40.000
2.500	6.300	45.000

d1	d2	l1
mm	mm	mm

Centre drills without flat

DIN 333 | B | N | 118°

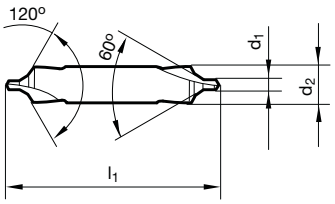
Tool material	HSS
Surface	○
Cutting direction	R

P	•
M	○
K	•
N	•
S	○
H	

web thinning ≥ Ø 2.000 • relieved cone • for centre holes acc. to DIN 332, sheet 1, form B • with protective 120° countersink

GÜHRINGNAVIGATOR

Cutting data page 68



Article no. **585**

d1	d2	l1
mm	mm	mm
1.000	4.000	35.500
1.250	5.000	40.000
1.600	6.300	45.000
2.000	8.000	50.000
2.500	10.000	56.000

d1	d2	l1
mm	mm	mm

90° Countersinks

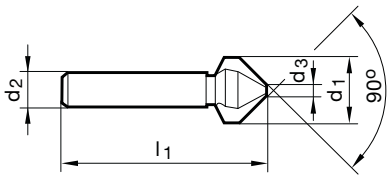
DIN 335 | C | R

Tool material	HSS
Surface	A
Form	C
Shank form	cyl.

P	1000
M	○
K	●
N	○
S	●
H	

GÜHRINGNAVIGATOR

Cutting data page 68



Article no. **1326**

d1	d2	d3	l1	Z	Code no.
mm	mm	mm	mm		
4.300	4.000	1.300	40.000	3	4.300
5.000	4.000	1.500	40.000	3	5.000
5.800	5.000	1.500	45.000	3	5.800
6.000	5.000	1.500	45.000	3	6.000
6.300	5.000	1.500	45.000	3	6.300

GÜHRINGNAVIGATOR

Tools with **bold** feed column no. are preferred choice.
To select the optimal tool and the recommended machining parameters for your application, please also use the electronic version of the GuhringNavigator on the internet: www.guehring.de.

Article no. ®
Article no. Ⓛ
Standard/DIN
Tool material
Carbide grade
Surface finish
Type
Cooling

Drill Ø mm	Feed column no.								
	101	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**
	f (mm/rev.)								
0.10	0.002	0.003	0.003	0.004	0.006	0.007	0.010	0.013	0.016
0.16	0.002	0.003	0.004	0.005	0.007	0.009	0.012	0.016	0.022
0.25	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.019	0.024
0.30	0.004	0.005	0.007	0.009	0.011	0.015	0.019	0.025	0.033
0.50	0.005	0.007	0.008	0.011	0.014	0.019	0.024	0.031	0.041
0.63	0.007	0.009	0.012	0.015	0.020	0.026	0.034	0.044	0.057
0.80	0.010	0.013	0.016	0.020	0.024	0.031	0.038	0.048	0.060
1.00	0.020	0.024	0.029	0.035	0.041	0.050	0.060	0.072	0.086
1.50	0.030	0.035	0.040	0.046	0.052	0.060	0.069	0.080	0.092
2.00	0.040	0.046	0.053	0.061	0.070	0.080	0.093	0.106	0.122

Drill Ø mm	Feed column no. Art. no. 6400/6401/6408/6412												
	56	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**
	f (mm/rev.)												
0.50	0.006	0.012	0.018	0.022	0.030	0.035	0.040	0.045	0.050	0.050	0.055	0.060	0.060
0.80	0.008	0.016	0.024	0.032	0.040	0.050	0.060	0.070	0.080	0.080	0.080	0.090	0.090
1.00	0.012	0.022	0.032	0.042	0.060	0.070	0.080	0.090	0.100	0.100	0.110	0.110	0.120
1.50	0.021	0.036	0.051	0.066	0.090	0.100	0.120	0.130	0.150	0.150	0.160	0.170	0.180
2.00	0.032	0.052	0.072	0.092	0.120	0.140	0.160	0.180	0.200	0.210	0.220	0.230	0.240
2.50	0.045	0.070	0.095	0.120	0.150	0.170	0.200	0.220	0.250	0.260	0.270	0.280	0.300
3.00	0.060	0.090	0.120	0.150	0.180	0.210	0.240	0.270	0.300	0.310	0.330	0.340	0.360

Coolant:
○ Air
● Neat oil
◍ Soluble oil

Cutting direction:
® right-hand cutting
Ⓛ left-hand cutting

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tensile strength N/mm²	Hardness	Coolant
Common structural steels	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Unalloyed heat-treatable steels	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Alloyed heat-treatable steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Unalloyed case hard. steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Alloyed case hardened steels	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Nitriding steels	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Hardened steels	–		≤48 HRC	●
			≤66 HRC	●
Stainless steels, sulphured	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitic	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitic	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Cast iron	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	◍ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	◍ ○
Spheroidal graphite iron and	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	◍
malleable cast iron	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	◍
Chilled cast iron	–		≤350 HB	◍
New cast materials GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
New cast materials ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Al cast alloys ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Copper, low-alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Brass, short-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
long-chipping	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100		◍ ○
Kevlar	Kevlar	≤1000		○
Glass, carbon concentr. plastics	GFK/CFK	≤1000		○

				≤4xD	≤7xD	≤5xD	≤8xD	≤15xD
301 303	660	701	3899	6400	6401	6405	6408	6412
1899	1899	WN	WN	WN	WN	WN	WN	WN
HSS-E-PM	HSS-E-PM	Sol. carbide	Sol. carbide	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.
		K10/K20	K/P	K/P	K/P	K/P	K/P	K/P
○	Ⓢ	○	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ
N	N	N	N	N	N	N	N	N
without	without	without	without	without	without	with	with	with









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 column no.		v_c m/min	Feed column no.		
21	106	*27*	106	*50*	105	*100*	**62**	*100*	**64**	**62**	*105*	**62**	**58**	**58**
18	105	*23*	105	*35*	104	*100*	**62**	*100*	**64**	**62**	*100*	**62**	**58**	**58**
18	106	*23*	106	*50*	**105**	*100*	**62**	*100*	**64**	**62**	*105*	**62**	**59**	**59**
16	105	*21*	105	*45*	**104**	*90*	**61**	*90*	**63**	**61**	*90*	**61**	**59**	**59**
20	105	*26*	105	*45*	104	*90*	**62**	*90*	**64**	**62**	*95*	**62**	**58**	**58**
18	105	*23*	105	*35*	104	*90*	**62**	*90*	**64**	**62**	*95*	**62**	**58**	**58**
14	**104**	*18*	**104**	*30*	103	*90*	**61**	*90*	**63**	**61**	*90*	**61**	**58**	**58**
14	**104**	*18*	**104**	*30*	103	*90*	**61**	*90*	**63**	**61**	*90*	**61**	**58**	**58**
12	103	*16*	103			*70*	**60**	*70*	**62**	**60**	*70*	**60**	**58**	**58**
18	106	*23*	106	*50*	103	*100*	**61**	*100*	**63**	**61**	*100*	**61**	**57**	**57**
14	**104**	*18*	**104**	*40*	103	*85*	**61**	*85*	**63**	**61**	*85*	**61**	**58**	**58**
12	103	*16*	103			*70*	**60**	*70*	**62**	**60**	*70*	**60**	**58**	**58**
14	**104**	*18*	**104**	*25*	103	*70*	**60**	*70*	**62**	**60**	*70*	**60**	**57**	**57**
12	103	*16*	103			*60*	**60**	*60*	**62**	**60**	*60*	**60**	**57**	**57**
16	**104**	*20*	**104**	*25*	103	*50*	**60**	*50*	**62**	**60**	*50*	**60**	**58**	**58**
14	103	*18*	103			*60*	**60**	*60*	**62**	**60**	*50*	**60**	**58**	**58**
14	103	*18*	103					*60*	**57**	**57**	*50*	**57**	**57**	**57**
8	102	*10*	102	*20*	102			*60*	**57**	**57**	*50*	*57*	*57*	*57*
				15	104									
18	104	*20*	104	*25*	**103**			*30*	57	57	*70*	**57**	**57**	**57**
14	103	*16*	103	*25*	**102**			*15*	56	56	*60*	**56**	**56**	**56**
16	103	*18*	103	*25*	**102**			*30*	57	57	*70*	**57**	**57**	**57**
26	106	*33*	106	*80*	**105**	*130*	**66**	*130*	**68**	**66**	*150*	**60**	**60**	**60**
22	**106**	*28*	**106**	*60*	**105**	*130*	**66**	*130*	**68**	**66**	*140*	**60**	**60**	**60**
18	106	*23*	106	*60*	105	*130*	**66**	*130*	**68**	**66**	*140*	**60**	**60**	**60**
22	**106**	*28*	**106**	*50*	**105**	*120*	**65**	*120*	**67**	**65**	*130*	**60**	**60**	**60**
				15	**103**			*10*	56	56	*25*	*56*	*56*	*56*
				45	**104**			*15*	56	56	*35*	*56*	*56*	*56*
				25	**104**			*15*	56	56	*35*	*56*	*56*	*56*
				160	**107**			*70*	68	68	*70*	*68*	*68*	*68*
				150	**106**			*70*	68	68	*70*	*68*	*68*	*68*
26	107			*100*	**106**			*135*	59	59	*135*	*59*	*59*	*59*
18	106			*60*	**106**			*135*	59	59	*135*	*59*	*59*	*59*
75	106	*80*	106	*150*	**105**									
42	105	*53*	105	*50*	**105**									
				67	106									
22	105	*28*	105	*44*	104									
22	104	*28*	104	*68*	103									
18	104	*23*	104	*49*	103									
13	104	*16*	104	*53*	103									
		14	104	*36*	103									
16	104	*20*	104	*50*	103									
18	104	*23*	104	*36*	103									
				60	104									

GÜHRINGNAVIGATOR

Tools with **bold** feed column no. are preferred choice.
To select the optimal tool and the recommended machining parameters for your application, please also use the electronic version of the GuhringNavigator on the internet: www.guehring.de.

Article no. ®
Standard/DIN
Tool material
Surface finish
Type

Drill Ø mm	Feed column no.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	f (mm/rev.)								
0,50	0.004	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.019
1.00	0.006	0.008	0.012	0.014	0.016	0.018	0.020	0.023	0.025
2.00	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125
2.50	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160
3.15	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.160
4.00	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.200
5.00	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250
6.30	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.315
8.00	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.315
10.00	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.400
12.50	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.500
16.00	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.500	0.630
20.00	0.125	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.630
25.00	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.800	0.800
31.50	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.800	1.000
40.00	0.200	0.250	0.315	0.400	0.500	0.630	0.800	1.000	1.250
50.00	0.250	0.310	0.400	0.500	0.630	0.800	1.000	1.250	1.250
63.00	0.315	0.400	0.500	0.630	0.800	1.000	1.250	1.600	1.600
80.00	0.400	0.500	0.630	0.800	1.000	1.250	1.600	1.600	2.000

Coolant:
○ Air
● Neat oil
◍ Soluble oil

Cutting direction:
® right-hand cutting
Ⓛ left-hand cutting

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tensile strength N/mm²	Hardness	Coolant
Common structural steels	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Unalloyed heat-treatable steels	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Alloyed heat-treatable steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Unalloyed case hard. steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Alloyed case hardened steels	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Nitriding steels	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Hardened steels	–		≤48 HRC	●
			≤66 HRC	●
Stainless steels, sulphured	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitic	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitic	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Cast iron	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	◍ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	◍ ○
Spheroidal graphite iron and malleable cast iron	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	◍
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	◍
Chilled cast iron	–		≤350 HB	◍
New cast materials GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
New cast materials ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Al cast alloys ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Copper, low-alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Brass, short-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
long-chipping	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100		◍ ○
Kevlar	Kevlar	≤1000		○
Glass, carbon concentr. plastics	GFK/CFK	≤1000		○

≤3xD

659	329
1897	1897
HSCO	HSCO
S	>Ø 2,36
GV 120	GV 120

vc m/min	Feed column no.	vc m/min	Feed column no.
38	5	35	5
33	4	30	5
44	5	40	5
38	5	40	**5**
44	5	40	5
44	5	40	5
38	**4**	35	**4**
27	**4**	20	**4**
22	**3**	16	**3**
44	4	36	6
22	**4**	20	**4**
18	**3**	15	**3**
22	**4**	16	4
18	**3**	12	3
19	**4**	15	**4**
14	**3**	12	**3**
14	**3**	15	3
9	**2**	8	**2**
4	1	4	1
20	4	18	1
15	**3**	14	3
18	**3**	16	3
40	6	35	**6**
35	**6**	30	**6**
33	6	30	6
27	6	25	**6**
12	3	10	3
6	2	8	1
11	2	10	2
7	2	6	2
45	5	35	4
40	**4**	30	**4**
23	4	20	4
17	4	15	4
		20	4

≤5xD

657
338
HSCO
S
Ti

vc m/min	Feed column no.
22	3
14	3
9	**2**
20	4
15	**3**
18	**3**
12	**3**
6	2
11	**2**
7	**2**
17	4

605	622
338	338
HSCO	HSCO
	>Ø 2,36
Ti	GT 100

vc m/min	Feed column no.		
35			5
30			5
40			5
40			**5**
40			5
40			5
35			4
20			**4**
16	3		**3**
36	6		6
20			4
15	3		**3**
16			4
12	3		**3**
15			4
12	3		**3**
15	3		**3**
8	**2**		
18	4		**4**
14	**3**		2
16	**3**		3
35			6
30			6
30			6
28			6
10	3		3
8	1		
10	**2**		
6	**2**		
80			7
70			6
40			5
40			4
20			4
15			**4**
20			4

205
338
HSS
>Ø 2,36
N

vc m/min	Feed column no.
27	**6**
22	**5**
30	**6**
30	5
25	**5**
25	**5**
30	6
16	4
30	**6**
30	6
25	6
25	6
70	7
70	6
50	6
50	5
40	5
30	4
25	4
15	4
18	4
28	5

≤10xD

336
340
HSCO
>Ø 2,36
GT 100

vc m/min	Feed column no.
33	5
27	5
36	5
32	**5**
36	5
36	5
22	**4**
18	**4**
14	**3**
32	5
18	**4**
13	**3**
14	**4**
10	**3**
13	**4**
10	**3**
12	**3**
6	2
4	1
12	**4**
8	2
10	**3**
32	6
27	**6**
26	6
24	**6**
6	3
70	7
60	6
54	5
36	5
30	5
24	5
18	4
13	**4**
16	4

217
340
HSS
>Ø 2,36
N

vc m/min	Feed column no.
24	**6**
20	**5**
27	**6**
27	5
22	5
22	5
27	6
14	4
27	**6**
27	6
22	6
18	6
45	7
45	6
63	6
54	5
36	5
28	4
22	4
22	4
14	4
22	5

Drill Ø mm from	Feed column no. 11	12	13	14	15	16	17	18
	f (mm/rev.)							
1.50	0.002	0.004	0.006	0.008	0.012	0.020	0.032	0.045
2.00	0.003	0.005	0.007	0.010	0.016	0.028	0.046	0.055
2.50	0.004	0.006	0.008	0.012	0.018	0.030	0.054	0.070
4.00	0.005	0.007	0.010	0.016	0.025	0.043	0.065	0.085
6.00	0.007	0.009	0.013	0.024	0.035	0.061	0.085	0.120
8.00	0.010	0.014	0.022	0.032	0.045	0.068	0.100	0.150
10.00	0.012	0.016	0.028	0.040	0.055	0.075	0.120	0.160
14.00	0.020	0.025	0.035	0.050	0.065	0.085	0.130	0.180
18.00	0.025	0.030	0.040	0.055	0.070	0.095	0.145	0.200
20.00	0.026	0.035	0.045	0.060	0.080	0.110	0.180	0.250
24.00	0.027	0.036	0.047	0.065	0.085	0.130	0.185	0.300
28.00	0.028	0.038	0.049	0.068	0.090	0.140	0.195	0.350
30.00	0.030	0.040	0.050	0.070	0.100	0.150	0.200	0.400
35.00	0.035	0.045	0.055	0.075	0.120	0.180	0.250	0.450
40.00	0.040	0.050	0.060	0.080	0.150	0.200	0.300	0.500

*The feed rates always relate to tools with the recommended coating. In some cases the successful application of un-coated tools cannot be guaranteed.

The sequence of operations for deep hole drilling

- production of pilot hole (L = 1.5 x D, tolerance G9)
- enter at low revolutions, approx. 200 rev./min, feed rate approx. 500 mm/min. With tools for drilling depths in excess than 40 x D enter the pilot hole revolving in left hand direction.
- setting of coolant pressure and revolutions
- uninterrupted drilling to required drilling depth without wood pecking. When applying gun drills with increased length-diameter-ratio , we recommend machining with reduced cutting parameters (approx. 75% of the optimal cutting speed) up to a drilling depth of approx. 25 mm.
- switching off coolant supply after reaching the required hole depth
- withdrawal in top gear with stationary spindle

Material dependent coolants

○ air
● neat oil
◍ soluble oil

STOP All deep hole drills must have support for the pilot hole. Deep hole drills must never operate at full speed without support in the machine shop.

Application advice

- For drilling depths in excess than 40 x D we recommend the use of two or more gun drills, e. g. Ø 10 x 400 mm and Ø 9.95 x 800 mm.
- Gun drills for drilling depths of more than 40 x D should enter the pilot hole revolving in the left hand direction.
- When changing tools for drilling depths of more than 40 x D, the tool can be damped by switching on coolant supply for just one second.
- For machining of long-chipping materials we recommend the use of gun drills with polished flutes.
- Generally we recommend the use of soluble oil with a minimum oil content of 10 %.
- Single-fluted gun drills for long-chipping aluminium should be supplied with point grind 180° and coolant chamber.
- When spotting in aluminium with an Si-content of less than 1%, i.e. with recommended cutting rates v_c > 160 m/min we recommend to advance to the final speed in several steps. In addition, a deeper pilot hole of approximately 3 x D should be produced.

EB100

single-fluted gun drill

solid carbide

0.9 ... 12.0

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tens.str. N/mm²	Hardness	Coolant	recom. coating*	≤35xD v_c m/min	≤35xD Feed col. no.	>35xD v_c m/min	>35xD Feed col. no.
Common structural steels	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345**	≤500		◍		100	15	100	15
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937**	≤1000		◍		85	15	85	15
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37	≤850		◍		90	15	90	15
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb2	≤1000		◍		80	15	80	15
Unalloyed heat-treatable steels	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍		80	14	80	14
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍		75	14	75	14
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍		75	14	75	14
Alloyed heat-treatable steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍		75	14	75	14
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍	A	65	14	65	14
Unalloyed case hard. steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍	A	80	15	80	15
Alloyed case hardened steels	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●		75	14	75	14
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●		65	14	65	14
Nitriding steels	**1.8504** 34CrAl6	≤1000		◍		75	14	75	14
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●	A	65	14	65	14
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍		75	13	75	13
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6	≤1400		●	A	65	13	65	13
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●	A	55	12	55	12
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●	A	65	13	65	13
Hardened steels	–		≤48 HRC	●		30	13	30	13
			≤66 HRC	●		25	10	25	14
Stainless steels, sulphured	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105**	≤900		●		40	14	40	14
austenitic	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10	≤1100		●	A	35	14	35	14
martensitic	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122**	≤1500		●		35	14	35	14
Cast iron	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	◍ ○		85	16	85	16
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	◍ ○		80	16	85	16
Spheroidal graphite iron and	**0.7050** EN-GJS-500-7 (GGG50), **0.8035**		≤240 HB	◍		80	15	80	15
malleable cast iron	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2		≤350 HB	◍		70	15	70	15
Chilled cast iron	–		≤350 HB	◍		55	14	55	14
New cast materials GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○					
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○					
New cast materials ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○					
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○					
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000		●		20	12	20	12
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●	A	35	12	35	12
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5	≤1400		●		30	12	30	12
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍		150	17	150	17
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si	≤650		◍		120	19	120	19
Al cast alloys ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍		120	20	120	20
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍		130	18	130	18
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05**	≤400		○		110	17	110	17
Copper, low-alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍	A	75	15	75	15
Brass, short-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410**	≤600		◍		120	18	120	18
long-chipping	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍		90	18	90	18
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176**	≤600		◍ ●		95	17	95	17
	2.0790 CuNi18Zn19Pb	≤850		●		75	17	75	17
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●		70	17	70	17
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●		60	17	60	17
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren	≤150		○		75	15	75	15
Thermoplastics	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○		70	15	70	15
Kevlar	Kevlar	≤1000		○		60	14	60	14
Glass, carbon concentr. plastics	GFK/CFK	≤1000		○		50	14	50	14

Procedure
In order to achieve optimal machining results when producing deep holes, especially when spotting on radii or uneven surface, we recommend the following operating steps.

1. Milling a surface, i.e. with Guhring's Ratio end mill RF 100 U incl. centre cutting. The surface must be at right angles to the entrance angle of the drilling operation.
2. Production of a cylindrical pilot hole (tolerance G9) with a drilling depth of minimum 1 x D. For this we recommend our Ratio drill RT 100 U or RT 100 F. Thanks to their point angle of 140° and their Ø-tolerance m7 these Ratio drills are optimally suited for this operating step.
3. Entering the pilot hole at a speed of approximately 300 rev./min and a feed rate of approximately 500 mm/min.
4. Adjusting the cooling lubricant pressure and speed.
5. Continuous drilling to full drilling depth without pecking cycle.
6. With through holes with straight, i.e. 90°, exit, reduce feed rate by 50% approximately 1 mm before to break through.
7. With through holes with oblique exit reduce the feed rate vf to 40% approximately 1 mm before to break through.
8. After achieving the drilling depth switch off speed and cooling lubricant. Withdraw at rapid traverse.

Ratio end mill type RF 100 U, article no. 3736
Thanks to its unequal helix Guhring's FIRE-coated Ratio end mill RF 100 U offers maximum feed rates and tool life for finishing and roughing operations in steel and cast materials as well as Ti- and Ni-alloys.

Ratio drill RT 100 U, article no. 2477
Ratio drill RT 100 F, article no. 1660
Guhring's Ratio drills excel with very good self-centering characteristics and alignment accurate holes thanks to their special cutting edge geometry. Type U is especially suitable for the machining of general steels and high-alloyed AlSi-alloys, type F for high-alloyed, stainless, acid and heat resistant steels, Al and Al-alloys, Mg and Mg-alloys as well as Ti and Ti-alloys.

GÜHRINGNAVIGATOR

Tools with **bold** feed column no. are preferred choice.
To select the optimal tool and the recommended machining parameters for your application, please also use the electronic version of the GuhringNavigator on the internet: www.guehring.de.

Article no.
Standard/DIN
Tool material
Surface finish
Type
Point angle °

Drill Ø mm	Feed column no.								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	f (mm/rev.)								
0.50	0.004	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.019
1.00	0.006	0.008	0.012	0.014	0.016	0.018	0.020	0.023	0.025
2.00	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125
2.50	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160
3.15	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.160
4.00	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.200
5.00	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250
6.30	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.315
8.00	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.315
10.00	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.400
12.50	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.500
16.00	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.500	0.630
20.00	0.125	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.630
25.00	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.800	0.800
31.50	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.800	1.000
40.00	0.200	0.250	0.315	0.400	0.500	0.630	0.800	1.000	1.250
50.00	0.250	0.310	0.400	0.500	0.630	0.800	1.000	1.250	1.250
63.00	0.315	0.400	0.500	0.630	0.800	1.000	1.250	1.600	1.600
80.00	0.400	0.500	0.630	0.800	1.000	1.250	1.600	1.600	2.000

Coolant:
○ Air
● Neat oil
◍ Soluble oil

Cutting direction:
right-hand cutting
left-hand cutting

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tensile strength N/mm²	Hardness	Coolant
Common structural steels	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Unalloyed heat-treatable steels	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Alloyed heat-treatable steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Unalloyed case hard. steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Alloyed case hardened steels	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Nitriding steels	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Hardened steels	–		≤48 HRC	●
			≤66 HRC	●
Stainless steels, sulphured	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitic	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitic	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Cast iron	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	◍ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	◍ ○
Spheroidal graphite iron and	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	◍
malleable cast iron	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	◍
Chilled cast iron	–		≤350 HB	◍
New cast materials GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
New cast materials ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Al cast alloys ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Copper, low-alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Brass, short-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
long-chipping	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100		◍ ○
Kevlar	Kevlar	≤1000		○
Glass, carbon concentr. plastics	GFK/CFK	≤1000		○

NC spotting drills

1133	1135
Company std.	
HSCO	
F	F
N	N
90	120

v_c m/min	Feed column no.	
42	6	6
36	5	5
48	6	6
42	**6**	**6**
44	6	6
44	6	6
40	**5**	**5**
27	**4**	**4**
22	**3**	**3**
37	6	6
22	**4**	**4**
18	**3**	**3**
19	**4**	**4**
15	**3**	**3**
21	**4**	**4**
16	**3**	**3**
12	3	3
10	2	2
18	**3**	**3**
15	**3**	**3**
12	**3**	**3**
38	**6**	**6**
35	**6**	**6**
33	**6**	**6**
28	**6**	**6**
7	1	1
10	2	2
8	2	2
85	7	7
65	7	7
65	6	6
80	6	6
70	5	5
75	**5**	**5**
50	**5**	**5**
45	**5**	**5**
40	**4**	**4**
25	**4**	**4**
20	**4**	**4**
25	**4**	**4**
40	**4**	**4**

Center drills

585
DIN 333
HSS
○
B

v_c m/min	Feed column no.
30	**4**
25	**4**
30	**4**
30	4
25	**4**
20	**4**
20	3
15	4
8	3
25	**5**
15	4
8	3
10	4
8	3
10	3
6	3
6	3
5	2
10	3
8	3
6	3
20	**6**
20	5
25	**6**
20	5
3	1
5	2
4	2
70	**7**
70	**7**
40	6
40	6
60	6
50	5
60	5
40	5
30	4
25	4
15	4
15	4
15	4
25	5

613	614
DIN 333	
HSS	
S	S
A	R

v_c m/min	Feed column no.	
35	**4**	**4**
30	**4**	**4**
35	**4**	**4**
35	4	4
30	**4**	**4**
25	**4**	**4**
22	3	3
17	4	4
10	3	3
30	**5**	**5**
18	4	4
10	3	3
13	4	4
10	3	3
13	3	3
8	3	3
8	3	3
8	2	2
15	3	3
10	3	3
8	3	3
25	**6**	**6**
25	5	5
30	**6**	**6**
25	5	5
6	1	1
6	2	2
5	2	2
50	6	6
70	6	6
60	**5**	**5**
70	5	5
45	**5**	**5**
35	**4**	**4**
30	4	4
20	**4**	**4**
18	4	4
20	**4**	**4**
30	5	5

Countersink

Article no.	1326
Standard/DIN	DIN 335
Tool material	HSS
Surface finish	A
Type	B
Angle of taper °	90

v_c m/min	Feed column no.
37	**86**
35	**85**
37	**86**
35	**85**
37	**85**
35	**85**
23	**85**
17	**85**
14	**84**
29	**86**
17	**85**
12	**84**
17	**85**
14	**84**
20	**85**
17	**84**
17	**84**
12	**84**
18	**85**
14	**84**
16	**84**
29	**85**
18	**85**
25	**85**
23	**84**
9	**84**
25	**85**
16	**84**
9	**84**
17	**86**
12	**85**
104	**86**
81	**86**
46	**86**
35	**86**
115	**86**
69	**85**
92	**85**
58	**85**
35	**86**
30	**86**
28	**86**
23	**86**
35	**85**
46	**85**
81	**85**

Micro-precision **threading tools**

MICRO-PRECISION
THREADING TOOLS

Tools for the production of threads have the same critical task in common: They are applied at the end of the production chain when components and individual parts are practically finished. Therefore, the production of threads is an especially delicate operation. If the tool is incorrectly applied or operates unreliably the workpiece can be damaged or even unusable. For the production of micro-precision threads there are several procedures leading to the required result.

from page 74

Micro-precision thread milling cutters

Guhring's micro-precision thread milling cutters are suitable for right-hand as well as left-hand threads and allow the production of different thread tolerances with only one tool. Thanks to the low cutting pressure the thread milling cutters are optimally suitable for high tensile materials such as for example VA steels, Inconel or titanium. Hard machining up to HRC 65 is possible. In these machining areas micro-precision thread milling cutters promise absolute process reliability and high productivity.

- different thread tolerances with only one tool
- for the machining of special alloys and up to HRC 65

Application example:
Fastening thread insert seat

Material: 1.2343 (43 HRC)
Dimension: M2,5

v_c = 45 m/min

f_z = 0.02 mm

from page 77

Taps for ISO metric threads

The combination of cutting ability and special coating distinguish Guhring's taps in micro-precision machining. Relief geometry and rake angle were specially adapted for micro-precision machining. In this field the application is possible in a broad material spectrum, including structural steel, high-tensile steel as well as stainless steel.

- extreme cutting ability thanks to adapted geometry
- applicable in a broad material spectrum

Application example:
Tapping in stainless steel

Material: 1.4571
Dimension: M3

v_c = 8 m/min

from page 79

Fluteless taps

Guhring's micro-precision fluteless taps were raised to the next level with regard to their polygon shape. By modifying the geometry the contact surface between tool and functional area was optimised. Torque was subsequently reduced by up to 30 percent.

- up to 30 % less torque
- reduced axial forces

Application example:
Fluteless tapping in titanium

Material: TiAl6V4
Dimension: M2,5

v_c = 6 m/min

Micro-thread milling cutters

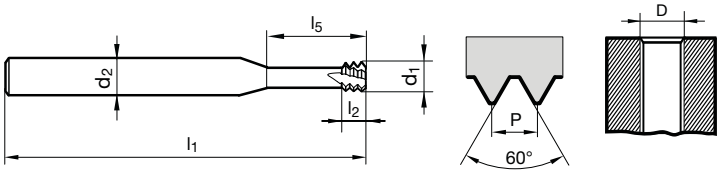
3xD

P	•
M	•
K	•
N	•
S	•
H	

Tool material	**Solid carbide**
Surface	C
Type	MTM3 SP
Threads	3,0
Shank form	HA

GÜHRINGNAVIGATOR

Cutting data page 80



Company std. Article no. **4226**

D	P	d1	d2	l1	l2	l5	Z	Code no.
	mm	mm	mm	mm	mm	mm		
M1,6	0.350	1.200	3.000	39.000	1.100	4.800	3	1.600
M1,8	0.350	1.400	3.000	39.000	1.100	5.400	3	1.800
M2	0.400	1.550	3.000	39.000	1.200	6.000	4	2.000
M2,5	0.450	1.950	3.000	39.000	1.400	7.500	4	2.500
M3	0.500	2.400	6.000	58.000	1.500	9.500	4	3.000

Micro-thread milling cutters

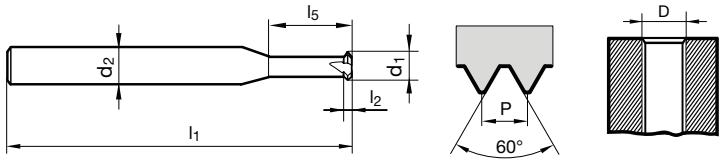
3xD

P	•
M	•
K	•
N	•
S	•
H	

Tool material	**Solid carbide**
Surface	C
Type	MTM1 SP
Threads	1,0
Shank form	HA

GÜHRINGNAVIGATOR

Cutting data page 80



Company std. Article no. **4225**

D	P max.	d1	d2	l1	l2	l5	Z	Code no.
	mm	mm	mm	mm	mm	mm		
M1.4 - M1.8	0.350	1.050	3.000	39.000	0.400	3.800	3	1.800
M2 - M2.4	0.400	1.500	3.000	39.000	0.400	7.000	3	2.400
M2.5 - M3	0.500	2.000	3.000	39.000	0.500	9.000	4	3.000

Micro-thread milling cutters

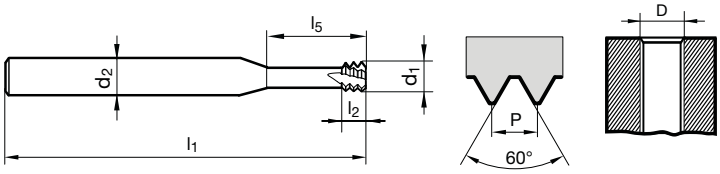
3xD

Tool material	**Solid carbide**
Surface	A
Type	MTMH3 SP
Threads	3,0
Shank form	HA

P	
M	
K	
N	
S	○
H	●

GÜHRINGNAVIGATOR

Cutting data page 80



Company std. Article no. **4227**

D	P	d1	d2	l1	l2	l5	Z	Code no.
	mm	mm	mm	mm	mm	mm		
M2	0.400	1.550	3.000	39.000	1.200	6.000	4	2.000
M2,5	0.450	1.950	3.000	39.000	1.400	7.500	4	2.500
M3	0.500	2.350	6.000	58.000	1.500	9.500	4	3.000

Machine taps for ISO metric threads

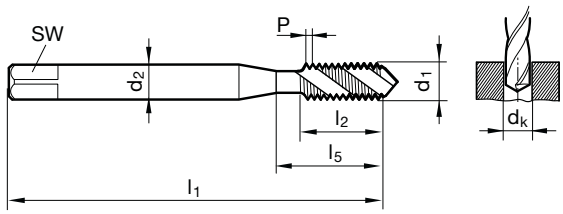
Tool material	**HSS-E**
Tolerance on Ø	6HX
Surface	A
Type	VA R45
Form	C
Internal cooling	

NEW

P	•
M	•
K	○
N	○
S	•
H	

GÜHRINGNAVIGATOR

Cutting data page 80



DIN 2184-1 DIN 371 Article no. **393**

d1	P	d2	SW	dk	l1	l2	l5
	mm	mm	mm	mm	mm	mm	mm
M2	0.400	2.800	2.100	1.60	45.000	4.500	13.500
M2,5	0.450	2.800	2.100	2.05	50.000	5.000	14.500
M3	0.500	3.500	2.700	2.50	56.000	6.000	18.000

Machine taps for ISO metric threads

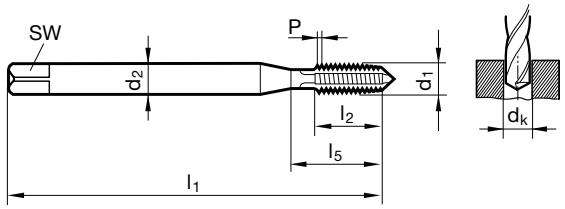
Tool material	HSS-E
Tolerance on Ø	6HX
Surface	S
Type	VA
Form	B
Internal cooling	

NEW

P	•
M	•
K	○
N	○
S	•
H	

GÜHRINGNAVIGATOR

Cutting data page 80



DIN 2184-1 DIN 371 Article no. **4218**

d1	P	d2	SW	dk	l1	l2	l5
	mm	mm	mm	mm	mm	mm	mm
M2	0.400	2.800	2.100	1.60	45.000	8.000	13.500
M2,5	0.450	2.800	2.100	2.05	50.000	9.000	14.500
M3	0.500	3.500	2.700	2.50	56.000	10.000	18.000

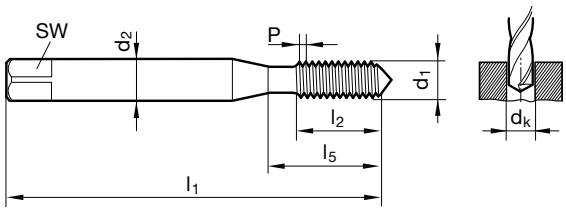
Fluteless machine taps for ISO metric threads

Tool material	HSS-E
Tolerance on Ø	6HX
Surface	S
Type	N
Form	C
Internal cooling	

P	•
M	•
K	
N	○
S	
H	

GÜHRINGNAVIGATOR

Cutting data page 80



DIN 2174 ~DIN 371 Article no. **921**

d1	P	d2	SW	dk	l1	l2	l5
	mm	mm	mm	mm	mm	mm	mm
M1	0.250	2.500	2.100	0.90	40.000	4.000	
M 1.2	0.250	2.500	2.100	1.10	40.000	4.800	
M 1.4	0.300	2.500	2.100	1.25	40.000	5.600	
M 1.6	0.350	2.500	2.100	1.45	40.000	6.400	
M 1.7	0.350	2.500	2.100	1.55	40.000	6.800	
M 1.8	0.350	2.500	2.100	1.65	40.000	7.300	
M2	0.400	2.800	2.100	1.85	45.000	8.000	13.500
M 2.5	0.450	2.800	2.100	2.30	50.000	9.000	14.500
M3	0.500	3.500	2.700	2.80	56.000	10.000	18.000

GÜHRINGNAVIGATOR

Article no.
Thread type
Tolerance
Standard/DIN
Tool material
Type/Form
Surface finish
Cooling
Shank tolerance

Milling part Ø mm	Feed column no. 1	2	3	4	5
	f_z (mm/Z) up-cut milling				
1.050 - 1.400	0.010	0.020	0.030	0.040	0.045
1.500 - 1.600	0.020	0.020	0.030	0.040	0.050
1.950 - 2.350	0.020	0.020	0.040	0.050	0.060
2.400 - 2.500	0.025	0.035	0.040	0.060	0.070

Cooling:
⊠ without coolant ducts

Coolant:
○ Air
● Oil
◍ Soluble oil
△ Paste

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tensile strength N/mm²	Hardness	Coolant
Common structural steels	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍●△
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍●△
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍●△
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍●△
Unalloyed heat-treatable steels	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍●△
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍●△
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍●△
Alloyed heat-treatable steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍●△
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍●△
Unalloyed case hard. steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍●△
Alloyed case hardened steels	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		◍●△
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		◍●△
Nitriding steels	**1.8504** 34CrAl6	≤1000		◍●△
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		◍●△
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍●△
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		◍●△
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		◍●△
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	◍●△
Hardened steels	–		≤48 HRC	●◍
			≤66 HRC	●◍
Stainless steels, sulphured	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●△◍
austenitic	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●△◍
martensitic	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●△◍
Cast iron	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	◍●
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	◍●
Spheroidal graphite iron and malleable cast iron	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	◍●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	◍●
Chilled cast iron	–		≤350 HB	◍●
New cast materials GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍●
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍●
New cast materials ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍●
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍●
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000		●◍
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●◍
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●◍
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍△●
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍△●
Al cast alloys ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍△●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍△●
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		◍△●
Copper, low-alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍△●
Brass, short-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍△●
long-chipping	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍△●
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍△●
	2.0790 CuNi18Zn19Pb	≤850		◍△●
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		◍△●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		◍△●
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren	≤150		◍
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100		◍
Kevlar	Kevlar	≤1000		◍
Glass, carbon concentr. plastics	GFK/CFK	≤1000		◍

Taps

393	4218
M	M
6HX	6HX
371	371
HSS-E	HSS-E
N R45/C	VA/B
A	S
⊠	⊠
h9	h9




v_c m/min	v_c m/min
18	20
18	20
18	20
18	20
18	20
18	20
18	20
15	18
12	15
18	20
15	18
12	15
15	18
12	15
15	18
12	15
12	15
15	18
10	12
10	12
10	12
20	25
20	25
20	25
20	25
18	20
18	20
18	20
15	18
2	3
2	3
2	3
20	25
20	25
20	25
18	20
18	20
20	25
18	20
20	25
18	20
18	20
20	25
20	25
15	18
10	12

Fluteless taps

921
M
6HX
~371
HSS-E
N/C
S
⊠
h9


v_c m/min
12
12
12
12
12
12
12
10
8
12
10
8
10
8
10
8
8
8
4
4
4
15
15
15
15
15
15
15

Micro thread milling cutters

4226	4225	4227
Company std.	Company std.	Company std.
Sol. carbide	Sol. carbide	Sol. carbide
MTM3 SP	MTM1 SP	MTMH3 SP
C	C	A
⊠	⊠	⊠
h6	h6	h6






v_c m/min	Feed column no.	v_c m/min	Feed column no.	v_c m/min	Feed column no.
90	4	90	4		
80	4	80	4		
90	4	90	4		
80	4	80	4		
90	4	90	4		
90	4	90	4		
80	4	80	4		
70	3	70	3		
60	3	60	3		
90	4	90	4		
70	3	70	3		
60	3	60	3		
70	3	70	3		
60	3	60	3		
80	3	80	3		
60	3	60	3		
60	3	60	3		
60	3	60	3		
				50	1
				40	1
50	2	50	2		
50	2	50	2		
60	2	60	2		
80	4	80	4		
80	4	80	4		
70	4	70	4		
70	4	70	4		
70	4	70	4		
70	4	70	4		
60	3	60	3		
60	3	60	3		
60	3	60	3		
20	2	20	2		
20	2	20	2		
20	2	20	2		
100	5	100	5		
100	5	100	5		
90	5	90	5		
90	5	90	5		
90	5	90	5		
100	5	100	5		
80	5	80	5		
80	5	80	5		
80	5	80	5		
80	5	80	5		
80	5	80	5		
80	5	80	5		
100	5	100	5		
60	4	60	4		
60	3	60	3		
60	3	60	3		

Micro-precision **milling tools**

MICRO-PRECISION **MILLING TOOLS**

With milling operations using a small tool diameter the deflection of the tool is a considerable problem. The high demands of micro-precision machining require the prevention or reduction of dimensional deviations caused by tool deflection. For this, it is necessary the micro-precision milling tools are especially fast cutting and sharp. High carbide quality, close tolerances and ensuring process reliable cooling are absolutely essential already from the blank stage.

from page 94

End mills

End mills (with straight face) in the micro-precision range are available as universal tools with z = 2, 3 or 4 in the dimensions 0.3 to 8 mm. The pilot end mill is applied for spotting uneven surfaces and cavities and ensures an accurate hole. Materials up to 55 HRC can be process reliably machined.

- slot drills and pilot end mills in different designs
- universal micro-precision milling up to 55 HRC

Application example:
Slotting in 1.4301 (wet machining)
Micro-precision slot drill article no.: 3684 0.6 mm

a_p = 0.1 mm
a_e = 0.6 mm
v_c = 60 m/min S = 32,000 min^{-1}
v_f = 800 mm/min fz = 0.006 mm

from page 89

Profile cutters

The profile cutter range includes ball nose and corner radius cutters for the machining of heat treatable and stainless steels, high-tensile aluminium and titanium as well as for the machining of hardened steels, chilled cast iron and wear materials.

Micro-precision profile cutters guarantee accurate diameter tolerances and close radius tolerances in precision mould making. The cylinder and radius areas are ground in a one pass process for optimal wear protection, the radius grind with constant helix correction ensures further process reliability. Finest surface finishes are made possible through homogenised cutting edges and contribute to further increasing tool life

- seamless radius area
- with SIGNUM-coating

Application example:
Profile cutting in 1.2083 HRC 54 (dry machining),
HSC profile cutter GF 500 Guhring no.: 3856 2.0 mm

a_p = 0.05 mm
a_e = 0.2 mm
v_c = 110 m/min S = 17,500 min^{-1}
v_f = 700 mm/min fz = 0.02 mm

from page 98

Chamfering milling cutters

Micro-precision chamfering milling cutters are universally suitable for chamfering, forward and backward de-burring and for contour operations in most materials. The lead chamfer of established chamfer tools was optimised for the Guhring micro-precision range. Low cutting pressure ensures an especially soft cut with little wear. The 90° forward and backward de-burring tool enables the chamfering of the upper and lower edge without re-clamping the workpiece. The cutting ability of the tools extends to the smallest diameter – to nearly 0.

- facet relief grind
- no secondary burr

Application example:
Chamfer milling in 1.4571 (wet machining)
90° chamfering milling cutter Guhring no.: 6713 4.0 mm

a_p = 0.2 mm
a_e = 0.2 mm
v_c = 130 m/min S = 13,750 min^{-1}
v_f = 1.650 mm/min fz = 0.03 mm

available as special tool

ExclusiveLine

Micro-precision milling cutters of the ExclusiveLine are available in the lengths 3, 5, 8, 10, 12 x D as well in designs with flute numbers z = 2 and z = 3. The z = 3 design also possesses a 45° helix angle for a low-vibration operation. The face geometry was specially re-developed and re-designed for the micro-precision milling cutter range. The specifically produced carbide meets the especially high demands on hardness and was therefore selected especially fine grain. New is also peripheral cooling with 4 or 6 coolant ducts – also made possible thanks to Guhring's own carbide production. The combination of radius and transition angle achieves maximum rigidity with corresponding effective length.

- 3 different face, 5 different length ratio options
- smallest diameter and radius tolerances (+/- 5 µm)

Application example:
Copy milling in 1.2379 HRC 58 (dry machining),
ExclusiveLine profile cutter 1.0 mm

a_p = 0.05 mm
a_e = 0.05 mm
v_c = 120 m/min S = 38,200 min^{-1}
v_f = 610 mm/min fz = 0.008 mm

MICRO-PRECISION MILLING CUTTERS
EXCLUSIVELINE®

available as special tools

many geometries for all materials

2-fluted

- sharp-edged, ball nose or corner radius
- with neck clearance
- reach: 3xD, 5xD, 8xD, 10xD, 12xD
- in Ø-range 0.3 mm – 3.00 mm

3-fluted

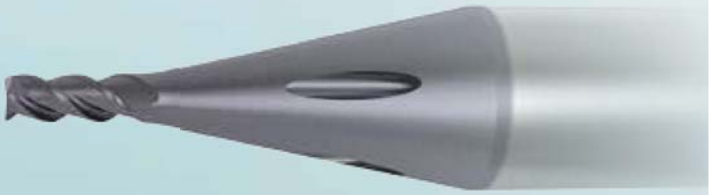
- 45° helix
- cutting edge length: 2xD and 4xD
- in Ø-range 0.3 mm – 3.00 mm

Titanium, special alloys | Stainless Steel | Steel | Cast iron | Hardened Steel | Aluminium, non-ferrous metals, plastics

3-fluted

In addition to our successful mini slot drills we are extending the range of ExclusiveLine micro precision milling cutters with universal 3-fluted milling cutters with 45° helix for slotting, roughing and finishing in most materials:

- all plastics such as POM, PE, PVC, PEEK, PMMA or similar
- aluminium and non-ferrous metals as well as precious metals
- soft and tough steels up to high-tensile steels up to 48 HRC
- stainless and acid resistant materials and special alloys such as titanium, cobalt-chrome and Inconel

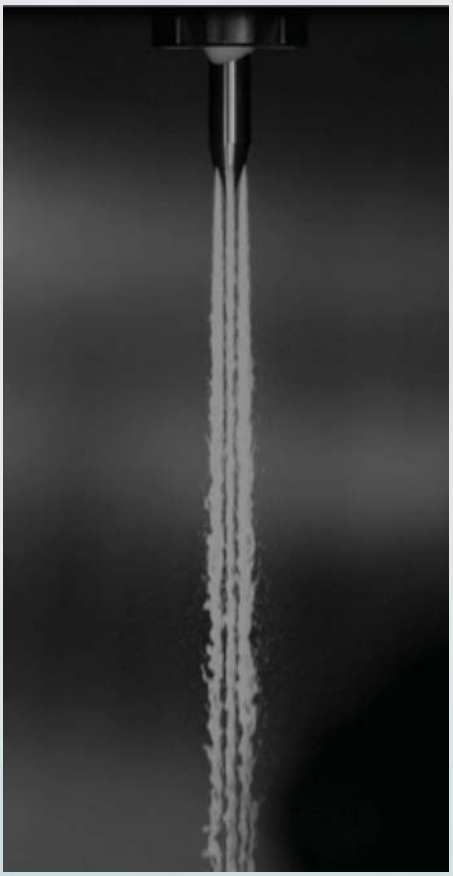


Innovative coolant duct design

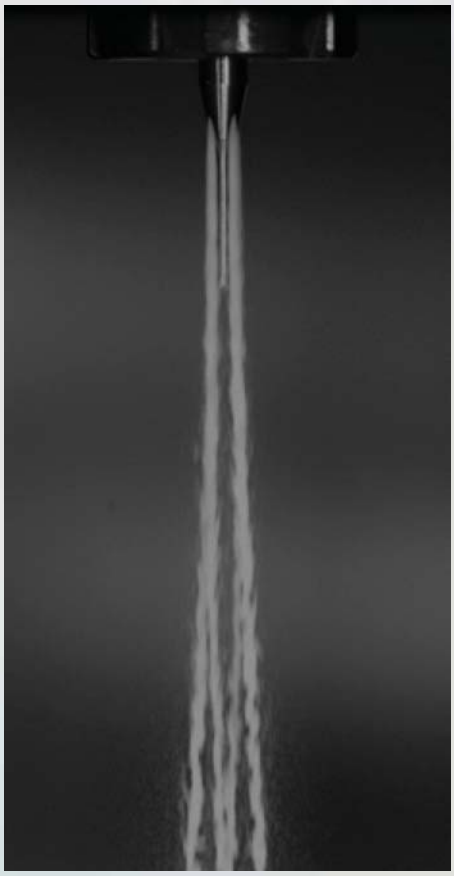
GÜHROJET

A specially designed ultra-hard finest grain carbide was applied for ExclusiveLine micro-precision milling cutters – made possible by Guhring's in-house carbide development. Dependent on tool diameter four to six peripheral coolant ducts guarantee a perfect chip evacuation via air, MQL or high-pressure internal cooling even with deep slots or pockets.

Switching on GuhroJet internal cooling

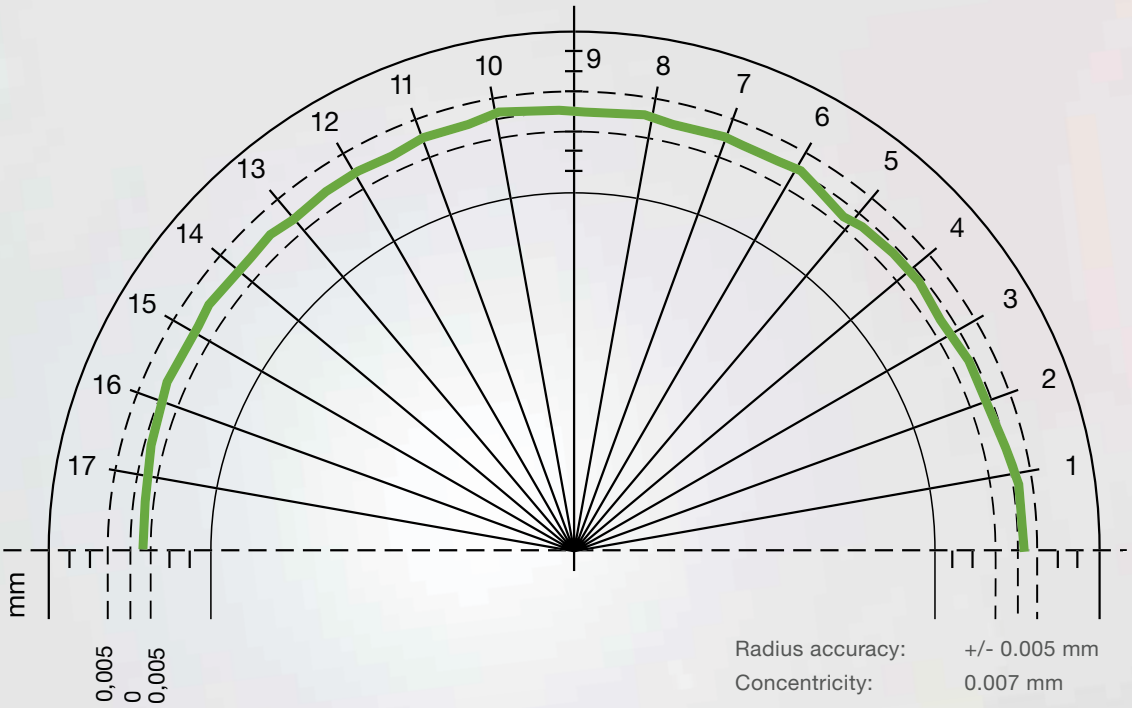


Internal cooling with 80 bar with S = 0 rev./min



Internal cooling with 80 bar with S = 24,000 rev./min

Radius accuracy of our ball nose and corner radius ExclusiveLine micro-precision milling cutters:



Optimal wear resistance

Seamless radius area

Radius accuracy:	+/- 0.005 mm
Concentricity:	0.007 mm
Diameter tolerance:	+/- 0.005 mm

Accuracy tool classes:

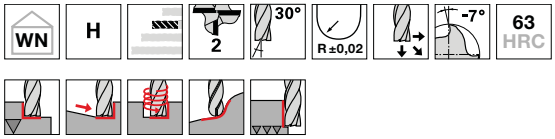
Guhring's radius tools offer the following accuracy classes in diameter and radius tolerances to ensure the required component precision.

Tool type	Tool accuracy	
 Ball nose end mill 2- and 4-fluted	Diameter: Radius tolerance:	h10 +/- 0.05 mm
 GF 300 / GF 500 HSC profile cutter	Diameter: Radius tolerance:	h8 +/- 0.01 mm

EXCLUSIVELINE®

 **Micro-precision milling cutters**	**Diameter:** **Radius tolerance:**	**+/- 0.005 mm** **+/- 0.005 mm**

Ball nose hard profile cutters GF 300 B

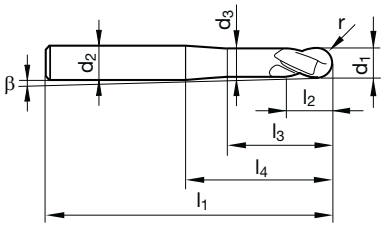


Tool material	**Solid carbide**
Surface	Y
Type	H
Shank form	HA

P	○
M	
K	•
N	
S	
H	•

GÜHRINGNAVIGATOR
Cutting data page 100

- neck clearance
- centre cutting



Article no. **3359**

d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Code no.
mm	mm	mm	mm	mm	mm	mm	mm	°		
0.50	3.00	0.40	38	0.7	2.6	10.0	0.25	7.40	2	0.500
0.80	3.00	0.70	38	1.2	3.5	10.0	0.40	6.60	2	0.800
1.00	3.00	0.90	38	1.5	4.0	10.0	0.50	6.10	2	1.000
1.50	3.00	1.40	38	2.2	5.5	10.0	0.75	4.70	2	1.500
2.00	6.00	1.90	57	3.0	9.4	21.0	1.00	5.80	2	2.000
3.00	6.00	2.70	57	5.0	11.6	21.0	1.50	4.40	2	3.000
4.00	6.00	3.70	57	6.0	14.5	21.0	2.00	3.10	2	4.000
5.00	6.00	4.70	57	8.0	17.3	21.0	2.50	1.60	2	5.000
6.00	6.00	5.70	57	9.0	20.0	21.0	3.00		2	6.000
8.00	8.00	7.70	63	12.0	26.0	27.0	4.00		2	8.000

Ball nose slot drills (2-fluted)

DIN 6527 L | N | 2 | 30° | R ±0,05 | 9° | 48 HRC

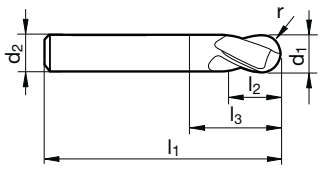
Tool material	**Solid carbide**
Surface	F
Type	N
Shank form	HA

P	•
M	•
K	•
N	•
S	•
H	○

GÜHRING NAVIGATOR

Cutting data page 100

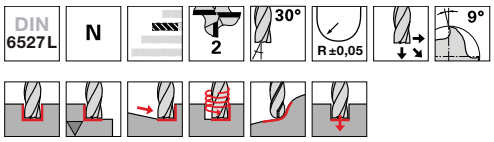
• centre cutting



Article no. **3679**

d1 h10	d2 h6	l1	l2	l3	r	Z	Code no.
mm	mm	mm	mm	mm	mm		
0.50	3.00	38	1.0	2.1	0.2	2	0.500
0.80	3.00	38	1.0	2.1	0.4	2	0.800
1.00	3.00	38	2.0	3.9	0.5	2	1.000
1.50	3.00	38	3.0	6.4	0.7	2	1.500
2.00	6.00	57	6.0	9.4	1.0	2	2.000
3.00	6.00	57	7.0	11.9	1.5	2	3.000
4.00	6.00	57	8.0	13.4	2.0	2	4.000
5.00	6.00	57	10.0	16.9	2.5	2	5.000
6.00	6.00	57	10.0	21.0	3.0	2	6.000
8.00	8.00	63	16.0	27.0	4.0	2	8.000

Ball nose slot drills (2-fluted)

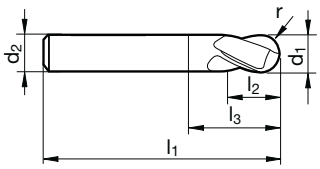


Tool material	**Solid carbide**
Surface	◯
Type	N
Shank form	HA

P	•
M	•
K	
N	•
S	•
H	

GÜHRINGNAVIGATOR
Cutting data page 100

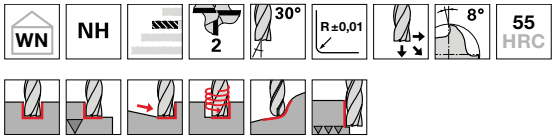
• centre cutting



Article no. **3308**

d1 h10	d2 h6	l1	l2	l3	r	Z	**Code no.**
mm	mm	mm	mm	mm	mm		
0.50	3.00	38	1.0	2.1	0.2	2	0.500
0.80	3.00	38	1.0	2.1	0.4	2	0.800
1.00	3.00	38	2.0	3.9	0.5	2	1.000
1.50	3.00	38	3.0	6.4	0.7	2	1.500
2.00	6.00	57	6.0	9.4	1.0	2	2.000
3.00	6.00	57	7.0	11.9	1.5	2	3.000
4.00	6.00	57	8.0	13.4	2.0	2	4.000
5.00	6.00	57	10.0	16.9	2.5	2	5.000
6.00	6.00	57	10.0	21.0	3.0	2	6.000
8.00	8.00	63	16.0	27.0	4.0	2	8.000

HSC Torus end mills GF 500 T

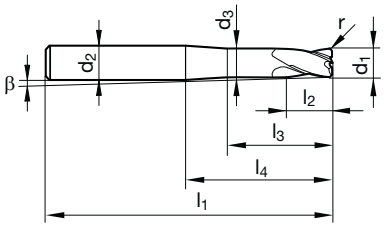


Tool material	**Solid carbide**
Surface	Y
Type	NH
Shank form	HA

P	•
M	•
K	•
N	○
S	•
H	•

GÜHRINGNAVIGATOR
Cutting data page 100

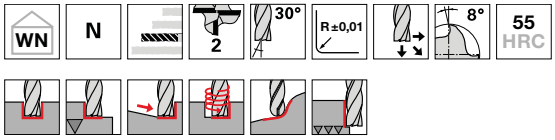
- neck clearance
- centre cutting



Article no. **3856**

d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Code no.
mm	mm	mm	mm	mm	mm	mm	mm	°		
0.50	4.00	0.48	50	1.0	3.0	20.0	0.10	4.60	2	0.501
1.00	4.00	0.95	50	2.0	6.0	20.0	0.20	4.00	2	1.002
2.00	6.00	1.90	57	3.0	8.0	21.0	0.20	5.50	2	2.002
2.00	6.00	1.90	57	3.0	8.0	21.0	0.50	5.60	2	2.000
3.00	6.00	2.80	57	3.5	14.0	21.0	0.50	4.20	2	3.000
4.00	6.00	3.80	57	4.0	16.0	21.0	0.30	2.80	2	4.003
4.00	6.00	3.80	57	4.0	16.0	21.0	0.50	2.80	2	4.005
4.00	6.00	3.80	57	4.0	16.0	21.0	1.00	2.90	2	4.000
5.00	6.00	4.80	57	5.0	18.0	21.0	0.50	1.40	2	5.005
5.00	6.00	4.80	57	5.0	18.0	21.0	1.00	1.50	2	5.010
6.00	6.00	5.70	57	6.0	20.0	21.0	0.50		2	6.005
6.00	6.00	5.70	57	6.0	20.0	21.0	1.00		2	6.010
6.00	6.00	5.70	57	6.0	20.0	21.0	1.50		2	6.015
6.00	6.00	5.70	57	6.0	20.0	21.0	2.00		2	6.000
8.00	8.00	7.70	63	8.0	26.0	27.0	2.00		2	8.000

HSC Torus end mills GF 500 T

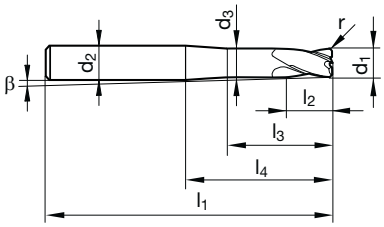


Tool material	**Solid carbide**
Surface	Y
Type	N
Shank form	HA

P	•
M	•
K	•
N	○
S	•
H	•

GÜHRINGNAVIGATOR
Cutting data page 100

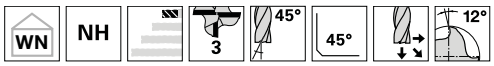
- neck clearance
- centre cutting



Article no. **3865**

d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Code no.
mm	mm	mm	mm	mm	mm	mm	mm	°		
0.50	4.00	0.48	50	1.0	6.0	20.0	0.10	5.10	2	0.500
1.00	4.00	0.95	50	2.0	12.0	20.0	0.20	4.40	2	1.002
2.00	6.00	1.90	75	3.0	18.0	35.0	0.20	3.30	2	2.002
2.00	6.00	1.90	75	3.0	18.0	35.0	0.50	3.40	2	2.005
3.00	6.00	2.80	80	3.5	25.0	40.0	0.50	2.20	2	3.005
4.00	6.00	3.80	80	4.0	32.0	40.0	0.30	1.50	2	4.003
4.00	6.00	3.80	80	4.0	32.0	40.0	0.50	1.50	2	4.005
5.00	6.00	4.80	80	5.0	39.0	40.0	0.50	0.80	2	5.005
5.00	6.00	4.80	80	5.0	39.0	40.0	1.00	0.80	2	5.010
6.00	6.00	5.70	80	6.0	39.0	40.0	0.50		2	6.005
6.00	6.00	5.70	80	6.0	39.0	40.0	1.00		2	6.010
6.00	6.00	5.70	80	6.0	39.0	40.0	1.50		2	6.015
6.00	6.00	5.70	80	6.0	39.0	40.0	2.00		2	6.000
8.00	8.00	7.70	100	8.0	59.0	60.0	2.00		2	8.000

Mini slot drills (3-fluted)

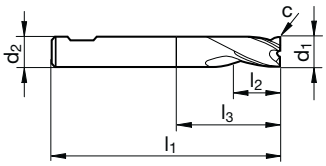


Tool material	**Solid carbide**
Surface	F
Type	NH
Shank form	HA/HB

P	•
M	•
K	○
N	•
S	○
H	

GÜHRINGNAVIGATOR
Cutting data page 100

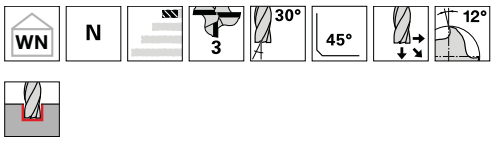
• centre cutting



Article no. **3686**

d1 e8	d2 h6	l1	l2	l3	c	Z	Code no.
mm	mm	mm	mm	mm	mm x 45°		
1.00	3.00	38	2.0	3.4	0.02	3	1.000
1.20	3.00	38	2.0	3.4	0.02	3	1.200
1.50	3.00	38	3.0	5.9	0.02	3	1.500
1.80	3.00	38	3.0	5.9	0.02	3	1.800
2.00	6.00	45	4.0	6.9	0.02	3	2.000
2.50	6.00	45	5.0	7.9	0.05	3	2.500
3.00	6.00	45	6.0	9.9	0.05	3	3.000
3.50	6.00	45	6.0	9.9	0.05	3	3.500
4.00	6.00	45	7.0	10.9	0.05	3	4.000
4.50	6.00	45	8.0	13.4	0.05	3	4.500
5.00	6.00	45	8.0	13.4	0.05	3	5.000
5.50	6.00	45	8.0	14.4	0.05	3	5.500
5.75	6.00	45	10.0	17.0	0.05	3	5.750
6.00	6.00	45	10.0	15.0	0.05	3	6.000

Mini slot drills (3-fluted)

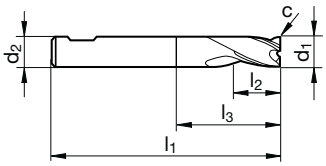


Tool material	**Solid carbide**
Surface	F
Type	N
Shank form	HA/HB

P	•
M	•
K	○
N	•
S	•
H	

GÜHRINGNAVIGATOR
Cutting data page 100

• centre cutting



Article no. **3684**

d1 e8	d2 h6	l1	l2	l3	c	Z	**Code no.**
mm	mm	mm	mm	mm	mm x 45°		
0.30	3.00	38	1.0	3.4		3	0.300
0.40	3.00	38	1.0	3.4		3	0.400
0.50	3.00	38	1.5	3.4	0.02	3	0.500
0.60	3.00	38	1.5	3.4	0.02	3	0.600
0.80	3.00	38	2.0	3.9	0.02	3	0.800
1.00	3.00	38	2.0	3.9	0.02	3	1.000
1.20	3.00	38	2.0	3.9	0.02	3	1.200
1.50	3.00	38	2.0	3.9	0.02	3	1.500
1.80	3.00	38	2.0	3.9	0.02	3	1.800
2.00	6.00	38	4.0	7.4	0.02	3	2.000
2.50	6.00	38	5.0	8.4	0.05	3	2.500
3.00	6.00	38	5.0	8.4	0.05	3	3.000
3.50	6.00	38	6.0	9.4	0.05	3	3.500
4.00	6.00	38	7.0	10.4	0.05	3	4.000
4.50	6.00	38	8.0	12.4	0.05	3	4.500
5.00	6.00	38	8.0	12.4	0.05	3	5.000
5.50	6.00	38	8.0	12.4	0.05	3	5.500
5.75	6.00	38	8.0	12.4	0.05	3	5.750
6.00	6.00	38	8.0	14.0	0.05	3	6.000

Slot drills (2-fluted)

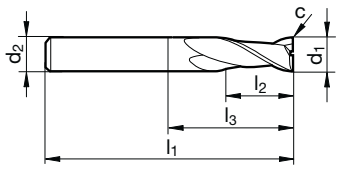
DIN 6527 L | N | 2 | 30° | 45° | 9°

Tool material	Solid carbide	
Surface	F	○
Type	N	N
Shank form	HA	HA

P	•
M	•
K	•
N	•
S	
H	

GÜHRINGNAVIGATOR
Cutting data page 100

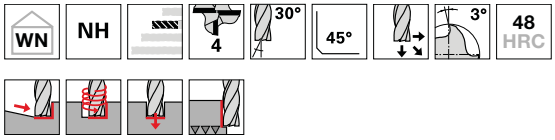
• centre cutting



Article no.	3635	3195

d1 h10	d2 h6	l1	l2	l3	c	Z	Code no.
mm	mm	mm	mm	mm	mm x 45°		
1.00	3.00	38	2.0	3.9	0.02	2	1.000
1.50	3.00	38	3.0	6.4	0.02	2	1.500
2.00	6.00	57	6.0	9.4	0.02	2	2.000
2.50	6.00	57	7.0	10.4	0.05	2	2.500
2.80	6.00	57	7.0	11.9	0.05	2	2.800
3.00	6.00	57	7.0	11.9	0.05	2	3.000
3.50	6.00	57	7.0	12.4	0.05	2	3.500
3.80	6.00	57	8.0	13.4	0.05	2	3.800
4.00	6.00	57	8.0	13.4	0.05	2	4.000
4.50	6.00	57	8.0	14.9	0.05	2	4.500
4.80	6.00	57	10.0	16.9	0.05	2	4.800
5.00	6.00	57	10.0	16.9	0.05	2	5.000
5.50	6.00	57	10.0	17.4	0.05	2	5.500
5.75	6.00	57	10.0	18.4	0.05	2	5.750
6.00	6.00	57	10.0	21.0	0.05	2	6.000

Pilot end mills RF 100 P

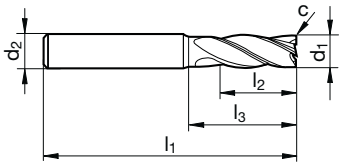


Tool material	**Solid carbide**
Surface	A
Type	NH
Shank form	HA

P	•
M	○
K	•
N	•
S	○
H	

GÜHRINGNAVIGATOR
Cutting data page 100

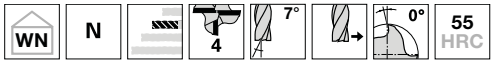
- for piloting, drilling, finishing
- special pilot geometry
- centre cutting



Article no. **6716**

d1 m8	d2 h6	l1	l2	l3	c	Z	**Code no.**
mm	mm	mm	mm	mm	mm x 45°		
1.40	3.00	38	3.0	5.9	0.01	4	1.400
1.50	3.00	38	4.0	6.9	0.02	4	1.500
1.80	3.00	38	6.0	8.9	0.02	4	1.800
2.00	3.00	38	6.5	9.4	0.02	4	2.000
2.10	3.00	38	6.5	9.9	0.02	4	2.100
2.30	3.00	38	6.5	9.9	0.02	4	2.300
2.50	3.00	38	6.5	9.9	0.03	4	2.500
2.80	3.00	38	6.5	10.0	0.03	4	2.800
3.00	6.00	57	8.0	12.4	0.03	4	3.000
3.50	6.00	57	10.0	14.9	0.04	4	3.500
4.00	6.00	57	11.0	15.9	0.04	4	4.000
4.50	6.00	57	11.0	17.4	0.05	4	4.500
5.00	6.00	57	13.0	19.4	0.05	4	5.000
5.50	6.00	57	13.0	20.4	0.06	4	5.500
6.00	8.00	63	13.0	20.4	0.06	4	6.000

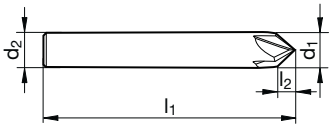
Chamfering milling cutters



Tool material	**Solid carbide**
Surface	A
Type	N
Shank form	HA

P	•
M	•
K	•
N	•
S	•
H	○

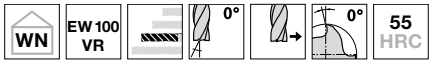
GÜHRINGNAVIGATOR
Cutting data page 100



Article no.	**6713**

d1 js9	d2 h6	l1	l2	Z	**Code no.**
mm	mm	mm	mm		
4.000	4.000	50.000	2.000	4	4.000
6.000	6.000	57.000	3.000	4	6.000
8.000	8.000	63.000	4.000	4	8.000

Front/back deburrer 90°

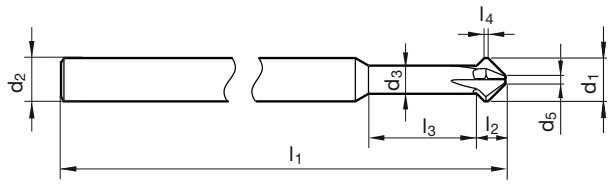


Tool material	**Solid carbide**
Surface	a
Type	EW 100 VR
Shank form	HA

P	•
M	•
K	•
N	○
S	•
H	•

GÜHRING NAVIGATOR
Cutting data page 100

- neck clearance
- without centre cutting



Article no. **495**

d1	d2 h6	d3	d4	l1	l2	l3	l4	Z	Code no.
mm	mm	mm	mm	mm	mm	mm	mm		
3.00	4.00	2.20	0.6	75	2.1	9.3	5.0	4	3.000
4.00	4.00	2.90	0.8	75	2.7	12.3	6.0	4	4.000
5.00	5.00	3.90	1.0	75	3.0	15.0	7.0	4	5.000
6.00	6.00	3.90	1.2	100	3.9	14.3	8.0	4	6.000
8.00	6.00	6.00	1.6	100	4.7		12.0	4	8.000

GÜHRINGNAVIGATOR Milling cutters

Tools with **bold** feed column no. are preferred choice.

a_e = Width of cut

a_p = Depth of cut

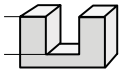
		Slot milling	
	Tool material	Sol. carbide	Sol. carbide
	Type	N	N/NH
Art. no.	coated	3635	3684
			3686
	bright	3195	

* All recommendations are for coated tools

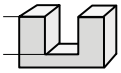
** For bright milling cutters please reduce cutting data (vc and fz) -30%.

a_e = 1 x D

a_e = 1 x D



a_p = 0,2 x D



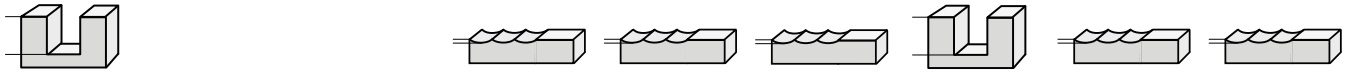
a_p = 0,2 x D

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)															
0.30	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
0.50	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
0.80	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
1.00	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
1.50	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
2.00	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
4.00	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
6.00	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
8.00	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
10.00	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	Tensile strength N/mm²	Hardness	v_c m/min	Feed col. no.	v_c m/min	Feed col. no.
Common structural steels	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1)	≤500		*85 - 105*	**42**	*94 - 116*	**43**
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH	≤1000		*81 - 99*	**41**	*89 - 109*	**42**
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		*85 - 105*	**41**	*94 - 116*	**42**
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20	≤1000		*63 - 77*	**42**	*69 - 85*	43
Unalloyed heat-treatable steels	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		*85 - 105*	**41**	*94 - 116*	**42**
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		*76 - 94*	**41**	*84 - 104*	**42**
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		*63 - 77*	**42**	*69 - 85*	43
Alloyed heat-treatable steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		*76 - 94*	**42**	*84 - 104*	43
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		*63 - 77*	42		
Unalloyed case hard. steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		*90 - 110*	**41**	*99 - 121*	**42**
Alloyed case hardened steels	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		*76 - 94*	**41**	*84 - 104*	42
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		*54 - 66*	42		
Nitriding steels	**1.8504** 34CrAl6	≤1000		*85 - 105*	**41**	*94 - 116*	42
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		*76 - 94*	**40**		
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		*76 - 94*	**41**	*84 - 104*	**42**
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767**	≤1400		*63 - 77*	40	*69 - 85*	41u
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		*45 - 55*	**42**	*49 - 61*	43
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	*45 - 55*	**40**		
Hardened steels	–		≤48 HRC	*45 - 55*	40		
			≤66 HRC				
Stainless steels, sulphured	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17	≤900		*45 - 55*	**42**	*49 - 61*	**43**
austenitic	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571**	≤1100		*40 - 50*	**40**	*45 - 55*	**41**
martensitic	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521**	≤1500		*36 - 44*	41	*39 - 49*	42
Cast iron	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	*108 - 132*	**41**	*118 - 146*	**42**
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	*99 - 121*	**40**	*108 - 134*	**41**
Spheroidal graphite iron and	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4		≤240 HB	*90 - 110*	**41**	*99 - 121*	**42**
malleable cast iron	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2		≤350 HB	*81 - 99*	**40**	*89 - 109*	**41**
Chilled cast iron	–		≤350 HB	*54 - 66*	**40**	*59 - 73*	**41**
New cast materials GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB				
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB				
New cast materials ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000					
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400					
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000		*27 - 33*	**40**	*29 - 37*	**41**
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		*45 - 55*	**40**	*49 - 61*	**41**
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5	≤1400		*36 - 44*	**40**	*39 - 49*	**41**
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		*405 - 495*	43	*297 - 363*	**46**
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365**	≤650		*495 - 605*	43	*360 - 440*	**46**
Al cast alloys ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		*198 - 242*	42	*217 - 267*	43
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		*162 - 198*	43	*178 - 218*	44
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		*225 - 275*	44	*171 - 209*	**47**
Copper, low-alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		*108 - 132*	43	*118 - 146*	44
Brass, short-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		*90 - 110*	43	*99 - 121*	44
long-chipping	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		*81 - 99*	42	*67 - 83*	**45**
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		*90 - 110*	42	*99 - 121*	43
	2.0790 CuNi18Zn19Pb	≤850		*72 - 88*	41	*79 - 97*	42
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		*72 - 88*	42	*63 - 77*	**45**
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		*63 - 77*	40	*54 - 66*	**43**
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren	≤150		*108 - 132*	40	*81 - 99*	**43**
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100		*99 - 121*	40	*72 - 88*	**43**
Kevlar	Kevlar	≤1000					
Glass, carbon concentr. plastics	GFK/CFK	≤1000					

Pilot holes	Chamfering		Copying			ExclusiveLine Micro mill. cutters		
Sol. carbide	Sol. carbide	Sol. carbide	Sol. carbide	Sol. carbide	Sol. carbide	Sol. carbide	Sol. carbide	Sol. carbide
N	N	N	N	GF 300 B	GF 500 T	Face mill. cutter	Torus mill. cutter	Ball nose end mills
6716	6713	495	3679	3359	3856	Special	Special	Special
					3865			
			3308					

a_e = 1 x D | a_e = 0,2 x D | a_e = 0,2 x D | a_e = 0,1 x D | a_e = 0,05 x D | a_e = 0,2 x D | a_e = 1 x D | a_e = 0,1 x D | a_e = 0,2 x D



a_p = 1 x D | a_p = 0,2 x D | a_p = 0,2 x D | a_p = 0,1 x D | a_p = 0,05 x D | a_p = 0,1 x D | a_p = 0,2 x D | a_p = 0,1 x D | a_p = 0,1 x 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.	v_c m/min	Feed col. no.
120 - 145	41	170 - 208	51	170 - 208	49	153 - 187	45			153 - 187	45	85 - 105	44	153 - 187	46	153 - 187	46
100 - 125	40	157 - 193	50	157 - 193	48	144 - 176	44			144 - 176	44	81 - 99	43	144 - 176	45	144 - 176	45
115 - 130	40	170 - 208	50	170 - 208	48	153 - 187	44			153 - 187	44	85 - 105	43	153 - 187	45	153 - 187	45
100 - 120	39	126 - 154	49	126 - 154	47	153 - 187	43			153 - 187	43	63 - 77	44	153 - 187	44	153 - 187	44
115 - 135	40	170 - 208	50	170 - 208	48	135 - 165	44			135 - 165	44	85 - 105	43	135 - 165	45	135 - 165	45
100 - 120	39	151 - 185	50	151 - 185	48	135 - 165	44			135 - 165	44	76 - 94	43	135 - 165	45	135 - 165	45
95-115	39	126 - 154	49	126 - 154	47	117 - 143	43			117 - 143	43	63 - 77	44	117 - 143	44	117 - 143	44
95 - 115	39	151 - 185	49	151 - 185	47	126 - 154	43	135 - 155	45	126 - 154	43	76 - 94	44	126 - 154	44	126 - 154	44
70 - 95	38	126 - 154	48	126 - 154	46	153 - 187	42	110 - 140	43	153 - 187	42	63 - 77	44	153 - 187	43	153 - 187	43
115 - 135	40	189 - 231	50	189 - 231	48	198 - 242	44			198 - 242	44	90 - 110	43	198 - 242	45	198 - 242	45
100 - 120	39	151 - 185	50	151 - 185	48	171 - 209	44	120 - 145	45	171 - 209	44	76 - 94	43	171 - 209	45	171 - 209	45
95 - 115	39	113 - 139	49	113 - 139	47	108 - 132	43	100 - 125	43	108 - 132	43	54 - 66	44	108 - 132	44	108 - 132	44
95 - 115	39	170 - 208	50	170 - 208	48	144 - 176	44	115 - 130	43	144 - 176	44	85 - 105	43	144 - 176	45	144 - 176	45
70 - 95	38	151 - 185	48	151 - 185	46	135 - 165	42	100 - 120	43	135 - 165	42	76 - 94	42	135 - 165	43	135 - 165	43
100 - 120	39	151 - 185	50	151 - 185	48	135 - 165	44	120 - 145	45	135 - 165	44	76 - 94	43	135 - 165	45	135 - 165	45
95 - 115	39	126 - 154	48	126 - 154	46	117 - 143	42	100 - 115	43	117 - 143	42	63 - 77	42	117 - 143	43	117 - 143	43
70 - 95	38	94 - 116	49	94 - 116	47	85 - 105	43	90 - 100	43	85 - 105	43	45 - 55	44	85 - 105	44	85 - 105	44
30 - 40	37	94 - 116	48	94 - 116	46	85 - 105	42	70 - 100	42	85 - 105	42	45 - 55	42	85 - 105	43	85 - 105	43
35 - 45	38	44 - 54	46	44 - 54	44	49 - 61	41	80 - 110	43	49 - 61	41	45 - 55	42	49 - 61	42	49 - 61	42
								60 - 75	42								
55 - 65	40	80 - 100	49	80 - 100	47	85 - 105	43			85 - 105	43	45 - 55	44	85 - 105	44	85 - 105	44
45 - 55	39	70 - 90	48	70 - 90	46	76 - 94	42	65 - 85	45	76 - 94	42	40 - 50	42	76 - 94	43	76 - 94	43
30 - 50	38	65 - 70	49	65 - 70	47	67 - 83	43	60 - 75	43	67 - 83	43	36 - 44	43	67 - 83	44	67 - 83	44
120 - 145	43	220 - 270	50	220 - 270	48	198 - 242	44	198 - 242	47	198 - 242	44	108 - 132	43	198 - 242	45	198 - 242	45
100 - 125	42	201 - 247	49	201 - 247	47	189 - 231	43	189 - 231	46	189 - 231	43	99 - 121	42	189 - 231	44	189 - 231	44
115 - 130	40	182 - 224	50	182 - 224	48	171 - 209	44	171 - 209	47	171 - 209	44	90 - 110	43	171 - 209	45	171 - 209	45
100 - 120	39	157 - 193	49	157 - 193	47	144 - 176	43	144 - 176	46	144 - 176	43	81 - 99	42	144 - 176	44	144 - 176	44
60 - 80	39	107 - 131	47	107 - 131	45	99 - 121	41	130 - 150	45	99 - 121	41	54 - 66	42	99 - 121	42	99 - 121	42
95 - 120	40							120 - 145	45								
85 - 100	39							100 - 125	43								
90 - 115	40							115 - 130	43								
82 - 100	39							100 - 120	43								
25 - 35	37	56 - 70	48	56 - 70	48	49 - 61	42	35 - 45	41	49 - 61	42	27 - 33	42	49 - 61	43	49 - 61	43
45 - 55	39	54 - 86	43	54 - 86	43			65 - 85	45			45 - 55	42				
30 - 50	38	44 - 72	42	44 - 72	42			60 - 75	43			36 - 44	42				
297 - 363	46	342 - 418	51	342 - 418	51	720 - 880	47			720 - 880	47	405 - 495	45	720 - 880	48	720 - 880	48
360 - 440	46	414 - 506	50	414 - 506	50	855 - 1045	47			855 - 1045	47	495 - 605	45	855 - 1045	48	855 - 1045	48
144 - 176	45	165 - 203	49	165 - 203	49	342 - 418	45			342 - 418	45	198 - 242	44	342 - 418	46	342 - 418	46
117 - 143	46					288 - 352	46			288 - 352	46	162 - 198	45	288 - 352	47	288 - 352	47
171 - 209	47	197 - 241	51	197 - 241	51	405 - 495	47			405 - 495	47	225 - 275	46	405 - 495	48	405 - 495	48
81 - 99	46	93 - 115	50	93 - 115	50	180 - 220	46			180 - 220	46	108 - 132	45	180 - 220	47	180 - 220	47
72 - 88	46	82 - 102	49	82 - 102	49	171 - 209	45			171 - 209	45	90 - 110	45	171 - 209	46	171 - 209	46
67 - 83	45	77 - 95	49	77 - 95	49	162 - 198	45			162 - 198	45	81 - 99	44	162 - 198	46	162 - 198	46
72 - 88	45	82 - 102	49	82 - 102	49	180 - 220	45			180 - 220	45	90 - 110	44	180 - 220	46	180 - 220	46
63 - 77	44					171 - 209	44			171 - 209	44	72 - 88	43	171 - 209	45	171 - 209	45
63 - 77	45	72 - 90	48	72 - 90	48	198 - 242	44			198 - 242	44	72 - 88	44	198 - 242	45	198 - 242	45
54 - 66	43					189 - 231	43			189 - 231	43	63 - 77	42	189 - 231	44	189 - 231	44
81 - 99	43	93 - 115	47	93 - 115	47							108 - 132	42				
72 - 88	43	82 - 102	47	82 - 102	47							99 - 121	42				

Micro-precision **reaming tools**

MICRO-PRECISION
REAMING TOOLS

The already extreme demands on surface finish quality and tolerance are raised to a further level in the area of micro-precision reaming. As long as the reamer was suitably ground and the other operating conditions satisfy the high requirements, these demands can also be met for micro-precision reaming. Key factors include Guhring's own carbide adapted to meet the demands of reaming operations as well as concentricity and process reliability.

from page 106

HR 500

The blind hole option possesses a central coolant bore. The through hole option possesses four off-centre coolant bores safely guiding the chip to the front. Thus the solid carbide high-performance reamer HR 500 also achieves outstanding cutting values and high hole qualities in the micro-precision range. As the sole standard reamer with internal cooling from Ø 1.97 mm it enables higher cutting values and considerably longer tool life in comparison to the other reamers.

- high cutting values and process reliability
- universal application
- suitable for hard machining up to approximately 63 HRC

Application example:
16MnCr5, Ø = 2.0 H7

v_c = 150 m/min
f_u = 0.25 mm/rev.
Tool life: 33 m

page 110, 112, 113

Solid carbide NC machine reamers

NC reamers similar to DIN 8093 with straight shank (h6) especially for standard clamping in hydraulic or shrink fit chucks. High concentricity and process reliability for the production of fits.

- universal application
  (steel, aluminium, non-ferrous metals up to 52 HRC)
- NC shank design to DIN 6535 HA (h6)

Application example:
42CrMo4, Ø = 2.5 ± 0,01

v_c = 12 m/min
f_u = 0.08 mm/rev.
Tool life: 12 m

page 111, 114

HSS-E machine reamers

Micro-precision reamers with h9 shank are predominantly suitable for single component and small series production. High concentricity and process reliability for universal application.

- for small series and single component manufacture
- tol. h9

from page 118

Deburring forks

Micro-precision deburring forks mechanically de-burr in one clamping set up. Valuable setting-up times and costs are saved. The operating principle of the deburring tool is based on the carbide's tension, thus the deburring fork does not require any moving mechanical components that as source of error may influence the process reliability.

- for de-burring hole entry and exit in one step
- manual re-working unnecessary

High performance reamers

WN | HR 500 S | H7 | HA | R | EU

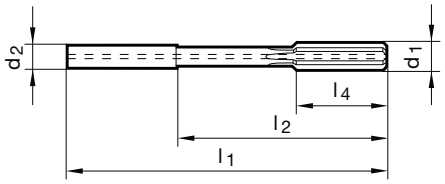
Tool material	**Solid carbide**
Surface	a
Drill type	
Form	

P	•
M	•
K	○
N	
S	○
H	63

with axial coolant duct • for clamping in hydraulic chucks or shrink fit chucks

GÜHRINGNAVIGATOR

Cutting data page 120



Article no. **1685**

d1	d2 h6	l1	l2	l4	Z	Code no.
mm	mm	mm	mm	mm		
2.000	4.000	50.000	22.000	8.000	4	2.000
2.500	4.000	50.000	22.000	8.000	4	2.500
3.000	4.000	68.000	40.000	12.000	4	3.000

High performance reamers

WN | HR 500 D | H7 | HA | R | EU

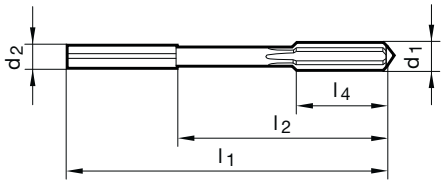
Tool material	**Solid carbide**
Surface	a
Drill type	
Form	

P	•
M	•
K	○
N	
S	○
H	63

< Ø 2.950 with axial, off-centre coolant ducts through the shank, ≥ Ø 2.950 with longitudinal flutes on the shank for coolant supply • for clamping in hydraulic chucks or shrink fit chucks

GÜHRINGNAVIGATOR

Cutting data page 120



Article no. **1686**

d1	d2 h6	l1	l2	l4	Z	Code no.
mm	mm	mm	mm	mm		
2.000	4.000	50.000	22.000	8.000	4	2.000
2.500	4.000	50.000	22.000	8.000	4	2.500
3.000	4.000	68.000	40.000	12.000	4	3.000

High performance reamers

WN | HR 500 S | +0,005 | HA | R | EU

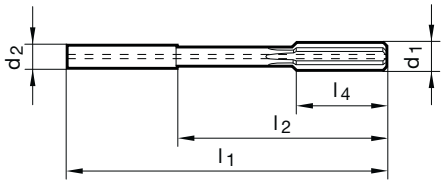
Tool material	Solid carbide
Surface	a
Drill type	
Form	

P	•
M	•
K	○
N	
S	○
H	63

with axial coolant duct • for clamping in hydraulic chucks or shrink fit chucks

GÜHRINGNAVIGATOR

Cutting data page 120



Article no. **1675**

d1	d2 h6	l1	l2	l4	Z	Code no.
mm	mm	mm	mm	mm		
1.970	4.000	50.000	22.000	8.000	4	1.970
1.980	4.000	50.000	22.000	8.000	4	1.980
1.990	4.000	50.000	22.000	8.000	4	1.990
2.000	4.000	50.000	22.000	8.000	4	2.000
2.010	4.000	50.000	22.000	8.000	4	2.010
2.020	4.000	50.000	22.000	8.000	4	2.020
2.030	4.000	50.000	22.000	8.000	4	2.030
2.970	4.000	68.000	40.000	12.000	4	2.970
2.980	4.000	68.000	40.000	12.000	4	2.980
2.990	4.000	68.000	40.000	12.000	4	2.990
3.000	4.000	68.000	40.000	12.000	4	3.000
3.010	4.000	68.000	40.000	12.000	4	3.010
3.020	4.000	68.000	40.000	12.000	4	3.020
3.030	4.000	68.000	40.000	12.000	4	3.030

High performance reamers

WN | HR 500 D | +0,005 | HA | R | EU

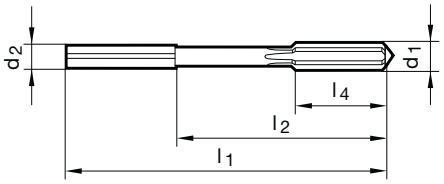
Tool material	Solid carbide
Surface	a
Drill type	
Form	

P	•
M	•
K	○
N	
S	○
H	63

< Ø 2.950 with axial, off-centre coolant ducts through the shank, ≥ Ø 2.950 with longitudinal flutes on the shank for coolant supply • for clamping in hydraulic chucks or shrink fit chucks

GÜHRING NAVIGATOR

Cutting data page 120



Article no. **1676**

d1	d2 h6	l1	l2	l4	Z	Code no.
mm	mm	mm	mm	mm		
1.970	4.000	50.000	22.000	8.000	4	1.970
1.980	4.000	50.000	22.000	8.000	4	1.980
1.990	4.000	50.000	22.000	8.000	4	1.990
2.000	4.000	50.000	22.000	8.000	4	2.000
2.010	4.000	50.000	22.000	8.000	4	2.010
2.020	4.000	50.000	22.000	8.000	4	2.020
2.030	4.000	50.000	22.000	8.000	4	2.030
2.970	4.000	68.000	40.000	12.000	4	2.970
2.980	4.000	68.000	40.000	12.000	4	2.980
2.990	4.000	68.000	40.000	12.000	4	2.990
3.000	4.000	68.000	40.000	12.000	4	3.000
3.010	4.000	68.000	40.000	12.000	4	3.010
3.020	4.000	68.000	40.000	12.000	4	3.020
3.030	4.000	68.000	40.000	12.000	4	3.030

NC machine reamers

WN | +0,004 +0,005 | HA | R | EU

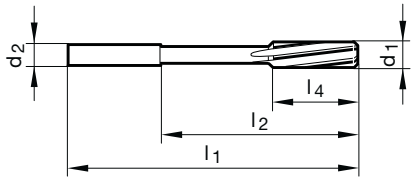
Tool material	**Solid carbide**
Surface	○
Drill type	
Form	B

P	•
M	○
K	•
N	•
S	•
H	52

manufacturing tolerance: ≤ Ø 5.50 mm: 0.000/+0.004 • > Ø 5.50 mm: 0.00/+0.005 • Ø > 3.75 mm with extremely unequal flute spacing

GÜHRINGNAVIGATOR

Cutting data page 120



Article no. **1427**

d1	d2	l1	l5	l6	Z	Code no.
mm	mm	mm	mm	mm		
0.980	4.000	50.000	22.000	6.000	3	0.980
0.990	4.000	50.000	22.000	6.000	3	0.990
1.000	4.000	50.000	22.000	6.000	3	1.000
1.010	4.000	50.000	22.000	6.000	3	1.010
1.020	4.000	50.000	22.000	6.000	3	1.020
1.030	4.000	50.000	22.000	9.000	3	1.030
1.480	4.000	50.000	22.000	9.000	3	1.480
1.490	4.000	50.000	22.000	9.000	3	1.490
1.500	4.000	50.000	22.000	9.000	3	1.500
1.510	4.000	50.000	22.000	9.000	3	1.510
1.520	4.000	50.000	22.000	9.000	3	1.520
1.530	4.000	50.000	22.000	9.000	3	1.530
1.980	4.000	50.000	22.000	12.000	4	1.980
1.990	4.000	50.000	22.000	12.000	4	1.990
2.000	4.000	50.000	22.000	12.000	4	2.000
2.010	4.000	50.000	22.000	12.000	4	2.010
2.020	4.000	50.000	22.000	12.000	4	2.020
2.030	4.000	50.000	22.000	12.000	4	2.030
2.480	4.000	60.000	32.000	16.000	4	2.480
2.490	4.000	60.000	32.000	16.000	4	2.490
2.500	4.000	60.000	32.000	16.000	4	2.500
2.510	4.000	60.000	32.000	16.000	4	2.510
2.520	4.000	60.000	32.000	16.000	4	2.520
2.530	4.000	60.000	32.000	16.000	4	2.530
2.970	4.000	64.000	36.000	17.000	6	2.970
2.980	4.000	64.000	36.000	17.000	6	2.980
2.990	4.000	64.000	36.000	17.000	6	2.990
3.000	4.000	64.000	36.000	17.000	6	3.000
3.010	4.000	64.000	36.000	17.000	6	3.010
3.020	4.000	64.000	36.000	17.000	6	3.020
3.030	4.000	64.000	36.000	17.000	6	3.030

Machine reamers

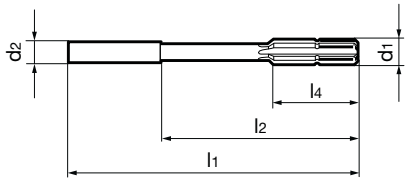
~DIN 8093 | H7 | Cyl | R | EU

P	1400
M	○
K	•
N	•
S	•
H	48

≥ Ø 3.0 mm with extrem unequal flute spacing • > Ø 9.50 mm: carbide inserts • ≤ Ø 9.50 mm: solid carbide • ≤ Ø 9.50 mm with external centres on both ends • > Ø 9.50 mm with internal centres on both ends • shank Ø < 10.0 mm tolerance h9, shank Ø ≥ 10,0 mm tolerance h6

GÜHRINGNAVIGATOR

Cutting data page 120



Tool material	Carbide	
Surface	◯	◯
Drill type		
Form	A	B
Article no.	**1408**	**1409**

d1	d2 h9	l1	l5	l6	Z	Code no.
mm	mm	mm	mm	mm		
1.000	1.000	34.000	15.000	5.500	3	1.000
1.200	1.200	38.000	16.500	7.500	3	1.200
1.400	1.400	40.000	18.000	8.000	3	1.400
1.500	1.500	40.000	18.000	8.000	3	1.500
1.600	1.600	43.000	20.000	9.000	3	1.600
1.800	1.800	46.000	22.000	10.000	4	1.800
2.000	2.000	49.000	24.000	11.000	4	2.000
2.200	2.200	53.000	25.000	12.000	4	2.200
2.500	2.500	57.000	29.000	14.000	4	2.500
2.800	2.800	61.000	33.000	15.000	4	2.800
3.000	3.000	61.000	33.000	15.000	6	3.000

NC machine reamers

DIN 212-3 | +0,004 +0,005 | HA | R | ≠

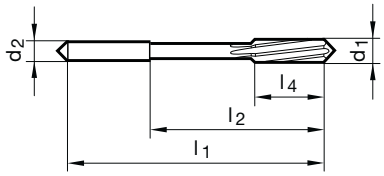
Tool material	HSS-E
Surface	○
Drill type	
Form	B

P	1000
M	○
K	•
N	•
S	•
H	

> Ø 3.75 mm with internal centres on both ends • ≤ Ø 3.75 mm with external centres on both ends • manufacturing tolerance: ≤ Ø 5.50 mm: 0.000/+0.004 • > Ø 5.50 mm: 0.00/+0.005

GÜHRINGNAVIGATOR

Cutting data page 120



Article no. **455**

d1	d2	l1	l5	l6	Z	Code no.
mm	mm	mm	mm	mm		
1.000	1.000	34.000	15.000	5.500	3	1.000
1.010	1.000	34.000	15.000	5.500	3	1.010
1.020	1.000	34.000	15.000	5.500	3	1.020
1.030	1.000	34.000	15.000	5.500	3	1.030
1.500	2.000	40.000	18.000	8.000	3	1.500
1.510	2.000	43.000	20.000	9.000	3	1.510
1.520	2.000	43.000	20.000	9.000	3	1.520
1.530	2.000	43.000	20.000	9.000	3	1.530
1.970	2.000	49.000	24.000	11.000	4	1.970
1.980	2.000	49.000	24.000	11.000	4	1.980
1.990	2.000	49.000	24.000	11.000	4	1.990
2.000	2.000	49.000	24.000	11.000	4	2.000
2.010	2.000	49.000	24.000	11.000	4	2.010
2.020	2.000	49.000	24.000	11.000	4	2.020
2.030	2.000	49.000	24.000	11.000	4	2.030
2.470	3.000	57.000	29.000	14.000	4	2.470
2.480	3.000	57.000	29.000	14.000	4	2.480
2.490	3.000	57.000	29.000	14.000	4	2.490
2.500	3.000	57.000	29.000	14.000	4	2.500
2.510	3.000	57.000	29.000	14.000	4	2.510
2.520	3.000	57.000	29.000	14.000	4	2.520
2.530	3.000	57.000	29.000	14.000	4	2.530
2.970	3.000	61.000	33.000	15.000	6	2.970
2.980	3.000	61.000	33.000	15.000	6	2.980
2.990	3.000	61.000	33.000	15.000	6	2.990
3.000	3.000	61.000	33.000	15.000	6	3.000
3.010	4.000	65.000	37.000	16.000	6	3.010
3.020	4.000	65.000	37.000	16.000	6	3.020
3.030	4.000	65.000	37.000	16.000	6	3.030

NC machine reamers

DIN 212-3 | H7 | HA | R | ≠

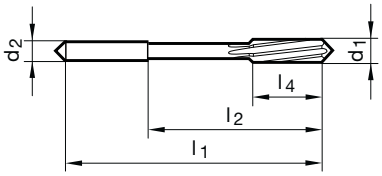
Tool material	HSS-E
Surface	○
Drill type	
Form	B

P	1000
M	○
K	•
N	•
S	•
H	

≤ Ø 3.75 mm with external centres on both ends • > Ø 3.75 mm with internal centres on both ends

GÜHRING NAVIGATOR

Cutting data page 120



Article no. **490**

d1	d2	l1	l5	l6	Z	Code no.
mm	mm	mm	mm	mm		
1.500	2.000	40.000	18.000	8.000	3	1.500
1.600	2.000	43.000	20.000	9.000	3	1.600
1.700	2.000	43.000	20.000	9.000	3	1.700
1.800	2.000	46.000	22.000	10.000	4	1.800
1.900	2.000	46.000	22.000	10.000	4	1.900
2.000	2.000	49.000	24.000	11.000	4	2.000
2.100	2.000	49.000	24.000	11.000	4	2.100
2.200	3.000	53.000	25.000	12.000	4	2.200
2.300	3.000	53.000	25.000	12.000	4	2.300
2.400	3.000	57.000	29.000	14.000	4	2.400
2.500	3.000	57.000	29.000	14.000	4	2.500
2.600	3.000	57.000	29.000	14.000	4	2.600
2.700	3.000	61.000	33.000	15.000	6	2.700
2.800	3.000	61.000	33.000	15.000	6	2.800
2.900	3.000	61.000	33.000	15.000	6	2.900
3.000	3.000	61.000	33.000	15.000	6	3.000

Machine reamers

DIN 212 | +0,004 +0,005 | Cyl | R | ≠

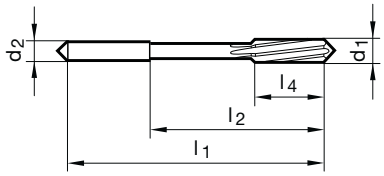
Tool material	HSS-E
Surface	○
Drill type	
Form	B

P	1000
M	○
K	•
N	•
S	•
H	

> Ø 3.75 mm with internal centres on both ends • ≤ Ø 3.75 mm with external centres on both ends • Ø in increments of 0.01 mm • manufacturing tolerance: • Ø 0.95 - 5.50 mm: 0.00/+0.004 • Ø 5.51 - 12.05 mm: 0.00/+0.005

GÜHRINGNAVIGATOR

Cutting data page 120



Article no. **496**

d1	d2	l1	l5	l6	Z	Code no.
mm	mm	mm	mm	mm		
0.950	1.000	34.000	15.000	5.500	3	0.950
0.960	1.000	34.000	15.000	5.500	3	0.960
0.970	1.000	34.000	15.000	5.500	3	0.970
0.980	1.000	34.000	15.000	5.500	3	0.980
0.990	1.000	34.000	15.000	5.500	3	0.990
1.000	1.000	34.000	15.000	5.500	3	1.000
1.010	1.000	34.000	15.000	5.500	3	1.010
1.020	1.000	34.000	15.000	5.500	3	1.020
1.030	1.000	34.000	15.000	5.500	3	1.030
1.040	1.000	34.000	15.000	5.500	3	1.040
1.050	1.000	34.000	15.000	5.500	3	1.050
1.060	1.000	34.000	15.000	5.500	3	1.060
1.070	1.100	36.000	15.500	6.500	3	1.070
1.080	1.100	36.000	15.500	6.500	3	1.080
1.090	1.100	36.000	15.500	6.500	3	1.090
1.100	1.100	36.000	15.500	6.500	3	1.100
1.110	1.100	36.000	15.500	6.500	3	1.110
1.120	1.100	36.000	15.500	6.500	3	1.120
1.130	1.100	36.000	15.500	6.500	3	1.130
1.140	1.100	36.000	15.500	6.500	3	1.140
1.150	1.100	36.000	15.500	6.500	3	1.150
1.160	1.100	36.000	15.500	6.500	3	1.160
1.170	1.100	36.000	15.500	6.500	3	1.170
1.180	1.100	36.000	15.500	6.500	3	1.180
1.190	1.200	38.000	16.500	7.500	3	1.190
1.200	1.200	38.000	16.500	7.500	3	1.200
1.210	1.200	38.000	16.500	7.500	3	1.210
1.220	1.200	38.000	16.500	7.500	3	1.220
1.230	1.200	38.000	16.500	7.500	3	1.230
1.240	1.200	38.000	16.500	7.500	3	1.240
1.250	1.200	38.000	16.500	7.500	3	1.250
1.260	1.200	38.000	16.500	7.500	3	1.260
1.270	1.200	38.000	16.500	7.500	3	1.270
1.280	1.200	38.000	16.500	7.500	3	1.280
1.290	1.200	38.000	16.500	7.500	3	1.290
1.300	1.200	38.000	16.500	7.500	3	1.300
1.310	1.200	38.000	16.500	7.500	3	1.310
1.320	1.200	38.000	16.500	7.500	3	1.320
1.330	1.400	40.000	18.000	8.000	3	1.330
1.340	1.400	40.000	18.000	8.000	3	1.340
1.350	1.400	40.000	18.000	8.000	3	1.350
1.360	1.400	40.000	18.000	8.000	3	1.360

d1	d2	l1	l5	l6	Z	Code no.
mm	mm	mm	mm	mm		
1.370	1.400	40.000	18.000	8.000	3	1.370
1.380	1.400	40.000	18.000	8.000	3	1.380
1.390	1.400	40.000	18.000	8.000	3	1.390
1.400	1.400	40.000	18.000	8.000	3	1.400
1.410	1.400	40.000	18.000	8.000	3	1.410
1.420	1.500	40.000	18.000	8.000	3	1.420
1.430	1.500	40.000	18.000	8.000	3	1.430
1.440	1.500	40.000	18.000	8.000	3	1.440
1.450	1.500	40.000	18.000	8.000	3	1.450
1.460	1.500	40.000	18.000	8.000	3	1.460
1.470	1.500	40.000	18.000	8.000	3	1.470
1.480	1.500	40.000	18.000	8.000	3	1.480
1.490	1.500	40.000	18.000	8.000	3	1.490
1.500	1.500	40.000	18.000	8.000	3	1.500
1.510	1.600	43.000	20.000	9.000	3	1.510
1.520	1.600	43.000	20.000	9.000	3	1.520
1.530	1.600	43.000	20.000	9.000	3	1.530
1.540	1.600	43.000	20.000	9.000	3	1.540
1.550	1.600	43.000	20.000	9.000	3	1.550
1.560	1.600	43.000	20.000	9.000	3	1.560
1.570	1.600	43.000	20.000	9.000	3	1.570
1.580	1.600	43.000	20.000	9.000	3	1.580
1.590	1.600	43.000	20.000	9.000	3	1.590
1.600	1.600	43.000	20.000	9.000	3	1.600
1.610	1.600	43.000	20.000	9.000	3	1.610
1.620	1.600	43.000	20.000	9.000	3	1.620
1.630	1.600	43.000	20.000	9.000	3	1.630
1.640	1.600	43.000	20.000	9.000	3	1.640
1.650	1.600	43.000	20.000	9.000	3	1.650
1.670	1.600	43.000	20.000	9.000	3	1.670
1.680	1.600	43.000	20.000	9.000	3	1.680
1.690	1.600	43.000	20.000	9.000	3	1.690
1.700	1.600	43.000	20.000	9.000	3	1.700
1.710	1.800	46.000	22.000	10.000	4	1.710
1.720	1.800	46.000	22.000	10.000	4	1.720
1.730	1.800	46.000	22.000	10.000	4	1.730
1.740	1.800	46.000	22.000	10.000	4	1.740
1.750	1.800	46.000	22.000	10.000	4	1.750
1.760	1.800	46.000	22.000	10.000	4	1.760
1.770	1.800	46.000	22.000	10.000	4	1.770
1.780	1.800	46.000	22.000	10.000	4	1.780
1.790	1.800	46.000	22.000	10.000	4	1.790
1.800	1.800	46.000	22.000	10.000	4	1.800
1.810	1.800	46.000	22.000	10.000	4	1.810
1.820	1.800	46.000	22.000	10.000	4	1.820
1.830	1.800	46.000	22.000	10.000	4	1.830
1.840	1.800	46.000	22.000	10.000	4	1.840
1.850	1.800	46.000	22.000	10.000	4	1.850
1.860	1.800	46.000	22.000	10.000	4	1.860
1.870	1.800	46.000	22.000	10.000	4	1.870
1.880	1.800	46.000	22.000	10.000	4	1.880
1.890	1.800	46.000	22.000	10.000	4	1.890
1.900	1.800	46.000	22.000	10.000	4	1.900
1.910	2.000	49.000	24.000	11.000	4	1.910
1.920	2.000	49.000	24.000	11.000	4	1.920
1.930	2.000	49.000	24.000	11.000	4	1.930
1.940	2.000	49.000	24.000	11.000	4	1.940
1.950	2.000	49.000	24.000	11.000	4	1.950
1.960	2.000	49.000	24.000	11.000	4	1.960
1.970	2.000	49.000	24.000	11.000	4	1.970
1.980	2.000	49.000	24.000	11.000	4	1.980
1.990	2.000	49.000	24.000	11.000	4	1.990
2.000	2.000	49.000	24.000	11.000	4	2.000
2.010	2.000	49.000	24.000	11.000	4	2.010
2.020	2.000	49.000	24.000	11.000	4	2.020
2.030	2.000	49.000	24.000	11.000	4	2.030
2.040	2.000	49.000	24.000	11.000	4	2.040
2.050	2.000	49.000	24.000	11.000	4	2.050
2.060	2.000	49.000	24.000	11.000	4	2.060
2.070	2.000	49.000	24.000	11.000	4	2.070
2.080	2.000	49.000	24.000	11.000	4	2.080
2.090	2.000	49.000	24.000	11.000	4	2.090

d1	d2	l1	l5	l6	Z	Code no.
mm	mm	mm	mm	mm		
2.100	2.000	49.000	24.000	11.000	4	2.100
2.110	2.000	49.000	24.000	11.000	4	2.110
2.120	2.000	49.000	24.000	11.000	4	2.120
2.130	2.200	53.000	25.000	12.000	4	2.130
2.140	2.200	53.000	25.000	12.000	4	2.140
2.150	2.200	53.000	25.000	12.000	4	2.150
2.160	2.200	53.000	25.000	12.000	4	2.160
2.170	2.200	53.000	25.000	12.000	4	2.170
2.180	2.200	53.000	25.000	12.000	4	2.180
2.190	2.200	53.000	25.000	12.000	4	2.190
2.200	2.200	53.000	25.000	12.000	4	2.200
2.210	2.200	53.000	25.000	12.000	4	2.210
2.220	2.200	53.000	25.000	12.000	4	2.220
2.230	2.200	53.000	25.000	12.000	4	2.230
2.240	2.200	53.000	25.000	12.000	4	2.240
2.250	2.200	53.000	25.000	12.000	4	2.250
2.260	2.200	53.000	25.000	12.000	4	2.260
2.270	2.200	53.000	25.000	12.000	4	2.270
2.280	2.200	53.000	25.000	12.000	4	2.280
2.290	2.200	53.000	25.000	12.000	4	2.290
2.300	2.200	53.000	25.000	12.000	4	2.300
2.310	2.200	53.000	25.000	12.000	4	2.310
2.320	2.200	53.000	25.000	12.000	4	2.320
2.330	2.200	53.000	25.000	12.000	4	2.330
2.340	2.200	53.000	25.000	12.000	4	2.340
2.350	2.200	53.000	25.000	12.000	4	2.350
2.360	2.200	53.000	25.000	12.000	4	2.360
2.370	2.500	57.000	29.000	14.000	4	2.370
2.380	2.500	57.000	29.000	14.000	4	2.380
2.390	2.500	57.000	29.000	14.000	4	2.390
2.400	2.500	57.000	29.000	14.000	4	2.400
2.410	2.500	57.000	29.000	14.000	4	2.410
2.420	2.500	57.000	29.000	14.000	4	2.420
2.430	2.500	57.000	29.000	14.000	4	2.430
2.440	2.500	57.000	29.000	14.000	4	2.440
2.450	2.500	57.000	29.000	14.000	4	2.450
2.460	2.500	57.000	29.000	14.000	4	2.460
2.470	2.500	57.000	29.000	14.000	4	2.470
2.480	2.500	57.000	29.000	14.000	4	2.480
2.490	2.500	57.000	29.000	14.000	4	2.490
2.500	2.500	57.000	29.000	14.000	4	2.500
2.510	2.500	57.000	29.000	14.000	4	2.510
2.520	2.500	57.000	29.000	14.000	4	2.520
2.530	2.500	57.000	29.000	14.000	4	2.530
2.540	2.500	57.000	29.000	14.000	4	2.540
2.550	2.500	57.000	29.000	14.000	4	2.550
2.560	2.500	57.000	29.000	14.000	4	2.560
2.580	2.500	57.000	29.000	14.000	4	2.580
2.590	2.500	57.000	29.000	14.000	4	2.590
2.600	2.500	57.000	29.000	14.000	4	2.600
2.610	2.500	57.000	29.000	14.000	4	2.610
2.620	2.500	57.000	29.000	14.000	4	2.620
2.630	2.500	57.000	29.000	14.000	4	2.630
2.640	2.500	57.000	29.000	14.000	4	2.640
2.650	2.500	57.000	29.000	14.000	4	2.650
2.660	2.800	61.000	33.000	15.000	6	2.660
2.670	2.800	61.000	33.000	15.000	6	2.670
2.680	2.800	61.000	33.000	15.000	6	2.680
2.690	2.800	61.000	33.000	15.000	6	2.690
2.700	2.800	61.000	33.000	15.000	6	2.700
2.710	2.800	61.000	33.000	15.000	6	2.710
2.720	2.800	61.000	33.000	15.000	6	2.720
2.730	2.800	61.000	33.000	15.000	6	2.730
2.740	2.800	61.000	33.000	15.000	6	2.740
2.750	2.800	61.000	33.000	15.000	6	2.750
2.760	2.800	61.000	33.000	15.000	6	2.760
2.770	2.800	61.000	33.000	15.000	6	2.770
2.780	2.800	61.000	33.000	15.000	6	2.780
2.790	2.800	61.000	33.000	15.000	6	2.790
2.800	2.800	61.000	33.000	15.000	6	2.800
2.810	3.000	61.000	33.000	15.000	6	2.810
2.820	3.000	61.000	33.000	15.000	6	2.820

d1	d2	l1	l5	l6	Z	Code no.
mm	mm	mm	mm	mm		
2.830	3.000	61.000	33.000	15.000	6	2.830
2.840	3.000	61.000	33.000	15.000	6	2.840
2.850	3.000	61.000	33.000	15.000	6	2.850
2.860	3.000	61.000	33.000	15.000	6	2.860
2.870	3.000	61.000	33.000	15.000	6	2.870
2.880	3.000	61.000	33.000	15.000	6	2.880
2.890	3.000	61.000	33.000	15.000	6	2.890
2.900	3.000	61.000	33.000	15.000	6	2.900
2.910	3.000	61.000	33.000	15.000	6	2.910
2.920	3.000	61.000	33.000	15.000	6	2.920
2.930	3.000	61.000	33.000	15.000	6	2.930
2.940	3.000	61.000	33.000	15.000	6	2.940
2.950	3.000	61.000	33.000	15.000	6	2.950
2.960	3.000	61.000	33.000	15.000	6	2.960
2.970	3.000	61.000	33.000	15.000	6	2.970
2.980	3.000	61.000	33.000	15.000	6	2.980
2.990	3.000	61.000	33.000	15.000	6	2.990
3.000	3.000	61.000	33.000	15.000	6	3.000
3.010	3.200	65.000	37.000	16.000	6	3.010
3.020	3.200	65.000	37.000	16.000	6	3.020
3.030	3.200	65.000	37.000	16.000	6	3.030

Deburring forks

WN | EW 100 G | Cyl | R

Tool material	**Solid carbide**
Surface	◯

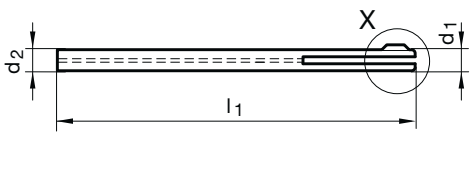
P	•
M	•
K	•
N	○
S	○
H	○

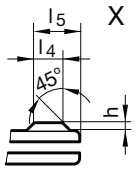
with internal coolant supply • for holding in collet chucks

internal and external de-burring • universal for tooling, milling, turning and robotic applications

GÜHRINGNAVIGATOR

Cutting data page 120





Article no. **4100**

d1	d2	Ø-range	l1	l4	l5	h1	Code no.
mm	mm		mm	mm	mm	mm	
2.000	1.900	1.91 -2.15	80.000	1.000	2.050	0.350	2.000
2.250	2.100	2.16 -2.40	80.000	1.500	2.600	0.400	2.250
2.500	2.400	2.41 -2.70	80.000	1.500	2.900	0.400	2.500
2.750	2.600	2.71 -2.90	90.000	1.500	2.950	0.450	2.750
3.000	2.900	2.91 -3.25	90.000	2.000	3.650	0.450	3.000

Deburring forks

WN | EW 100 G | HA | R

Tool material	**Solid carbide**
Surface	◯

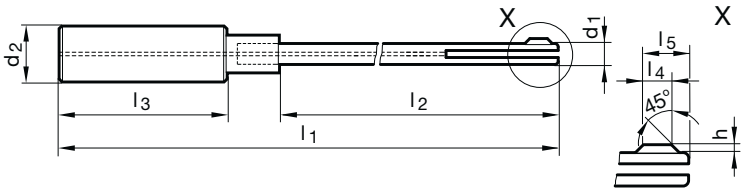
P	•
M	•
K	•
N	○
S	○
H	○

for clamping in hydraulic and shrink fit chucks • with shank to DIN 6535 • with internal coolant supply

internal and external de-burring • universal for tooling, milling, turning and robotic applications

GÜHRINGNAVIGATOR

Cutting data page 120



Article no. **4101**

d1	d1	Ø-range	d2	l1	l2	l3	l4	l5	h1	Code no.
mm	mm		mm	mm	mm	mm	mm	mm	mm	
2.000	1.900	1.91 -2.15	6.000	120.000	69.000	36.000	1.000	2.050	0.350	2.000
2.250	2.100	2.16 -2.40	6.000	120.000	69.000	36.000	1.500	2.600	0.400	2.250
2.500	2.400	2.41 -2.70	6.000	120.000	69.000	36.000	1.500	2.900	0.400	2.500
2.750	2.600	2.71 -2.90	6.000	130.000	79.000	36.000	1.500	2.950	0.450	2.750
3.000	2.900	2.91 -3.25	6.000	130.000	79.000	36.000	2.000	3.650	0.450	3.000

GÜHRINGNAVIGATOR

Tools with **bold** feed column no. are preferred choice.
To select the optimal tool and the recommended machining parameters for your application, please also use the electronic version of the GuhringNavigator on the internet: www.guehring.de.

Article no.
Standard/DIN
Tool material
Surface finish
Tyep/Form
Cooling

Tools with bold feed column no. are preferred choice.

Reamer Ø mm	Feed column no.						
	71	**72**	**73**	**74**	**75**	**76**	**77**
	f (mm/rev.)						
1.00	0.030	0.050	0.070	0.090	0.120	0.160	0.200
2.00	0.050	0.070	0.090	0.120	0.200	0.300	0.400
3.00	0.080	0.100	0.125	0.20	0.300	0.600	0.800
4.00	0.100	0.125	0.160	0.300	0.500	1.000	1.200
5.00	0.100	0.125	0.160	0.400	0.600	1.000	1.400
6.30	0.125	0.160	0.200	0.400	0.700	1.200	1.600
8.00	0.160	0.200	0.250	0.600	1.000	1.800	2.400

Coolant:
○ Air
● Neat oil
◍ Soluble oil

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tensile strength N/mm²	Hardness	Coolant
Common structural steels	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Unalloyed heat-treatable steels	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Alloyed heat-treatable steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Unalloyed case hard. steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Alloyed case hardened steels	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Nitriding steels	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Hardened steels	–		≤48 HRC	●
			≤66 HRC	●
Stainless steels, sulphured	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitic	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitic	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Cast iron	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Spheroidal graphite iron and	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	◍
malleable cast iron	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	◍
Chilled cast iron	–		≤350 HB	◍
New cast materials GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
New cast materials ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Al cast alloys ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Copper, low-alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Brass, short-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
long-chipping	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100		◍ ○
Kevlar	Kevlar	≤1000		○
Glass, carbon concentr. plastics	GFK/CFK	≤1000		○

High performance reamers		NC reamers	Machine reamers		NC reamers		Machine reamers
1685/1675	1686/1676	1427	1408	1409	455	490	496
WN	WN	WN	~ 8093	~ 8093	212-3	212-3	212
Sol. carbide	Sol. carbide	Sol. carbide	Carbide	Carbide	HSS-E	HSS-E	HSS-E
a	a	○	○	○	○	○	○
HR 500 S	HR 500 D	B	A	B	B	B	B
axial	axial	-	-	-	-	-	-





v_c m/min	Feed column no.		v_c m/min	Feed column no.	v_c m/min	Feed column no.		v_c m/min	Feed column no.		v_c m/min	Feed column no.
120-250	75-76	75-76	18	72	18	72	72	16	72	72	16	72
120-250	75-76	75-76	16	72	16	72	72	12	72	72	12	72
120-250	75-76	75-76	18	72	18	72	72	12	72	72	12	72
120-250	75-76	75-76	16	72	16	72	72	10	71	71	10	71
120-250	75-76	75-76	18	71	18	71	71	14	72	72	14	72
120-250	75-76	75-76	16	72	16	72	72	12	71	71	12	71
120-250	75-76	75-76	14	71	14	71	71	10	71	71	10	71
120-250	75-76	75-76	14	71	14	71	71	10	71	71	10	71
120-250	75-76	75-76	12	71	12	71	71	8	71	71	8	71
120-250	75-76	75-76	18	71	18	71	71	16	72	72	16	72
120-250	75-76	75-76	14	71	14	71	71	10	71	71	10	71
120-250	75-76	75-76	12	71	12	71	71	8	71	71	8	71
120-250	75-76	75-76	14	71	14	71	71	10	71	71	10	71
120-250	75-76	75-76	12	71	12	71	71	8	71	71	8	71
120-250	75-76	75-76	12	71	12	71	71	14	72	72	14	72
120-250	75-76	75-76	10	71	10	71	71	10	71	71	10	71
60-120	75-76	75-76	10	71	10	71	71	10	71	71	10	71
30-60	73-74	73-74										
40-60	73-74	73-74	6	71								
15-60	73-74	73-74										
60-120	74-75	74-75	8	71	8	71	71	6	72	72	6	72
40-80	74-75	74-75	6	71	6	71	71	6	72	72	6	72
60-120	74-75	74-75	6	71	6	71	71	4	72	72	4	72
60-140	75-76	75-76	20	71	20	71	71	14	71	71	14	71
60-140	75-76	75-76	18	71	18	71	71	12	71	71	12	71
120-250	74-75	74-75	20	71	20	71	71	12	71	71	12	71
60-120	74-75	74-75	18	71	18	71	71	10	71	71	10	71
30-50	74-75	74-75										
120	75-76	75-76	16	71	16	71	71	8	71	71	8	71
80	75-76	75-76	16	71	16	71	71	8	71	71	8	71
120	75-76	75-76	12	71	12	71	71	8	71	71	8	71
80	75-76	75-76	12	71	12	71	71					
40-60	74-75	74-75	6	71	6	71	71	4	71	71	4	71
40-60	74	74	10	71	10	71	71	6	71	71	6	71
40-60	74	74	10	71	10	71	71	4	71	71	4	71
			30	73	30	73	73	18	73	73	18	73
			30	73	30	73	73	18	73	73	18	73
			40	72	40	72	72	20	72	72	20	72
			30	72	30	72	72	18	72	72	18	72
80-160	75-76	75-76	25	72	25	72	72	20	72	72	20	72
			25	72	25	72	72	18	72	72	18	72
100-250	75-76	75-76	35	72	35	72	72	18	72	72	18	72
			30	72	30	72	72	16	72	72	16	72
100-250	75-76	75-76	35	72	35	72	72	20	72	72	20	72
100-250	75-76	75-76	30	72	30	72	72	18	72	72	18	72
			30	72	30	72	72	18	72	72	18	72
			25	72	25	72	72	14	72	72	14	72
80-200	75-76	75-76	20	73	20	73	73	12	73	73	12	73
80-200	75-76	75-76	20	73	20	73	73	14	73	73	14	73
80	71	71										
80	71	71										

ISO code

P	Steel, high-alloyed steel
M	Stainless steel Stainless
K	Grey cast iron, spher, graphite/mall. 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

Coatings

- bright
- steam tempered
- nitrided lands
- A TiAlN
- A TiAlN SuperA
- C TiCN
- S TiN
- S Sirius
- Y Signum
- F FIRE/nano FIRE
- a TiAlN nanoA

Pictograms

Tool material

High-speed steel — Solid carbide finest grain (HM-UF)

Cutting depth

Ø-tolerance

Shank form

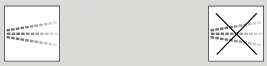
to DIN 6535 — Cylindrical

Standard

to DIN — to Guhring standard

Type

Internal cooling



with Internal cooling — without Internal cooling

Cutting direction

right

Hole type

Trough hole — Blind hole — Through/blind hole

Form

Application

Slotting — Roughing — Ramping — Helix — Drilling — Finishing — Copying

Length

short (DIIN) — long (DIN) — extra length

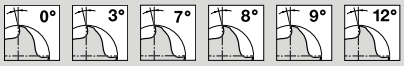
No. of cutting edges

no. of major cutting edges

Helix angle

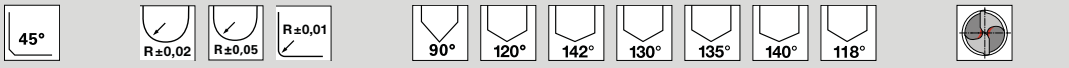
Size of helix angle / no. of different helix angles — straight-fluted — left-hand helix

Rake angle



Rake angle of circumference cutting edges

Cutting edge form



Corner chamfer — Radius with tolerance — Point angle — Web thinning

Feed

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

Hardness

Spacing

unequal — extremely unequal

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