



**SOLID CARBIDE
MICRO-PRECISION DRILLS**
Specialists for universal
high-performance machining

- without internal cooling from nominal diameter
0.8 mm for drilling depths up to 4xD and 7xD
- with internal cooling from nominal diameter
1.4 mm for drilling depths up to 8xD and 15xD

NEW
now with IC for 8xD
and 15xD

EXCLUSIVELINE®

Made by Guhring

Solid carbide micro-precision drills Technical data and advantages

Optimal tool design down to the smallest detail

The production of the smallest holes requires highest accuracy. Solid carbide micro-precision drills of Guhring's ExclusiveLine are designed to optimally satisfy these requirements.

They enable high-performance machining in the majority of materials. The 4 facet point grind with honed cutting edges offer high cutting rates and optimal chip breaking. The special flute profile provides problem free swarf evacuation from the hole.

Additional specifications are the reinforced shank for improved tool clamping and the SuperA-coating, which is especially designed for demanding applications like the machining of hardened steels or HSC.

Micro-precision drills with internal cooling are available with spiral coolant ducts thanks to the company's own carbide technology.

Small but mighty - with and without internal cooling

Solid carbide micro-precision drills without internal cooling for drilling depths up to 4xD and 7xD are available in the diameter range from 0.8 to 3.0 mm.

Holes up to 8xD and 15xD are the domain of solid carbide micro-precision drills with internal cooling. Thanks to the optimised tool geometry, pecking is not required for holes up to 15xD with Guhring's solid carbide micro-precision drills.

The tool design makes the solid carbide micro-precision drill up to 4xD without internal cooling optimally suitable as a pilot drill for the 15xD micro-precision drill with internal cooling.



NEW
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and 15xD

Machining examples of solid carbide micro-precision drills 8xD and 15xD with IC

Guhring no.	6408	6408	6412	6412
Diameter	1.4 mm	2.5 mm	2.5 mm	2.1 mm
Coating	SuperA	SuperA	SuperA	SuperA
Material group	cast iron	alloyed case hardened steel	alloyed heat-treatable steel	stainless steel
Material description	GG25	16MnCr5	42CrMo4	X6CrNiTi18 10
Drill. depth [mm]	8xD	8xD	15xD	15xD
Hole type	blind hole	blind hole	blind hole	blind hole
Cooling	IC 80 bar	IC 80 bar	IC 80 bar	IC 80 bar
Coolant	soluble oil	soluble oil	soluble oil	soluble oil
Machine type	machining centre	machining centre	machining centre	machining centre
v_c [mm/min]	80	120	100	60
f [mm/rev.]	0.1	0.14	0.1	0.03
Tool life [m]	150	110	60	60

Solid carbide Micro-precision drills Special tools

Superior in every sense

ExclusiveLine micro-precision drills have proven their exceptional performance capabilities in various volume applications and tool life tests. The tables below document a few application examples with convincing results.

For special applications: Special solutions to customer requirements

In addition to spiral-fluted standard micro-precision drills without internal cooling from 0.8 mm nominal diameter for drilling depths up to 4xD and 7xD as well as from 1.4 mm nominal diameter with internal cooling for up to 8xD and 15xD, Guhring also provides special tools as part of the ExclusiveLine range.

Including:

- intermediate sizes for the standard range
- stepped tools for multi-diameter holes or countersunk holes
- special lengths up to 30xD drilling depth
- other shank forms
- alternative coatings

A questionnaire for special tools can be found at the end of this brochure.



Internal cooling increases tool life considerably!

A comparison between a conventional micro-precision drill w/o internal cooling for holes up to 7xD and a 8xD drill with

internal cooling 6408 demonstrates the advantages of internal cooling: Tool life increases considerably.

Guhring no.	Competitor without internal cooling	6408 with internal cooling
Diameter	2.6 mm	2.6 mm
Coating	TiAlN	SuperA
Material group	stainless steel	stainless steel
Material description	105CrMo17	105CrMo17
Drill. depth [mm]	7xD	8xD
Hole type	blind hole	blind hole
Cooling	external	internal 100 bar
Coolant	neat oil	neat oil
Machine type	machining centre	machining centre
v_c [mm/min]	53	53
f [mm/rev.]	0.08	0.06
Tool life	100 workpieces	500 workpieces, end of tool life not reached!

Solid carbide micro-precision drills 8 x D with internal cooling Technical data and dimensions

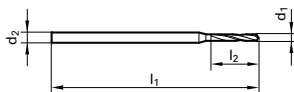
Tool material	Solid carbide
Surface finish	Super A
Cooling	■
Discount group	164
Guhring no.	6408

DIN	Guhring std.
Shank design	reinforced
Shank tol.	h6
Type	N

Product information

- drilling depth ~ 8 x D
- right-hand cutting
- 2-facet point grind
- 135° point angle
- special flute form
- Ø tolerance h7

NEW
now with IC for 8xD
and 15xD



d_1	d_2	l_1	l_2	Availability
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	●
2.350	4.000	62.000	26.000	●
2.380	4.000	62.000	26.000	●
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	●

Solid carbide micro-precision drills Application recommendations

Tools with bold feed column no. are preferred choice.

General hints:

No play in spindle bearings,
alignment accurate tool holders.
We recommend the application of
hydraulic chucks or shrink fit chucks.

Cooling hints:

We recommend lubrication by
soluble oil or neat oil, coolant
pressure min. 40 bar.

NEW
now with IC for 8xD
and 15xD

☒ with external cooling

■ with internal cooling

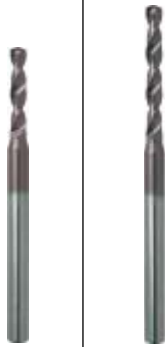
drill-Ø mm	Feed column no.												
	56	57	58	59	60	61	62	63	64	65	66	67	68
	f (mm/rev.)												
0.80	0.008	0.016	0.024	0.032	0.04	0.05	0.06	0.07	0.08	0.08	0.08	0.09	0.09
1.00	0.012	0.022	0.032	0.042	0.06	0.07	0.08	0.09	0.10	0.10	0.11	0.11	0.12
1.50	0.021	0.036	0.051	0.066	0.09	0.10	0.12	0.13	0.15	0.15	0.16	0.17	0.18
2.00	0.032	0.052	0.072	0.092	0.12	0.14	0.16	0.18	0.20	0.21	0.22	0.23	0.24
2.50	0.045	0.070	0.095	0.120	0.15	0.17	0.20	0.22	0.25	0.26	0.27	0.28	0.30
3.00	0.060	0.090	0.120	0.150	0.18	0.21	0.24	0.27	0.30	0.31	0.33	0.34	0.36



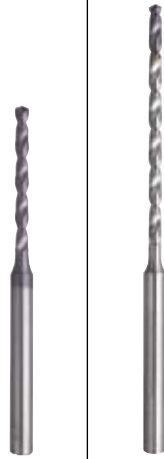
All drilling tools from 8xD must be guided during spot drilling. They must never operate at full speed without support in the machine shop

Material group	Material examples, new description (old description in brackets) <i>Figures in bold = material no. to DIN EN</i>	Tensile strength Hardness MPa (N/mm ²)
Common structural steels	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 >500-850
Free-cutting steels	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 850-1000
Unalloyed heat-treatable steels	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤ 700 700-850 850-1000
Alloyed heat-treatable steels	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	850 ≤1000 1000-1200
Unalloyed case hardened steels	1.0301 (C10), 1.1121 C10E (Ck10)	≤750
Alloyed case hardened steels	1.7043 38Cr4 1.5752 15NiCr13 (15NiCr13), 1.7131 16MnCr5, 1.7264 20CrMo5	850 ≤1000 1000-1200
Nitriding steels	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≥850 ≤1000 >1000-1200
Tool steels	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 >850-1000
High speed steels	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≥650-1000
Spring steels	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)	≤330 HB
Stainless steels, sulphured austenitic martensitic	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A) 1.4057 X20CrNi 17 2 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤850 ≤850 ≤850
Hardened steels	-	≤40-48 HRC >48-60 HRC
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200
Cast iron	0.6010 EN-GJL-100(GG10), 0.6020 EN-GJL-200(GG20) 0.6025 EN-GJL-250(GG25), 0.6035 EN-GJL-350(GG35)	≤240 HB <300 HB
Spheroidal graphite iron and malleable cast iron	0.7050 EN-GJS-500-7(GGG50), 0.8035 EN-GJMW-350-4(GTW35) 0.7070 EN-GJS-700-2(GGG70), 0.8170 EN-GJMB-700-2(GTS70)	≤240 HB <300 HB
Chilled cast iron	-	≤350 HB
Ti and Ti-alloys	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, -TiAl8Mo1V1	≤850 >850-1200
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	≤450
Al cast alloys ≤ 10 % Si > 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600
Magnesium alloys	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤450
Copper, low-alloyed	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤400
Brass, short-chipping long-chipping	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600 ≤600
Bronze, short-chipping	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 >600-850
Bronze, long-chipping	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 >850-1000
Duroplastics Thermoplastics	Bakelite, Resopal, Pertinax, Moltopren Plexiglass, Hostalen, Novodur, Makralon	- -
Kevlar	Kevlar	-
Glass, carbon concentrated plastics	GRT/CRP	-

Tool material	Solid carbide	
Surface finish	Super A	
Cooling	☒	
Drilling depth	~ 4 x D	~ 7 x D
Guhring no.	6400	6401



Tool material	Solid carbide	
Surface finish	Super A	
Cooling	☐	
Drilling depth	~ 8 x D	~ 15 x D
Guhring no.	6408	6412

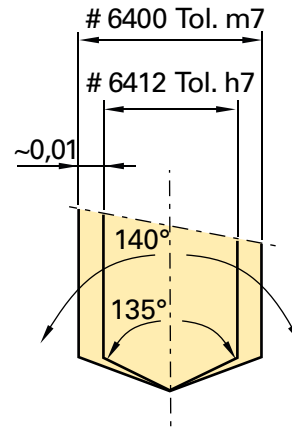


V _c m/min	Feed column no.	
90-120	64	62
90-110	64	62
90-120	64	62
80-100	63	61
80-110	64	62
80-110	64	62
80-100	63	61
80-100	63	61
60-80	62	60
90-110	63	61
70-100	63	61
60-80	62	60
60-80	62	60
50-70	62	60
40-60	62	60
40-60	62	60
40-60	57	57
40-60	57	57
30	57	57
15	56	56
30	57	57
10	56	56
<150	68	66
<140	68	66
<140	68	66
<130	67	65
15	56	56
15	56	56
60-80	68	68
60-80	68	68
120-150	59	59
120-150	59	59

V _c m/min	Feed column no.	
90-120	58	58
90-110	58	58
90-120	59	59
80-100	59	59
80-110	58	58
80-110	58	58
80-100	58	58
80-100	58	58
60-80	58	58
90-110	57	57
70-100	58	58
60-80	58	58
60-80	57	57
50-70	57	57
40-60	58	58
40-60	58	58
40-60	57	57
40-60	57	57
60-80	57	57
60	56	56
60-80	57	57
25	56	56
<150	60	60
<140	60	60
<140	60	60
<130	60	60
35	56	56
35	56	56
60-80	68	68
60-80	68	68
120-150	59	59
120-150	59	59

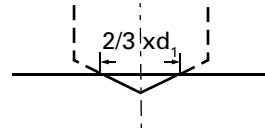
Pilot drilling

For the application of solid carbide micro-precision drills 15xD we recommend a pilot hole 1xD up to 2xD depth. For this pilot hole, the solid carbide micro-precision drill 4xD is optimally suitable. Its point angle and its diameter tolerance are perfectly adapted.



Centering

In order to achieve full performance with solid carbide micro-precision drills from 8xD drilling depth, we recommend centering. The ExclusiveLine solid carbide micro-precision drill up to 4xD, Guhring no. 6400, can be applied for this purpose. The centering diameter should be approximately 2/3xD.



Filter quality

When applying solid carbide micro-precision drills we recommend constant monitoring of the lubricant's filter quality due to the extremely small coolant duct diameters, for example with our check instrument CC 3000.



Solid carbide micro-precision drills - special tools questionnaire

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Order **Inquiry**

Name/customer no. if available New customer

Street no.

Telephone

Date

Contact for queries

Order no.

Town/post code

Fax

Signature

Quantity	<input type="text"/>
Dimensions	<p> $d_3 \text{ h}6 =$ <input type="text"/> $l_1 =$ <input type="text"/> $l_2 =$ <input type="text"/> $d_1 =$ <input type="text"/> $\Delta 1 =$ <input type="text"/> ° Tol <input type="checkbox"/> h7 <input type="checkbox"/> m7 </p>
Step	<p> $d_2 =$ <input type="text"/> $l_3 =$ <input type="text"/> $d_1 =$ <input type="text"/> $\Delta 2 =$ <input type="text"/> ° Tol <input type="checkbox"/> h7 <input type="checkbox"/> m7 </p>
Machining	<input type="checkbox"/> Step hole <input type="checkbox"/> Drilling and countersinking
Shank form	<input type="checkbox"/> HA <input type="checkbox"/> HE
Internal cooling	<input type="checkbox"/> Yes <input type="checkbox"/> No
Coating	<input type="checkbox"/> bright <input type="checkbox"/> SuperA

High-tech tools for especially demanding machining tasks

RT 100 R - The specialist for the machining of cast materials

Specialist for the machining of cast materials with patented radius point geometry. Especially suitable for CGI and ADI. Available as standard drills for drilling depths 5xD and 7xD with internal cooling and FIRE-coating in the ExclusiveLine range.

We also produce RT 100 R with steps and in intermediate sizes according to your requirements as special solutions.

RT 100 T - For deep holes in steels

RT 100 T spiral-flute extra length drills provide highest economic efficiency for the production of deep holes up to 30xD in steels. In the standard range they are available in the diameter range from 3 to maximum 14 mm for the drilling depths 20xD, 25xD and 30xD.

Intermediate sizes up to 30xD or maximum 400 mm total length as well as designs optimised for MQL machining are available as special solutions.

HR 500 - Reaming higher than cermet performance level

Solid carbide HPC reamers provide cermet performance level but without the disadvantages of cermet. HR 500 D are designed for through holes whilst HR 500 S are available for blind holes both included in Guhring's ExclusiveLine range. They enable first machining of nearly all materials from soft steels up to high tensile alloy steels at the highest possible cutting rates - often in conditions where interrupted cutting or lack of rigidity is present.

In addition to the standard range from 4 to 20 mm diameter, we produce intermediate sizes of HR 500 D and HR 500 S solid carbide HPC reamers as special tools on request.



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EXCLUSIVELINE®

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