GUHRING

The Tool Company

2010 Full-Line Drill Catalog

2010 Full-Line Drill Catalog

GUHRING

Dear customer,

Optimal customer benefit is the mission statement of our corporate strategy. More than 4,500 employees are globally located to successfully implement this strategy. All employees are committed to ensuring total customer satisfaction and, therefore, making Guhring one of the world's leading suppliers of rotary cutting tools. The strategic direction of our company is based upon the following strengths:

Manufacturing competence
With our own carbide production, coating technology, machine and equipment divisions as well as development departments for the core competences, we have direct influence over the essential parameters for the efficiency of the tool: material, geometry and coating.

Product know-how
More than a century of knowledge and experience regarding tool manufacturing, combined with our R&D center's innovative strength, leads to a consistent flow of new, trend-setting tooling solultions and the optimization of existing technologies. In excess of 130 application technicians and product managers provide their know-how and support with the aim of increasing customer productivity.

Dietmar Pfränger
Production and Technical Director

Dr. Jörg Gühring
President, Research and Development

Tool Division

Diversity is our strength. There is no other competitor who produces an equally large range of cutting tools, especially in carbide. We naturally also produce tools in high speed steel and in the high-tech tool materials cermet, PCD/CBN and ceramic. Along with the standard product offering, with currently more than 1,650 tool types and 44,000 products, we also provide special solutions for specific customer applications on request. Additionally, we always take into account current machining trends with tooling solutions for the machining of new materials or for new machining technologies.

Service Division

For customers to optimally utilize the potential of their Guhring tools, we provide a comprehensive service package such as re-grinding and re-coating with original Guhring geometries and coatings returning the original efficiency to the refurbished tools.

TMS, our tool management service, incorporates process planning, logistics, tool application, tool maintenance as well as process optimization; and is specifically aimed at allowing the customer to concentrate on his core business tasks.

Oliver Gühring
Sales and Marketing Director

Bernd Schatz
Financial and Commercial Director

Innovation proficiency
Guhring has always stood for tool technology innovations from which numerous standards have been established, such as TiN coating which we were the first tooling manufacturer to apply to drills in 1980. The HSK tool system and the patented radius point geometry used for machining CGI and ADI are other examples. Currently, our MQL systems as well as the unique adjustment and setting for multi-fluted, two-step PCD/CBN tools are establishing new benchmarks in tool technology.

Global service
Guhring is represented in close proximity to their customers with 26 production plants, 36 service centers, 43 sales companies and numerous marketing partners globally. Thanks to this comprehensive network we can ensure your tool supply. World-wide homogeneous standards ensure that you can always rely on the same high level of Guhring quality anywhere in the world.

We are privileged to continue to convince our customers through our efficiency!

Dr. Jörg Gühring

Carbide Division

Guhring's carbide development and production makes it possible to provide tools in application optimized tool materials and, therefore, immediately perform with success to new machining trends as well as materials. Customers benefit directly from the associated technology and cost advantages. Our carbide division and its annual carbide production of approximately 2,000 tons makes Guhring of the largest carbide producers worldwide. Gaining importance are the production and sales of special products for applications outside the rotary cutting tool industry.

Machine and equipment division

To ensure the geometries, tool materials and coatings are converted into precision tools of the highest quality with an optimal cost-efficiency, Guhring's machine and equipment division designs and produces the most important manufacturing equipment for our tool production. This includes state-of-the-art grinding and coating systems as well as precision measuring instruments. In addition, the machine and equipment division also designs and produces TM vending machines for the service division to specific customer requirements.


Factory Albstadt I


Factory Albstadt II


Precision Tools Production, Berlin


Factory Mindelheim


Factory Sigmaringen-Laiz


Factory Brazil

Production Plants

Germany

Albstadt I
Albstadt II
Berlin/Präzisionswerkzeuge
Berlin/Hartstoffe
Geislingen
Markt Erlbach
Mindelheim
Sigmaringen-Laiz

World-Wide

Australia
Brazil
China
Czech Republic
Great Britain
India
Ireland
Italy
Japan
Korea
Mexico
Poland
Rumania
Taiwan
USA – Brookfield
USA – New Hudson
Vietnam

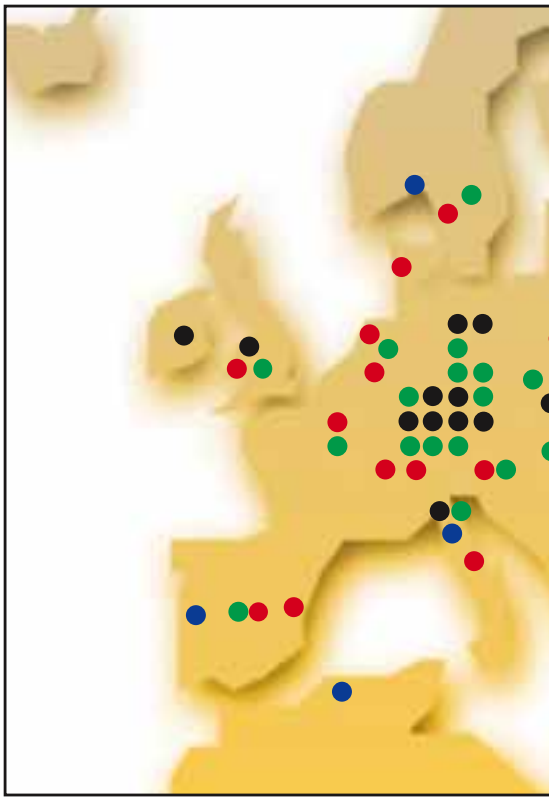
Service Centers

Germany

Albstadt
Berlin/Precision Tools
Geislingen
Gosheim
Hörselberg / Eisenach
Mindelheim
Röhrsdorf / Chemnitz
Saarbrücken
Veldhoven / NL

World-Wide

Australia
Austria
Brazil – Diadema
Brazil – Joinville
China
Czech Republic
France
Great Britain
Hungary
India
Italy
Japan
Korea
Mexico
Netherlands
Poland
Rumania
Russia
South Africa
Spain
Sweden
Taiwan
Turkey
USA – Brookfield
USA – New Hudson
Vietnam
White Russia




Factory Italy


Factory Nagoya / Japan


Factory Poland


Factory Rumania


Factory Taiwan


Carbide Plant Berlin


Factory Geislingen


Factory Markt Erlbach


Factory China


Factory Great Britain

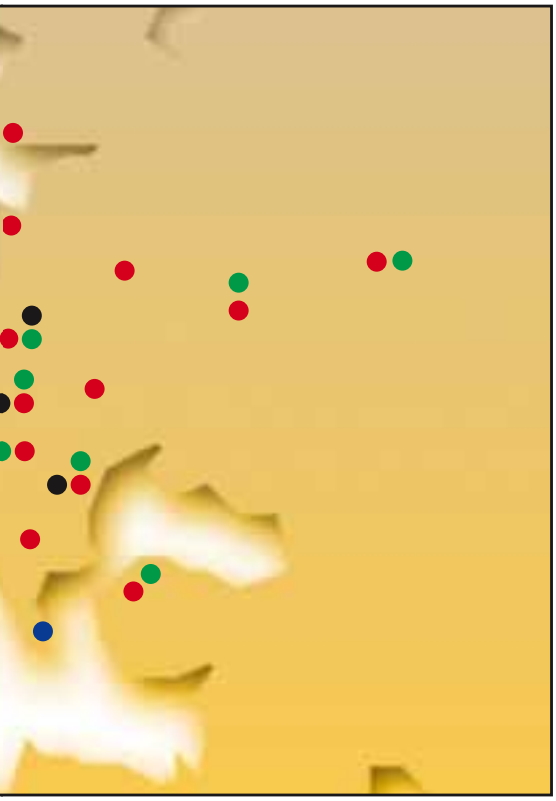

Factory Bangalore/India

Sales Companies

Argentina
Australia
Austria
Baltic States (Estonia, Latvia, Lithuania)
Belgium
Brazil
Bulgaria
Canada
China
Czech Republic
Denmark
Finland
France – Metz-Tessy
France – Alsace
Great Britain
Hungary
India
Indonesia
Italy
Japan
Korea
Malaysia
Mexico
Netherlands
Poland
Rumania
Russia
Sweden
Switzerland
Singapore
Slovakia
Spain – Barcelona
Spain – Madrid
South Africa
Taiwan
Thailand
Turkey
Ukraine
USA – Brookfield
USA – New Hudson
Vietnam
White Russia

Sales and Marketing Partners

Bolivia
Chile
Colombia
Egypt
Greece
Hongkong
Italy
Maghreb States (Morocco, Algeria, Tunisia)
Mauritius
Norway
Pakistan
Peru
Philippines
Portugal
Sweden
Venezuela
Vietnam




Factory Chungnam/Korea


Factory Mexico


Factory Czech Republic


Factory USA-Brookfield


Factory USA-New Hudson

For more than 35 years, Guhring Inc. (USA) has brought the innovations of industry-leading Guhring technology, products and technical support to the United States. ***One company, one brand, same name*** known throughout North America for quality for over three decades.

Our new 2010 high performance drill catalog provides a quick and easy reference guide to selecting the right Guhring drill for your application, The Guide begins on page 19.

Take a look at the new drill index and the updated drill selection guide. With these new pages, finding the optimum drilling solution is quick and easy. In addition, you can visit www.guhring.com to use **Guhring NAVIGATOR** tool selection software program to identify the right tool for your machining operation. Navigator can also provide operating parameters for the tools you have chosen.

New for 2010, Guhring introduces a category of carbide drills, taps and variable helix carbide end mills called **Guhring Select** tools. These tool series are manufactured from the same materials and to the same quality and exacting tolerances that you expect from Guhring. Each series has been selected because of its versatility in a wide range of materials and machining operations, to provide you with a full compliment of quality drill, tap and milling options at an economical price.

GUHRING Select

Simplify your tool search by choosing **Guhring Select**. These tools offer a full range of economical, quality, machining solutions. From the production facility to the small prototype machine shop, there is a Guhring Select tool that will suit your needs.

Look for the **Guhring Select** logo to quickly identify these economical tooling choices.

Guhring no.	Std. range/ page	Feeds & Speeds	Description	Tool Material	Finish
205	50	337	General purpose (Type N), jobber length, 118° point, standard straight shank	HSS	bright/steam oxide >2.36
206	54	337	Low Helix (Type H), jobber length, 118° point, standard straight shank	HSS	bright finish
207	56	338	High Helix (Type W), jobber length, 130° point, standard straight shank	HSS	bright finish
208	58	338	General purpose (Type N), jobber length, 118° point, standard straight shank	HSS	bright/steam oxide >2.36
217	60	339	General purpose (Type N), taper length, 118° point, standard straight shank	HSS	bright/steam oxide >2.36
219	62	339	High Helix (Type W), taper length, 130° point, standard straight shank	HSS	bright finish
223	63	340	General purpose (Type N), stub length, 118° point, standard straight shank	HSS	bright/steam oxide >2.36
224	66	340	Low Helix (Type H), stub length, 118° point, standard straight shank	HSS	bright finish
225	67	341	High Helix (Type W), stub length, 130° point, standard straight shank	HSS	bright finish
226	68	341	General purpose (Type N), stub length, 118° point, standard straight shank	HSS	bright/steam oxide >2.36
235	70	342	General purpose (Type N), extra length #1, 118° point, standard straight shank	HSS	bright/steam oxide >2.36
245	71	342	General purpose (Type N), Standard (MTS), 118˚ point, Morse Taper shank	HSS	bright/steam oxide >2.36
257	74	343	General purpose (Type N), Bushing (MTS), 118˚ point, Morse Taper shank	HSS	surface treated
266	75	343	General purpose (Type N), extra length #1, 118° point, Morse Taper shank	HSS	surface treated
280	77	N/A	Form A center drill, Extra long, 60°, non-flatted body, bright finish, RH	HSS	bright finish
281	77	N/A	Form A center drill, 60°, non-flatted body, bright finish, RH	HSS	bright finish
282	77	N/A	Form A center drill, 60°, non-flatted body, bright finish, LH	HSS	bright finish
283	77	N/A	Form R center drill, Radiused. 60°, non-flatted body, bright finish, RH	HSS	bright finish
284	77	N/A	Form R center drill, Radiused, 60°, non-flatted body, bright finish, LH	HSS	bright finish
285	78	N/A	Form B center drill, 60°/120° double angle, non-flatted body, bright finish, RH	HSS	bright finish
287	80	N/A	Form A center drill, 60°, Flatted body, bright finish, RH	HSS	bright finish
288	80	N/A	Form R center drill, Radiused, 60°, Flatted body, bright finish, RH	HSS	bright finish
289	80	N/A	Form B center drill, 60°/120° double angle, Flatted body, bright finish, RH	HSS	bright finish
292	79	N/A	Form A center drill, 60°, non-flatted body, bright finish, RH	HSS	bright finish
294	79	N/A	Form A center drill, 60°, non-flatted body, bright finish, LH	HSS	bright finish
301	82	344	Micro-Precision (Type N), micro-precision, 118° point, reinforced straight shank	Cobalt	bright finish
303	84	344	Micro-Precision (Type N), micro-precision, 118° point, reinforced straight shank	Cobalt	bright finish
305	85	345	General purpose (Type N), jobber length, 118° point, standard straight shank	Cobalt	bright/steam oxide >2.36
308	88	345	General purpose (Type N), jobber length, 118° point, standard straight shank	Cobalt	bright/steam oxide >6.0
317	90	346	General purpose (Type N), taper length, 118° point, standard straight shank	Cobalt	bright/steam oxide >2.36
329	91	346	Heavy Duty (Type GV120), stub length, 130° point, standard straight shank	Cobalt	bright/steam oxide >2.36
336	93	347	GT 50 deep hole, taper length, 130° point, standard straight shank	Cobalt	bright/nitrided lands >2.36
345	94	347	General purpose (Type N), Standard (MTS), 118˚ point, Morse Taper shank	Cobalt	surface treated
381	77	N/A	Form A center drill, 60°, non-flatted body, bright finish, RH	Cobalt	bright finish
390	96	348	GT 100 IC deep hole, taper length, 130° point, standard straight shank	HSS	bright finish
501	96	348	GT 50 deep hole, taper length, 130° point, standard straight shank	HSS	bright finish
502	98	349	General purpose (Type N), extra length #1, 130° point, standard straight shank	HSS	bright/nitrided lands >2.36
503	99	349	GT 100 deep hole, extra length #2, 130° point, standard straight shank	HSS	bright/nitrided lands >2.36
504	100	350	GT 100 deep hole, extra length #3, 130° point, standard straight shank	HSS	nitrided lands
515	101	350	GT 500 DZ high performance, stub length, 130° cone-relief point, standard straight shank	PM-Cobalt	FIREX® coated
524	103	351	GT 50 deep hole, extra length #1, 130° point, standard straight shank	HSS	bright finish
526	104	351	GT 100 deep hole, extra length #1, 118° point, Morse Taper shank	HSS	nitrided lands/steam oxide >16.0
527	105	352	GT 100 deep hole, extra length #2, 130° point, Morse Taper shank	HSS	nitrided lands/steam oxide >16.0
530	106	352	GT 500 DZ high performance, jobber length, 130° cone relief point, standard straight shank	PM-Cobalt	FIREX® coated
535	107	353	GT 100 deep hole, taper length, 130° point, standard straight shank	HSS	bright/nitrided lands >2.36
546	109	N/A	NC Spot • Short, NC Spot, 142° point, standard straight shank	DK 120 Carbide	bright finish
549	110	353	GT 100 deep hole, jobber length, 130° point, standard straight shank	HSS	bright/nitrided lands >2.36
550	112	354	GT 100 deep hole, jobber length, 130° point, standard straight shank	HSS	bright/nitrided lands >2.36
551	113	354	GT 100 deep hole, Bushing (MTS), 130° point, Morse Taper shank	HSS	nitrided lands/steam oxide >16.0
552	114	355	GT 80 deep hole, stub length, 130° point, standard straight shank	HSS	<2.36 bright/nitrided lands/steam >16.0
553	116	355	GT 80 deep hole, stub length, 130° point, standard straight shank	HSS	<2.36 bright/nitrided lands/steam >16.1
556	109	N/A	NC Spot • Short, NC Spot, 120° point, standard straight shank	HSS	bright finish
557	109	N/A	NC Spot • Short, NC Spot, 90° point, standard straight shank	HSS	bright finish
559	109	N/A	NC Spot • Long, NC Spot, 90° point, standard straight shank	HSS	bright finish
567	109	N/A	NC Spot • Short, NC Spot, 120° point, standard straight shank	HSS	TiN coated
568	109	N/A	NC Spot • Short, NC Spot, 90° point, standard straight shank	HSS	TiN coated
581	77	N/A	Form A center drill, 60°, non-flatted body, bright finish, RH	HSS	bright finish
582	77	N/A	Form A center drill, 60°, non-flatted body, bright finish, LH	HSS	bright finish
583	77	N/A	Form R center drill, Radiused, 60°, non-flatted body, bright finish, RH	HSS	bright finish
584	77	N/A	Form R center drill, Radiused, 60°, non-flatted body, bright finish, LH	HSS	bright finish
585	78	N/A	Form B center drill, 60°/120° double angle, non-flatted body, bright finish, RH	HSS	bright finish

Contents

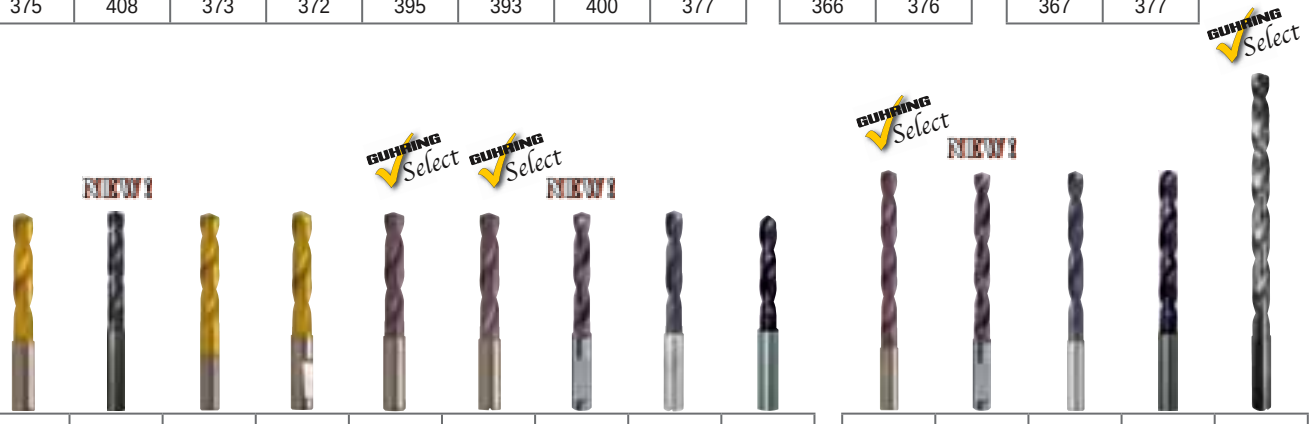
Guhring no.	Std. range/ page	Feeds & Speeds	Description	Tool Material	Finish
4024	182	382-83	HT 800 WP indexable insert, self-centering 140° SF point	DK 460 UF Carbide	bright finish
4025	182	384-85	HT 800 WP indexable insert, self-centering 140° SF point	DK 460 UF Carbide	TiN coated
4026	182	385-86	HT 800 WP indexable insert, self-centering 140° SF point	DK 460 UF Carbide	FIREX® coated
4042	183	N/A	HT 800 WP body, coolant through, 3xD full-helical flute, straight shank w/whistle notch	HSS	Nickel
4043	183	N/A	HT 800 WP body, coolant through, 5xD full-helical flute, straight shank w/whistle notch	HSS	Nickel
4044	190	387	RT 100 X high penetration, 7xD, self-centering140° SU point, reinforced straight shank	DK 460 UF Carbide	nano-FIREX® coated
4048	183	N/A	HT 800 WP body, coolant through, 7xD full-helical flute, straight shank w/whistle notch	HSS	Nickel
4107	186	N/A	NEW HT 800 WP body, coolant through, 3xD full-helical flute, straight shank w/whistle notch	HSS	Nickel
4108	186	N/A	NEW HT 800 WP body, coolant through, 5xD full-helical flute, straight shank w/whistle notch	HSS	Nickel
4109	186	N/A	NEW HT 800 WP body, coolant through, 7xD full-helical flute, straight shank w/whistle notch	HSS	Nickel
4112	185	387-88	NEW HT 800 WP indexable insert, self-centering 140° SF point	DK 460 UF Carbide	nano-FIREX® coated
4113	185	389-90	NEW HT 800 WP indexable insert, self-centering 140° SF point	DK 460 UF Carbide	FIREX® coated
4114	185	390-91	NEW HT 800 WP indexable insert, self-centering 140° SF point	DK 460 UF Carbide	bright finish
5020	192	390-91	EB 100 straight-flute gun drills, 80mm flute length, type G point point, reinforced straight shank	DK 460 UF Carbide	bright finish
5021	192	390-91	EB 100 straight-flute gun drills, 160mm flute length, type G point point, reinforced straight shank	DK 460 UF Carbide	bright finish
5024	192	390-91	EB 100 straight-flute gun drills, 45mm flute length, type G point point, reinforced straight shank	DK 460 UF Carbide	bright finish
5026	192	390-91	EB 100 straight-flute gun drills, 120mm flute length, type G point point, reinforced straight shank	DK 460 UF Carbide	bright finish
5242	181	N/A	RT 800 WP body, coolant through, 3xD full-helical flute, straight shank w/whisltle notch	HSS	Nickel
5243	181	N/A	RT 800 WP body, coolant through, 5xD full-helical flute, straight shank w/whisltle notch	HSS	Nickel
5248	181	N/A	RT 800 WP body, coolant through, 7xD full-helical flute, straight shank w/whisltle notch	HSS	Nickel
5510	193	393	RT 100 U high penetration, 3xD, self-centering140° SU point, reinforced straight shank	DK 460 UF Carbide	FIREX® coated
5511	195	393	RT 100 U high penetration, 5xD, self-centering140° SU point, reinforced straight shank	DK 460 UF Carbide	TiN coated
5512	197	394	RT 100 U high penetration, 7xD, self-centering140° SU point, reinforced straight shank	DK 460 UF Carbide	FIREX® coated
5513	199	394	RT 150 GG straight flute high penetration, 10xD, 120° point, reinforced straight shank	DK 460 UF Carbide	bright finish
5514	200	395	RT 100 U high penetration, 3xD, self-centering 140° SU point, reinforced straight shank	DK 460 UF Carbide	FIREX® coated
5515	202	395	RT 100 U high penetration, 5xD, self-centering140° SU point, reinforced straight shank	DK 460 UF Carbide	FIREX® coated
5518	204	396	GS 200 G three-flute high precision, 5xD, self-centering130° point, reinforced straight shank	DK 460 UF Carbide	bright finish
5519	205	396	GU 500 DZ universal, jobber length, 118° 4-facet split point, standard straight shank	Cobalt	TiN coated
5520	206	397	GU 500 DZ universal, stub length, 118° 4-facet split point, standard straight shank	Cobalt	TiN coated
5521	207	397	GT 500 DZ high performance, stub length, 130° cone-relief point, standard straight shank	PM-Cobalt	TiN coated
5522	208	398	GT 500 DZ high performance, jobber length, 130° cone relief point, standard straight shank	PM-Cobalt	TiN coated
5523	209	398	GU 500 DZ universal, jobber length, 118° 4-facet split point, standard straight shank	Cobalt	bright finish
5524	210	399	GU 500 DZ universal, stub length, 118° 4-facet split point, standard straight shank	Cobalt	bright finish
5525	211	399	RT 100 C high penetration, 12xD, self-centering140° SC, double margins point, reinforced str shank	DK 460 UF Carbide	FIREX® coated
5610	212	400	RT 100 U high penetration, 3xD, self-centering140° SU point, reinforced shank w/whistle notch	DK 460 UF Carbide	FIREX® coated
5611	214	400	RT 100 U high penetration, 5xD, self-centering140° SU point, reinforced shank w/whistle notch	DK 460 UF Carbide	FIREX® coated
5612	216	401	RT 100 U high penetration, 7xD, self-centering140° SU point, reinforced shank w/whistle notch	DK 460 UF Carbide	FIREX® coated
6068	217	401	RT 150 GG straight flute high penetration, 4xD, 130° point, reinforced straight shank	DK 255 UF Carbide	bright finish
6069	218	402	RT 150 GG straight flute high penetration, 7xD, 130° point, reinforced straight shank	DK 255 UF Carbide	bright finish
6070	219	402	RT 150 GG straight flute high penetration, 10xD, 130° point, reinforced straight shank	DK 255 UF Carbide	bright finish
6400	220	403	Exclusive Line Micro Drills, 4xD, 140° 4-facet ground hone point, reinforced straight shank	DK 460 UF Carbide	bright finish
6401	220	403	Exclusive Line Micro Drills, 7xD, 140° 4-facet ground hone point, reinforced straight shank	DK 460 UF Carbide	bright finish
6408	221	404	Exclusive Line Micro Drills, 8xD, 135° 4-facet ground hone point, reinforced straight shank	DK 460 UF Carbide	TiAlN coated
6412	221	404	Exclusive Line Micro Drills, 15xD, 135° 4-facet ground hone point, reinforced straight shank	DK 460 UF Carbide	TiAlN coated
6501	222	404	RT 100 R high penetration, 5xD, radius point point, reinforced straight shank	DK 255 UF Carbide	FIREX® coated
6502	224	405	RT 100 R high penetration, 7xD, radius point point, reinforced straight shank	DK 255 UF Carbide	FIREX® coated
6511	226	405	RT 100 T high penetration, 20xD, 135° point, standard straight shank	K30/K40 Carbide	TiAlN tipped
6512	226	406	RT 100 T high penetration, 25xD, 135° point, standard straight shank	K30/K40 Carbide	TiAlN tipped
6513	227	406	RT 100 T high penetration, 30xD, 135° point, standard straight shank	K30/K40 Carbide	TiAlN tipped
6514	227	407	RT 100 T high penetration, 40xD, 135° point, standard straight shank	K30/K40 Carbide	TiAlN tipped
8510	228	408	RT 100 VA high penetration, 3xD, self-centering 140° VA point, reinforced straight shank	DK 460 UF Carbide	nano-A™ coated
8511	228	408	RT 100 VA high penetration, 5xD, self-centering 140° VA point, reinforced straight shank	DK 460 UF Carbide	nano-A™ coated
20042	235	N/A	Hollfelder, Drill/Chamfer unit for hydraulic chucks	N/A	N/A
20067	235	N/A	Hollfelder, Drill/Chamfer clamping set	N/A	N/A
20362	236	N/A	Hollfelder, K10 carbide insert	Carbide	bright finish
20363	236	N/A	Hollfelder, G12 / K10 carbide insert	Carbide	TiAlN coated
20364	236	N/A	Hollfelder, G16 / P20 carbide insert	Carbide	TiAlN coated
20365	236	N/A	Hollfelder, PCD insert	PCD	bright finish

Package quantity information can be found on page 49.

Technical information begins on page 282

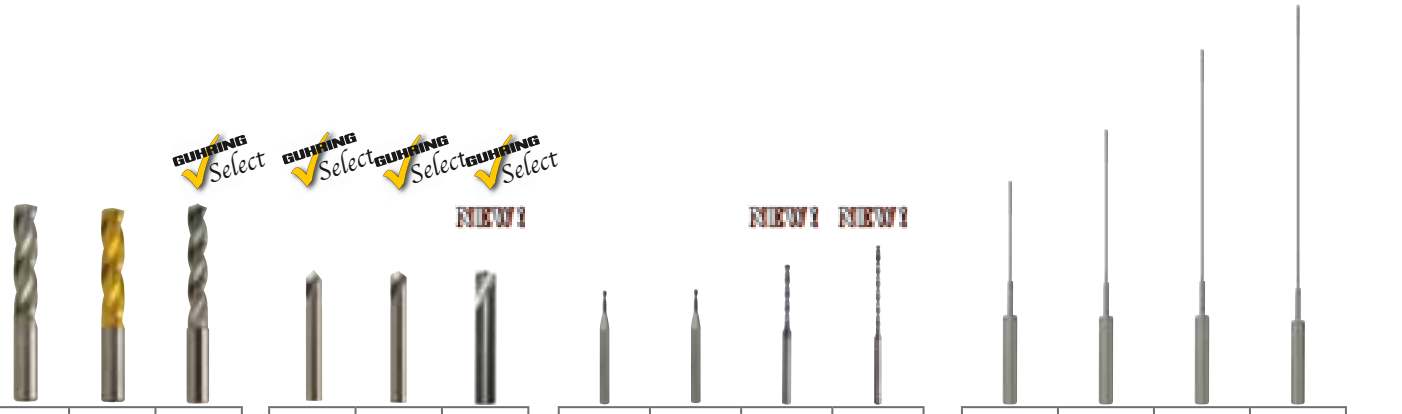
High Performance CARBIDE DRILLS

SERIES	1702	8510	1242	1184	5514	5510	5610	2477	730	2463	732	2464
Style	RT 100 F	RT 100 VA	RT 100 U	RT 100 U	RT 100 U	RT 100 U	RT 100 U	RT 100 "X"	Type N	Type N	Type N	Type N
Point Angle	140°	140°	140°	140°	140°	140°	140°	140°	118°	118°	118°	118°
Length	3 x D	3 x D	3 x D	3 x D	3 x D	3 x D	3 x D	3 x D	3 x D	3 x D	5 x D	5 x D
Shank												
Coolant												
Carbide Grade	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK120	DK120	DK120	DK120
Surface Finish	S	a	S	S	F	F	F	N	○	F	○	F
Std. Dia. Range mm	3.00- 15.00	3.00-16.00	3.00- 16.00	3.00- 20.00	3.00- 20.00	3.00- 20.00	3.00-20.00	3.00- 20.00	0.50- 16.00	1.00-16.00	1.00- 12.00	1.00- 12.00
Std. Dia. Range In.	0.1181- 0.5906	0.1181- 0.6299	0.1181- 0.6299	0.1181- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.0197- 0.6299	0.0394- 0.6299	0.0394- 0.4724	0.0394- 0.4724
Catalog Page	167	228	162	158	200	193	212	173	147	169	148	171
Tech Data Page	375	408	373	372	395	393	400	377	366	376	367	377



SERIES	1662	8511	1243	1183	5515	5511	5611	2479	6501	5512	5612	4044	6502	5525
Style	RT 100 F	RT 100 VA	RT 100 U	RT 100 U	RT 100 U	RT 100 U	RT 100 U	RT 100 "X"	RT 100 R	RT 100 U	RT 100 U	RT 100 "X"	RT 100 R	RT 100 C
Point Angle	140°	140°	140°	140°	140°	140°	140°	140°	Special	140°	140°	140°	Special	140°
Length	5 x D	5 x D	5 x D	5 x D	5 x D	5 x D	5 x D	5 x D	5 x D	7 x D	7 x D	7 x D	7 x D	12 x D
Shank														
Coolant														
Carbide Grade	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK255F	DK460UF	DK460UF	DK460UF	DK255F	DK460UF
Surface Finish	S	a	S	S	F	F	F	N	F	F	F	N	F	F
Std. Dia. Range mm	3.00- 24.50	3.00- 16.00	5.00- 16.00	3.30- 20.00	3.00- 20.00	3.00- 20.00	3.00- 20.00	3.00- 20.00	3.00- 20.00	3.00- 20.00	5.00- 20.00	4.00- 20.00	4.00- 20.00	3.00- 20.00
Std. Dia. Range In.	0.1181 - 0.9646	0.1181- 0.6299	0.1969- 0.6299	0.1575- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.1969- 0.7874	0.1575- 0.7874	0.1575- 0.7874	0.1181- 0.7874
Catalog Page	165	228	163	156	202	195	214	175	222	197	216	190	224	211
Tech Data Page	375	408	374	371	395	393	400	378	404	394	401	387	405	399

○ bright ● steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN



1452	609	5518	723	724	546	6400	6401	6408	6412	5024	5020	5026	5021
GS 200 U	GS 200 U	GS 200 G	90° Spot	120° Spot	142° Spot	Micro Drill	Micro Drill	Micro Drill	Micro Drill	EB100	EB100	EB100	EB100
150°	150°	130°	90°	120°	142°	140°	140°	135°	135°	Special	Special	Special	Special
5 x D	5 x D	5 x D	Short	Short	Short	4 x D	7 x D	8 x D	15 x D	45mm FL	80mm FL	120mm FL	160mm FL
DK460UF	DK460UF	DK460UF	DK120	DK120	DK120	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF
○	(S)	○	○	○	○	(A)	(A)	(A)	(A)	○	○	○	○
3.00- 20.00	3.00- 20.00	3.00- 20.00	5.00- 20.00	5.00- 20.00	4.00- 20.00	0.80- 3.00	0.80- 3.00	1.40-3.00	1.40-3.00	1.20- 3.20	1.20- 5.00	1.50- 5.00	1.50- 8.00
0.1181- 0.6248	0.1181- 0.6248	0.1181- 0.7874	0.1969- 0.7874	0.1969- 0.7874	0.1575- 0.7874	0.0315- 0.1181	0.0315- 0.1181	0.0551- 0.1181	0.0551- 0.1181	0.0472- 0.1260	0.0472- 0.1969	0.0591- 0.1969	0.0591- 0.1969
164	120	204	109	109	109	220	220	221	221	192	192	192	192
374	356	396	N/A	N/A	N/A	403	403	404	404	390-91	390-91	390-91	390-91

768	6068	769	6069	2601	2602	5513	6070	773	6511	6512	6513	6514
RT 150 GG	RT 150 GG	RT 150 GG	RT 150 GG	GT 100	GT 100	RT 150 GG	RT 150 GG	RT 150 GN	RT 100 T	RT 100 T	RT 100 T	RT 100 T
120°	130°	120°	130°	130°	130°	120°	130°	120°	135°	135°	135°	135°
4 x D	4 x D	7 x D	7 x D	8 x D	8 x D	10 x D	10 x D	15 x D	20 x D	25 x D	30 x D	40 x D
DK460UF	DK255F	DK460UF	DK255F	DK460UF	DK460UF	DK460UF	DK255F	DK460UF	DK460UF	DK460UF	DK460UF	DK460UF
○	○	○	○	○	(S)	○	○	○	(A)	(A)	(A)	(A)
3.00- 20.00	3.00- 20.00	3.00- 20.00	3.00- 20.00	3.17- 12.70	3.17- 12.70	3.00- 16.00	3.00- 20.00	5.00- 14.00	3.00- 14.00	3.00- 12.00	3.00- 10.00	3.00- 8.00
0.1181- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.1181- 0.7874	0.1248- 0.5000	0.1248- 0.5000	0.1181- 0.6299	0.1181- 0.7874	0.1969- 0.5512	0.1378- 0.5512	0.1378- 0.4724	0.1378- 0.3937	0.1378- 0.3150
150	217	151	218	177	178	199	219	152	226	226	227	227
367	401	368	402	380	380	394	402	368	405	406	406	407

(A) Super-A™ (F) FIREX® (A) TiAlN (N) nano-FIREX® (a) nano-A™

High Performance CARBIDE DRILLS

HT 800 WP

***While Supplies Last ***






SERIES	4024*	4025*	4026*	4042*	4043*	4048*
Style	HT 800 WP Insert	HT 800 WP Insert	HT 800 WP Insert	HT 800 WP Holder	HT 800 WP Holder	HT 800 WP Holder
Point Angle	140°	140°	140°	N/A	N/A	N/A
Length	N/A	N/A	N/A	3 x D	5 x D	7 x D
Shank	N/A	N/A	N/A			
Coolant						
Carbide Grade	DK460UF	DK460UF	DK460UF	HSS	HSS	HSS
Surface Finish	○	Ⓢ	Ⓕ	Nickel	Nickel	Nickel
Std. Dia. Range mm	11.50- 15.87	11.50- 15.87	11.50- 15.87	N/A	N/A	N/A
Std. Dia. Range In.	0.4528- 0.6248	0.4528- 0.6248	0.4528- 0.6248	N/A	N/A	N/A
Catalog Page	182	182	182	183	183	183
Tech Data Page	382-83	384-85	385-86	N/A	N/A	N/A

Interchangeable

Series 4024, 4025 and 4026 inserts are completely interchangeable with series 4112, 4113 and 4114 inserts. Both sets of inserts will fit in both sets of holders (series 4042, 4043, 4048 and 4107, 4108, 4109).

RT 800 WP

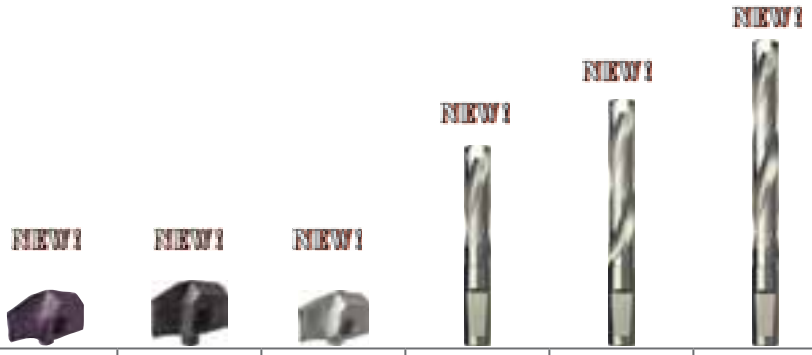





SERIES	2747	1047	2485	5242	5243	5248
Style	RT 800 WP Insert	RT 800 WP Insert	RT 800 WP Insert	RT 800 WP Holder	RT 800 WP Holder	RT 800 WP Holder
Point Angle	140°	140°	140°	N/A	N/A	N/A
Length	N/A	N/A	N/A	3 x D	5 x D	7 x D
Shank	N/A	N/A	N/A			
Coolant						
Carbide Grade	DK460UF	DK460UF	DK460UF	HSS	HSS	HSS
Surface Finish	○	Ⓢ	Ⓕ	Nickel	Nickel	Nickel
Std. Dia. Range mm	16.00- 40.50	16.00- 40.50	16.00- 40.50	N/A	N/A	N/A
Std. Dia. Range In.	0.6299- 1.5945	0.6299- 1.5945	0.6299- 1.5945	N/A	N/A	N/A
Catalog Page	180	180	180	181	181	181
Tech Data Page	381-82	369-70	378-79	N/A	N/A	N/A

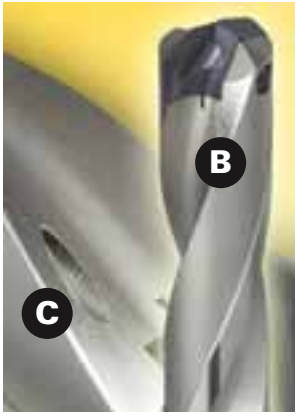
Interchangeable

HT 800 WP



SERIES	4112	4113	4114	4107	4108	4109
Style	HT 800 WP Insert	HT 800 WP Insert	HT 800 WP Insert	HT 800 WP Holder	HT 800 WP Holder	HT 800 WP Holder
Point Angle	140°	140°	140°	N/A	N/A	N/A
Length	N/A	N/A	N/A	3 x D	5 x D	7 x D
Shank	N/A	N/A	N/A			
Coolant						
Carbide Grade	DK460UF	DK460UF	DK460UF	HSS	HSS	HSS
Surface Finish	a	F	○	Nickel	Nickel	Nickel
Std. Dia. Range mm	11.00- 26.00	11.00- 26.00	11.00- 26.00	N/A	N/A	N/A
Std. Dia. Range In.	0.4331- 1.0236	0.4331- 1.0236	0.4331- 1.0236	N/A	N/A	N/A
Catalog Page	185	185	185	186	186	186
Tech Data Page	387-88	389-90	390-91	N/A	N/A	N/A

Advantages of the new HT 800 WP design:



A **Extended tool life**
Thanks to special micro-machined cutting edges and the application oriented coatings, the interchangeable inserts of the HT 800 WP drilling system are especially wear resistant. The bodies of the HT 800 WP drilling system also possess extremely high wear resistance thanks to the optimized body material with nickel plated surface. The incremental holder sizes in steps of 0.5 mm also leads to less wear on the body.

B **Optimized chip flow**
Thanks to their flute cross section the bodies of the HT 800 WP drilling system ensure optimal chip evacuation from the hole, even in deep-hole applications.

C **Superior coolant delivery**
Delivery of coolant is ensured by coolant ducts with maximum cross section, exiting in the flutes. This enables optimal coolant flow to the the cutting edges, further improving the chip evacuation from the hole.

D **Highly accurate and rigid insert seat**
The accurate insert seat enables indexing in the machine in only a few simple steps, with a standard Torx screw driver. The tough material of the HT 800 WP bodies allows the insert to be changed more frequently than with conventional systems, due to reduced wear of the insert seat. The clamping screws with screw lock ensure a secure holding of the interchangeable insert in the body, even with machines subject to high levels of vibrations.

Stub Length Drills

NEW! Expanded offering

SERIES	223	226	653	224	225	552	553	329	659	5524	5520	5521	515
Style	N	N (LH)	N	H	W	GT80	GT80 (LH)	GV120	GV120	GU500DZ	GU500DZ	GT500DZ	GT500DZ
Point Angle	118°	118°	118°	118°	130°	130°	130°	130°	130°	118°	118°	130°	130°
Length	Stub	Stub	Stub	Stub	Stub	Stub	Stub	Stub	Stub	Stub	Stub	Stub	Stub
Shank													
Coolant													
Substrate	HSS	HSS	HSS	HSS	HSS	HSS	HSS	Cobalt	Cobalt	Cobalt	Cobalt	PM-Cobalt	PM-Cobalt
Surface Finish	○●	○●	S	○	○	○◓	○◓	○●	S	○	S	S	F
Std. Dia. Range mm	0.350 - 48.000	0.320 - 50.000	0.500 - 30.160	0.690 - 22.000	1.000 - 22.000	1.000 - 20.000	1.000 - 20.000	0.400 - 48.000	0.500 - 15.500	1.000 - 14.000	1.000 - 14.000	1.000 - 14.000	1.000 - 14.000
Std. Dia. Range In.	0.0138 - 1.8898	0.0126 - 1.9685	0.0197 - 1.1874	0.0272 - 0.8661	0.0394 - 0.8661	0.0394 - 0.7874	0.0394 - 0.7874	0.0157 - 1.8898	0.0197 - 0.6102	0.0394 - 0.5512	0.0394 - 0.5512	0.0394 - 0.5512	0.0394 - 0.5512
Catalog Page	63	68	130	66	67	114	116	91	136	210	206	207	101
Tech Data Page	340	341	360	340	341	355	355	346	362	399	397	397	350

Jobber Length Drills

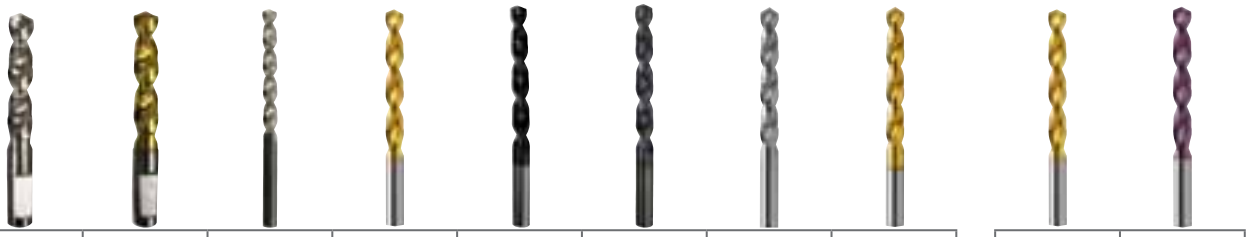
NEW!

SERIES	205	208	651	664	206	207	549	550	652	305	308	605	657	2458
Style	N	N (LH)	N	N (LH)	H	W	GT100	GT100(LH)	GT100	N	N (LH)	Ti	Ti	Ti
Point Angle	118°	118°	118°	118°	118°	130°	130°	130°	130°	118°	118°	130°	130°	130°
Length	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber
Shank														
Coolant														
Substrate	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt
Surface Finish	○●	○●	S	S	○	○	○◓	○◓	S	○●	○●	○	S	F
Std. Dia. Range mm	0.200 - 20.000	0.200 - 20.000	0.200 - 19.500	0.250 - 14.250	0.200 - 20.000	0.200 - 20.000	0.600 - 16.000	1.000 - 16.000	1.000 - 16.000	0.200 - 20.000	0.360 - 20.000	0.200 - 19.000	0.500 - 14.500	0.400 - 15.000
Std. Dia. Range In.	0.0079 - 0.7874	0.0079 - 0.7874	0.0079 - 0.7677	0.0098 - 0.561	0.0079 - 0.7874	0.0079 - 0.7874	0.0236 - 0.6299	0.0394 - 0.6299	0.0394 - 0.6299	0.0079 - 0.7874	0.0142 - 0.7874	0.0079 - 0.748	0.0197 - 0.5709	0.0157 - 0.5906
Catalog Page	50	58	125	139	54	56	110	112	128	85	88	118	133	168
Tech Data Page	337	338	359	363	337	338	353	354	359	345	345	356	361	376

○ bright ● steam oxide ◓ nitrided lands ● nitrided S TiN

NEW! Expanded offering

Jobber Length Drills



SERIES	1131	1132	622	658	1221	1223	5523	5519	5522	530
Style	GT80	GT80	GT100	GT100	GT100	GT100	GU500DZ	GU500DZ	GT500DZ	GT500DZ
Point Angle	130°	130°	130°	130°	130°	130°	118°	118°	130°	130°
Length	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber	Jobber
Shank										
Coolant										
Substrate	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	PM-Cobalt	PM-Cobalt
Surface Finish	○	S	○◐	S	C	A	○	S	S	S
Std. Dia. Range mm	5.000 - 20.000	5.000 - 20.000	1.000 - 16.000	1.000 - 16.000	3.000 - 12.000	3.000 - 12.000	1.000 - 14.000	1.000 - 14.000	1.000 - 14.000	1.000 - 14.000
Std. Dia. Range In.	0.1969 - 0.7874	0.1969 - 0.7874	0.0394 - 0.6299	0.0394 - 0.6299	0.1181 - 0.4724	0.1181 - 0.4724	0.0394 - 0.5512	0.0394 - 0.5512	0.0394 - 0.5512	0.0394 - 0.5512
Catalog Page	154	155	124	134	160	161	209	205	208	106
Tech Data Page	370	371	358	361	372	373	398	396	398	352

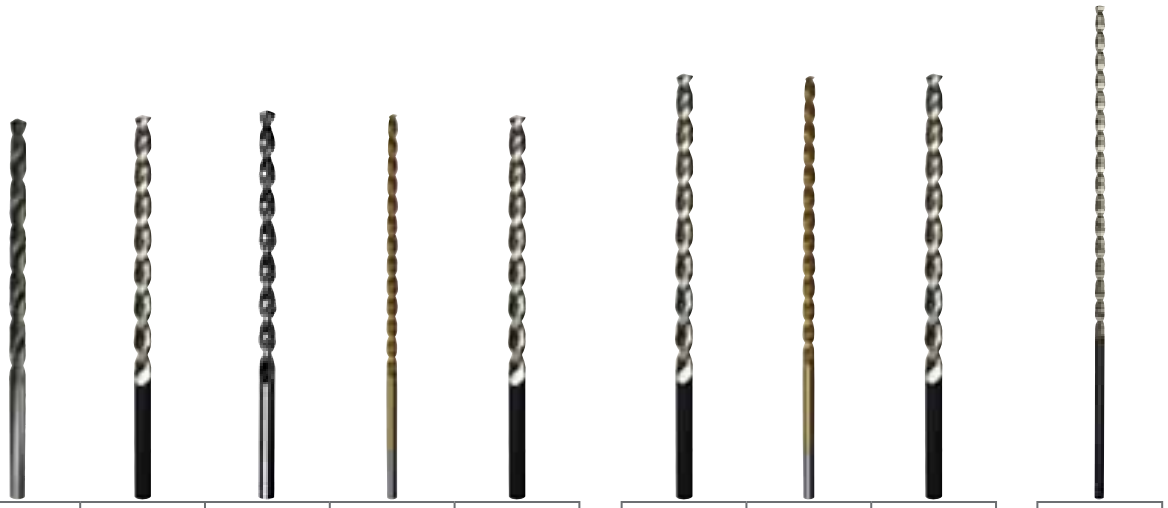
Taper Length Drills

SERIES	217	667	219	501	390	535	668	317	617	669	336
Style	N	N	W	GT50	GT100	GT100	GT100	N	Ti	Ti	GT100
Point Angle	118°	118°	130°	130°	130°	130°	130°	118°	130°	130°	130°
Length	Taper	Taper	Taper	Taper	Taper	Taper	Taper	Taper	Taper	Taper	Taper
Shank											
Coolant											
Substrate	HSS	HSS	HSS	HSS	HSS	HSS	HSS	Cobalt	Cobalt	Cobalt	Cobalt
Surface Finish	○◐	S	○	○	○	○◐	S	○◐	○	S	○◐
Std. Dia. Range mm	0.400 - 36.510	0.500 - 22.220	0.400 - 20.640	1.000 - 14.000	3.000 - 13.000	1.000 - 14.000	1.000 - 14.000	0.500 - 26.000	1.000 - 13.000	1.000 - 10.200	1.000 - 16.000
Std. Dia. Range In.	0.0157 - 1.4374	0.0197 - 0.8748	0.0157 - 0.8126	0.0394 - 0.5512	0.1181 - 0.5118	0.0394 - 0.5512	0.0394 - 0.5512	0.0197 - 1.0236	0.0394 - 0.5118	0.0394 - 0.4016	0.0394 - 0.6299
Catalog Page	60	141	62	96	96	107	142	90	121	144	93
Tech Data Page	339	364	339	348	348	353	364	346	357	365	347

A Super-A™ F FIREX® A TiAlN N nano-FIREX® a nano-A™

HSS / Cobalt Drills

Extra Length Drills



SERIES	235	502	524	670	618	503	671	619	504
Style	N	GT100	GT50	GT100	GT100	GT100	GT100	GT100	GT100
Point Angle	118°	130°	130°	130°	130°	130°	130°	130°	130°
Length	XL #1	XL #1	XL #1	XL #1	XL #1	XL #2	XL #2	XL #2	XL #3
Shank									
Coolant									
Substrate	HSS	HSS	HSS	HSS	Cobalt	HSS	HSS	Cobalt	HSS
Surface Finish	○●	○◓	○	Ⓢ	◓	○◓	Ⓢ	◓	◓
Std. Dia. Range mm	1.600 - 13.000	1.950 - 13.000	2.000 - 12.700	1.980 - 12.700	2.700 - 10.000	2.000 - 13.000	2.700 - 8.500	3.000 - 10.000	2.500 - 13.000
Std. Dia. Range In.	0.063 - 0.5118	0.0768 - 0.5118	0.0787 - 0.500	0.078 - 0.500	0.1063 - 0.3937	0.0787 - 0.5118	0.1063 - 0.3347	0.1181 - 0.3937	0.0984 - 0.5118
Catalog Page	70	98	103	145	122	99	146	123	100
Tech Data Page	342	349	351	365	357	349	366	358	350

NC Spot Drills

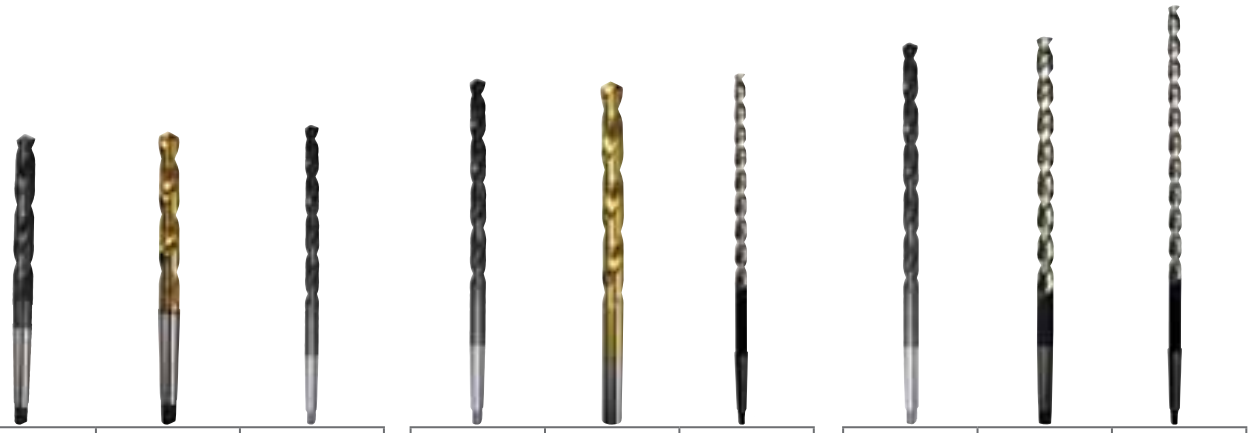
SERIES	556	557	567	568	559
Style	NC Spot	NC Spot	NC Spot	NC Spot	NC Spot
Point Angle	120°	90°	120°	90°	90°
Length	Spot	Spot	Spot	Spot	Spot
Shank					
Coolant					
Substrate	HSS	HSS	HSS	HSS	HSS
Surface Finish	○	○	Ⓢ	Ⓢ	○
Std. Dia. Range mm	3.000 - 25.400	3.000 - 25.400	3.000 - 25.400	3.000 - 25.400	6.350 - 25.400
Std. Dia. Range In.	0.1181 - 1.000	0.1181 - 1.000	0.1181 - 1.000	0.1181 - 1.000	0.250 - 1.000
Catalog Page	109	109	109	109	109
Tech Data Page	N/A	N/A	N/A	N/A	N/A

Micro Drills

SERIES	301	303	660
Style	N	N (LH)	N
Point Angle	118°	118°	118°
Length	Micro	Micro	Micro
Shank			
Coolant			
Substrate	Cobalt	Cobalt	Cobalt
Surface Finish	○	○	Ⓢ
Std. Dia. Range mm	0.050 - 1.920	0.130 - 1.945	0.128 - 1.900
Std. Dia. Range In.	0.002 - 0.0756	0.0051 - 0.0766	0.0050 - 0.0748
Catalog Page	82	84	85
Tech Data Page	344	344	345

○ bright ● steam oxide ◓ nitrided lands ◓ nitrided Ⓢ TiN

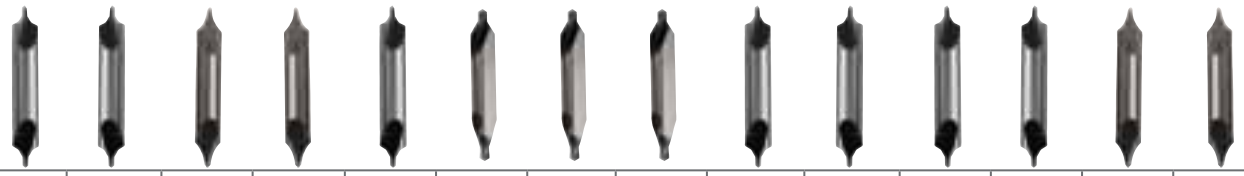
Morse Taper Shank Drills



SERIES	245	654	345	257	666	551	266	526	527
Style	N	N	N	N	N	GT100	N	GT100	GT100
Point Angle	118°	118°	118°	118°	118°	130°	118°	130°	130°
Length	Jobber	Jobber	Jobber	Bushing	Bushing	Bushing	XL #1	XL #1	XL #2
Shank									
Coolant									
Substrate	HSS	HSS	Cobalt	HSS	HSS	HSS	HSS	HSS	HSS
Surface Finish		S			S				
Std. Dia. Range mm	2.000 - 98.420	3.000 - 31.000	3.000 - 50.000	2.900 - 50.000	1.000 - 13.000	5.500 - 32.000	8.000 - 50.000	8.000 - 31.000	8.000 - 30.000
Std. Dia. Range In.	0.0787 - 3.8748	0.1181 - 1.2205	0.1181 - 1.9685	0.1142 - 1.9685	0.0394 - 0.5118	0.2165 - 1.2598	0.315 - 1.9685	0.315 - 1.2205	0.315 - 1.1811
Catalog Page	71	132	94	74	140	113	75	104	105
Tech Data Page	342	360	347	343	363	354	343	351	352

NEW!

Center Drills / Countersinks

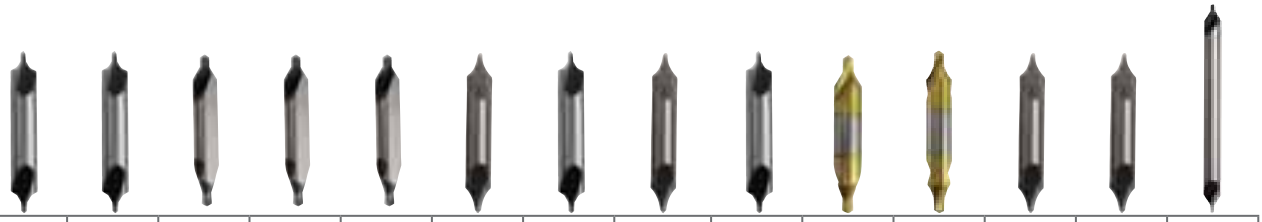


SERIES	281	282	283	284	285	287	288	289	292	294	581	582	583	584
Style	Form A	Form A (LH)	Form R	Form R (LH)	Form B	Form A	Form R	Form B	Form A	Form A (LH)	Form A	Form A (LH)	Form R	Form R (LH)
Point Angle	60°	60°	60°	60°	60°/120°	60°	60°	60°/120°	60°	60°	60°	60°	60°	60°
Standard	Guhring	DIN 333A	DIN 333R	DIN 333R	DIN 320B	*DIN 333A*	*DIN 333R*	*DIN 320B*	BS 328R	BS 328L	DIN 333A	DIN 333A	DIN 333R	DIN 333R
Shank	Round	Round	Round	Round	Round	Flatted	Flatted	Flatted	Round	Round	Round	Round	Round	Round
Coolant														
Substrate	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
Surface Finish														
Std. Dia. Range mm	0.50-10.00	0.50-6.30	0.50-10.00	0.80-4.00	1.00-6.30	1.60-10.00	1.00-8.00	1.60-6.30			0.50-12.50	0.50-12.50	0.50-12.50	0.80-5.00
Std. Dia. Range In.									No. 1 - 7	No. 1 - 7				
Catalog Page	77	77	77	77	78	80	80	80	79	79	77	77	77	77
Tech Data Page	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

HSS / Cobalt Drills

NEW!

Center Drills / Countersinks



SERIES	585	586	587	588	589	590	591	594	595	613	614	381	736	280
Style	Form B	Form B	Form A	Form R	Form B	Form A	Form B	Form A	Form B	Form A	Form R	Form A	Form A	Form A
Point Angle	60°/ 120°	60°	60°	60°	60°/ 120°	60°	60°/ 120°	60°	60°/ 120°	60°	60°	60°	60°	60°
Standard	DIN 333B	DIN 333B	DIN 333A	*DIN 333R*	*DIN 333B*	*DIN 333A*	*DIN 333B*	ASA	ASA	DIN 333A	DIN 333R	DIN 333A	*DIN 333A*	Guhring
Shank	Round	Round	Flatted	Flatted	Flatted	Round	Round	Round	Round	Round	Round	Round	Round	Round
Coolant														
Substrate	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	Cobalt	Carbide	HSS
Surface Finish	○	○	○	○	○	○	○	○	○	Ⓢ	Ⓢ	○	○	○
Std. Dia. Range mm	1.00-10.00	1.00-10.00	1.60-12.50	1.00-6.30	1.60-10.00	1.00-12.50	1.00-10.00			0.50-8.00	0.50-8.00	1.00-4.00	0.50-6.30	1.00-3.15
Std. Dia. Range In.								No. 1 - 8	No. 11 s- 18					
Catalog Page	78	78	80	80	80	77	78	79	79	77	77	77	77	77
Tech Data Page	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

With so many tools in Guhring's offering, how do you find the right one for your application?

Guhring has developed a number of ways to help you identify the best Guhring drill, end mill or tap for your application quickly and easily:

First, you can log onto the new **www.guhring.com** to find a number of helpful resources. Here you'll find a link to **Guhring Navigator tool finder** software. Navigator allows you to provide basic information about an application and instantly receive a Guhring tooling solution. Just provide the type of material to be machined and the style of tool needed and Navigator will provide the proper Guhring tool *as well as the correct operating parameters*.

NEW for 2010: Our new **cross reference tool** makes converting to a Guhring product quick and simple. By providing your current cutting tool's part number or entering a tool description, the cross reference chart suggests Guhring tools which can be substituted without sacrificing quality.

All Guhring product literature is also avialable on our website as PDF files for you to view or download, so you are able to page through our most recent catalogs at any time. Each of our main line catalogs begins with a helpful illustrated index to guide you toward the best Guhring drill, end mill or tap for your application, as well as a complete technical section with running parameters.

Our **Technical Support staff** stands ready to assist you, whether you elect to make a phone call to (800) 776-6170, or to complete the brief online form found at guhring.com under the Technical tab. Expert answers to your tooling or application questions are just a call or a few clicks away!

GUHRING

High-Performance Cutting Tools for Composite and Aerospace Materials

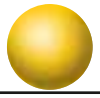
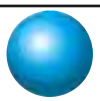
Standard tooling:

Carbide Routers
PCD End Mills
90° Diamond Coated Drills (see page 153)

PCD Special Tooling Capabilities:

Pleae see PCD section for information, page 240

This guide will help you find a drill that's well suited to your application. To begin, identify the workpiece material from the materials groups listed below:

Color Code	Material Guide (Chemical Description or ANSI standard)	Page
	**General Steels, Brass, Copper** 1035, 1213, 12L13, 11L08, 1015, 1038, 1018	20
	**Alloyed Steels, Nitrided Steels, Case Hardened Steels** S1, 4140, 4150, 4137, 4135	24
	**Stainless and Acid-Resistant Steels** 316, 321, 316Ti, 410, 420	28
	**Tool Steels, High-Tensile Steels, Hardened Materials** D1, H13, H21, O2, M2, W110, 4130, 1045, 1060	32
	**Aluminum and Aluminum Alloys** Al99, AlMn1Mg0.5, AlCuMgPb, AlZnMgCu1	36
	**Cast Iron** No35B, No45B, No55B, 60-40-18, 80-55-06, 50005, 70003	40
	**Titanium and Ti-Alloys, Aerospace Materials, Nickel-Based Alloys** 5390A, Titanium, TiAl6V4, TiCu2, Nimonic, Inconel, Hastelloy, Waspaloy	44

Next, look for the color code associated with your workpiece material on the following pages. On the color-corresponding page will be a listing of the most popular drills for that material, arranged by drill length. Choose the drill series that most closely fits your application, and follow the column down to the listing of the page number that will display the full diameter range for that drill series.

Looking for a different substrate/coating combination, or other changes in options offered in this catalog? Contact our Specials department to learn about Guhring's extensive capabilities in producing special tooling to fit your needs.

High-Performance Drill Recommendations

Series	6400/ 6401	1242	1184	2477	609	1243	2479	1183	4044	2602	5525	1047 4112 (Insert)	6511 - 6514
Length	4xD/7xD	3xD	3xD	3xD	5xD	5xD	5xD	5xD	7xD	8xD	12xD	3, 5, 7 x D	20xD - 40xD
Shank													
Style	Micro	RT 100 U	RT 100 U	RT100X	GS 200 U 3-flute	RT 100 U	RT100X	RT 100 U	RT100X	GT 100	RT 100 C	RT 800 WP/ HT 800 WP	RT 100 T
Point Angle	140°	140°	140°	140°	150°	140°	140°	140°	140°	130°	140°	140°	135°
Coolant Fed													
Substrate	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide
Surface Finish	A	S	S	N	S	S	N	S	N	S	F	S	A
Structural Steel	√	√	√	√	√	√	√	√	√	√	√	√	√
Free-cutting steel	√	√	√	√	√	√	√	√	√	√	√	√	√
Unalloyed steels	√	√	√	√	√	√	√	√	√	√	√	√	√
Copper	√	√	√	√	√	√	√	√	√	√	√	√	
Brass	√	√	√	√	√	√	√	√	√	√	√	√	
Size range mm	0.80-3.00	3.00-16.00	3.00-20.00	3.00-20.00	3.00-20.00	5.00-16.00	3.00-20.00	3.30-20.00	4.00-20.00	3.17-12.70	3.00-20.00	11.50-40.50	3.00-14.00
Sizes page	220	162	158	173	120	163	175	156	190	178	211	185	227

Material group	Examples
Common structural steels	A283, A516, Gr50, 30, 35, 42, 45, 50, 55, 60, 65, 70, 75 , 80, 85, 90, 100, 110, 135, 140, 145, 150, 160
Free-cutting steels	1151, 1215, L10, 10L10, 10L15, 10L17, 10L20, 10L23, 10L25, 10L30, 10L35, 10L40, 10L42, 10L45, 10L49, 10L50, 10L55, 11L15, 11L16, 11L17, 11L37, 11L38, 11L39, 11L41, 11L44, 11L46, 12L11, 12L12, 12L13, 12L14, 12L15, 41L25, 41L30, 41L35, 41L40, 41L42, 41L47, 41L50 51L15, 51L17, 51L20, 86L20, 86L40
Unalloyed heat-treatable steels	1005, 1006, 1008, 1009, 1010, 1011, 1012, 1013, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1025, 1026, 1029, 1030, 1033, 1035, 1037, 1038, 1039, 1040, 1042, 1043, 1044, 1045, 1046, 1049, 1050, 1053, 1055, 1059, 1060, 1064, 1065, 1069, 1070, 1071, 1074, 1075, 1078, 1080, 1084, 1085, 1086, 1090, 1095
Copper, low-alloyed	C10100, C27000, C71500, C52400, C77000, C17200, C71500, C95500, C86500
Brass, short-chipping	CUZn10, CUZn20

○ bright ◍ steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN

Stub Length (3xD) Drills

Series	301	303	223	226	225	224	552	553	653	5520	730
Length	Micro	Micro (LH)	3xD	3xD (LH)	3xD	3xD	3xD	3xD (LH)	3xD	3xD	3xD
Shank											
Style	N	N	N	N	W	H	GT80	GT80	N	GU500DZ	N
Point Angle	118°	118°	118°	118°	130°	118°	130°	130°	118°	118°	118°
Coolant Fed											
Substrate	Cobalt	Cobalt	HSS	HSS	HSS	HSS	HSS	HSS	HSS	Cobalt	Carbide
Surface Finish	○	○	○●	○●	○	○	○◓	○◓	Ⓢ	Ⓢ	○
Structural Steel	√	√	√	√			√	√	√	√	√
Free-cutting steel	√	√	√	√	√		√	√	√	√	√
Unalloyed steels	√	√	√	√	√		√	√	√	√	√
Copper	√	√	√	√	√	√	√	√	√	√	√
Brass	√	√	√	√		√	√	√	√	√	√
Size range mm	0.050 - 1.920	0.130 - 1.945	0.350-48.000	0.320-50.000	1.000-22.000	0.690-22.000	1.000-20.000	1.000-20.000	0.500-30.160	1.000-14.000	0.500-16.000
Sizes page	82	84	63	68	67	66	114	116	130	206	147

Free toolfinder software

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Jobber Length (5xD) Drills

Series	205	208	664	206	651	549	652	2602	1131	732	2464
											
Length	5xD	5xD (LH)	5xD (LH)	5xD	5xD	5xD	5xD	5xD	5xD	5xD	5xD
Shank											
Style	N	N	N	H	N	GT100	GT100	GT100	GT80	N	N
Point Angle	118°	118°	118°	118°	118°	130°	130°	118°	130°	118°	118°
Coolant Fed											
Substrate	HSS	HSS	HSS	HSS	HSS	HSS	HSS	Carbide	Cobalt	Carbide	Carbide
Surface Finish											
Structural Steel	√	√	√		√	√	√	√	√	√	√
Free-cutting steel	√	√	√		√	√	√	√	√	√	√
Unalloyed steels	√	√	√		√	√	√	√	√	√	√
Copper	√	√	√	√	√	√	√	√	√	√	√
Brass	√	√	√	√	√	√	√	√	√	√	√
Size range mm	0.200-20.000	0.200-20.000	0.250-14.250	0.200-20.000	0.200-19.500	0.600-16.000	1.000-16.000	3.170-12.700	5.000-20.000	1.000-12.000	1.000-12.000
Sizes page	50	58	139	54	125	110	128	178	154	148	171

Material group	Examples
Common structural steels	A283, A516, Gr50, 30, 35, 42, 45, 50, 55, 60, 65, 70, 75 , 80, 85, 90, 100, 110, 135, 140, 145, 150, 160
Free-cutting steels	1151, 1215, L10, 10L10, 10L15, 10L17, 10L20, 10L23, 10L25, 10L30, 10L35, 10L40, 10L42, 10L45, 10L49, 10L50, 10L55, 11L15, 11L16, 11L17, 11L37, 11L38, 11L39, 11L41, 11L44, 11L46, 12L11, 12L12, 12L13, 12L14, 12L15, 41L25, 41L30, 41L35, 41L40, 41L42, 41L47, 41L50 51L15, 51L17, 51L20, 86L20, 86L40
Unalloyed heat-treatable steels	1005, 1006, 1008, 1009, 1010, 1011, 1012, 1013, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1025, 1026, 1029, 1030, 1033, 1035, 1037, 1038, 1039, 1040, 1042, 1043, 1044, 1045, 1046, 1049, 1050, 1053, 1055, 1059, 1060, 1064, 1065, 1069, 1070, 1071, 1074, 1075, 1078, 1080, 1084, 1085, 1086, 1090, 1095
Copper, low-alloyed	C10100, C27000, C71500, C52400, C77000, C17200, C71500, C95500, C86500
Brass, short-chipping	CUZn10, CUZn20

○ bright ◍ steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN

Extra Length (≥10xD) Drills

Series	535	217	390	235	502	266	526	503	671	527	504
Length	10xD	10xD	10xD	Extra #1	Extra #1	Extra #1	Extra #1	Extra #2	Extra #2	Extra #2	Extra #3
Shank											
Style	GT100	N	GT100	N	GT100	N	GT100	GT100	GT100	GT100	GT100
Point Angle	130°	118°	130°	118°	130°	118°	130°	130°	130°	130°	130°
Coolant Fed											
Substrate	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
Surface Finish									S		
Structural Steel	√	√	√	√	√	√	√	√	√	√	√
Free-cutting steel	√	√	√	√	√	√	√	√	√	√	√
Unalloyed steels	√	√	√	√	√	√	√	√	√	√	√
Copper	√	√	√	√	√	√	√	√	√	√	√
Brass	√	√	√	√	√	√	√	√	√	√	√
Size range mm	1.000-14.000	0.400-36.510	3.000-13.000	1.600-13.000	1.950-13.000	8.000-50.000	8.000-31.000	2.000-13.000	2.700-8.500	8.000-30.000	2.500-13.000
Sizes page	107	60	96	70	98	75	104	99	146	105	100

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High-Performance Drill Recommendations

Series	5514	5510	2477	5515	5511	2479	609	5512	4044	5525	4026 4112 (Insert)	6511 - 6514
Length	3xD	3xD	3xD	5xD	5xD	5xD	5xD	7xD	7xD	12xD	3, 5, 7 x D	20xD - 40xD
Shank												
Style	RT100U	RT100U	RT100X	RT100U	RT100U	RT100X	GS200U 3-flute	RT100U	RT100X	RT100C	HT800 / RT800WP	RT 100 T
Point Angle	140°	140°	140°	140°	140°	140°	150°	140°	140°	140°	140°	135°
Coolant Fed												
Substrate	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide
Surface Finish	F	F	N	F	F	N	S	F	N	F	F	A
Unalloyed case hardened steels	√	√	√	√	√	√	√	√	√	√	√	√
Alloyed case hardened steels	√	√	√	√	√	√	√	√	√	√	√	
Alloyed heat-treatable steels	√	√	√	√	√	√	√	√	√	√	√	√
Nitriding steels	√	√	√	√	√	√	√	√	√	√	√	
Size Range (mm)	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	5.00-20.00	3.00-20.00	3.00-20.00	11.50-40.50	3.00-14.00
Sizes page	200	193	173	202	195	175	120	197	190	211	185	226

Material group	Examples
Unalloyed case hardened steels	1005, 1006, 1008, 1009, 1010, 1011, 1012, 1013, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1025, 1026, 1029, 1030, 1033, 1035, 1037, 1038, 1039, 1040, 1042, 1043, 1044, 1045, 1046, 1049, 1050, 1053, 1055, 1059, 1060, 1064, 1065, 1069, 1070, 1071, 1074, 1075, 1078, 1080, 1084, 1085, 1086, 1090, 1095
Alloyed case hardened steels	2317, 2512, 2515, 2517, 3115, 3120, 3215, 3220, 3312, 3316, 3325, 4012, 4023, 4024, 4027, 4028, 4118, 4119, 4125, 4317, 4320, 4419, 4422, 4427, 4608, 4615, 4617, 4620, 4621, 4626, 4718, 4720, 4815, 4817, 4820, 5015, 5115, 5117, 5120, 6115, 6118, 6120, 6125, 8115, 8615, 8617, 8620, 8622, 8625, 8627, 8720, 8822, 9310, 9315, 9317
Alloyed heat-treatable steels	1330, 1335, 1340, 1345, 2340, 3140, 3145, 3150, 3230, 3240, 3335, 3340, 3435, 3450, 4032, 4037, 4063, 4130, 4135, 4137, 4140, 4142, 4145, 4147, 4150, 4161, 4337, 4340, 4640, 5045, 5046, 5060, 5130, 5132, 5135, 5140, 5145, 5157, 5150, 5155, 5160, 6130, 6135, 6140, 6145, 6150, 7140, 6145, 6150, 7140, 8630, 8632, 8635, 8637, 8640, 8642, 8645, 8650, 8650, 8660, 8735, 8740, 8742, 9250, 9254, 9255, 9260, 9262, 9840, 9850
Nitriding steels	1132, 1137, 1138, 1139, 1140, 1141, 1144, 1145, 1146, 1151

○ bright ● steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN

Stub Length (3xD) Drills

Series	660	303	653	553	329	659	5520	5521	515	730	2463
Length	Micro	Micro LH	3xD	3xD LH	3xD	3xD	3xD	3xD	3xD	3xD	3xD
Shank											
Style	N	N	N	GT80	GV120	GV120	GU500DZ	GT500DZ	GT500DZ	N	N
Point Angle	118°	118°	118°	130°	130°	130°	118°	130°	130°	118°	118°
Coolant Fed											
Substrate	Cobalt	Cobalt	HSS	HSS	Cobalt	Cobalt	Cobalt	PM-Cobalt	PM-Cobalt	Carbide	Carbide
Surface Finish	S		S			S	S	S	F		F
Unalloyed case hardened steels	√					√		√	√		√
Alloyed case hardened steels	√					√		√	√		√
Alloyed heat-treatable steels	√	√	√	√	√	√	√	√	√	√	√
Nitriding steels	√	√	√	√	√	√	√	√	√	√	√
Size Range (mm)	0.128 -1.900	0.130-1.945	0.500-30.160	1.000-20.000	0.400-48.000	0.500-15.500	1.000-14.000	1.000-14.000	1.000-14.000	0.500-16.000	1.000-16.000
Sizes page	138	84	130	116	91	136	206	207	101	147	169

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Jobber Length (5xD) Drills

Series	305	308	5519	605	657	622	658	1221	1132	530	2464
											
Length	5xD	5xD (LH)	5xD	5xD	5xD	5xD	5xD	5xD	5xD	5xD	5xD
Shank											
Style	N	N	GU500DZ	Ti	Ti	GT100	GT100	GT100	GT80	GT500DZ	N
Point Angle	118°	118°	118°	130°	130°	130°	130°	130°	130°	130°	118°
Coolant Fed											
Substrate	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	PM-Cobalt	Carbide
Surface Finish											
Unalloyed case hardened steels			√		√		√	√	√	√	√
Alloyed case hardened steels			√		√		√	√	√	√	√
Alloyed heat-treatable steels	√	√	√	√	√	√	√	√	√	√	√
Nitriding steels	√	√	√	√	√	√	√	√	√	√	√
Size Range (mm)	0.200-20.000	0.360-20.000	1.000-14.000	0.200-19.000	0.500-14.500	1.000-16.000	1.000-16.000	3.000-12.000	5.000-20.000	1.000-14.000	1.000-12.000
Sizes page	85	88	205	118	133	124	134	160	155	106	171

Material group	Examples
Unalloyed case hardened steels	1005, 1006, 1008, 1009, 1010, 1011, 1012, 1013, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1025, 1026, 1029, 1030, 1033, 1035, 1037, 1038, 1039, 1040, 1042, 1043, 1044, 1045, 1046, 1049, 1050, 1053, 1055, 1059, 1060, 1064, 1065, 1069, 1070, 1071, 1074, 1075, 1078, 1080, 1084, 1085, 1086, 1090, 1095
Alloyed case hardened steels	2317, 2512, 2515, 2517, 3115, 3120, 3215, 3220, 3312, 3316, 3325, 4012, 4023, 4024, 4027, 4028, 4118, 4119, 4125, 4317, 4320, 4419, 4422, 4427, 4608, 4615, 4617, 4620, 4621, 4626, 4718, 4720, 4815, 4817, 4820, 5015, 5115, 5117, 5120, 6115, 6118, 6120, 6125, 8115, 8615, 8617, 8620, 8622, 8625, 8627, 8720, 8822, 9310, 9315, 9317
Alloyed heat-treatable steels	1330, 1335, 1340, 1345, 2340, 3140, 3145, 3150, 3230, 3240, 3335, 3340, 3435, 3450, 4032, 4037, 4063, 4130, 4135, 4137, 4140, 4142, 4145, 4147, 4150, 4161, 4337, 4340, 4640, 5045, 5046, 5060, 5130, 5132, 5135, 5140, 5145, 5157, 5150, 5155, 5160, 6130, 6135, 6140, 6145, 6150, 7140, 6145, 6150, 7140, 8630, 8632, 8635, 8637, 8640, 8642, 8645, 8650, 8650, 8660, 8735, 8740, 8742, 9250, 9254, 9255, 9260, 9262, 9840, 9850
Nitriding steels	1132, 1137, 1138, 1139, 1140, 1141, 1144, 1145, 1146, 1151

○ bright ◍ steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN

Extra Length (≤10xD) Drills

Series	5020 - 5026	345	317	336	617	669	618	619	504
Length	45mm FL - 160 mm FL	10xD	10xD	10xD	10xD	10xD	Extra #1	Extra #2	Extra #3
Shank									
Style	EB100	N	N	GT100	Ti	Ti	GT100	GT100	GT100
Point Angle	Special	118°	118°	130°	130°	130°	130°	130°	130°
Coolant Fed									
Substrate	Carbide	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	HSS
Surface Finish	○	●	○ ●	○ ◓	○	Ⓢ	◓	◓	◓
Unalloyed case hardened steels	√	√			√	√	√	√	
Alloyed case hardened steels	√	√			√	√	√	√	
Alloyed heat-treatable steels	√	√	√	√	√	√	√	√	√
Nitriding steels	√	√	√	√	√	√	√	√	√
Size Range (mm)	1.200 - 8.000	3.000 - 50.000	0.500 - 26.000	1.000 - 16.000	1.000 - 13.000	1.000 - 10.200	2.700 - 10.000	3.000 - 10.000	2.500 - 13.000
Sizes page	192	94	90	93	121	144	122	123	100

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High-Performance Drill Recommendations

Series	1702	5514	8510	2477	5515	1662	8511	2479	609	5512	4044	5525	4112 2485 (Insert)	6511 - 6514
Length	3xD	3xD	3xD	3xD	5xD	5xD	5xD	5xD	5xD	7xD	7xD	12xD	3, 5, 7 x D	20xD - 40xD
Shank														
Style	RT100F	RT100U	RT100VA	RT100X	RT100U	RT100F	RT100VA	RT100X	GS200U 3-flute	RT100U	RT100X	RT100C	HT800 / RT800WP	RT 100 T
Point Angle	140°	140°	140°	140°	140°	140°	140°	140°	150°	140°	140°	140°	140°	135°
Coolant Fed														
Substrate	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide
Surface Finish	S	F	a	N	F	S	a	N	S	F	N	F	F	A
Austenitic 300	√	√	√	√	√	√	√	√	√	√	√	√	√	
Martensitic 400	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Ph Stainless	√	√	√	√	√	√	√	√	√	√	√	√	√	
Size range mm	3.00-15.00	3.00-20.00	3.00-16.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-16.00	3.00-20.00	3.00-20.00	3.00-20.00	4.00-20.00	3.00-20.00	11.50-40.50	3.00-14.00
Sizes page	167	200	228	173	202	165	230	175	120	197	190	211	185	226

Material group	Examples
Stainless steels, sulphured	203 Ez, 303 Se, 303 Ma, 303 Pb, 303 PlusX, 430F Se, 416 Se, 416 PlusX, 420F, 420F Se, 440F, 440F Se
austenitic	201, 202, 301, 302B, 303, 304, 304L, 305, 308, 309, 309S, 310, 310S, 314, 316, 316L, 317, 321, 330, 347, 348, 384, 385, Nitronic 32, Nitronic 33, Nitronic 40, Nitronic 50, Nitronic 60, 17-7PH
martensitic	403, 405, 410, 414, 416, 420, 422, 430, 431, 440A, 440B, 440C, 446, 501, 502, 630, Greek Ascoloy

bright steam oxide nitrided lands nitrided S TiN

Stub Length (3xD) Drills

Series	6401	660	329	659	5520	5521	515	2463
								
Length	7xD	7xD	3xD	3xD	3xD	3xD	3xD	3xD
Shank								
Style	Micro	Micro	GV120	GV120	GU500DZ	GT500DZ	GT500DZ	N
Point Angle	140°	118°	130°	130°	118°	130°	130°	118°
Coolant Fed								
Substrate	Carbide	Cobalt	Cobalt	Cobalt	Cobalt	PM-Cobalt	PM-Cobalt	Carbide
Surface Finish	A	S	●	S	S	S	F	F
Austenitic 300	√	√	√	√	√	√	√	√
Martensitic 400	√	√	√	√	√	√	√	√
Ph Stainless	√	√	√	√	√	√	√	√
Size range mm	0.800 - 3.000	0.128 - 1.900	0.400 - 48.000	0.500 - 15.500	1.000 - 14.000	1.000 - 14.000	1.000 - 14.000	1.000 - 16.000
Sizes page	220	138	91	136	206	207	101	169

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Jobber Length (5xD) Drills

Series	305	5519	605	657	622	658	1223	1132	530	2464
										
Length	5xD	5xD	5xD	5xD	5xD	5xD	5xD	5xD	5xD	5xD
Shank										
Style	N	GU500DZ	Ti	Ti	GT100	GT100	GT100	GT80	GT500DZ	N
Point Angle	118°	118°	130°	130°	130°	130°	130°	130°	130°	118°
Coolant Fed										
Substrate	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	PM-Cobalt	Carbide
Surface Finish										
Austenitic 300	√	√	√	√	√	√	√	√	√	√
Martensitic 400	√	√	√	√	√	√	√	√	√	√
Ph Stainless	√	√	√	√	√	√	√	√	√	√
Size range mm	0.200 - 20.000	1.000 - 14.000	0.200 - 19.000	0.500 - 14.500	1.000 - 16.000	1.000 - 16.000	3.000 - 12.000	5.000 - 20.000	1.000 - 14.000	1.000 - 12.000
Sizes page	85	205	118	133	124	134	161	155	106	171

Material group	Examples
Stainless steels, sulphured	203 Ez, 303 Se, 303 Ma, 303 Pb, 303 PlusX, 430F Se, 416 Se, 416 PlusX, 420F, 420F Se, 440F, 440F Se
austenitic	201, 202, 301, 302B, 303, 304, 304L, 305, 308, 309, 309S, 310, 310S, 314, 316, 316L, 317, 321, 330, 347, 348, 384, 385, Nitronic 32, Nitronic 33, Nitronic 40, Nitronic 50, Nitronic 60, 17-7PH
martensitic	403, 405, 410, 414, 416, 420, 422, 430, 431, 440A, 440B, 440C, 446, 501, 502, 630, Greek Ascoloy

○ bright ● steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN

Extra Length (≤10xD) Drills

Series	6408 / 6412	5020 - 5026	345	317	336	617	669	618	619
Length	8xD / 15xD	45mm FL - 160 mm FL	10xD	10xD	10xD	10xD	10xD	Extra #1	Extra #2
Shank									
Style	Micro	EB100	N	N	GT100	Ti	Ti	GT100	GT100
Point Angle	135°	Special	118°	118°	130°	130°	130°	130°	130°
Coolant Fed									
Substrate	Carbide	Carbide	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt
Surface Finish	A						S		
Austenitic 300	√	√	√	√	√	√	√	√	√
Martensitic 400	√	√	√	√	√	√	√	√	√
Ph Stainless	√	√	√	√	√	√	√	√	√
Size range mm	1.400 - 3.000	1.200 - 8.000	3.000 - 50.000	0.500 - 26.000	1.000 - 16.000	1.000 - 13.000	1.000 - 10.200	2.700 - 10.000	3.000 - 10.000
Sizes page	221	192	94	90	93	121	144	122	123

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High-Performance Drill Recommendations

Series	5514	5510	2477	5515	5511	2479	609	5512	4044	5525	4112 2485 (Insert)	6511 - 6514
												
Length	3xD	3xD	3xD	5xD	5xD	5xD	5xD	7xD	7xD	12xD	3, 5, 7 x D	20xD - 40xD
Shank												
Style	RT100U	RT100U	RT100X	RT100U	RT100U	RT100X	GS200U 3-flute	RT100U	RT100X	RT100C	HT800 / RT800WP	RT100T
Point Angle	140°	140°	140°	140°	140°	140°	150°	140°	140°	140°	140°	135°
Coolant Fed												
Substrate	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide
Surface Finish	F	F	N	F	F	N	S	F	N	F	F	A
High speed steels	√	√	√	√	√	√	√	√	√	√	√	
Spring steels	√	√	√	√	√	√	√	√	√	√	√	
Hardened steels	√	√	√	√	√	√	√	√	√	√	√	
Tool steels	√	√	√	√	√	√	√	√	√	√	√	√
Alloyed heat-treatable	√	√	√	√	√	√	√	√	√	√	√	√
Size range (mm)	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	4.00-20.00	3.00-20.00	11.50-40.50	3.00-10.00
Sizes page	200	193	173	202	195	175	120	197	190	211	180	226

Material group	Examples
High speed steels	M1, M2, M3-1, M3-2, M4, M6, M7, M10, M30, M33, M34, M36, M41, M42, M43, M44, M46, M47, T1, T2, T4, T5, T6, T8, T15
Spring steels	5150, 5155, 6145, 6150, 9255
Hardened steels >48-60 Rc	Heat Treated Steels
Tool steels	A2, A3, A4, A5, A6, A8, A9, A10, O1, O2, O6, O7, A7, D2, D3, D4, D5, D7, H10, H11, H12, H13, H14, H19, H20, H21, H22, H23, H24, H25, H26, H41, H42, H43, L1, L3, W1, W2, W5
Alloyed Heat Treatable	1330, 1335, 1340, 1345, 3140, 3145, 3150, 3230, 3240, 3335, 3340, 3435, 3450, 4032, 4037, 4063, 4130, 4135, 4137, 4140, 4142, 4145, 4147, 4150, 4161, 4337, 4340, 4640, 5045, 5046, 5060, 5130, 5132, 5135, 5140, 5145, 5157, 5150, 5155, 5160, 6130, 6135, 6140, 6145, 6150, 7140, 6145, 6150, 7140, 8630, 8632, 8635, 8637, 8640, 8642, 8645, 8650, 8650, 8660, 8735, 8740, 8742, 9250, 9254, 9255, 9260, 9262, 9840, 9850, 2340

○ bright ● steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN

Stub Length (3xD) Drills

Series	6400	660	659	5521	515	2463
						
Length	4xD	7xD	3xD	3xD	3xD	3xD
Shank						
Style	Micro	Micro	GV120	GT500DZ	GT500DZ	N
Point Angle	140°	118°	130°	130°	130°	118°
Coolant Fed						
Substrate	Carbide	Cobalt	Cobalt	PM-Cobalt	PM-Cobalt	Carbide
Surface Finish	A	S	S	S	F	F
High speed steels	√	√	√	√	√	√
Spring steels	√	√	√	√	√	√
Hardened steels					√	√
Tool steels	√	√	√	√	√	√
Alloyed heat-treatable	√	√	√	√	√	√
Size range (mm)	0.800 - 3.000	0.128 - 1.900	0.500 - 15.500	1.000 - 14.000	1.000 - 14.000	1.000 - 16.000
Sizes page	220	138	136	207	101	169

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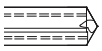
Jobber Length (5xD) Drills

Series	6401	5519	657	658	1223	1132	530	2464
								
Length	7xD	5xD	5xD	5xD	5xD	5xD	5xD	5xD
Shank								
Style	Micro	GU500DZ	Ti	GT100	GT100	GT80	GT500DZ	N
Point Angle	140°	118°	130°	130°	130°	130°	130°	118°
Coolant Fed								
Substrate	Carbide	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	PM-Cobalt	Carbide
Surface Finish	A	S	S	S	A	S	F	F
High speed steels	√	√	√	√	√	√	√	√
Spring steels	√	√	√	√	√	√	√	√
Hardened steels			√		√	√	√	√
Tool steels	√	√	√	√	√	√	√	√
Alloyed heat-treatable	√	√	√	√	√	√	√	√
Size range (mm)	0.800 - 3.000	1.000 - 14.000	0.500 - 14.500	1.000 - 16.000	3.000 - 12.000	5.000 - 20.000	1.000 - 14.000	1.000 - 12.000
Sizes page	220	205	133	134	161	155	106	171

Material group	Examples
High speed steels	M1, M2, M3-1, M3-2, M4, M6, M7, M10, M30, M33, M34, M36, M41, M42, M43, M44, M46, M47, T1, T2, T4, T5, T6, T8, T15
Spring steels	5150, 5155, 6145, 6150, 9255
Hardened steels >48-60 Rc	Heat Treated Steels
Tool steels	A2, A3, A4, A5, A6, A8, A9, A10, O1, O2, O6, O7, A7, D2, D3, D4, D5, D7, H10, H11, H12, H13, H14, H19, H20, H21, H22, H23, H24, H25, H26, H41, H42, H43, L1, L3, W1, W2, W5
Alloyed Heat Treatable	1330, 1335, 1340, 1345, 3140, 3145, 3150, 3230, 3240, 3335, 3340, 3435, 3450, 4032, 4037, 4063, 4130, 4135, 4137, 4140, 4142, 4145, 4147, 4150, 4161, 4337, 4340, 4640, 5045, 5046, 5060, 5130, 5132, 5135, 5140, 5145, 5157, 5150, 5155, 5160, 6130, 6135, 6140, 6145, 6150, 7140, 6145, 6150, 7140, 8630, 8632, 8635, 8637, 8640, 8642, 8645, 8650, 8650, 8660, 8735, 8740, 8742, 9250, 9254, 9255, 9260, 9262, 9840, 9850, 2340

○ bright ◍ steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN

Extra Length (≤10xD) Drills

Series	6408 / 6412	5020 - 5026	345	317	336	669	618	619
								
Length	8xD / 15xD	45mm FL - 160 mm FL	10xD	10xD	10xD	10xD	Extra #1	Extra #2
Shank								
Style	Micro	EB100	N	N	GT100	Ti	GT100	GT100
Point Angle	135	Special	118°	118°	130°	130°	130°	130°
Coolant Fed								
Substrate	Carbide	Carbide	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt
Surface Finish								
High speed steels	√	√	√	√	√	√	√	√
Spring steels	√	√	√	√	√	√	√	√
Hardened steels						√		
Tool steels	√	√	√	√	√	√	√	√
Alloyed heat-treatable	√	√	√	√	√	√	√	√
Size range (mm)	1.400 - 3.000	1.200 - 8.000	3.000 - 50.000	0.500 - 26.000	1.000 - 16.000	1.000 - 10.200	2.700 - 10.000	3.000 - 10.000
Sizes page	221	192	94	90	93	144	122	123

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High-Performance Drill Recommendations

Series	1242	1702	768	5518	1243	1183	769	5512	2601	5513	5525	4114/ 2747 (Insert)
Length	3xD	3xD	4xD	5xD	5xD	5xD	7xD	7xD	8xD	10xD	12xD	3, 5, 7 x D
Shank												
Style	RT100U	RT100F	RT150GG	GS200G 3-flute	RT100U	RT100U	RT150GG	RT100U	GT 100	RT150GG	RT100C	HT800 / RT800WP
Point Angle	140°	140°	120°	130°	140°	140°	120°	140°	130°	120°	140°	140°
Coolant Fed												
Substrate	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide
Surface Finish	(S)	(S)	○	○	(S)	(S)	○	(F)	○	○	(F)	(F)
Wrought aluminum	√	√		√	√	√		√	√		√	√
Cast aluminum <10% Si	√	√		√	√	√		√	√		√	√
Cast aluminum >10% Si			√	√			√		√	√		√
Size Range (mm)	3.00-16.00	3.00 - 15.00	3.00-20.00	3.00-20.00	5.00-16.00	3.30-20.00	3.00-20.00	5.00-20.00	3.17-12.70	3.00-16.00	3.00-20.00	11.50-40.50
Sizes page	162	167	150	204	163	156	151	197	177	199	211	180

Material group	Examples
Aluminium and Al-alloys	EC 1060, 1100, 1145, 1175, 1235, 2011, 2014, 2017, 2018, 2021, 2024, 2025, 2117, 2218, 2219, 2618, 3003, 3004, 3005, 4032, 4032-T6, 5005, 5050, 5052, 5056, 5083, 5086, 5154, 5252, 5254, 5454, 5456, 5457, 5652, 5657, 6053, 6061, 6061-T6, 6063, 6066, 6070, 6101, 6151, 6253, 6262, 6463, 6951, 7001, 7004, 7005, 7039, 7049, 7050, 7075, 7075-T6, 7079, 7175, 7178
Al wrought alloys	1100-0, 3003-H18, 5056-0, 2024-T4, 4043-H18
Al cast alloys	295-T6, 319-F, 356-T6, 380-F, 384-F, 390-F, 443-F, 413-F, 518-F, 713-TS, 850-TS

○ bright ◍ steam oxide ◓ nitrided lands ● nitrided (S) TiN

Stub Length (3xD) Drills

Series	6401	301	660	225	552	553	653	730
Length	7xD	7xD	7xD	3xD	3xD	3xD (LH)	3xD	3xD
Shank								
Style	Micro	Micro	Micro	W	GT80	GT80	N	N
Point Angle	140°	118°	118°	130°	130°	130°	118°	118°
Coolant Fed								
Substrate	Carbide	Cobalt	Cobalt	HSS	HSS	HSS	HSS	Carbide
Surface Finish	A		S				S	
Wrought aluminum	√	√		√	√	√		√
Cast aluminum <10% Si	√	√		√	√	√		√
Cast aluminum >10% Si	√	√	√	√	√	√	√	√
Size Range (mm)	0.800 - 3.000	0.050 - 1.920	0.128 - 1.900	1.000 - 22.000	1.000 - 20.000	1.000 - 20.000	0.500 - 30.160	0.500 - 16.000
Sizes page	220	82	138	67	114	116	130	147

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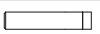
Jobber Length (5xD) Drills

Series	6401	207	549	550	652	658	5519	2601	2602	1131	732
											
Length	7xD	5xD	5xD	5xD (LH)	5xD	5xD	5xD	5xD	5xD	5xD	5xD
Shank											
Style	Micro	W	GT100	GT100	GT100	GT100	GU500DZ	GT100	GT100	GT80	N
Point Angle	140°	130°	130°	130°	130°	130°	118°	130°	130°	130°	118°
Coolant Fed											
Substrate	Carbide	HSS	HSS	HSS	HSS	Cobalt	Cobalt	Carbide	Carbide	Cobalt	Carbide
Surface Finish	A	○	○◓	○◓	S	S	S	○	S	○	○
Wrought aluminum	√	√	√	√				√		√	√
Cast aluminum <10% Si	√	√	√	√				√		√	√
Cast aluminum >10% Si	√	√	√	√	√	√	√	√	√	√	√
Size Range (mm)	0.800-3.000	0.200-20.000	0.600-16.000	1.000-16.000	1.000-16.000	1.000-16.000	1.000-14.000	3.170-12.700	3.170-12.700	5.000-20.000	1.000-12.000
Sizes page	220	56	110	112	128	134	205	177	178	154	148

Material group	Examples
Aluminium and Al-alloys	EC 1060, 1100, 1145, 1175, 1235, 2011, 2014, 2017, 2018, 2021, 2024, 2025, 2117, 2218, 2219, 2618, 3003, 3004, 3005, 4032, 4032-T6, 5005, 5050, 5052, 5056, 5083, 5086, 5154, 5252, 5254, 5454, 5456, 5457, 5652, 5657, 6053, 6061, 6061-T6, 6063, 6066, 6070, 6101, 6151, 6253, 6262, 6463, 6951, 7001, 7004, 7005, 7039, 7049, 7050, 7075, 7075-T6, 7079, 7175, 7178
Al wrought alloys	1100-0, 3003-H18, 5056-0, 2024-T4, 4043-H18
Al cast alloys	295-T6, 319-F, 356-T6, 380-F, 384-F, 390-F, 443-F, 413-F, 518-F, 713-TS, 850-TS

○ bright ◍ steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN

Extra Length (≤10xD) Drills

Series	6408 / 6412	5020 - 5026	219	535	501	668	390	524	526	503	504
Length	8xD / 15xD	45mm FL - 160 mm FL	10xD	10xD	10xD	10xD	10xD	Extra #1	Extra #1	Extra #2	Extra #3
Shank											
Style	Micro	EB100	W	GT100	GT50	GT100	GT100	GT50	GT100	GT100	GT100
Point Angle	135	Special	130°	130°	130°	130°	130°	130°	130°	130°	130°
Coolant Fed											
Substrate	Carbide	Carbide	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
Surface Finish	○	○	○	○◓	○	Ⓢ	○	○	○◓	○◓	◓
Wrought aluminum	√	√	√	√	√		√	√	√	√	√
Cast aluminum <10% Si	√	√	√	√	√		√	√	√	√	√
Cast aluminum >10% Si	√	√	√	√	√	√	√	√	√	√	√
Size Range (mm)	1.400-3.000	1.200-8.000	0.400-20.640	1.000-14.000	1.000-14.000	1.000-14.000	3.000-13.000	2.000-12.700	8.000-31.000	2.000-13.000	2.500-13.000
Sizes page	221	192	62	107	96	142	96	103	104	99	100

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High-Performance Drill Recommendations

Series	5514	6068	5511	609	6501	6069	6502	5512	6070	5525	4113/ 2485 Insert	6511 - 6514
Length	3xD	4xD	5xD	5xD	5xD	7xD	7xD	7xD	10xD	12xD	3, 5, 7 x D	20xD - 40xD
Shank												
Style	RT100U	RT150GG	RT100U	GS200U 3-flute	RT100R	RT150GG	RT100R	RT100U	RT150GG	RT100C	HT800 / RT800WP	RT100T
Point Angle	140°	130°	140°	150°	Radius	130°	Radius	140°	130°	140°	140°	135°
Coolant Fed												
Substrate	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide
Surface Finish	F	○	F	S	F	○	F	F	○	F	F	A
Cast iron	√	√	√	√	√	√	√	√	√	√	√	√
Spheroidal graphite and malleable cast	√	√	√	√	√	√	√	√	√	√	√	√
Chilled cast iron	√		√		√		√	√			√	
Size range (mm)	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	4.00-20.00	3.00-20.00	3.00-20.00	3.00-20.00	11.50-40.50	3.00-14.00
Sizes page	200	217	195	120	222	218	224	197	219	211	180	226

Material group	Examples
Cast iron	A48-20 B, A48-30 B, A48-40 B, A48-50B, A159G1800, A159G2500, A159G3000, A159G3500, A159G4000
Spheroidal graphite iron and malleable cast iron	60-10-18, 60-40-18, 65-45-12, 80-55-06, 100-70-03, 120-90-02, 32510, 35018, 40010, 50005, 60004, 70003, 80002, 90001, A220-70003, A220-8002, A536
Chilled cast iron	

Stub Length (3xD) Drills

Series	6400	301	660	223	226	653	659	515	5520	730	2463
Length	4xD	Micro	Micro	3xD	3xD (LH)	3xD	3xD	3xD	3xD	3xD	3xD
Shank											
Style	Micro	N	N	N	N	N	GV120	GT500DZ	GU500DZ	N	N
Point Angle	140°	118°	118°	118°	118°	118°	130°	130°	118°	118°	118°
Coolant Fed											
Substrate	Carbide	Cobalt	Cobalt	HSS	HSS	HSS	Cobalt	PM-Cobalt	Cobalt	Carbide	Carbide
Surface Finish	A		S			S	S	F	S		F
Cast iron	√	√	√	√	√	√	√	√	√	√	√
Spheroidal graphite and malleable cast	√	√	√	√	√	√	√	√	√	√	√
Chilled cast iron							√	√			√
Size range (mm)	0.800-3.000	0.050-1.920	0.128-1.900	0.350-48.000	0.320-50.000	0.500-30.160	0.500-15.500	1.000-14.000	1.000-14.000	0.500-16.000	1.000-16.000
Sizes page	220	82	138	63	68	130	136	101	206	147	169

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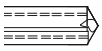
Jobber Length (5xD) Drills

Series	205	208	651	549	652	658	5519	657	1132	732	2464
											
Length	5xD	5xD (LH)	5xD	5xD	5xD	5xD	5xD	5xD	5xD	5xD	5xD
Shank											
Style	N	N	N	GT100	GT100	GT100	GU500DZ	Ti	GT80	N	N
Point Angle	118°	118°	118°	130°	130°	130°	118°	130°	130°	118°	118°
Coolant Fed											
Substrate	HSS	HSS	HSS	HSS	HSS	Cobalt	Cobalt	Cobalt	Cobalt	Carbide	Carbide
Surface Finish											
Cast iron	√	√	√	√	√	√	√		√	√	√
Spheroidal graphite and malleable cast	√	√	√	√	√	√	√		√	√	√
Chilled cast iron								√	√		√
Size range (mm)	0.200-20.000	0.200-20.000	0.200-19.500	0.600-16.000	1.000-16.000	1.000-16.000	1.000-14.000	0.500-14.500	5.000-20.000	1.000-12.000	1.000-12.000
Sizes page	50	58	125	110	128	134	205	133	155	148	171

Material group	Examples
Cast iron	A48-20 B, A48-30 B, A48-40 B, A48-50B, A159G1800, A159G2500, A159G3000, A159G3500, A159G4000
Spheroidal graphite iron and malleable cast iron	60-10-18, 60-40-18, 65-45-12, 80-55-06, 100-70-03, 120-90-02, 32510, 35018, 40010, 50005, 60004, 70003, 80002, 90001, A220-70003, A220-8002, A536
Chilled cast iron	

○ bright ● steam oxide ◓ nitrided lands ● nitrided Ⓢ TiN

Extra Length (≤10xD) Drills

Series	6408 / 6412	5020 - 5026	654	217	336	669	670	526	671	504
										
Length	8xD / 15xD	45mm FL - 160 mm FL	10xD	10xD	10xD	10xD	Extra #1	Extra #1	Extra #2	Extra #3
Shank										
Style	Micro	EB100	N	N	GT100	Ti	GT100	GT100	GT100	GT100
Point Angle	135	Special	118˚	118˚	130°	130°	130°	130°	130°	130°
Coolant Fed										
Substrate	Carbide	Carbide	HSS	HSS	Cobalt	Cobalt	HSS	HSS	HSS	HSS
Surface Finish										
Cast iron	√	√	√	√	√		√	√	√	√
Spheroidal graphite and malleable cast	√	√	√	√	√		√	√	√	√
Chilled cast iron						√	√		√	
Size range (mm)	1.400 - 3.000	1.200 - 8.000	3.000 - 31.000	0.400 - 36.510	1.000 - 16.000	1.000 - 10.200	1.980 - 12.700	8.000 - 31.000	2.700 - 8.500	2.500 - 13.000
Sizes page	221	192	132	60	93	144	145	104	146	100

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High-Performance Drill Recommendations

Series	5514	5510	8510	5515	5511	8511	5518	609	5512	4044	4112 / 2485 Insert
Length	3xD	3xD	3xD	5xD	5xD	5xD	5xD	5xD	7xD	7xD	3, 5, 7 x D
Shank											
Style	RT100U	RT100U	RT100VA	RT100U	RT100U	RT100VA	GS200G 3-flute	GS200U 3-flute	RT100U	RT100X	HT800 / RT800WP
Point Angle	140°	140°	140°	140°	140°	140°	130°	150°	140°	140°	140°
Coolant Fed											
Substrate	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide	Carbide
Surface Finish	F	F	a	F	F	a	○	S	F	N	F
Special alloys	√	√	√	√	√	√		√	√	√	√
Ti and Ti-alloys	√	√	√	√	√	√	√	√	√	√	√
Magnesium alloys	√	√	√	√	√	√		√	√	√	√
Size Range (mm)	3.00-20.00	3.00-20.00	3.00-16.00	3.00-20.00	3.00-20.00	3.00-16.00	3.00-20.00	3.00 - 20.00	3.00-20.00	4.00-20.00	11.50-40.50
Sizes page	200	193	228	202	195	230	204	120	197	190	180

Material group	Examples
Special alloys	Inconel, Hastelloy, Monel, Nimonic, MAR-M246, DS-Ni, Waspalloy, Rene41
Ti and Ti-alloys	Ti6AL4V, 5390A, TiCu2
Magnesium alloys	AZ31B, AZ63A, AZ80A, AZ91C, EZ33A, HK31A, QE22A, ZK60A

Stub Length (3xD) Drills

Series	6400	329	659	515	2463
					
Length	4xD	3xD	3xD	3xD	3xD
Shank					
Style	Micro	GV120	GV120	GT500DZ	N
Point Angle	140°	130°	130°	130°	118°
Coolant Fed					
Substrate	Carbide	Cobalt	Cobalt	PM-Cobalt	Carbide
Surface Finish	A		S	F	F
Special alloys	√		√	√	
Ti and Ti-alloys	√		√	√	√
Magnesium alloys	√	√	√	√	√
Size Range (mm)	0.800 - 3.000	0.400 - 48.000	0.500 - 15.500	1.000 - 14.000	1.000 - 16.000
Sizes page	220	91	136	101	169

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Jobber Length (5xD) Drills

Series	6401	605	657	658	1223	530	2464
							
Length	7xD	5xD	5xD	5xD	5xD	5xD	5xD
Shank							
Style	Micro	Ti	Ti	GT100	GT100	GT500DZ	N
Point Angle	140°	130°	130°	130°	130°	130°	118°
Coolant Fed							
Substrate	Carbide	Cobalt	Cobalt	Cobalt	Cobalt	PM-Cobalt	Carbide
Surface Finish	A	○	S	S	A	F	F
Special alloys	√		√			√	
Ti and Ti-alloys	√	√				√	√
Magnesium alloys	√	√	√	√	√	√	√
Size Range (mm)	0.800-3.000	0.200 - 19.000	0.500 - 14.500	1.000 - 16.000	3.000 - 12.000	1.000 - 14.000	1.000 - 12.000
Sizes page	220	118	133	134	161	106	171

Material group	Examples
Special alloys	Inconel, Hastelloy, Monel, Nimonic, MAR-M246, DS-Ni, Waspalloy, Rene41
Ti and Ti-alloys	Ti6AL4V, 5390A, TiCu2
Magnesium alloys	AZ31B, AZ63A, AZ80A, AZ91C, EZ33A, HK31A, QE22A, ZK60A

Extra Length (≤10xD) Drills

Series	6408 / 6412	5020 - 5026	617	669	336	618	619	6511 - 6514
Length	8xD / 15xD	45mm FL - 160 mm FL	10xD	10xD	10xD	Extra #1	Extra #2	20xD - 40xD
Shank								
Style	Micro	EB100	Ti	Ti	GT100	GT100	GT100	RT100T
Point Angle	135	Special	130°	130°	130°	130°	130°	135°
Coolant Fed								
Substrate	Carbide	Carbide	Cobalt	Cobalt	Cobalt	Cobalt	Cobalt	Carbide
Surface Finish	○	○	○	(S)	○◓	◓	◓	(A)
Special alloys	√	√		√	√	√	√	√
Ti and Ti-alloys	√	√	√	√	√	√	√	
Magnesium alloys	√	√		√	√	√	√	√
Size Range (mm)	1.400 - 3.000	1.200 - 8.000	1.000 - 13.000	1.000 - 10.200	1.000 - 16.000	2.700 - 10.000	3.000 - 10.000	3.000-14.000
Sizes page	221	192	121	144	93	122	123	226

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GUHRING

Standard drill offering

Packaging Details

Tool group	Standard	Units per package
Straight shank HSS twist drills	DIN 338 DIN 1897 and similar Guhring standards	Ø 7.50 mm packed in units of 10 Ø 7.50 ... Ø 10.60 mm packed in units of 5* Ø 10.60 mm 1 unit per package
	DIN 339 DIN 340 and similar Guhring standards	Ø 6.70 mm packed in units of 10 Ø 6.70 ... Ø 10.60 mm packed in units of 5 Ø 10.60 mm 1 unit per package
	DIN 1869	Ø 7.50 mm packed in units of 10 Ø 7.50 ... Ø 10.60 mm packed in units of 5 Ø 10.60 mm 1 unit per package
Taper shank HSS twist drills	all DIN-standards and Guhring-standards	all sizes supplied 1 unit per package
Carbide and carbide tipped twist drills	all DIN-standards and Guhring-standards	Ø 2.00 mm packed in units of 10 Ø 2.00 mm 1 unit per package
Micro-precision drills	DIN 1899	all sizes supplied packed in units of 10
Metric center drills	DIN 333 form A, form R	Ø 4.00 mm packed in units of 10 Ø 4.00 mm 1 unit per package
	DIN 333 form B	Ø 2.50 mm packed in units of 10 Ø 2.50 mm 1 unit per package

*coated tools packed in units of 10

Tool group	Standard	Units per package
HSS machine taps and fluteless machine taps	DIN 371 DIN 376 DIN 374 DIN 2174 DIN 2184	≤ M12 mm packed in units of 5 > M12 mm 1 unit per package

Tool group	Standard	Units per package
Milling cutters and reamers all tool materials	all DIN-standards and Guhring-standards	all sizes supplied 1 unit per package

5xD

Steam Oxide
>2.36 mm dia.

External Coolant

Straight Shank

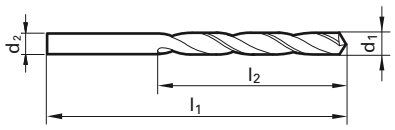
Speeds & Feeds
information pg 337

Series 205

General Purpose

HSS, general purpose (Type N), jobber length, 118° point, Form A
web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels / Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0083		91	0.210	19.00	2.50
0.0087		90	0.220	19.00	2.50
0.0091		89	0.230	19.00	2.50
0.0094		88	0.240	19.00	2.50
0.0098		87	0.250	19.00	3.00
0.0102			0.260	19.00	3.00
0.0106		86	0.270	19.00	3.00
0.0110		85	0.280	19.00	3.00
0.0114		84	0.290	19.00	3.00
0.0118			0.300	19.00	3.00
0.0122		83	0.310	19.00	4.00
0.0126		82	0.320	19.00	4.00
0.0130		81	0.330	19.00	4.00
0.0134		80	0.340	19.00	4.00
0.0138			0.350	19.00	4.00
0.0142			0.360	19.00	4.00
0.0146		79	0.370	19.00	4.00
0.0150			0.380	19.00	4.00
0.0154			0.390	20.00	5.00
0.0157	1/64		0.400	20.00	5.00
0.0161		78	0.410	20.00	5.00
0.0165			0.420	20.00	5.00
0.0169			0.430	20.00	5.00
0.0173			0.440	20.00	5.00
0.0177			0.450	20.00	5.00
0.0181		77	0.460	20.00	5.00
0.0185			0.470	20.00	5.00
0.0189			0.480	20.00	5.00
0.0193			0.490	22.00	6.00
0.0197			0.500	22.00	6.00
0.0201		76	0.510	22.00	6.00
0.0205			0.520	22.00	6.00
0.0209		75	0.530	22.00	6.00
0.0213			0.540	24.00	7.00
0.0217			0.550	24.00	7.00
0.0220			0.560	24.00	7.00
0.0224		74	0.570	24.00	7.00
0.0228			0.580	24.00	7.00
0.0232			0.590	24.00	7.00
0.0236			0.600	24.00	7.00
0.0240		73	0.610	26.00	8.00
0.0244			0.620	26.00	8.00
0.0248			0.630	26.00	8.00
0.0252		72	0.640	26.00	8.00
0.0256			0.650	26.00	8.00
0.0260		71	0.660	26.00	8.00
0.0264			0.670	26.00	8.00
0.0266			0.675	28.00	9.00
0.0268			0.680	28.00	9.00
0.0272			0.690	28.00	9.00
0.0276			0.700	28.00	9.00
0.0280		70	0.710	28.00	9.00
0.0283			0.720	28.00	9.00
0.0287			0.730	28.00	9.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0291		69	0.740	28.00	9.00
0.0295			0.750	28.00	9.00
0.0299			0.760	30.00	10.00
0.0303			0.770	30.00	10.00
0.0307			0.780	30.00	10.00
0.0311	1/32	68	0.790	30.00	10.00
0.0315			0.800	30.00	10.00
0.0319		67	0.810	30.00	10.00
0.0323			0.820	30.00	10.00
0.0327			0.830	30.00	10.00
0.0331		66	0.840	30.00	10.00
0.0335			0.850	30.00	10.00
0.0339			0.860	32.00	11.00
0.0343			0.870	32.00	11.00
0.0346			0.880	32.00	11.00
0.0350		65	0.890	32.00	11.00
0.0354			0.900	32.00	11.00
0.0358		64	0.910	32.00	11.00
0.0362			0.920	32.00	11.00
0.0366			0.930	32.00	11.00
0.0370		63	0.940	32.00	11.00
0.0374			0.950	32.00	11.00
0.0378			0.960	34.00	12.00
0.0382		62	0.970	34.00	12.00
0.0386			0.980	34.00	12.00
0.0390		61	0.990	34.00	12.00
0.0394			1.000	34.00	12.00
0.0398			1.010	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0406			1.030	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0413			1.050	34.00	12.00
0.0417			1.060	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0425			1.080	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0437			1.110	36.00	14.00
0.0441			1.120	36.00	14.00
0.0445			1.130	36.00	14.00
0.0449			1.140	36.00	14.00
0.0453			1.150	36.00	14.00
0.0457			1.160	36.00	14.00
0.0461			1.170	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0476			1.210	38.00	16.00
0.0480			1.220	38.00	16.00
0.0484			1.230	38.00	16.00
0.0488			1.240	38.00	16.00
0.0492			1.250	38.00	16.00
0.0496			1.260	38.00	16.00
0.0500			1.270	38.00	16.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0504			1.280	38.00	16.00
0.0508			1.290	38.00	16.00
0.0512			1.300	38.00	16.00
0.0516			1.310	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0524			1.330	40.00	18.00
0.0528			1.340	40.00	18.00
0.0531			1.350	40.00	18.00
0.0535			1.360	40.00	18.00
0.0539			1.370	40.00	18.00
0.0543			1.380	40.00	18.00
0.0547			1.390	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0555			1.410	40.00	18.00
0.0559			1.420	40.00	18.00
0.0563			1.430	40.00	18.00
0.0567			1.440	40.00	18.00
0.0571			1.450	40.00	18.00
0.0575			1.460	40.00	18.00
0.0579			1.470	40.00	18.00
0.0583			1.480	40.00	18.00
0.0587			1.490	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0598			1.520	43.00	20.00
0.0602			1.530	43.00	20.00
0.0606			1.540	43.00	20.00
0.0610			1.550	43.00	20.00
0.0614			1.560	43.00	20.00
0.0618			1.570	43.00	20.00
0.0622			1.580	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0638			1.620	43.00	20.00
0.0642			1.630	43.00	20.00
0.0646			1.640	43.00	20.00
0.0650			1.650	43.00	20.00
0.0654			1.660	43.00	20.00
0.0657			1.670	43.00	20.00
0.0661			1.680	43.00	20.00
0.0665			1.690	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0673			1.710	46.00	22.00
0.0677			1.720	46.00	22.00
0.0681			1.730	46.00	22.00
0.0685			1.740	46.00	22.00
0.0689			1.750	46.00	22.00
0.0693			1.760	46.00	22.00
0.0697			1.770	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0705			1.790	46.00	22.00
0.0709			1.800	46.00	22.00
0.0713			1.810	46.00	22.00

To order: Series number + mm, ex. 5518 3.000

Series 205

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Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.0717			1.820	46.00	22.00
0.0720			1.830	46.00	22.00
0.0724			1.840	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0732			1.860	46.00	22.00
0.0736			1.870	46.00	22.00
0.0740			1.880	46.00	22.00
0.0744			1.890	46.00	22.00
0.0748			1.900	46.00	22.00
0.0752			1.910	49.00	24.00
0.0756			1.920	49.00	24.00
0.0760		48	1.930	49.00	24.00
0.0764			1.940	49.00	24.00
0.0768			1.950	49.00	24.00
0.0772			1.960	49.00	24.00
0.0776			1.970	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0795			2.020	49.00	24.00
0.0799			2.030	49.00	24.00
0.0807			2.050	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0815			2.070	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0823			2.090	49.00	24.00
0.0827			2.100	49.00	24.00
0.0831			2.110	49.00	24.00
0.0839			2.130	53.00	27.00
0.0843			2.140	53.00	27.00
0.0846			2.150	53.00	27.00
0.0854			2.170	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0882			2.240	53.00	27.00
0.0886			2.250	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0894			2.270	53.00	27.00
0.0902			2.290	53.00	27.00
0.0906			2.300	53.00	27.00
0.0913			2.320	53.00	27.00
0.0921			2.340	53.00	27.00
0.0925			2.350	53.00	27.00
0.0929			2.360	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0941			2.390	57.00	30.00
0.0945			2.400	57.00	30.00
0.0953			2.420	57.00	30.00
0.0957			2.430	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0965			2.450	57.00	30.00
0.0969			2.460	57.00	30.00
0.0972			2.470	57.00	30.00
0.0976			2.480	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0988			2.510	57.00	30.00
0.0992			2.520	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1000			2.540	57.00	30.00
0.1004			2.550	57.00	30.00
0.1012			2.570	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1031			2.620	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1051			2.670	61.00	33.00
0.1055			2.680	61.00	33.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1071			2.720	61.00	33.00
0.1075			2.730	61.00	33.00
0.1083			2.750	61.00	33.00
0.1087			2.760	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1134			2.880	61.00	33.00
0.1142			2.900	61.00	33.00
0.1146			2.910	61.00	33.00
0.1154			2.930	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1165			2.960	61.00	33.00
0.1173			2.980	61.00	33.00
0.1177			2.990	61.00	33.00
0.1181			3.000	61.00	33.00
0.1185			3.010	65.00	36.00
0.1197			3.040	65.00	36.00
0.1201		31	3.050	65.00	36.00
0.1209			3.070	65.00	36.00
0.1213			3.080	65.00	36.00
0.1220			3.100	65.00	36.00
0.1228			3.120	65.00	36.00
0.1232			3.130	65.00	36.00
0.1240			3.150	65.00	36.00
0.1244			3.160	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1252			3.180	65.00	36.00
0.1260			3.200	65.00	36.00
0.1268			3.220	65.00	36.00
0.1272			3.230	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1307			3.320	65.00	36.00
0.1319			3.350	65.00	36.00
0.1339			3.400	70.00	39.00
0.1346			3.420	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1386			3.520	70.00	39.00
0.1398			3.550	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1421			3.610	70.00	39.00
0.1425			3.620	70.00	39.00
0.1437			3.650	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1449			3.680	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1504			3.820	75.00	43.00
0.1516			3.850	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1547			3.930	75.00	43.00
0.1555			3.950	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1579			4.010	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1594			4.050	75.00	43.00
0.1598			4.060	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1681			4.270	80.00	47.00
0.1693		18	4.300	80.00	47.00
0.1701			4.320	80.00	47.00
0.1713			4.350	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1740			4.420	80.00	47.00
0.1752			4.450	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1780			4.520	80.00	47.00
0.1783			4.530	80.00	47.00
0.1791			4.550	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1831			4.650	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1870			4.750	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1902			4.830	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1913			4.860	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1949			4.950	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1980			5.030	86.00	52.00
0.1988			5.050	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2028			5.150	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2067			5.250	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2106			5.350	93.00	57.00
0.2126			5.400	93.00	57.00
0.2130		3	5.410	93.00	57.00
0.2146			5.450	93.00	57.00
0.2165			5.500	93.00	57.00
0.2185			5.550	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2224			5.650	93.00	57.00
0.2244			5.700	93.00	57.00

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Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.2264			5.750	93.00	57.00
0.2280		1	5.790	93.00	57.00
0.2283			5.800	93.00	57.00
0.2303			5.850	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2350			5.970	93.00	57.00
0.2354			5.980	93.00	57.00
0.2362			6.000	93.00	57.00
0.2374			6.030	101.00	63.00
0.2378		B	6.040	101.00	63.00
0.2382			6.050	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2449			6.220	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2539			6.450	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2579			6.550	101.00	63.00
0.2598			6.600	101.00	63.00
0.2610		G	6.630	101.00	63.00
0.2618			6.650	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2661			6.760	109.00	69.00
0.2677			6.800	109.00	69.00
0.2697			6.850	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2736			6.950	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2776			7.050	109.00	69.00
0.2783			7.070	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2815			7.150	109.00	69.00
0.2835			7.200	109.00	69.00
0.2854			7.250	109.00	69.00
0.2874			7.300	109.00	69.00
0.2894			7.350	109.00	69.00
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2933			7.450	109.00	69.00
0.2949		M	7.490	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2972			7.550	117.00	75.00
0.2992			7.600	117.00	75.00
0.3012			7.650	117.00	75.00
0.3020		N	7.670	117.00	75.00
0.3031			7.700	117.00	75.00
0.3051			7.750	117.00	75.00
0.3071			7.800	117.00	75.00
0.3091			7.850	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3130			7.950	117.00	75.00
0.3142			7.980	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3169			8.050	117.00	75.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.3189			8.100	117.00	75.00
0.3201			8.130	117.00	75.00
0.3209			8.150	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3248			8.250	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3287			8.350	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3327			8.450	117.00	75.00
0.3346			8.500	117.00	75.00
0.3366			8.550	125.00	81.00
0.3386			8.600	125.00	81.00
0.3390		R	8.610	125.00	81.00
0.3406			8.650	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3445			8.750	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3484			8.850	125.00	81.00
0.3504			8.900	125.00	81.00
0.3524			8.950	125.00	81.00
0.3543			9.000	125.00	81.00
0.3555			9.030	125.00	81.00
0.3563			9.050	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3602			9.150	125.00	81.00
0.3622			9.200	125.00	81.00
0.3642			9.250	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3681			9.350	125.00	81.00
0.3701			9.400	125.00	81.00
0.3720			9.450	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3760			9.550	133.00	87.00
0.3772		V	9.580	133.00	87.00
0.3780			9.600	133.00	87.00
0.3799			9.650	133.00	87.00
0.3819			9.700	133.00	87.00
0.3839			9.750	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3878			9.850	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3917			9.950	133.00	87.00
0.3937			10.000	133.00	87.00
0.3953			10.040	133.00	87.00
0.3969		X	10.080	133.00	87.00
0.3976			10.100	133.00	87.00
0.3996			10.150	133.00	87.00
0.4016			10.200	133.00	87.00
0.4035			10.250	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4075			10.350	133.00	87.00
0.4094			10.400	133.00	87.00
0.4130		Z	10.490	133.00	87.00
0.4134			10.500	133.00	87.00
0.4173			10.600	133.00	87.00
0.4213			10.700	142.00	94.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.4220	27/64		10.720	142.00	94.00
0.4232			10.750	142.00	94.00
0.4252			10.800	142.00	94.00
0.4291			10.900	142.00	94.00
0.4331			11.000	142.00	94.00
0.4350			11.050	142.00	94.00
0.4370			11.100	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4390			11.150	142.00	94.00
0.4409			11.200	142.00	94.00
0.4429			11.250	142.00	94.00
0.4449			11.300	142.00	94.00
0.4469			11.350	142.00	94.00
0.4488			11.400	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4567			11.600	142.00	94.00
0.4606			11.700	142.00	94.00
0.4626			11.750	142.00	94.00
0.4646			11.800	142.00	94.00
0.4685			11.900	151.00	101.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4744			12.050	151.00	101.00
0.4764			12.100	151.00	101.00
0.4783			12.150	151.00	101.00
0.4803			12.200	151.00	101.00
0.4823			12.250	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4882			12.400	151.00	101.00
0.4921			12.500	151.00	101.00
0.4961			12.600	151.00	101.00
0.4980			12.650	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5020			12.750	151.00	101.00
0.5039			12.800	151.00	101.00
0.5059			12.850	151.00	101.00
0.5079			12.900	151.00	101.00
0.5118			13.000	151.00	101.00
0.5157	33/64		13.100	151.00	101.00
0.5177			13.150	151.00	101.00
0.5197			13.200	151.00	101.00
0.5217			13.250	160.00	108.00
0.5236			13.300	160.00	108.00
0.5276			13.400	160.00	108.00
0.5311	17/32		13.490	160.00	108.00
0.5315			13.500	160.00	108.00
0.5354			13.600	160.00	108.00
0.5394			13.700	160.00	108.00
0.5413			13.750	160.00	108.00
0.5433			13.800	160.00	108.00
0.5469	35/64		13.890	160.00	108.00
0.5472			13.900	160.00	108.00
0.5512			14.000	160.00	108.00
0.5531			14.050	169.00	114.00
0.5551			14.100	169.00	114.00
0.5591			14.200	169.00	114.00
0.5610			14.250	169.00	114.00
0.5626	9/16		14.290	169.00	114.00
0.5630			14.300	169.00	114.00
0.5669			14.400	169.00	114.00
0.5709			14.500	169.00	114.00
0.5748			14.600	169.00	114.00
0.5780	37/64		14.680	169.00	114.00
0.5787			14.700	169.00	114.00
0.5807			14.750	169.00	114.00
0.5827			14.800	169.00	114.00

To order: Series number + mm, ex. 5518 3.000

Series 205

Speeds & Feeds information pg 337

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.5846			14.850	169.00	114.00
0.5866			14.900	169.00	114.00
0.5906			15.000	169.00	114.00
0.5937	19/32		15.080	178.00	120.00
0.5945			15.100	178.00	120.00
0.5984			15.200	178.00	120.00
0.6004			15.250	178.00	120.00
0.6024			15.300	178.00	120.00
0.6063			15.400	178.00	120.00
0.6094	39/64		15.480	178.00	120.00
0.6102			15.500	178.00	120.00
0.6142			15.600	178.00	120.00
0.6181			15.700	178.00	120.00
0.6201			15.750	178.00	120.00
0.6220			15.800	178.00	120.00
0.6248	5/8		15.870	178.00	120.00
0.6260			15.900	178.00	120.00
0.6299			16.000	178.00	120.00
0.6339			16.100	184.00	125.00
0.6378			16.200	184.00	125.00
0.6398			16.250	184.00	125.00
0.6406	41/64		16.270	184.00	125.00
0.6417			16.300	184.00	125.00
0.6457			16.400	184.00	125.00
0.6496			16.500	184.00	125.00
0.6535			16.600	184.00	125.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.6563	21/32		16.670	184.00	125.00
0.6575			16.700	184.00	125.00
0.6594			16.750	184.00	125.00
0.6614			16.800	184.00	125.00
0.6654			16.900	184.00	125.00
0.6693			17.000	184.00	125.00
0.6720	43/64		17.070	191.00	130.00
0.6732			17.100	191.00	130.00
0.6772			17.200	191.00	130.00
0.6791			17.250	191.00	130.00
0.6811			17.300	191.00	130.00
0.6850			17.400	191.00	130.00
0.6874	11/16		17.460	191.00	130.00
0.6890			17.500	191.00	130.00
0.6929			17.600	191.00	130.00
0.6969			17.700	191.00	130.00
0.6988			17.750	191.00	130.00
0.7008			17.800	191.00	130.00
0.7031	45/64		17.860	191.00	130.00
0.7047			17.900	191.00	130.00
0.7087			18.000	191.00	130.00
0.7126			18.100	198.00	135.00
0.7165			18.200	198.00	135.00
0.7185			18.250	198.00	135.00
0.7189	23/32		18.260	198.00	135.00
0.7205			18.300	198.00	135.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.7244			18.400	198.00	135.00
0.7283			18.500	198.00	135.00
0.7323			18.600	198.00	135.00
0.7343	47/64		18.650	198.00	135.00
0.7382			18.750	198.00	135.00
0.7402			18.800	198.00	135.00
0.7441			18.900	198.00	135.00
0.7480			19.000	198.00	135.00
0.7500	3/4		19.050	205.00	140.00
0.7520			19.100	205.00	140.00
0.7559			19.200	205.00	140.00
0.7579			19.250	205.00	140.00
0.7638			19.400	205.00	140.00
0.7677			19.500	205.00	140.00
0.7717			19.600	205.00	140.00
0.7776			19.750	205.00	140.00
0.7811	25/32		19.840	205.00	140.00
0.7874			20.000	205.00	140.00

Alternative Drill Series:

#651 HSS, GP, 5xD, 118 pt, TiN
#305 Cobalt, GP, 5xD, 118 pt, Oxide
#732 Carbide, GP, 5xD, 130 pt, Bright
#5523 Cobalt, GU500, 5xD, 118 pt, Bright
#5519 Cobalt, GU500, 5xD, 118 pt, TiN

5xD

Bright Finish

External Coolant

Straight Shank

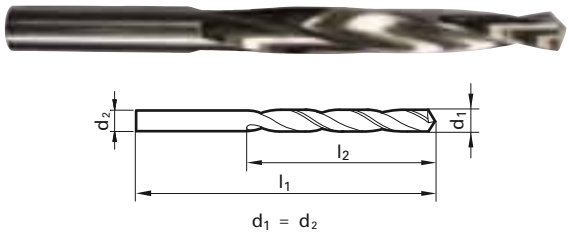
Speeds & Feeds information pg 337

Series 206

Low Helix

HSS, Low Helix (Type H), jobber length, 118° point, Form A web thinned >14.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

General Steels/Brass

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0079		92	0.200	19.00	2.50
0.0094		88	0.240	19.00	2.50
0.0098		87	0.250	19.00	3.00
0.0118			0.300	19.00	3.00
0.0134		80	0.340	19.00	4.00
0.0138			0.350	19.00	4.00
0.0157	1/64		0.400	20.00	5.00
0.0161		78	0.410	20.00	5.00
0.0177			0.450	20.00	5.00
0.0181		77	0.460	20.00	5.00
0.0197			0.500	22.00	6.00
0.0201		76	0.510	22.00	6.00
0.0209		75	0.530	22.00	6.00
0.0217			0.550	24.00	7.00
0.0224		74	0.570	24.00	7.00
0.0236			0.600	24.00	7.00
0.0244			0.620	26.00	8.00
0.0256			0.650	26.00	8.00
0.0260		71	0.660	26.00	8.00
0.0276			0.700	28.00	9.00
0.0283			0.720	28.00	9.00
0.0287			0.730	28.00	9.00
0.0291		69	0.740	28.00	9.00
0.0295			0.750	28.00	9.00
0.0299			0.760	30.00	10.00
0.0303			0.770	30.00	10.00
0.0311	1/32	68	0.790	30.00	10.00
0.0315			0.800	30.00	10.00
0.0319		67	0.810	30.00	10.00
0.0327			0.830	30.00	10.00
0.0331		66	0.840	30.00	10.00
0.0335			0.850	30.00	10.00
0.0339			0.860	32.00	11.00
0.0343			0.870	32.00	11.00
0.0346			0.880	32.00	11.00
0.0350		65	0.890	32.00	11.00
0.0354			0.900	32.00	11.00
0.0358		64	0.910	32.00	11.00
0.0366			0.930	32.00	11.00
0.0374			0.950	32.00	11.00
0.0378			0.960	34.00	12.00
0.0382		62	0.970	34.00	12.00
0.0390		61	0.990	34.00	12.00
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0413			1.050	34.00	12.00
0.0433			1.100	36.00	14.00
0.0453			1.150	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0480			1.220	38.00	16.00
0.0492			1.250	38.00	16.00
0.0500			1.270	38.00	16.00
0.0504			1.280	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0524			1.330	40.00	18.00
0.0531			1.350	40.00	18.00
0.0539			1.370	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0563			1.430	40.00	18.00
0.0567			1.440	40.00	18.00
0.0571			1.450	40.00	18.00
0.0579			1.470	40.00	18.00
0.0591			1.500	40.00	18.00
0.0602			1.530	43.00	20.00
0.0606			1.540	43.00	20.00
0.0610			1.550	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0638			1.620	43.00	20.00
0.0650			1.650	43.00	20.00
0.0657			1.670	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0677			1.720	46.00	22.00
0.0681			1.730	46.00	22.00
0.0689			1.750	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0756			1.920	49.00	24.00
0.0768			1.950	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0787			2.000	49.00	24.00
0.0795			2.020	49.00	24.00
0.0807			2.050	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0815			2.070	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0886			2.250	53.00	27.00
0.0894			2.270	53.00	27.00
0.0906			2.300	53.00	27.00
0.0925			2.350	53.00	27.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0965			2.450	57.00	30.00
0.0972			2.470	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1012			2.570	57.00	30.00
0.1024			2.600	57.00	30.00
0.1035			2.630	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1142			2.900	61.00	33.00
0.1150			2.920	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1240			3.150	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1268			3.220	65.00	36.00
0.1280			3.250	65.00	36.00
0.1299			3.300	65.00	36.00
0.1319			3.350	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1398			3.550	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1437			3.650	70.00	39.00
0.1457			3.700	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1508			3.830	75.00	43.00
0.1516			3.850	75.00	43.00
0.1524			3.870	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1555			3.950	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1583			4.020	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1594			4.050	75.00	43.00
0.1614			4.100	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1752			4.450	80.00	47.00
0.1772		16	4.500	80.00	47.00

To order: Series number + mm, ex. 5518 3.000

Series 206

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Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.1811			4.600	80.00	47.00
0.1831			4.650	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1870			4.750	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1949			4.950	86.00	52.00
0.1969			5.000	86.00	52.00
0.1988			5.050	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2067			5.250	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2382			6.050	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2539			6.450	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2579			6.550	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2854			7.250	109.00	69.00
0.2874			7.300	109.00	69.00
0.2894			7.350	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3051			7.750	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3169			8.050	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3248			8.250	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3642			9.250	125.00	81.00
0.3661			9.300	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3839			9.750	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.3937			10.000	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4035			10.250	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4134			10.500	133.00	87.00
0.4173			10.600	133.00	87.00
0.4220	27/64		10.720	142.00	94.00
0.4252			10.800	142.00	94.00
0.4291			10.900	142.00	94.00
0.4331			11.000	142.00	94.00
0.4370			11.100	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4449			11.300	142.00	94.00
0.4488			11.400	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4567			11.600	142.00	94.00
0.4606			11.700	142.00	94.00
0.4646			11.800	142.00	94.00
0.4685			11.900	151.00	101.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4764			12.100	151.00	101.00
0.4803			12.200	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5039			12.800	151.00	101.00
0.5118			13.000	151.00	101.00
0.5197			13.200	151.00	101.00
0.5315			13.500	160.00	108.00
0.5512			14.000	160.00	108.00
0.5709			14.500	169.00	114.00
0.5906			15.000	169.00	114.00
0.6299			16.000	178.00	120.00
0.6693			17.000	184.00	125.00
0.7087			18.000	191.00	130.00
0.7480			19.000	198.00	135.00
0.7874			20.000	205.00	140.00

Alternative Drill Series:

#205 HSS, GP, 5xD, 118 pt, Oxide

5xD

Bright Finish

External Coolant

Straight Shank

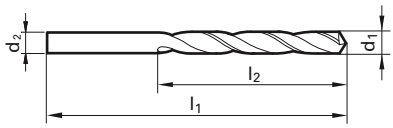
Speeds & Feeds information pg 338

Series 207

High Helix

HSS, High Helix (Type W), jobber length, 130° point, Form A web thinned >14.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

General Steels/Brass

Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0079		92	0.200	19.00	2.50
0.0118			0.300	19.00	3.00
0.0138			0.350	19.00	4.00
0.0157	1/64		0.400	20.00	5.00
0.0177			0.450	20.00	5.00
0.0181		77	0.460	20.00	5.00
0.0197			0.500	22.00	6.00
0.0201		76	0.510	22.00	6.00
0.0217			0.550	24.00	7.00
0.0224		74	0.570	24.00	7.00
0.0236			0.600	24.00	7.00
0.0240		73	0.610	26.00	8.00
0.0244			0.620	26.00	8.00
0.0252		72	0.640	26.00	8.00
0.0256			0.650	26.00	8.00
0.0260		71	0.660	26.00	8.00
0.0276			0.700	28.00	9.00
0.0295			0.750	28.00	9.00
0.0307			0.780	30.00	10.00
0.0311	1/32	68	0.790	30.00	10.00
0.0315			0.800	30.00	10.00
0.0319		67	0.810	30.00	10.00
0.0331		66	0.840	30.00	10.00
0.0335			0.850	30.00	10.00
0.0339			0.860	32.00	11.00
0.0343			0.870	32.00	11.00
0.0354			0.900	32.00	11.00
0.0374			0.950	32.00	11.00
0.0382		62	0.970	34.00	12.00
0.0386			0.980	34.00	12.00
0.0390		61	0.990	34.00	12.00
0.0394			1.000	34.00	12.00
0.0398			1.010	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0413			1.050	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0425			1.080	36.00	14.00
0.0433			1.100	36.00	14.00
0.0441			1.120	36.00	14.00
0.0453			1.150	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0480			1.220	38.00	16.00
0.0492			1.250	38.00	16.00
0.0500			1.270	38.00	16.00
0.0512			1.300	38.00	16.00
0.0516			1.310	38.00	16.00
0.0524			1.330	40.00	18.00
0.0531			1.350	40.00	18.00
0.0543			1.380	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0559			1.420	40.00	18.00
0.0563			1.430	40.00	18.00
0.0571			1.450	40.00	18.00
0.0579			1.470	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0610			1.550	43.00	20.00
0.0622			1.580	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0650			1.650	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0689			1.750	46.00	22.00
0.0693			1.760	46.00	22.00
0.0697			1.770	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0768			1.950	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0787			2.000	49.00	24.00
0.0795			2.020	49.00	24.00
0.0807			2.050	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0866			2.200	53.00	27.00
0.0874			2.220	53.00	27.00
0.0886			2.250	53.00	27.00
0.0906			2.300	53.00	27.00
0.0913			2.320	53.00	27.00
0.0925			2.350	53.00	27.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0965			2.450	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00
0.1071			2.720	61.00	33.00
0.1075			2.730	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1193			3.030	65.00	36.00
0.1201		31	3.050	65.00	36.00
0.1205			3.060	65.00	36.00
0.1220			3.100	65.00	36.00
0.1240			3.150	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1319			3.350	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1390			3.530	70.00	39.00
0.1398			3.550	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1437			3.650	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1516			3.850	75.00	43.00
0.1535			3.900	75.00	43.00
0.1555			3.950	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1594			4.050	75.00	43.00
0.1614			4.100	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1713			4.350	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1831			4.650	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1870			4.750	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1949			4.950	86.00	52.00
0.1969			5.000	86.00	52.00
0.1988			5.050	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00

To order: Series number + mm, ex. 5518 3.000

Series 207

Speeds & Feeds information pg 338

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2067			5.250	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2146			5.450	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2283			5.800	93.00	57.00
0.2303			5.850	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2618			6.650	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2697			6.850	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2736			6.950	109.00	69.00
0.2756			7.000	109.00	69.00
0.2776			7.050	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2854			7.250	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3051			7.750	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3209			8.150	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3248			8.250	117.00	75.00
0.3268			8.300	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3445			8.750	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3969		X	10.080	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4035			10.250	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4094			10.400	133.00	87.00
0.4134			10.500	133.00	87.00
0.4173			10.600	133.00	87.00
0.4213			10.700	142.00	94.00
0.4232			10.750	142.00	94.00
0.4252			10.800	142.00	94.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4291			10.900	142.00	94.00
0.4331			11.000	142.00	94.00
0.4370			11.100	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4429			11.250	142.00	94.00
0.4449			11.300	142.00	94.00
0.4488			11.400	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4567			11.600	142.00	94.00
0.4606			11.700	142.00	94.00
0.4626			11.750	142.00	94.00
0.4646			11.800	142.00	94.00
0.4685			11.900	151.00	101.00
0.4724			12.000	151.00	101.00
0.4764			12.100	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.4961			12.600	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5039			12.800	151.00	101.00
0.5079			12.900	151.00	101.00
0.5118			13.000	151.00	101.00
0.5157	33/64		13.100	151.00	101.00
0.5197			13.200	151.00	101.00
0.5315			13.500	160.00	108.00
0.5433			13.800	160.00	108.00
0.5512			14.000	160.00	108.00
0.5709			14.500	169.00	114.00
0.5787			14.700	169.00	114.00
0.5827			14.800	169.00	114.00
0.5906			15.000	169.00	114.00
0.5984			15.200	178.00	120.00
0.6102			15.500	178.00	120.00
0.6299			16.000	178.00	120.00
0.6496			16.500	184.00	125.00
0.6693			17.000	184.00	125.00
0.7087			18.000	191.00	130.00
0.7185			18.250	198.00	135.00
0.7480			19.000	198.00	135.00
0.7874			20.000	205.00	140.00

Alternative Drill Series:

#549 HSS, GT100, 5xD, 130 pt, Bright

5xD

Steam Oxide
>6.00 mm dia.

External Coolant

Straight Shank

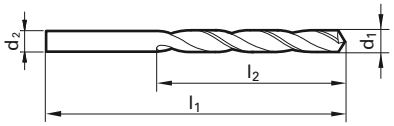
Speeds & Feeds
information pg 338

Series 208

General Purpose, LH helix

HSS, general purpose (Type N), jobber length, 118° point, Form A web thinned >14.0mm dia., standard straight shank, LH cut

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0094		88	0.240	19.00	2.50
0.0114		84	0.290	19.00	3.00
0.0118			0.300	19.00	3.00
0.0134		80	0.340	19.00	4.00
0.0138			0.350	19.00	4.00
0.0142			0.360	19.00	4.00
0.0146		79	0.370	19.00	4.00
0.0157	1/64		0.400	20.00	5.00
0.0161		78	0.410	20.00	5.00
0.0165			0.420	20.00	5.00
0.0169			0.430	20.00	5.00
0.0173			0.440	20.00	5.00
0.0177			0.450	20.00	5.00
0.0181		77	0.460	20.00	5.00
0.0185			0.470	20.00	5.00
0.0189			0.480	20.00	5.00
0.0197			0.500	22.00	6.00
0.0201		76	0.510	22.00	6.00
0.0205			0.520	22.00	6.00
0.0209		75	0.530	22.00	6.00
0.0213			0.540	24.00	7.00
0.0217			0.550	24.00	7.00
0.0220			0.560	24.00	7.00
0.0224		74	0.570	24.00	7.00
0.0228			0.580	24.00	7.00
0.0236			0.600	24.00	7.00
0.0240		73	0.610	26.00	8.00
0.0244			0.620	26.00	8.00
0.0248			0.630	26.00	8.00
0.0252		72	0.640	26.00	8.00
0.0256			0.650	26.00	8.00
0.0260		71	0.660	26.00	8.00
0.0264			0.670	26.00	8.00
0.0268			0.680	28.00	9.00
0.0276			0.700	28.00	9.00
0.0280		70	0.710	28.00	9.00
0.0283			0.720	28.00	9.00
0.0287			0.730	28.00	9.00
0.0295			0.750	28.00	9.00
0.0303			0.770	30.00	10.00
0.0307			0.780	30.00	10.00
0.0311	1/32	68	0.790	30.00	10.00
0.0315			0.800	30.00	10.00
0.0319		67	0.810	30.00	10.00
0.0323			0.820	30.00	10.00
0.0327			0.830	30.00	10.00
0.0331		66	0.840	30.00	10.00
0.0335			0.850	30.00	10.00
0.0339			0.860	32.00	11.00
0.0343			0.870	32.00	11.00
0.0346			0.880	32.00	11.00
0.0350		65	0.890	32.00	11.00
0.0354			0.900	32.00	11.00
0.0358		64	0.910	32.00	11.00
0.0362			0.920	32.00	11.00
0.0366			0.930	32.00	11.00
0.0374			0.950	32.00	11.00
0.0378			0.960	34.00	12.00
0.0382		62	0.970	34.00	12.00
0.0386			0.980	34.00	12.00
0.0390		61	0.990	34.00	12.00
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0413			1.050	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0425			1.080	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0441			1.120	36.00	14.00
0.0445			1.130	36.00	14.00
0.0453			1.150	36.00	14.00
0.0461			1.170	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0476			1.210	38.00	16.00
0.0480			1.220	38.00	16.00
0.0488			1.240	38.00	16.00
0.0492			1.250	38.00	16.00
0.0500			1.270	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0531			1.350	40.00	18.00
0.0543			1.380	40.00	18.00
0.0547			1.390	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0559			1.420	40.00	18.00
0.0571			1.450	40.00	18.00
0.0579			1.470	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0602			1.530	43.00	20.00
0.0610			1.550	43.00	20.00
0.0614			1.560	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0638			1.620	43.00	20.00
0.0642			1.630	43.00	20.00
0.0650			1.650	43.00	20.00
0.0654			1.660	43.00	20.00
0.0661			1.680	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0677			1.720	46.00	22.00
0.0681			1.730	46.00	22.00
0.0689			1.750	46.00	22.00
0.0693			1.760	46.00	22.00
0.0709			1.800	46.00	22.00
0.0717			1.820	46.00	22.00
0.0720			1.830	46.00	22.00
0.0724			1.840	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0764			1.940	49.00	24.00
0.0768			1.950	49.00	24.00
0.0776			1.970	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0787			2.000	49.00	24.00
0.0803			2.040	49.00	24.00
0.0807			2.050	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0835			2.120	49.00	24.00
0.0846			2.150	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0886			2.250	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0898			2.280	53.00	27.00
0.0906			2.300	53.00	27.00
0.0913			2.320	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0965			2.450	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00
0.1075			2.730	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1169			2.970	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1209			3.070	65.00	36.00

To order: Series number + mm, ex. 5518 3.000

Series 208

Speeds & Feeds information pg 338

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.1220			3.100	65.00	36.00
0.1240			3.150	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1268			3.220	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1319			3.350	65.00	36.00
0.1327			3.370	70.00	39.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1398			3.550	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1437			3.650	70.00	39.00
0.1457			3.700	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1516			3.850	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1555			3.950	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1594			4.050	75.00	43.00
0.1614			4.100	75.00	43.00
0.1626			4.130	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1713			4.350	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1752			4.450	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1791			4.550	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1831			4.650	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1870			4.750	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1949			4.950	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2067			5.250	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2283			5.800	93.00	57.00
0.2303			5.850	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2382			6.050	101.00	63.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3051			7.750	117.00	75.00
0.3071			7.800	117.00	75.00
0.3091			7.850	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3583			9.100	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3839			9.750	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4035			10.250	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4094			10.400	133.00	87.00
0.4134			10.500	133.00	87.00
0.4173			10.600	133.00	87.00
0.4213			10.700	142.00	94.00
0.4220	27/64		10.720	142.00	94.00
0.4232			10.750	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4449			11.300	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4646			11.800	142.00	94.00
0.4685			11.900	151.00	101.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4764			12.100	151.00	101.00
0.4803			12.200	151.00	101.00
0.4823			12.250	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4882			12.400	151.00	101.00
0.4921			12.500	151.00	101.00
0.4961			12.600	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5118			13.000	151.00	101.00
0.5217			13.250	160.00	108.00
0.5276			13.400	160.00	108.00
0.5669			14.400	169.00	114.00
0.5787			14.700	169.00	114.00
0.5827			14.800	169.00	114.00
0.6004			15.250	178.00	120.00
0.6102			15.500	178.00	120.00
0.6248	5/8		15.870	178.00	120.00
0.6299			16.000	178.00	120.00

Alternative Drill Series:

#308 Cobalt, GP Low LH Helix, 5xD, 118 pt, Oxide
#664 HSS, GP Low LH Helix, 5xD, 118 pt, TiN

10xD

Steam Oxide
>2.36 mm dia.

External Coolant

Straight Shank

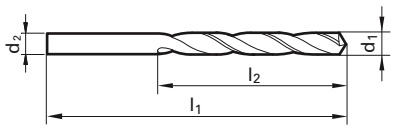
Speeds & Feeds
information pg 339

Series 217

General Purpose

HSS, general purpose (Type N), taper length, 118° point, Form A web thinned >14.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0157	1/64		0.400	30.00	10.00
0.0173			0.440	30.00	10.00
0.0185			0.470	30.00	10.00
0.0197			0.500	32.00	12.00
0.0205			0.520	32.00	12.00
0.0217			0.550	35.00	15.00
0.0224		74	0.570	35.00	15.00
0.0236			0.600	35.00	15.00
0.0244			0.620	38.00	18.00
0.0256			0.650	38.00	18.00
0.0276			0.700	42.00	21.00
0.0287			0.730	42.00	21.00
0.0295			0.750	42.00	21.00
0.0299			0.760	46.00	25.00
0.0311	1/32	68	0.790	46.00	25.00
0.0315			0.800	46.00	25.00
0.0323			0.820	46.00	25.00
0.0335			0.850	46.00	25.00
0.0354			0.900	51.00	29.00
0.0362			0.920	51.00	29.00
0.0374			0.950	51.00	29.00
0.0382		62	0.970	56.00	33.00
0.0394			1.000	56.00	33.00
0.0402		60	1.020	56.00	33.00
0.0413			1.050	56.00	33.00
0.0421		58	1.070	60.00	37.00
0.0429		57	1.090	60.00	37.00
0.0433			1.100	60.00	37.00
0.0441			1.120	60.00	37.00
0.0453			1.150	60.00	37.00
0.0465		56	1.180	60.00	37.00
0.0469	3/64		1.190	65.00	41.00
0.0472			1.200	65.00	41.00
0.0492			1.250	65.00	41.00
0.0512			1.300	65.00	41.00
0.0520		55	1.320	65.00	41.00
0.0531			1.350	70.00	45.00
0.0551		54	1.400	70.00	45.00
0.0571			1.450	70.00	45.00
0.0591			1.500	70.00	45.00
0.0594		53	1.510	76.00	50.00
0.0610			1.550	76.00	50.00
0.0626	1/16		1.590	76.00	50.00
0.0630			1.600	76.00	50.00
0.0634		52	1.610	76.00	50.00
0.0650			1.650	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0689			1.750	80.00	53.00
0.0701		50	1.780	80.00	53.00
0.0709			1.800	80.00	53.00
0.0728		49	1.850	80.00	53.00
0.0748			1.900	80.00	53.00
0.0760		48	1.930	85.00	56.00
0.0768			1.950	85.00	56.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0780	5/64		1.980	85.00	56.00
0.0787			2.000	85.00	56.00
0.0799			2.030	85.00	56.00
0.0807			2.050	85.00	56.00
0.0811		46	2.060	85.00	56.00
0.0819		45	2.080	85.00	56.00
0.0827			2.100	85.00	56.00
0.0846			2.150	90.00	59.00
0.0858		44	2.180	90.00	59.00
0.0866			2.200	90.00	59.00
0.0886			2.250	90.00	59.00
0.0890		43	2.260	90.00	59.00
0.0906			2.300	90.00	59.00
0.0913			2.320	90.00	59.00
0.0925			2.350	90.00	59.00
0.0933		42	2.370	95.00	62.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0961		41	2.440	95.00	62.00
0.0965			2.450	95.00	62.00
0.0980		40	2.490	95.00	62.00
0.0984			2.500	95.00	62.00
0.0996		39	2.530	95.00	62.00
0.1004			2.550	95.00	62.00
0.1016		38	2.580	95.00	62.00
0.1024			2.600	95.00	62.00
0.1031			2.620	95.00	62.00
0.1039		37	2.640	95.00	62.00
0.1043			2.650	95.00	62.00
0.1063			2.700	100.00	66.00
0.1067		36	2.710	100.00	66.00
0.1083			2.750	100.00	66.00
0.1094	7/64		2.780	100.00	66.00
0.1098		35	2.790	100.00	66.00
0.1102			2.800	100.00	66.00
0.1122			2.850	100.00	66.00
0.1130		33	2.870	100.00	66.00
0.1142			2.900	100.00	66.00
0.1161		32	2.950	100.00	66.00
0.1181			3.000	100.00	66.00
0.1201		31	3.050	106.00	69.00
0.1220			3.100	106.00	69.00
0.1240			3.150	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1280			3.250	106.00	69.00
0.1283		30	3.260	106.00	69.00
0.1299			3.300	106.00	69.00
0.1319			3.350	106.00	69.00
0.1339			3.400	112.00	73.00
0.1358		29	3.450	112.00	73.00
0.1378			3.500	112.00	73.00
0.1398			3.550	112.00	73.00
0.1406	9/64	28	3.570	112.00	73.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1417			3.600	112.00	73.00
0.1437			3.650	112.00	73.00
0.1441		27	3.660	112.00	73.00
0.1457			3.700	112.00	73.00
0.1476			3.750	112.00	73.00
0.1496		25	3.800	119.00	78.00
0.1516			3.850	119.00	78.00
0.1520		24	3.860	119.00	78.00
0.1535			3.900	119.00	78.00
0.1539		23	3.910	119.00	78.00
0.1555			3.950	119.00	78.00
0.1563	5/32		3.970	119.00	78.00
0.1571		22	3.990	119.00	78.00
0.1575			4.000	119.00	78.00
0.1591		21	4.040	119.00	78.00
0.1594			4.050	119.00	78.00
0.1610		20	4.090	119.00	78.00
0.1614			4.100	119.00	78.00
0.1634			4.150	119.00	78.00
0.1654			4.200	119.00	78.00
0.1661		19	4.220	119.00	78.00
0.1673			4.250	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1713			4.350	126.00	82.00
0.1720	11/64		4.370	126.00	82.00
0.1728		17	4.390	126.00	82.00
0.1732			4.400	126.00	82.00
0.1752			4.450	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1799		15	4.570	126.00	82.00
0.1811			4.600	126.00	82.00
0.1819		14	4.620	126.00	82.00
0.1831			4.650	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1870			4.750	126.00	82.00
0.1874	3/16		4.760	132.00	87.00
0.1890		12	4.800	132.00	87.00
0.1909		11	4.850	132.00	87.00
0.1929			4.900	132.00	87.00
0.1937		10	4.920	132.00	87.00
0.1949			4.950	132.00	87.00
0.1961		9	4.980	132.00	87.00
0.1969			5.000	132.00	87.00
0.1988			5.050	132.00	87.00
0.1992		8	5.060	132.00	87.00
0.2008			5.100	132.00	87.00
0.2012		7	5.110	132.00	87.00
0.2028			5.150	132.00	87.00
0.2031	13/64		5.160	132.00	87.00
0.2039		6	5.180	132.00	87.00
0.2047			5.200	132.00	87.00
0.2055		5	5.220	132.00	87.00
0.2067			5.250	132.00	87.00
0.2087			5.300	132.00	87.00

To order: Series number + mm, ex. 5518 3.000

Series 217

Speeds & Feeds information pg 339

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2091		4	5.310	139.00	91.00
0.2106			5.350	139.00	91.00
0.2126			5.400	139.00	91.00
0.2130		3	5.410	139.00	91.00
0.2146			5.450	139.00	91.00
0.2165			5.500	139.00	91.00
0.2185			5.550	139.00	91.00
0.2189	7/32		5.560	139.00	91.00
0.2205			5.600	139.00	91.00
0.2209		2	5.610	139.00	91.00
0.2224			5.650	139.00	91.00
0.2244			5.700	139.00	91.00
0.2264			5.750	139.00	91.00
0.2280		1	5.790	139.00	91.00
0.2283			5.800	139.00	91.00
0.2303			5.850	139.00	91.00
0.2323			5.900	139.00	91.00
0.2343	15/64		5.950	139.00	91.00
0.2362			6.000	139.00	91.00
0.2402			6.100	148.00	97.00
0.2421		C	6.150	148.00	97.00
0.2441			6.200	148.00	97.00
0.2461		D	6.250	148.00	97.00
0.2480			6.300	148.00	97.00
0.2500	1/4	E	6.350	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2598			6.600	148.00	97.00
0.2638			6.700	148.00	97.00
0.2657	17/64	H	6.750	156.00	102.00
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2795			7.100	156.00	102.00
0.2811	9/32	K	7.140	156.00	102.00
0.2835			7.200	156.00	102.00
0.2854			7.250	156.00	102.00
0.2874			7.300	156.00	102.00
0.2913			7.400	156.00	102.00
0.2953			7.500	156.00	102.00
0.2969	19/64		7.540	165.00	109.00
0.2992			7.600	165.00	109.00
0.3031			7.700	165.00	109.00
0.3051			7.750	165.00	109.00
0.3071			7.800	165.00	109.00
0.3110			7.900	165.00	109.00
0.3126	5/16		7.940	165.00	109.00
0.3150			8.000	165.00	109.00
0.3189			8.100	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3248			8.250	165.00	109.00
0.3268			8.300	165.00	109.00
0.3280	21/64		8.330	165.00	109.00
0.3307			8.400	165.00	109.00
0.3346			8.500	165.00	109.00
0.3386			8.600	175.00	115.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3425			8.700	175.00	115.00
0.3437	11/32		8.730	175.00	115.00
0.3445			8.750	175.00	115.00
0.3465			8.800	175.00	115.00
0.3504			8.900	175.00	115.00
0.3543			9.000	175.00	115.00
0.3583			9.100	175.00	115.00
0.3594	23/64		9.130	175.00	115.00
0.3622			9.200	175.00	115.00
0.3642			9.250	175.00	115.00
0.3661			9.300	175.00	115.00
0.3701			9.400	175.00	115.00
0.3740			9.500	175.00	115.00
0.3748	3/8		9.520	184.00	121.00
0.3780			9.600	184.00	121.00
0.3819			9.700	184.00	121.00
0.3839			9.750	184.00	121.00
0.3858		W	9.800	184.00	121.00
0.3898			9.900	184.00	121.00
0.3906	25/64		9.920	184.00	121.00
0.3937			10.000	184.00	121.00
0.3976			10.100	184.00	121.00
0.4016			10.200	184.00	121.00
0.4035			10.250	184.00	121.00
0.4055			10.300	184.00	121.00
0.4063	13/32		10.320	184.00	121.00
0.4094			10.400	184.00	121.00
0.4134			10.500	184.00	121.00
0.4173			10.600	184.00	121.00
0.4213			10.700	195.00	128.00
0.4220	27/64		10.720	195.00	128.00
0.4232			10.750	195.00	128.00
0.4252			10.800	195.00	128.00
0.4291			10.900	195.00	128.00
0.4331			11.000	195.00	128.00
0.4374	7/16		11.110	195.00	128.00
0.4409			11.200	195.00	128.00
0.4429			11.250	195.00	128.00
0.4449			11.300	195.00	128.00
0.4488			11.400	195.00	128.00
0.4528			11.500	195.00	128.00
0.4531	29/64		11.510	195.00	128.00
0.4567			11.600	195.00	128.00
0.4626			11.750	195.00	128.00
0.4646			11.800	195.00	128.00
0.4689	15/32		11.910	205.00	134.00
0.4724			12.000	205.00	134.00
0.4764			12.100	205.00	134.00
0.4803			12.200	205.00	134.00
0.4823			12.250	205.00	134.00
0.4843	31/64		12.300	205.00	134.00
0.4921			12.500	205.00	134.00
0.5000	1/2		12.700	205.00	134.00
0.5020			12.750	205.00	134.00
0.5039			12.800	205.00	134.00
0.5118			13.000	205.00	134.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.5157	33/64		13.100	205.00	134.00
0.5197			13.200	205.00	134.00
0.5311	17/32		13.490	214.00	140.00
0.5315			13.500	214.00	140.00
0.5413			13.750	214.00	140.00
0.5433			13.800	214.00	140.00
0.5469	35/64		13.890	214.00	140.00
0.5512			14.000	214.00	140.00
0.5591			14.200	220.00	144.00
0.5610			14.250	220.00	144.00
0.5626	9/16		14.290	220.00	144.00
0.5709			14.500	220.00	144.00
0.5780	37/64		14.680	220.00	144.00
0.5906			15.000	220.00	144.00
0.5937	19/32		15.080	227.00	149.00
0.6004			15.250	227.00	149.00
0.6063			15.400	227.00	149.00
0.6094	39/64		15.480	227.00	149.00
0.6102			15.500	227.00	149.00
0.6248	5/8		15.870	227.00	149.00
0.6299			16.000	227.00	149.00
0.6406	41/64		16.270	235.00	154.00
0.6496			16.500	235.00	154.00
0.6563	21/32		16.670	235.00	154.00
0.6693			17.000	235.00	154.00
0.6720	43/64		17.070	241.00	158.00
0.6874	11/16		17.460	241.00	158.00
0.6890			17.500	241.00	158.00
0.7087			18.000	241.00	158.00
0.7185			18.250	247.00	162.00
0.7189	23/32		18.260	247.00	162.00
0.7283			18.500	247.00	162.00
0.7343	47/64		18.650	247.00	162.00
0.7480			19.000	247.00	162.00
0.7500	3/4		19.050	254.00	166.00
0.7677			19.500	254.00	166.00
0.7811	25/32		19.840	254.00	166.00
0.7874			20.000	254.00	166.00
0.8071			20.500	261.00	171.00
0.8126	13/16		20.640	261.00	171.00
0.8169			20.750	261.00	171.00
0.8268			21.000	261.00	171.00
0.8465			21.500	268.00	176.00
0.8661			22.000	268.00	176.00
0.8748	7/8		22.220	268.00	176.00
0.9374	15/16		23.810	282.00	185.00
0.9449			24.000	282.00	185.00
0.9843	63/64		25.000	282.00	185.00

Alternative Drill Series:

#667 HSS, GP, 10xD, 118 pt, TiN
#317 Cobalt, GP, 10xD, 118 pt, Oxide
#617 Cobalt, Ti, 10xD, 130 pt, Bright
#669 Cobalt, Ti, 10xD, 130 pt, TiN

10xD

Bright Finish

External Coolant

Straight Shank

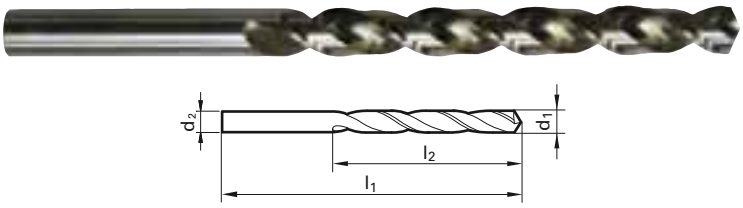
Speeds & Feeds information pg 339

Series 219

High Helix

HSS, High Helix (Type W), taper length, 130° point, Form A web thinned >14.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

General Steels/Brass

Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0157	1/64		0.400	30.00	10.00
0.0197			0.500	32.00	12.00
0.0236			0.600	35.00	15.00
0.0256			0.650	38.00	18.00
0.0276			0.700	42.00	21.00
0.0291		69	0.740	42.00	21.00
0.0295			0.750	42.00	21.00
0.0315			0.800	46.00	25.00
0.0335			0.850	46.00	25.00
0.0354			0.900	51.00	29.00
0.0374			0.950	51.00	29.00
0.0394			1.000	56.00	33.00
0.0413			1.050	56.00	33.00
0.0433			1.100	60.00	37.00
0.0453			1.150	60.00	37.00
0.0472			1.200	65.00	41.00
0.0480			1.220	65.00	41.00
0.0492			1.250	65.00	41.00
0.0512			1.300	65.00	41.00
0.0531			1.350	70.00	45.00
0.0551		54	1.400	70.00	45.00
0.0571			1.450	70.00	45.00
0.0591			1.500	70.00	45.00
0.0610			1.550	76.00	50.00
0.0630			1.600	76.00	50.00
0.0650			1.650	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0689			1.750	80.00	53.00
0.0701		50	1.780	80.00	53.00
0.0709			1.800	80.00	53.00
0.0728		49	1.850	80.00	53.00
0.0748			1.900	80.00	53.00
0.0768			1.950	85.00	56.00
0.0780	5/64		1.980	85.00	56.00
0.0787			2.000	85.00	56.00
0.0807			2.050	85.00	56.00
0.0827			2.100	85.00	56.00
0.0846			2.150	90.00	59.00
0.0866			2.200	90.00	59.00
0.0886			2.250	90.00	59.00
0.0906			2.300	90.00	59.00
0.0925			2.350	90.00	59.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0965			2.450	95.00	62.00
0.0984			2.500	95.00	62.00
0.1004			2.550	95.00	62.00
0.1024			2.600	95.00	62.00
0.1043			2.650	95.00	62.00
0.1063			2.700	100.00	66.00
0.1083			2.750	100.00	66.00
0.1102			2.800	100.00	66.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1122			2.850	100.00	66.00
0.1142			2.900	100.00	66.00
0.1161		32	2.950	100.00	66.00
0.1181			3.000	100.00	66.00
0.1220			3.100	106.00	69.00
0.1240			3.150	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1280			3.250	106.00	69.00
0.1299			3.300	106.00	69.00
0.1319			3.350	106.00	69.00
0.1339			3.400	112.00	73.00
0.1358		29	3.450	112.00	73.00
0.1378			3.500	112.00	73.00
0.1398			3.550	112.00	73.00
0.1417			3.600	112.00	73.00
0.1437			3.650	112.00	73.00
0.1457			3.700	112.00	73.00
0.1476			3.750	112.00	73.00
0.1496		25	3.800	119.00	78.00
0.1535			3.900	119.00	78.00
0.1575			4.000	119.00	78.00
0.1614			4.100	119.00	78.00
0.1634			4.150	119.00	78.00
0.1654			4.200	119.00	78.00
0.1673			4.250	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1732			4.400	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1811			4.600	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1890		12	4.800	132.00	87.00
0.1929			4.900	132.00	87.00
0.1969			5.000	132.00	87.00
0.2008			5.100	132.00	87.00
0.2047			5.200	132.00	87.00
0.2087			5.300	132.00	87.00
0.2126			5.400	139.00	91.00
0.2165			5.500	139.00	91.00
0.2205			5.600	139.00	91.00
0.2244			5.700	139.00	91.00
0.2283			5.800	139.00	91.00
0.2323			5.900	139.00	91.00
0.2362			6.000	139.00	91.00
0.2402			6.100	148.00	97.00
0.2441			6.200	148.00	97.00
0.2461		D	6.250	148.00	97.00
0.2480			6.300	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2598			6.600	148.00	97.00
0.2638			6.700	148.00	97.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2795			7.100	156.00	102.00
0.2835			7.200	156.00	102.00
0.2874			7.300	156.00	102.00
0.2913			7.400	156.00	102.00
0.2953			7.500	156.00	102.00
0.3031			7.700	165.00	109.00
0.3071			7.800	165.00	109.00
0.3110			7.900	165.00	109.00
0.3150			8.000	165.00	109.00
0.3169			8.050	165.00	109.00
0.3189			8.100	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3268			8.300	165.00	109.00
0.3307			8.400	165.00	109.00
0.3346			8.500	165.00	109.00
0.3366			8.550	175.00	115.00
0.3386			8.600	175.00	115.00
0.3425			8.700	175.00	115.00
0.3465			8.800	175.00	115.00
0.3504			8.900	175.00	115.00
0.3543			9.000	175.00	115.00
0.3583			9.100	175.00	115.00
0.3622			9.200	175.00	115.00
0.3740			9.500	175.00	115.00
0.3819			9.700	184.00	121.00
0.3858		W	9.800	184.00	121.00
0.3937			10.000	184.00	121.00
0.4016			10.200	184.00	121.00
0.4134			10.500	184.00	121.00
0.4252			10.800	195.00	128.00
0.4331			11.000	195.00	128.00
0.4528			11.500	195.00	128.00
0.4724			12.000	205.00	134.00
0.4921			12.500	205.00	134.00
0.5118			13.000	205.00	134.00
0.5157	33/64		13.100	205.00	134.00
0.5512			14.000	214.00	140.00
0.5709			14.500	220.00	144.00
0.5906			15.000	220.00	144.00
0.6299			16.000	227.00	149.00
0.6693			17.000	235.00	154.00
0.7087			18.000	241.00	158.00
0.7480			19.000	247.00	162.00
0.7874			20.000	254.00	166.00

Alternative Drill Series:

#501 HSS, GT50, 10xD, 118 pt, Bright

To order: Series number + mm, ex. 5518 3.000

3xD

Steam Oxide
>2.36 mm dia.

External Coolant

Straight Shank

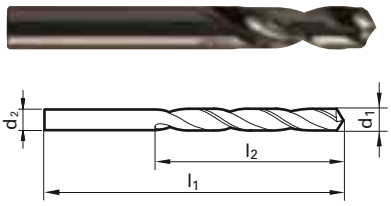
Speeds & Feeds
information pg 340

Series 223

General Purpose

HSS, general purpose (Type N), stub length, 118° point, Form A web thinned >14.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0157	1/64		0.400	19.00	2.50
0.0197			0.500	20.00	3.00
0.0217			0.550	21.00	3.50
0.0236			0.600	21.00	3.50
0.0256			0.650	22.00	4.00
0.0260		71	0.660	22.00	4.00
0.0276			0.700	23.00	4.50
0.0283			0.720	23.00	4.50
0.0295			0.750	23.00	4.50
0.0311	1/32	68	0.790	24.00	5.00
0.0315			0.800	24.00	5.00
0.0323			0.820	24.00	5.00
0.0350		65	0.890	25.00	5.50
0.0354			0.900	25.00	5.50
0.0374			0.950	25.00	5.50
0.0386			0.980	26.00	6.00
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0409		59	1.040	26.00	6.00
0.0413			1.050	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0453			1.150	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0469	3/64		1.190	28.00	7.00
0.0472			1.200	28.00	7.00
0.0492			1.250	28.00	7.00
0.0496			1.260	28.00	7.00
0.0504			1.280	28.00	7.00
0.0512			1.300	28.00	7.00
0.0520		55	1.320	28.00	7.00
0.0531			1.350	32.00	9.00
0.0551		54	1.400	32.00	9.00
0.0571			1.450	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0598			1.520	34.00	10.00
0.0610			1.550	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0650			1.650	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0677			1.720	36.00	11.00
0.0685			1.740	36.00	11.00
0.0689			1.750	36.00	11.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	38.00	12.00
0.0768			1.950	38.00	12.00
0.0776			1.970	38.00	12.00
0.0780	5/64		1.980	38.00	12.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0807			2.050	38.00	12.00
0.0811		46	2.060	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0827			2.100	38.00	12.00
0.0835			2.120	38.00	12.00
0.0846			2.150	40.00	13.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0874			2.220	40.00	13.00
0.0886			2.250	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0925			2.350	40.00	13.00
0.0933		42	2.370	43.00	14.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0965			2.450	43.00	14.00
0.0976			2.480	43.00	14.00
0.0980		40	2.490	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1004			2.550	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1043			2.650	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1083			2.750	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1098		35	2.790	46.00	16.00
0.1102			2.800	46.00	16.00
0.1110		34	2.820	46.00	16.00
0.1122			2.850	46.00	16.00
0.1130		33	2.870	46.00	16.00
0.1142			2.900	46.00	16.00
0.1150			2.920	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1169			2.970	46.00	16.00
0.1181			3.000	46.00	16.00
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1240			3.150	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1280			3.250	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1299			3.300	49.00	18.00
0.1319			3.350	49.00	18.00
0.1339			3.400	52.00	20.00
0.1358		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1398			3.550	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1437			3.650	52.00	20.00
0.1441		27	3.660	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1476			3.750	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1516			3.850	55.00	22.00
0.1520		24	3.860	55.00	22.00
0.1535			3.900	55.00	22.00
0.1539		23	3.910	55.00	22.00
0.1555			3.950	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1571		22	3.990	55.00	22.00
0.1575			4.000	55.00	22.00
0.1583			4.020	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1610		20	4.090	55.00	22.00
0.1614			4.100	55.00	22.00
0.1634			4.150	55.00	22.00
0.1654			4.200	55.00	22.00
0.1661		19	4.220	55.00	22.00
0.1673			4.250	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1728		17	4.390	58.00	24.00
0.1732			4.400	58.00	24.00
0.1752			4.450	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1791			4.550	58.00	24.00
0.1799		15	4.570	58.00	24.00
0.1811			4.600	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1870			4.750	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1909		11	4.850	62.00	26.00
0.1929			4.900	62.00	26.00
0.1937		10	4.920	62.00	26.00
0.1961		9	4.980	62.00	26.00
0.1969			5.000	62.00	26.00
0.1988			5.050	62.00	26.00
0.1992		8	5.060	62.00	26.00
0.2008			5.100	62.00	26.00
0.2012		7	5.110	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2039		6	5.180	62.00	26.00
0.2047			5.200	62.00	26.00
0.2055		5	5.220	62.00	26.00
0.2067			5.250	62.00	26.00

To order: Series number + mm, ex. 5518 3.000

Series 223

Speeds & Feeds information pg 340

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.2087			5.300	62.00	26.00
0.2091		4	5.310	66.00	28.00
0.2106			5.350	66.00	28.00
0.2126			5.400	66.00	28.00
0.2130		3	5.410	66.00	28.00
0.2146			5.450	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2209		2	5.610	66.00	28.00
0.2244			5.700	66.00	28.00
0.2264			5.750	66.00	28.00
0.2280		1	5.790	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2339		A	5.940	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2378		B	6.040	70.00	31.00
0.2382			6.050	70.00	31.00
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2441			6.200	70.00	31.00
0.2461		D	6.250	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2610		G	6.630	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2697			6.850	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2736			6.950	74.00	34.00
0.2756			7.000	74.00	34.00
0.2768		J	7.030	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2854			7.250	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2933			7.450	74.00	34.00
0.2949		M	7.490	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.2992			7.600	79.00	37.00
0.3020		N	7.670	79.00	37.00
0.3031			7.700	79.00	37.00
0.3051			7.750	79.00	37.00
0.3071			7.800	79.00	37.00
0.3091			7.850	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3161		O	8.030	79.00	37.00
0.3169			8.050	79.00	37.00
0.3189			8.100	79.00	37.00
0.3209			8.150	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3248			8.250	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.3307			8.400	79.00	37.00
0.3319		Q	8.430	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3390		R	8.610	84.00	40.00
0.3406			8.650	84.00	40.00
0.3425			8.700	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3445			8.750	84.00	40.00
0.3465			8.800	84.00	40.00
0.3480		S	8.840	84.00	40.00
0.3504			8.900	84.00	40.00
0.3524			8.950	84.00	40.00
0.3543			9.000	84.00	40.00
0.3579		T	9.090	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3642			9.250	84.00	40.00
0.3661			9.300	84.00	40.00
0.3677		U	9.340	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3772		V	9.580	89.00	43.00
0.3780			9.600	89.00	43.00
0.3799			9.650	89.00	43.00
0.3819			9.700	89.00	43.00
0.3839			9.750	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.3957			10.050	89.00	43.00
0.3969		X	10.080	89.00	43.00
0.3976			10.100	89.00	43.00
0.3996			10.150	89.00	43.00
0.4016			10.200	89.00	43.00
0.4035			10.250	89.00	43.00
0.4039		Y	10.260	89.00	43.00
0.4055			10.300	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4094			10.400	89.00	43.00
0.4130		Z	10.490	89.00	43.00
0.4134			10.500	89.00	43.00
0.4173			10.600	89.00	43.00
0.4213			10.700	95.00	47.00
0.4220	27/64		10.720	95.00	47.00
0.4232			10.750	95.00	47.00
0.4252			10.800	95.00	47.00
0.4291			10.900	95.00	47.00
0.4331			11.000	95.00	47.00
0.4370			11.100	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4409			11.200	95.00	47.00
0.4429			11.250	95.00	47.00
0.4449			11.300	95.00	47.00
0.4488			11.400	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4567			11.600	95.00	47.00
0.4606			11.700	95.00	47.00
0.4626			11.750	95.00	47.00
0.4646			11.800	95.00	47.00
0.4685			11.900	102.00	51.00
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.4764			12.100	102.00	51.00
0.4783			12.150	102.00	51.00
0.4803			12.200	102.00	51.00
0.4823			12.250	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4882			12.400	102.00	51.00
0.4921			12.500	102.00	51.00
0.4961			12.600	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5020			12.750	102.00	51.00
0.5039			12.800	102.00	51.00
0.5079			12.900	102.00	51.00
0.5118			13.000	102.00	51.00
0.5157	33/64		13.100	102.00	51.00
0.5197			13.200	102.00	51.00
0.5217			13.250	107.00	54.00
0.5236			13.300	107.00	54.00
0.5276			13.400	107.00	54.00
0.5311	17/32		13.490	107.00	54.00
0.5315			13.500	107.00	54.00
0.5354			13.600	107.00	54.00
0.5394			13.700	107.00	54.00
0.5413			13.750	107.00	54.00
0.5433			13.800	107.00	54.00
0.5469	35/64		13.890	107.00	54.00
0.5472			13.900	107.00	54.00
0.5512			14.000	107.00	54.00
0.5551			14.100	111.00	56.00
0.5591			14.200	111.00	56.00
0.5610			14.250	111.00	56.00
0.5626	9/16		14.290	111.00	56.00
0.5669			14.400	111.00	56.00
0.5709			14.500	111.00	56.00
0.5748			14.600	111.00	56.00
0.5780	37/64		14.680	111.00	56.00
0.5807			14.750	111.00	56.00
0.5827			14.800	111.00	56.00
0.5866			14.900	111.00	56.00
0.5906			15.000	111.00	56.00
0.5937	19/32		15.080	115.00	58.00
0.5945			15.100	115.00	58.00
0.5984			15.200	115.00	58.00
0.6004			15.250	115.00	58.00
0.6063			15.400	115.00	58.00
0.6094	39/64		15.480	115.00	58.00
0.6102			15.500	115.00	58.00
0.6142			15.600	115.00	58.00
0.6181			15.700	115.00	58.00
0.6201			15.750	115.00	58.00
0.6220			15.800	115.00	58.00
0.6248	5/8		15.870	115.00	58.00
0.6299			16.000	115.00	58.00
0.6339			16.100	119.00	60.00
0.6358			16.150	119.00	60.00
0.6398			16.250	119.00	60.00
0.6406	41/64		16.270	119.00	60.00
0.6417			16.300	119.00	60.00
0.6496			16.500	119.00	60.00
0.6563	21/32		16.670	119.00	60.00
0.6594			16.750	119.00	60.00
0.6693			17.000	119.00	60.00
0.6720	43/64		17.070	123.00	62.00
0.6732			17.100	123.00	62.00
0.6791			17.250	123.00	62.00
0.6811			17.300	123.00	62.00
0.6874	11/16		17.460	123.00	62.00
0.6890			17.500	123.00	62.00

To order: Series number + mm, ex. 5518 3.000

Series 223

Speeds & Feeds information pg 340

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.6929			17.600	123.00	62.00
0.6988			17.750	123.00	62.00
0.7031	45/64		17.860	123.00	62.00
0.7087			18.000	123.00	62.00
0.7126			18.100	127.00	64.00
0.7165			18.200	127.00	64.00
0.7185			18.250	127.00	64.00
0.7189	23/32		18.260	127.00	64.00
0.7283			18.500	127.00	64.00
0.7343	47/64		18.650	127.00	64.00
0.7382			18.750	127.00	64.00
0.7480			19.000	127.00	64.00
0.7500	3/4		19.050	131.00	66.00
0.7520			19.100	131.00	66.00
0.7579			19.250	131.00	66.00
0.7677			19.500	131.00	66.00
0.7776			19.750	131.00	66.00
0.7811	25/32		19.840	131.00	66.00
0.7874			20.000	131.00	66.00
0.7913			20.100	136.00	68.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.7969	51/64		20.240	136.00	68.00
0.8071			20.500	136.00	68.00
0.8126	13/16		20.640	136.00	68.00
0.8169			20.750	136.00	68.00
0.8189			20.800	136.00	68.00
0.8268			21.000	136.00	68.00
0.8280	53/64		21.030	136.00	68.00
0.8366			21.250	141.00	70.00
0.8437	27/32		21.430	141.00	70.00
0.8465			21.500	141.00	70.00
0.8661			22.000	141.00	70.00
0.8748	7/8		22.220	141.00	70.00
0.8858			22.500	146.00	72.00
0.8906	57/64		22.620	146.00	72.00
0.9055			23.000	146.00	72.00
0.9063	29/32		23.020	146.00	72.00
0.9220	59/64		23.420	146.00	72.00
0.9252			23.500	146.00	72.00
0.9374	15/16		23.810	151.00	75.00
0.9449			24.000	151.00	75.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.9531	61/64		24.210	151.00	75.00
0.9646			24.500	151.00	75.00
0.9689	31/32		24.610	151.00	75.00
0.9843	63/64		25.000	151.00	75.00
1.0000	1		25.400	156.00	78.00
1.0311	1 1/32		26.190	156.00	78.00
1.0433			26.500	156.00	78.00
1.1024			28.000	162.00	81.00
1.1248	1 1/8		28.570	168.00	84.00
1.1563	1 5/32		29.370	168.00	84.00
1.1811			30.000	168.00	84.00
1.2500	1 1/4		31.750	180.00	90.00

Alternative Drill Series:

#5524 Cobalt, GU500, 3xD, 118 pt, Bright
#653 HSS, GP, 3xD, 118 pt, TiN
#730 Carbide, GP, 3xD, 118 pt, Bright
#2463 Carbide, GP, 3xD, 118 pt, FIREX

3xD

Bright Finish

External Coolant

Straight Shank

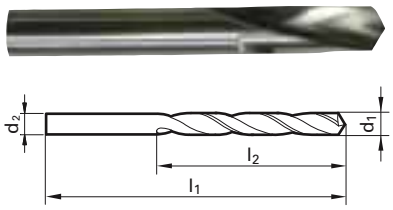
Speeds & Feeds information pg 340

Series 224

Low Helix

HSS, Low Helix (Type H), stub length, 118° point, Form A web thinned >14.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

General Steels/Brass

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0354			0.900	25.00	5.50
0.0394			1.000	26.00	6.00
0.0433			1.100	28.00	7.00
0.0472			1.200	28.00	7.00
0.0512			1.300	28.00	7.00
0.0551		54	1.400	32.00	9.00
0.0591			1.500	32.00	9.00
0.0610			1.550	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0748			1.900	36.00	11.00
0.0780	5/64		1.980	38.00	12.00
0.0787			2.000	38.00	12.00
0.0827			2.100	38.00	12.00
0.0866			2.200	40.00	13.00
0.0906			2.300	40.00	13.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0965			2.450	43.00	14.00
0.0984			2.500	43.00	14.00
0.1004			2.550	43.00	14.00
0.1024			2.600	43.00	14.00
0.1043			2.650	43.00	14.00
0.1063			2.700	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1102			2.800	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1299			3.300	49.00	18.00
0.1319			3.350	49.00	18.00
0.1339			3.400	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1457			3.700	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1516			3.850	55.00	22.00
0.1535			3.900	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1575			4.000	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1811			4.600	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1929			4.900	62.00	26.00
0.1969			5.000	62.00	26.00
0.2008			5.100	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2047			5.200	62.00	26.00
0.2087			5.300	62.00	26.00
0.2126			5.400	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2244			5.700	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2441			6.200	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2598			6.600	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2756			7.000	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2854			7.250	74.00	34.00
0.2953			7.500	74.00	34.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3161		O	8.030	79.00	37.00
0.3189			8.100	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3346			8.500	79.00	37.00
0.3543			9.000	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.4016			10.200	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4134			10.500	89.00	43.00
0.4220	27/64		10.720	95.00	47.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5315			13.500	107.00	54.00
0.5512			14.000	107.00	54.00
0.5906			15.000	111.00	56.00
0.6299			16.000	115.00	58.00
0.6693			17.000	119.00	60.00
0.7087			18.000	123.00	62.00
0.7480			19.000	127.00	64.00
0.7874			20.000	131.00	66.00
0.8268			21.000	136.00	68.00
0.8661			22.000	141.00	70.00

Alternative Drill Series:

#206 HSS, Low Helix, 5xD, 118 pt, Bright
#223 HSS, GP, 3xD, 118 pt, Oxide

To order: Series number + mm, ex. 5518 3.000

3xD

Bright Finish

External Coolant

Straight Shank

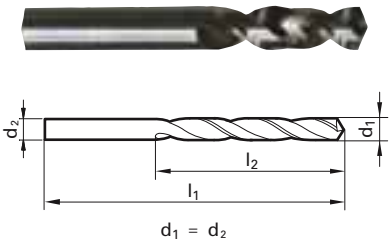
Speeds & Feeds
information pg 341

Series 225

High Helix

HSS, High Helix (Type W), stub length, 130° point, Form A
web thinned >14.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

General Steels/Brass

Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	26.00	6.00
0.0433			1.100	28.00	7.00
0.0469	3/64		1.190	28.00	7.00
0.0472			1.200	28.00	7.00
0.0512			1.300	28.00	7.00
0.0551		54	1.400	32.00	9.00
0.0591			1.500	32.00	9.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0709			1.800	36.00	11.00
0.0748			1.900	36.00	11.00
0.0780	5/64		1.980	38.00	12.00
0.0787			2.000	38.00	12.00
0.0827			2.100	38.00	12.00
0.0866			2.200	40.00	13.00
0.0886			2.250	40.00	13.00
0.0906			2.300	40.00	13.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0984			2.500	43.00	14.00
0.1024			2.600	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1083			2.750	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1102			2.800	46.00	16.00
0.1142			2.900	46.00	16.00
0.1181			3.000	46.00	16.00
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1378			3.500	52.00	20.00
0.1417			3.600	52.00	20.00
0.1457			3.700	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1535			3.900	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1575			4.000	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1811			4.600	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1929			4.900	62.00	26.00
0.1969			5.000	62.00	26.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2008			5.100	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2047			5.200	62.00	26.00
0.2067			5.250	62.00	26.00
0.2087			5.300	62.00	26.00
0.2126			5.400	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2244			5.700	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2402			6.100	70.00	31.00
0.2441			6.200	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2874			7.300	74.00	34.00
0.2953			7.500	74.00	34.00
0.2992			7.600	79.00	37.00
0.3071			7.800	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3425			8.700	84.00	40.00
0.3543			9.000	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3937			10.000	89.00	43.00
0.4016			10.200	89.00	43.00
0.4134			10.500	89.00	43.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4646			11.800	95.00	47.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5039			12.800	102.00	51.00
0.5118			13.000	102.00	51.00
0.5512			14.000	107.00	54.00
0.5709			14.500	111.00	56.00
0.5906			15.000	111.00	56.00
0.6299			16.000	115.00	58.00
0.6693			17.000	119.00	60.00
0.6890			17.500	123.00	62.00
0.7087			18.000	123.00	62.00
0.7480			19.000	127.00	64.00
0.7874			20.000	131.00	66.00

Alternative Drill Series:

#552 HSS, GT80, 3xD, 130 pt, Bright
#5521 PM Cobalt, GT500, 3xD, 130 pt, TiN
#515 PM Cobalt, GT500, 3xD, 130 pt, FIREX
#5524 Cobalt, GU500, 3xD, 118 pt, Bright

To order: Series number + mm, ex. 5518 3.000

3xD

Steam Oxide
>6.0 mm dia.

External Coolant

Straight Shank

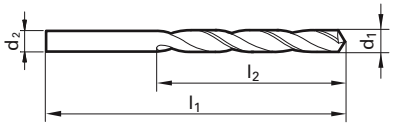
Speeds & Feeds
information pg 341

Series 226

General Purpose, LH helix

HSS, general purpose (Type N), stub length, 118° point, Form A web thinned >14.0mm dia., standard straight shank, LH cut

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0197			0.500	20.00	3.00
0.0217			0.550	21.00	3.50
0.0236			0.600	21.00	3.50
0.0256			0.650	22.00	4.00
0.0276			0.700	23.00	4.50
0.0295			0.750	23.00	4.50
0.0315			0.800	24.00	5.00
0.0335			0.850	24.00	5.00
0.0354			0.900	25.00	5.50
0.0374			0.950	25.00	5.50
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0413			1.050	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0453			1.150	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0469	3/64		1.190	28.00	7.00
0.0472			1.200	28.00	7.00
0.0492			1.250	28.00	7.00
0.0512			1.300	28.00	7.00
0.0520		55	1.320	28.00	7.00
0.0524			1.330	32.00	9.00
0.0531			1.350	32.00	9.00
0.0551		54	1.400	32.00	9.00
0.0571			1.450	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0610			1.550	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0650			1.650	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0689			1.750	36.00	11.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0713			1.810	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	38.00	12.00
0.0768			1.950	38.00	12.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0807			2.050	38.00	12.00
0.0811		46	2.060	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0827			2.100	38.00	12.00
0.0846			2.150	40.00	13.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0886			2.250	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0925			2.350	40.00	13.00
0.0933		42	2.370	43.00	14.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0965			2.450	43.00	14.00
0.0980		40	2.490	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1004			2.550	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1043			2.650	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1083			2.750	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1098		35	2.790	46.00	16.00
0.1102			2.800	46.00	16.00
0.1110		34	2.820	46.00	16.00
0.1122			2.850	46.00	16.00
0.1130		33	2.870	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1240			3.150	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1272			3.230	49.00	18.00
0.1280			3.250	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1299			3.300	49.00	18.00
0.1319			3.350	49.00	18.00
0.1339			3.400	52.00	20.00
0.1358		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1398			3.550	52.00	20.00
0.1417			3.600	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1476			3.750	52.00	20.00
0.1484			3.770	55.00	22.00
0.1496		25	3.800	55.00	22.00
0.1512			3.840	55.00	22.00
0.1516			3.850	55.00	22.00
0.1520		24	3.860	55.00	22.00
0.1535			3.900	55.00	22.00
0.1539		23	3.910	55.00	22.00
0.1555			3.950	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1571		22	3.990	55.00	22.00
0.1575			4.000	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1594			4.050	55.00	22.00
0.1614			4.100	55.00	22.00
0.1634			4.150	55.00	22.00
0.1654			4.200	55.00	22.00
0.1661		19	4.220	55.00	22.00
0.1673			4.250	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1713			4.350	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1728		17	4.390	58.00	24.00
0.1732			4.400	58.00	24.00
0.1752			4.450	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1799		15	4.570	58.00	24.00
0.1811			4.600	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1870			4.750	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1909		11	4.850	62.00	26.00
0.1929			4.900	62.00	26.00
0.1937		10	4.920	62.00	26.00
0.1961		9	4.980	62.00	26.00
0.1969			5.000	62.00	26.00
0.1988			5.050	62.00	26.00
0.2008			5.100	62.00	26.00
0.2012		7	5.110	62.00	26.00
0.2028			5.150	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2039		6	5.180	62.00	26.00
0.2047			5.200	62.00	26.00
0.2055		5	5.220	62.00	26.00
0.2067			5.250	62.00	26.00
0.2087			5.300	62.00	26.00
0.2091		4	5.310	66.00	28.00
0.2106			5.350	66.00	28.00
0.2126			5.400	66.00	28.00
0.2130		3	5.410	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2209		2	5.610	66.00	28.00
0.2224			5.650	66.00	28.00
0.2244			5.700	66.00	28.00
0.2264			5.750	66.00	28.00
0.2280		1	5.790	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2378		B	6.040	70.00	31.00

To order: Series number + mm, ex. 5518 3.000

Series 226

Speeds & Feeds information pg 341

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2441			6.200	70.00	31.00
0.2461		D	6.250	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2610		G	6.630	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2736			6.950	74.00	34.00
0.2756			7.000	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2854			7.250	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2949		M	7.490	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.2992			7.600	79.00	37.00
0.3031			7.700	79.00	37.00
0.3051			7.750	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3161		O	8.030	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3307			8.400	79.00	37.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.3319		Q	8.430	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3425			8.700	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3445			8.750	84.00	40.00
0.3465			8.800	84.00	40.00
0.3480		S	8.840	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3579		T	9.090	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3677		U	9.340	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3780			9.600	89.00	43.00
0.3819			9.700	89.00	43.00
0.3839			9.750	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3937			10.000	89.00	43.00
0.3969		X	10.080	89.00	43.00
0.3976			10.100	89.00	43.00
0.4016			10.200	89.00	43.00
0.4035			10.250	89.00	43.00
0.4055			10.300	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4094			10.400	89.00	43.00
0.4130		Z	10.490	89.00	43.00
0.4134			10.500	89.00	43.00
0.4173			10.600	89.00	43.00
0.4252			10.800	95.00	47.00
0.4291			10.900	95.00	47.00
0.4331			11.000	95.00	47.00
0.4370			11.100	95.00	47.00
0.4374	7/16		11.110	95.00	47.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.4409			11.200	95.00	47.00
0.4429			11.250	95.00	47.00
0.4449			11.300	95.00	47.00
0.4488			11.400	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4606			11.700	95.00	47.00
0.4626			11.750	95.00	47.00
0.4646			11.800	95.00	47.00
0.4724			12.000	102.00	51.00
0.4764			12.100	102.00	51.00
0.4803			12.200	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4882			12.400	102.00	51.00
0.4921			12.500	102.00	51.00
0.4961			12.600	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5354			13.600	107.00	54.00
0.5906			15.000	111.00	56.00
0.5984			15.200	115.00	58.00
0.6181			15.700	115.00	58.00
0.6201			15.750	115.00	58.00
0.6248	5/8		15.870	115.00	58.00
0.6496			16.500	119.00	60.00
0.6693			17.000	119.00	60.00
0.7500	3/4		19.050	131.00	66.00
0.7811	25/32		19.840	131.00	66.00
1.0000	1		25.400	156.00	78.00
1.0039			25.500	156.00	78.00
1.2008			30.500	174.00	87.00
1.7500	1 3/4		44.450	214.00	108.00

Alternative Drill Series:

#553 HSS, GT100, LH, 3xD, 130 pt, Bright

Extra Length #1

Steam Oxide
>2.36 mm dia.

External Coolant

Straight Shank

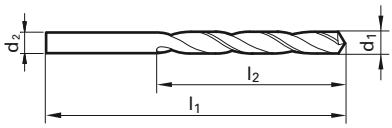
Speeds & Feeds
information pg 342

Series 235

General Purpose

HSS, general purpose (Type N), extra length #1, 118° point, Form A
web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0630			1.600	115.00	75.00
0.0709			1.800	120.00	80.00
0.0748			1.900	120.00	80.00
0.0768			1.950	125.00	85.00
0.0787			2.000	125.00	85.00
0.0807			2.050	125.00	85.00
0.0827			2.100	125.00	85.00
0.0866			2.200	135.00	90.00
0.0906			2.300	135.00	90.00
0.0937	3/32		2.380	150.00	100.00
0.0945			2.400	150.00	100.00
0.0984			2.500	150.00	100.00
0.1024			2.600	150.00	100.00
0.1063			2.700	150.00	100.00
0.1094	7/64		2.780	150.00	100.00
0.1102			2.800	150.00	100.00
0.1142			2.900	150.00	100.00
0.1181			3.000	150.00	100.00
0.1220			3.100	155.00	105.00
0.1248	1/8		3.170	155.00	105.00
0.1260			3.200	155.00	105.00
0.1280			3.250	155.00	105.00
0.1299			3.300	155.00	105.00
0.1339			3.400	165.00	115.00
0.1378			3.500	165.00	115.00
0.1406	9/64	28	3.570	165.00	115.00
0.1417			3.600	165.00	115.00
0.1457			3.700	165.00	115.00
0.1496		25	3.800	175.00	120.00
0.1535			3.900	175.00	120.00
0.1563	5/32		3.970	175.00	120.00
0.1575			4.000	175.00	120.00
0.1614			4.100	175.00	120.00
0.1654			4.200	175.00	120.00
0.1693		18	4.300	185.00	125.00
0.1720	11/64		4.370	185.00	125.00
0.1732			4.400	185.00	125.00
0.1772		16	4.500	185.00	125.00
0.1811			4.600	185.00	125.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1850		13	4.700	185.00	125.00
0.1874	3/16		4.760	195.00	135.00
0.1890		12	4.800	195.00	135.00
0.1929			4.900	195.00	135.00
0.1969			5.000	195.00	135.00
0.2008			5.100	195.00	135.00
0.2047			5.200	195.00	135.00
0.2087			5.300	195.00	135.00
0.2126			5.400	205.00	140.00
0.2165			5.500	205.00	140.00
0.2189	7/32		5.560	205.00	140.00
0.2205			5.600	205.00	140.00
0.2244			5.700	205.00	140.00
0.2283			5.800	205.00	140.00
0.2323			5.900	205.00	140.00
0.2343	15/64		5.950	205.00	140.00
0.2362			6.000	205.00	140.00
0.2402			6.100	215.00	150.00
0.2441			6.200	215.00	150.00
0.2480			6.300	215.00	150.00
0.2500	1/4	E	6.350	215.00	150.00
0.2520			6.400	215.00	150.00
0.2559			6.500	215.00	150.00
0.2598			6.600	215.00	150.00
0.2638			6.700	215.00	150.00
0.2657	17/64	H	6.750	225.00	155.00
0.2677			6.800	225.00	155.00
0.2756			7.000	225.00	155.00
0.2795			7.100	225.00	155.00
0.2811	9/32	K	7.140	225.00	155.00
0.2835			7.200	225.00	155.00
0.2913			7.400	225.00	155.00
0.2953			7.500	225.00	155.00
0.2969	19/64		7.540	240.00	165.00
0.2992			7.600	240.00	165.00
0.3031			7.700	240.00	165.00
0.3071			7.800	240.00	165.00
0.3110			7.900	240.00	165.00
0.3126	5/16		7.940	240.00	165.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3150			8.000	240.00	165.00
0.3189			8.100	240.00	165.00
0.3228		P	8.200	240.00	165.00
0.3268			8.300	240.00	165.00
0.3280	21/64		8.330	240.00	165.00
0.3307			8.400	240.00	165.00
0.3346			8.500	240.00	165.00
0.3386			8.600	250.00	175.00
0.3425			8.700	250.00	175.00
0.3437	11/32		8.730	250.00	175.00
0.3465			8.800	250.00	175.00
0.3543			9.000	250.00	175.00
0.3594	23/64		9.130	250.00	175.00
0.3740			9.500	250.00	175.00
0.3748	3/8		9.520	265.00	185.00
0.3780			9.600	265.00	185.00
0.3819			9.700	265.00	185.00
0.3858		W	9.800	265.00	185.00
0.3898			9.900	265.00	185.00
0.3937			10.000	265.00	185.00
0.4063	13/32		10.320	265.00	185.00
0.4134			10.500	265.00	185.00
0.4331			11.000	280.00	195.00
0.4374	7/16		11.110	280.00	195.00
0.4528			11.500	280.00	195.00
0.4724			12.000	295.00	205.00
0.4764			12.100	295.00	205.00
0.4843	31/64		12.300	295.00	205.00
0.4921			12.500	295.00	205.00
0.5000	1/2		12.700	295.00	205.00
0.5118			13.000	295.00	205.00

Alternative Drill Series:

#502 HSS, GT100, >10xD, 130 pt, Bright
#670 HSS, GT100, >10xD, 130 pt, TiN
#524 HSS, GT50, >10xD, 113 pt, Bright
#618 Cobalt, GT100, >10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

5xD

Series 245

General Purpose

HSS, general purpose (Type N), Standard (MTS), 118° point, Form A web thinned >14.0mm dia.Morse Taper shank, RH helix

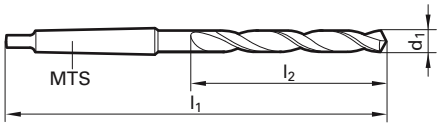
Cut / Shank Dia. = h8 tolerance range

Steam Oxide

External Coolant

Morse Taper Shank

Speeds & Feeds information pg 342



Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.0937	3/32		2.380	MTS 1	111.00	30.00
0.0984			2.500	MTS 1	111.00	30.00
0.1094	7/64		2.780	MTS 1	114.00	33.00
0.1248	1/8		3.170	MTS 1	117.00	36.00
0.1406	9/64	28	3.570	MTS 1	120.00	39.00
0.1496		25	3.800	MTS 1	124.00	43.00
0.1563	5/32		3.970	MTS 1	124.00	43.00
0.1575			4.000	MTS 1	124.00	43.00
0.1673			4.250	MTS 1	124.00	43.00
0.1720	11/64		4.370	MTS 1	128.00	47.00
0.1772		16	4.500	MTS 1	128.00	47.00
0.1874	3/16		4.760	MTS 1	133.00	52.00
0.1969			5.000	MTS 1	133.00	52.00
0.2008			5.100	MTS 1	133.00	52.00
0.2031	13/64		5.160	MTS 1	133.00	52.00
0.2047			5.200	MTS 1	133.00	52.00
0.2067			5.250	MTS 1	133.00	52.00
0.2087			5.300	MTS 1	133.00	52.00
0.2126			5.400	MTS 1	138.00	57.00
0.2165			5.500	MTS 1	138.00	57.00
0.2189	7/32		5.560	MTS 1	138.00	57.00
0.2205			5.600	MTS 1	138.00	57.00
0.2244			5.700	MTS 1	138.00	57.00
0.2264			5.750	MTS 1	138.00	57.00
0.2283			5.800	MTS 1	138.00	57.00
0.2323			5.900	MTS 1	138.00	57.00
0.2343	15/64		5.950	MTS 1	138.00	57.00
0.2362			6.000	MTS 1	138.00	57.00
0.2402			6.100	MTS 1	144.00	63.00
0.2441			6.200	MTS 1	144.00	63.00
0.2461		D	6.250	MTS 1	144.00	63.00
0.2480			6.300	MTS 1	144.00	63.00
0.2500	1/4	E	6.350	MTS 1	144.00	63.00
0.2520			6.400	MTS 1	144.00	63.00
0.2559			6.500	MTS 1	144.00	63.00
0.2598			6.600	MTS 1	144.00	63.00
0.2638			6.700	MTS 1	144.00	63.00
0.2657	17/64	H	6.750	MTS 1	150.00	69.00
0.2677			6.800	MTS 1	150.00	69.00
0.2717		I	6.900	MTS 1	150.00	69.00
0.2756			7.000	MTS 1	150.00	69.00
0.2811	9/32	K	7.140	MTS 1	150.00	69.00
0.2835			7.200	MTS 1	150.00	69.00
0.2854			7.250	MTS 1	150.00	69.00
0.2874			7.300	MTS 1	150.00	69.00
0.2913			7.400	MTS 1	150.00	69.00
0.2953			7.500	MTS 1	150.00	69.00
0.2969	19/64		7.540	MTS 1	156.00	75.00
0.2992			7.600	MTS 1	156.00	75.00
0.3031			7.700	MTS 1	156.00	75.00
0.3051			7.750	MTS 1	156.00	75.00
0.3071			7.800	MTS 1	156.00	75.00
0.3110			7.900	MTS 1	156.00	75.00
0.3126	5/16		7.940	MTS 1	156.00	75.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.3150			8.000	MTS 1	156.00	75.00
0.3189			8.100	MTS 1	156.00	75.00
0.3228		P	8.200	MTS 1	156.00	75.00
0.3248			8.250	MTS 1	156.00	75.00
0.3268			8.300	MTS 1	156.00	75.00
0.3280	21/64		8.330	MTS 1	156.00	75.00
0.3307			8.400	MTS 1	156.00	75.00
0.3346			8.500	MTS 1	156.00	75.00
0.3386			8.600	MTS 1	162.00	81.00
0.3425			8.700	MTS 1	162.00	81.00
0.3437	11/32		8.730	MTS 1	162.00	81.00
0.3445			8.750	MTS 1	162.00	81.00
0.3465			8.800	MTS 1	162.00	81.00
0.3504			8.900	MTS 1	162.00	81.00
0.3543			9.000	MTS 1	162.00	81.00
0.3583			9.100	MTS 1	162.00	81.00
0.3594	23/64		9.130	MTS 1	162.00	81.00
0.3622			9.200	MTS 1	162.00	81.00
0.3642			9.250	MTS 1	162.00	81.00
0.3661			9.300	MTS 1	162.00	81.00
0.3701			9.400	MTS 1	162.00	81.00
0.3740			9.500	MTS 1	162.00	81.00
0.3748	3/8		9.520	MTS 1	168.00	87.00
0.3819			9.700	MTS 1	168.00	87.00
0.3839			9.750	MTS 1	168.00	87.00
0.3858		W	9.800	MTS 1	168.00	87.00
0.3898			9.900	MTS 1	168.00	87.00
0.3906	25/64		9.920	MTS 1	168.00	87.00
0.3937			10.000	MTS 1	168.00	87.00
0.3976			10.100	MTS 1	168.00	87.00
0.4016			10.200	MTS 1	168.00	87.00
0.4035			10.250	MTS 1	168.00	87.00
0.4055			10.300	MTS 1	168.00	87.00
0.4063	13/32		10.320	MTS 1	168.00	87.00
0.4094			10.400	MTS 1	168.00	87.00
0.4134			10.500	MTS 1	168.00	87.00
0.4173			10.600	MTS 1	168.00	87.00
0.4213			10.700	MTS 1	175.00	94.00
0.4220	27/64		10.720	MTS 1	175.00	94.00
0.4232			10.750	MTS 1	175.00	94.00
0.4252			10.800	MTS 1	175.00	94.00
0.4291			10.900	MTS 1	175.00	94.00
0.4331			11.000	MTS 1	175.00	94.00
0.4370			11.100	MTS 1	175.00	94.00
0.4374	7/16		11.110	MTS 1	175.00	94.00
0.4409			11.200	MTS 1	175.00	94.00
0.4429			11.250	MTS 1	175.00	94.00
0.4449			11.300	MTS 1	175.00	94.00
0.4488			11.400	MTS 1	175.00	94.00
0.4528			11.500	MTS 1	175.00	94.00
0.4531	29/64		11.510	MTS 1	175.00	94.00
0.4567			11.600	MTS 1	175.00	94.00
0.4606			11.700	MTS 1	175.00	94.00
0.4626			11.750	MTS 1	175.00	94.00

Series 245

Speeds & Feeds information pg 342

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.4646			11.800	MTS 1	175.00	94.00
0.4685			11.900	MTS 1	182.00	101.00
0.4689	15/32		11.910	MTS 1	182.00	101.00
0.4724			12.000	MTS 1	182.00	101.00
0.4764			12.100	MTS 1	182.00	101.00
0.4803			12.200	MTS 1	182.00	101.00
0.4823			12.250	MTS 1	182.00	101.00
0.4843	31/64		12.300	MTS 1	182.00	101.00
0.4882			12.400	MTS 1	182.00	101.00
0.4921			12.500	MTS 1	182.00	101.00
0.4961			12.600	MTS 1	182.00	101.00
0.5000	1/2		12.700	MTS 1	182.00	101.00
0.5020			12.750	MTS 1	182.00	101.00
0.5039			12.800	MTS 1	182.00	101.00
0.5059			12.850	MTS 1	182.00	101.00
0.5079			12.900	MTS 1	182.00	101.00
0.5118			13.000	MTS 1	182.00	101.00
0.5157	33/64		13.100	MTS 1	182.00	101.00
0.5197			13.200	MTS 1	182.00	101.00
0.5217			13.250	MTS 1	189.00	108.00
0.5236			13.300	MTS 1	189.00	108.00
0.5276			13.400	MTS 1	189.00	108.00
0.5311	17/32		13.490	MTS 1	189.00	108.00
0.5315			13.500	MTS 1	189.00	108.00
0.5354			13.600	MTS 1	189.00	108.00
0.5394			13.700	MTS 1	189.00	108.00
0.5413			13.750	MTS 1	189.00	108.00
0.5433			13.800	MTS 1	189.00	108.00
0.5469	35/64		13.890	MTS 1	189.00	108.00
0.5472			13.900	MTS 1	189.00	108.00
0.5512			14.000	MTS 1	189.00	108.00
0.5551			14.100	MTS 2	212.00	114.00
0.5591			14.200	MTS 2	212.00	114.00
0.5610			14.250	MTS 2	212.00	114.00
0.5626	9/16		14.290	MTS 2	212.00	114.00
0.5630			14.300	MTS 2	212.00	114.00
0.5669			14.400	MTS 2	212.00	114.00
0.5709			14.500	MTS 2	212.00	114.00
0.5748			14.600	MTS 2	212.00	114.00
0.5780	37/64		14.680	MTS 2	212.00	114.00
0.5787			14.700	MTS 2	212.00	114.00
0.5807			14.750	MTS 2	212.00	114.00
0.5827			14.800	MTS 2	212.00	114.00
0.5866			14.900	MTS 2	212.00	114.00
0.5906			15.000	MTS 2	212.00	114.00
0.5937	19/32		15.080	MTS 2	218.00	120.00
0.5945			15.100	MTS 2	218.00	120.00
0.5984			15.200	MTS 2	218.00	120.00
0.6004			15.250	MTS 2	218.00	120.00
0.6024			15.300	MTS 2	218.00	120.00
0.6063			15.400	MTS 2	218.00	120.00
0.6094	39/64		15.480	MTS 2	218.00	120.00
0.6102			15.500	MTS 2	218.00	120.00
0.6142			15.600	MTS 2	218.00	120.00
0.6181			15.700	MTS 2	218.00	120.00
0.6201			15.750	MTS 2	218.00	120.00
0.6220			15.800	MTS 2	218.00	120.00
0.6248	5/8		15.870	MTS 2	218.00	120.00
0.6260			15.900	MTS 2	218.00	120.00
0.6299			16.000	MTS 2	218.00	120.00
0.6319			16.050	MTS 2	218.00	120.00
0.6339			16.100	MTS 2	223.00	125.00
0.6378			16.200	MTS 2	223.00	125.00
0.6398			16.250	MTS 2	223.00	125.00
0.6406	41/64		16.270	MTS 2	223.00	125.00
0.6417			16.300	MTS 2	223.00	125.00
0.6457			16.400	MTS 2	223.00	125.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.6496			16.500	MTS 2	223.00	125.00
0.6535			16.600	MTS 2	223.00	125.00
0.6563	21/32		16.670	MTS 2	223.00	125.00
0.6575			16.700	MTS 2	223.00	125.00
0.6594			16.750	MTS 2	223.00	125.00
0.6614			16.800	MTS 2	223.00	125.00
0.6654			16.900	MTS 2	223.00	125.00
0.6693			17.000	MTS 2	223.00	125.00
0.6720	43/64		17.070	MTS 2	228.00	130.00
0.6732			17.100	MTS 2	228.00	130.00
0.6772			17.200	MTS 2	228.00	130.00
0.6791			17.250	MTS 2	228.00	130.00
0.6811			17.300	MTS 2	228.00	130.00
0.6850			17.400	MTS 2	228.00	130.00
0.6874	11/16		17.460	MTS 2	228.00	130.00
0.6890			17.500	MTS 2	228.00	130.00
0.6929			17.600	MTS 2	228.00	130.00
0.6969			17.700	MTS 2	228.00	130.00
0.6988			17.750	MTS 2	228.00	130.00
0.7008			17.800	MTS 2	228.00	130.00
0.7031	45/64		17.860	MTS 2	228.00	130.00
0.7047			17.900	MTS 2	228.00	130.00
0.7087			18.000	MTS 2	228.00	130.00
0.7126			18.100	MTS 2	233.00	135.00
0.7165			18.200	MTS 2	233.00	135.00
0.7185			18.250	MTS 2	233.00	135.00
0.7189	23/32		18.260	MTS 2	233.00	135.00
0.7205			18.300	MTS 2	233.00	135.00
0.7283			18.500	MTS 2	233.00	135.00
0.7323			18.600	MTS 2	233.00	135.00
0.7343	47/64		18.650	MTS 2	233.00	135.00
0.7382			18.750	MTS 2	233.00	135.00
0.7402			18.800	MTS 2	233.00	135.00
0.7441			18.900	MTS 2	233.00	135.00
0.7480			19.000	MTS 2	233.00	135.00
0.7500	3/4		19.050	MTS 2	238.00	140.00
0.7520			19.100	MTS 2	238.00	140.00
0.7559			19.200	MTS 2	238.00	140.00
0.7579			19.250	MTS 2	238.00	140.00
0.7657	49/64		19.450	MTS 2	238.00	140.00
0.7677			19.500	MTS 2	238.00	140.00
0.7717			19.600	MTS 2	238.00	140.00
0.7756			19.700	MTS 2	238.00	140.00
0.7776			19.750	MTS 2	238.00	140.00
0.7795			19.800	MTS 2	238.00	140.00
0.7811	25/32		19.840	MTS 2	238.00	140.00
0.7835			19.900	MTS 2	238.00	140.00
0.7874			20.000	MTS 2	238.00	140.00
0.7913			20.100	MTS 2	243.00	145.00
0.7953			20.200	MTS 2	243.00	145.00
0.7969	51/64		20.240	MTS 2	243.00	145.00
0.7972			20.250	MTS 2	243.00	145.00
0.7992			20.300	MTS 2	243.00	145.00
0.8031			20.400	MTS 2	243.00	145.00
0.8071			20.500	MTS 2	243.00	145.00
0.8110			20.600	MTS 2	243.00	145.00
0.8126	13/16		20.640	MTS 2	243.00	145.00
0.8150			20.700	MTS 2	243.00	145.00
0.8169			20.750	MTS 2	243.00	145.00
0.8189			20.800	MTS 2	243.00	145.00
0.8268			21.000	MTS 2	243.00	145.00
0.8280	53/64		21.030	MTS 2	243.00	145.00
0.8307			21.100	MTS 2	243.00	145.00
0.8346			21.200	MTS 2	243.00	145.00
0.8366			21.250	MTS 2	248.00	150.00
0.8425			21.400	MTS 2	248.00	150.00
0.8437	27/32		21.430	MTS 2	248.00	150.00

To order: Series number + mm, ex. 5518 3.000

Series 245

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Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.8465			21.500	MTS 2	248.00	150.00
0.8543			21.700	MTS 2	248.00	150.00
0.8563			21.750	MTS 2	248.00	150.00
0.8594	55/64		21.830	MTS 2	248.00	150.00
0.8661			22.000	MTS 2	248.00	150.00
0.8701			22.100	MTS 2	248.00	150.00
0.8740			22.200	MTS 2	248.00	150.00
0.8748	7/8		22.220	MTS 2	248.00	150.00
0.8760			22.250	MTS 2	248.00	150.00
0.8780			22.300	MTS 2	248.00	150.00
0.8819			22.400	MTS 2	248.00	150.00
0.8858			22.500	MTS 2	253.00	155.00
0.8906	57/64		22.620	MTS 2	253.00	155.00
0.8957			22.750	MTS 2	253.00	155.00
0.9055			23.000	MTS 2	253.00	155.00
0.9063	29/32		23.020	MTS 2	253.00	155.00
0.9154			23.250	MTS 3	276.00	155.00
0.9220	59/64		23.420	MTS 3	276.00	155.00
0.9252			23.500	MTS 3	276.00	155.00
0.9350			23.750	MTS 3	281.00	160.00
0.9374	15/16		23.810	MTS 3	281.00	160.00
0.9449			24.000	MTS 3	281.00	160.00
0.9531	61/64		24.210	MTS 3	281.00	160.00
0.9547			24.250	MTS 3	281.00	160.00
0.9567			24.300	MTS 3	281.00	160.00
0.9646			24.500	MTS 3	281.00	160.00
0.9689	31/32		24.610	MTS 3	281.00	160.00
0.9744			24.750	MTS 3	281.00	160.00
0.9843	63/64		25.000	MTS 3	281.00	160.00
0.9941			25.250	MTS 3	286.00	165.00
1.0000	1		25.400	MTS 3	286.00	165.00
1.0039			25.500	MTS 3	286.00	165.00
1.0138			25.750	MTS 3	286.00	165.00
1.0157	1 1/64		25.800	MTS 3	286.00	165.00
1.0236			26.000	MTS 3	286.00	165.00
1.0311	1 1/32		26.190	MTS 3	286.00	165.00
1.0335			26.250	MTS 3	286.00	165.00
1.0433			26.500	MTS 3	286.00	165.00
1.0469	1 3/64		26.590	MTS 3	291.00	170.00
1.0531			26.750	MTS 3	291.00	170.00
1.0626	1 1/16		26.990	MTS 3	291.00	170.00
1.0630			27.000	MTS 3	291.00	170.00
1.0728			27.250	MTS 3	291.00	170.00
1.0780	1 5/64		27.380	MTS 3	291.00	170.00
1.0827			27.500	MTS 3	291.00	170.00
1.0925			27.750	MTS 3	291.00	170.00
1.0937	1 3/32		27.780	MTS 3	291.00	170.00
1.0945			27.800	MTS 3	291.00	170.00
1.1024			28.000	MTS 3	291.00	170.00
1.1122			28.250	MTS 3	296.00	175.00
1.1220			28.500	MTS 3	296.00	175.00
1.1248	1 1/8		28.570	MTS 3	296.00	175.00
1.1319			28.750	MTS 3	296.00	175.00
1.1417			29.000	MTS 3	296.00	175.00
1.1516			29.250	MTS 3	296.00	175.00
1.1563	1 5/32		29.370	MTS 3	296.00	175.00
1.1614			29.500	MTS 3	296.00	175.00
1.1713			29.750	MTS 3	296.00	175.00
1.1811			30.000	MTS 3	296.00	175.00
1.1874	1 3/16		30.160	MTS 3	301.00	180.00
1.1909			30.250	MTS 3	301.00	180.00
1.2008			30.500	MTS 3	301.00	180.00
1.2106			30.750	MTS 3	301.00	180.00
1.2205			31.000	MTS 3	301.00	180.00
1.2303			31.250	MTS 3	301.00	180.00
1.2402			31.500	MTS 3	301.00	180.00
1.2500	1 1/4		31.750	MTS 3	306.00	185.00
1.2598			32.000	MTS 4	334.00	185.00
1.2657	1 17/64		32.150	MTS 4	334.00	185.00
1.2697			32.250	MTS 4	334.00	185.00
1.2795			32.500	MTS 4	334.00	185.00
1.2811	1 9/32		32.540	MTS 4	334.00	185.00
1.2992			33.000	MTS 4	334.00	185.00
1.3126	1 5/16		33.340	MTS 4	334.00	185.00
1.3189			33.500	MTS 4	334.00	185.00
1.3280	1 21/64		33.730	MTS 4	339.00	190.00
1.3386			34.000	MTS 4	339.00	190.00
1.3437	1 11/32		34.130	MTS 4	339.00	190.00
1.3583			34.500	MTS 4	339.00	190.00
1.3748	1 3/8		34.920	MTS 4	339.00	190.00
1.3780			35.000	MTS 4	339.00	190.00
1.3976			35.500	MTS 4	339.00	190.00
1.4173			36.000	MTS 4	344.00	195.00
1.4370			36.500	MTS 4	344.00	195.00
1.4567			37.000	MTS 4	344.00	195.00
1.4689	1 15/32		37.310	MTS 4	344.00	195.00
1.4764			37.500	MTS 4	344.00	195.00
1.4961			38.000	MTS 4	349.00	200.00
1.5000	1 1/2		38.100	MTS 4	349.00	200.00
1.6094	1 39/64		40.880	MTS 4	354.00	205.00
1.7189	1 23/32		43.660	MTS 4	359.00	210.00
1.7811	1 25/32		45.240	MTS 4	364.00	215.00
1.8437	1 27/32		46.830	MTS 4	364.00	215.00
1.9220	1 59/64		48.820	MTS 4	369.00	220.00
2.1874	2 3/16		55.560	MTS 5	417.00	230.00
3.1248	3 1/8		79.370	MTS 6	514.00	260.00

Alternative Drill Series:

#654 HSS, GP, 5xD, 118 pt, Oxide
#345 Cobalt, GP, 5xD, 118 pt, Oxide
#661 Cobalt, GT100, 5xD, 130 pt, Bright

10xD

Steam Oxide

External Coolant

Morse Taper Shank

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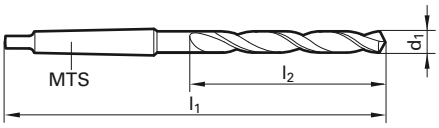
Series 257

General Purpose

HSS, general purpose (Type N), bushing length, 118° point, Form A web thinned >14.0mm dia., Morse Taper shank, RH helix

Cut / Shank Dia. = h8 tolerance range



Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.1575			4.000	MTS 1	145.00	64.00
0.2008			5.100	MTS 1	155.00	74.00
0.2520			6.400	MTS 1	167.00	86.00
0.2559			6.500	MTS 1	167.00	86.00
0.2657	17/64	H	6.750	MTS 1	174.00	93.00
0.3228		P	8.200	MTS 1	181.00	100.00
0.3346			8.500	MTS 1	181.00	100.00
0.3740			9.500	MTS 1	188.00	107.00
0.3937			10.000	MTS 1	197.00	116.00
0.3976			10.100	MTS 1	197.00	116.00
0.4016			10.200	MTS 1	197.00	116.00
0.4035			10.250	MTS 1	197.00	116.00
0.4055			10.300	MTS 1	197.00	116.00
0.4094			10.400	MTS 1	197.00	116.00
0.4134			10.500	MTS 1	197.00	116.00
0.4173			10.600	MTS 1	197.00	116.00
0.4213			10.700	MTS 1	206.00	125.00
0.4232			10.750	MTS 1	206.00	125.00
0.4252			10.800	MTS 1	206.00	125.00
0.4291			10.900	MTS 1	206.00	125.00
0.4331			11.000	MTS 1	206.00	125.00
0.4370			11.100	MTS 1	206.00	125.00
0.4409			11.200	MTS 1	206.00	125.00
0.4429			11.250	MTS 1	206.00	125.00
0.4449			11.300	MTS 1	206.00	125.00
0.4488			11.400	MTS 1	206.00	125.00
0.4528			11.500	MTS 1	206.00	125.00
0.4567			11.600	MTS 1	206.00	125.00
0.4626			11.750	MTS 1	206.00	125.00
0.4646			11.800	MTS 1	206.00	125.00
0.4685			11.900	MTS 1	215.00	134.00
0.4724			12.000	MTS 1	215.00	134.00
0.4764			12.100	MTS 1	215.00	134.00
0.4803			12.200	MTS 1	215.00	134.00
0.4823			12.250	MTS 1	215.00	134.00
0.4843	31/64		12.300	MTS 1	215.00	134.00
0.4882			12.400	MTS 1	215.00	134.00
0.4921			12.500	MTS 1	215.00	134.00
0.4961			12.600	MTS 1	215.00	134.00
0.5000	1/2		12.700	MTS 1	215.00	134.00
0.5020			12.750	MTS 1	215.00	134.00
0.5039			12.800	MTS 1	215.00	134.00
0.5118			13.000	MTS 1	215.00	134.00
0.5157	33/64		13.100	MTS 1	215.00	134.00
0.5197			13.200	MTS 1	215.00	134.00
0.5217			13.250	MTS 1	223.00	142.00
0.5236			13.300	MTS 1	223.00	142.00
0.5311	17/32		13.490	MTS 1	223.00	142.00
0.5315			13.500	MTS 1	223.00	142.00
0.5354			13.600	MTS 1	223.00	142.00
0.5413			13.750	MTS 1	223.00	142.00
0.5433			13.800	MTS 1	223.00	142.00
0.5472			13.900	MTS 1	223.00	142.00
0.5512			14.000	MTS 1	223.00	142.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.5551			14.100	MTS 2	245.00	147.00
0.5591			14.200	MTS 2	245.00	147.00
0.5610			14.250	MTS 2	245.00	147.00
0.5626	9/16		14.290	MTS 2	245.00	147.00
0.5630			14.300	MTS 2	245.00	147.00
0.5709			14.500	MTS 2	245.00	147.00
0.5807			14.750	MTS 2	245.00	147.00
0.5827			14.800	MTS 2	245.00	147.00
0.5866			14.900	MTS 2	245.00	147.00
0.5906			15.000	MTS 2	245.00	147.00
0.5937	19/32		15.080	MTS 2	251.00	153.00
0.5945			15.100	MTS 2	251.00	153.00
0.5984			15.200	MTS 2	251.00	153.00
0.6004			15.250	MTS 2	251.00	153.00
0.6024			15.300	MTS 2	251.00	153.00
0.6102			15.500	MTS 2	251.00	153.00
0.6142			15.600	MTS 2	251.00	153.00
0.6201			15.750	MTS 2	251.00	153.00
0.6220			15.800	MTS 2	251.00	153.00
0.6248	5/8		15.870	MTS 2	251.00	153.00
0.6299			16.000	MTS 2	251.00	153.00
0.6339			16.100	MTS 2	257.00	159.00
0.6398			16.250	MTS 2	257.00	159.00
0.6406	41/64		16.270	MTS 2	257.00	159.00
0.6457			16.400	MTS 2	257.00	159.00
0.6496			16.500	MTS 2	257.00	159.00
0.6563	21/32		16.670	MTS 2	257.00	159.00
0.6594			16.750	MTS 2	257.00	159.00
0.6693			17.000	MTS 2	257.00	159.00
0.6791			17.250	MTS 2	263.00	165.00
0.6874	11/16		17.460	MTS 2	263.00	165.00
0.6890			17.500	MTS 2	263.00	165.00
0.6988			17.750	MTS 2	263.00	165.00
0.7087			18.000	MTS 2	263.00	165.00
0.7185			18.250	MTS 2	269.00	171.00
0.7189	23/32		18.260	MTS 2	269.00	171.00
0.7283			18.500	MTS 2	269.00	171.00
0.7382			18.750	MTS 2	269.00	171.00
0.7480			19.000	MTS 2	269.00	171.00
0.7579			19.250	MTS 2	275.00	177.00
0.7677			19.500	MTS 2	275.00	177.00
0.7776			19.750	MTS 2	275.00	177.00
0.7811	25/32		19.840	MTS 2	275.00	177.00
0.7874			20.000	MTS 2	275.00	177.00
0.7972			20.250	MTS 2	282.00	184.00
0.8071			20.500	MTS 2	282.00	184.00
0.8126	13/16		20.640	MTS 2	282.00	184.00
0.8268			21.000	MTS 2	282.00	184.00
0.8465			21.500	MTS 2	289.00	191.00
0.8563			21.750	MTS 2	289.00	191.00
0.8661			22.000	MTS 2	289.00	191.00
0.8748	7/8		22.220	MTS 2	289.00	191.00
0.8760			22.250	MTS 2	289.00	191.00
0.8858			22.500	MTS 2	296.00	198.00

To order: Series number + mm, ex. 5518 3.000

Series 257

Speeds & Feeds information pg 343

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.9055			23.000	MTS 2	296.00	198.00
0.9154			23.250	MTS 3	319.00	198.00
0.9252			23.500	MTS 3	319.00	198.00
0.9350			23.750	MTS 3	327.00	206.00
0.9374	15/16		23.810	MTS 3	327.00	206.00
0.9449			24.000	MTS 3	327.00	206.00
0.9547			24.250	MTS 3	327.00	206.00
0.9646			24.500	MTS 3	327.00	206.00
0.9843	63/64		25.000	MTS 3	327.00	206.00
0.9941			25.250	MTS 3	335.00	214.00
1.0039			25.500	MTS 3	335.00	214.00
1.0236			26.000	MTS 3	335.00	214.00
1.0433			26.500	MTS 3	335.00	214.00
1.0630			27.000	MTS 3	343.00	222.00
1.0827			27.500	MTS 3	343.00	222.00
1.1024			28.000	MTS 3	343.00	222.00
1.1220			28.500	MTS 3	351.00	230.00
1.1417			29.000	MTS 3	351.00	230.00
1.1563	1 5/32		29.370	MTS 3	351.00	230.00
1.2500	1 1/4		31.750	MTS 4	397.00	248.00

Alternative Drill Series:

#551 HSS, GT100, 10xD, 130 pt, Bright

Extra Length #1

Steam Oxide

External Coolant

Morse Taper Shank

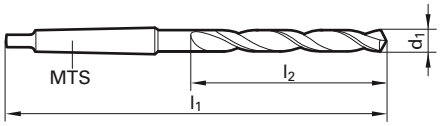
Speeds & Feeds information pg 343

Series 266

General Purpose

HSS, general purpose (Type N), extra length #1, 118° point, Form A web thinned all dia., Morse Taper shank, RH helix

Cut / Shank Dia. = h8 tolerance range



Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.3346			8.500	MTS 1	265.00	165.00
0.3543			9.000	MTS 1	275.00	175.00
0.3937			10.000	MTS 1	285.00	185.00
0.4016			10.200	MTS 1	285.00	185.00
0.4035			10.250	MTS 1	285.00	185.00
0.4063	13/32		10.320	MTS 1	285.00	185.00
0.4134			10.500	MTS 1	285.00	185.00
0.4331			11.000	MTS 1	300.00	195.00
0.4374	7/16		11.110	MTS 1	300.00	195.00
0.4528			11.500	MTS 1	300.00	195.00
0.4646			11.800	MTS 1	300.00	195.00
0.4724			12.000	MTS 1	310.00	205.00
0.4921			12.500	MTS 1	310.00	205.00
0.5000	1/2		12.700	MTS 1	310.00	205.00
0.5118			13.000	MTS 1	310.00	205.00
0.5311	17/32		13.490	MTS 1	325.00	220.00
0.5315			13.500	MTS 1	325.00	220.00
0.5512			14.000	MTS 1	325.00	220.00
0.5626	9/16		14.290	MTS 2	340.00	220.00
0.5709			14.500	MTS 2	340.00	220.00
0.5906			15.000	MTS 2	340.00	220.00
0.6004			15.250	MTS 2	355.00	230.00
0.6102			15.500	MTS 2	355.00	230.00
0.6299			16.000	MTS 2	355.00	230.00
0.6496			16.500	MTS 2	355.00	230.00
0.6563	21/32		16.670	MTS 2	355.00	230.00
0.6693			17.000	MTS 2	355.00	230.00
0.6890			17.500	MTS 2	370.00	245.00
0.7087			18.000	MTS 2	370.00	245.00
0.7283			18.500	MTS 2	370.00	245.00
0.7343	47/64		18.650	MTS 2	370.00	245.00
0.7480			19.000	MTS 2	370.00	245.00
0.7500	3/4		19.050	MTS 2	385.00	260.00
0.7677			19.500	MTS 2	385.00	260.00
0.7776			19.750	MTS 2	385.00	260.00
0.7874			20.000	MTS 2	385.00	260.00
0.8071			20.500	MTS 2	385.00	260.00
0.8126	13/16		20.640	MTS 2	385.00	260.00
0.8268			21.000	MTS 2	385.00	260.00
0.8465			21.500	MTS 2	405.00	270.00
0.8661			22.000	MTS 2	405.00	270.00
0.8858			22.500	MTS 2	405.00	270.00
0.9055			23.000	MTS 2	405.00	270.00
0.9063	29/32		23.020	MTS 2	405.00	270.00
1.3386			34.000	MTS 4	530.00	340.00

Alternative Drill Series:

#526 HSS, GT100, >10xD, 130 pt, Oxide
#620 Cobalt, GT100, >10xD, 130 pt, Oxide

To order: Series number + mm, ex. 5518 3.000

GUHRING

The Tool Company

HIGH PERFORMANCE SOLID CARBIDE END MILLS

- New: RF100 variable helix styles
- Precision ball nose designs
- Full metric offering
- Expanded size range
- Extensive corner radius selections

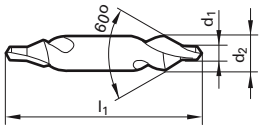
Metric

Center Drill/Countersink

Non-flatted body, 60° angle

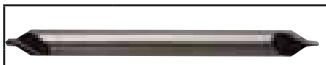
Tolerance information can be found in the Technical Section, Page 286

General Steels/Brass
Universal Steels
Cast Iron



	Series	581	613	381	590	736	582	583	614	584
	Standard	DIN 333	DIN 333	DIN 333	GUH STD	GUH STD	DIN 333	DIN 333	DIN 333	DIN 333
	Substrate	HSS	HSS	Cobalt	HSS	Carbide	HSS	HSS	HSS	HSS
	Cut Direction	RH	RH	RH	RH	RH	LH	RH	RH	LH
	Form	A	A	A	A	A	A	R	R	R
	Feature				Reinforced neck					
* one-sided	Surface Finish	◯	Ⓢ	◯	◯	◯	◯	◯	Ⓢ	◯
Order Code	d1	d2	l1							
0.500*	0.50	3.15	25.0	●	●			●	●	●		
0.800*	0.80	3.15	25.0	●	●			●	●	●	●	●
1.000	1.00	3.15	31.5	●	●	●	●	●	●	●	●	●
1.250	1.25	3.15	31.5	●	●	●	●	●	●	●	●	●
1.600	1.60	4.00	35.5	●	●	●	●	●	●	●	●	●
2.000	2.00	5.00	40.0	●	●	●	●	●	●	●	●	●
2.500	2.50	6.30	45.0	●	●	●	●	●	●	●	●	●
3.150	3.15	8.00	50.0	●	●	●	●	●	●	●	●	●
4.000	4.00	10.00	56.0	●	●	●	●	●	●	●	●	●
5.000	5.00	12.50	63.0	●	●		●	●	●	●	●	●
6.300	6.30	16.00	71.0	●	●		●	●	●	●	●	
8.000	8.00	20.00	80.0	●	●			●	●	●		
10.000	10.00	25.00	100.0	●			●			●		
12.500	12.50	31.50	125.0	●			●					

	Series	281	282	283	284
	Standard	GUH STD	GUH STD	GUH STD	GUH STD
	Substrate	HSS	HSS	HSS	HSS
	Cut Direction	RH	LH	RH	LH
	Form	A	A	R	R
	Feature				
* one-sided	Surface Finish	◯	◯	◯	◯
Order Code	d1	d2	l1				
0.500*	0.50	3.15	25.0	●	●	●	
0.800*	0.80	3.15	25.0	●	●	●	
1.000	1.00	3.15	31.5	●	●	●	
1.250	1.25	4.00	35.5	●	●	●	●
1.600	1.60	5.00	40.0	●	●	●	●
2.000	2.00	6.30	45.0	●	●	●	●
2.500	2.50	8.00	50.0	●	●	●	●
3.150	3.15	10.00	56.0	●	●	●	●
4.000	4.00	12.50	63.0	●	●	●	●
5.000	5.00	16.00	71.0	●	●	●	
6.300	6.30	20.00	80.0	●		●	
8.000	8.00	25.00	100.0	●		●	
10.000	10.00	31.50	125.0	●			



	Series	280
	Standard	GUH STD
	Substrate	HSS
	Cut Direction	RH
	Form	A
	Feature	Long length
	Surface Finish	◯
Order Code	d1	d2	l1	
1.00	1.00	4.00	120.0	●
1.60	1.60	5.00	120.0	●
2.00	2.00	6.00	120.0	●
2.50	2.50	8.00	120.0	●
3.15	3.15	10.00	120.0	●

To order: Series number + mm, ex. 5518 3.000

◯ bright Ⓢ TiN

Metric

Center Drill/Countersink

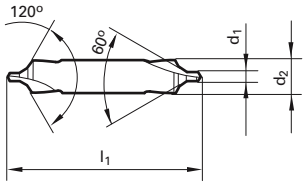
Non-flatted body, double angle 60°/120°

General Steels/Brass

Universal Steels

Cast Iron

Tolerance information can be found in the Technical Section, Page 286



	Series	585	586	591
	Standard	DIN 333	DIN 333	DIN 333
	Substrate	HSS	HSS	HSS
	Cut Direction	RH	LH	RH
	Form	B	B	B
	Feature			Reinforced neck
	Surface Finish	◯	◯	◯
Order Code	d1	d2	l1			
1.00	1.00	4.00	35.5	●		
1.25	1.25	5.00	40.0	●	●	●
1.60	1.60	6.30	45.0	●	●	●
2.00	2.00	8.00	50.0	●	●	●
2.50	2.50	10.00	56.0	●	●	●
3.15	3.15	11.20	60.0	●	●	●
4.00	4.00	14.00	67.0	●	●	●
5.00	5.00	18.00	75.0	●	●	●
6.30	6.30	20.00	80.0	●	●	
8.00	8.00	25.00	100.0	●		
10.00	10.00	31.50	125.0	●		

	Series	285
	Standard	GUH STD
	Substrate	HSS
	Cut Direction	RH
	Form	B
	Feature	
	Surface Finish	◯
Order Code	d1	d2	l1	
1.60	1.60	6.30	50.0	●
2.00	2.00	8.00	56.0	●
2.50	2.50	10.00	63.0	●
3.15	3.15	11.20	71.0	●
4.00	4.00	14.00	80.0	●
5.00	5.00	18.00	90.0	●
6.30	6.30	20.00	100.0	●
5.00	5.00	18.00	75.0	●
6.30	6.30	20.00	80.0	●

Technical Specifications - **Form A** Center Drills				
Standard	DIN 333	GUH STD	British Std. 328	ASA (USA Std.)
Point grind	relived cone	relived cone	relived cone	relived cone
Point angle	118°	118°	118°	118°
Web thin	1.6 mm dia up to DIN 1412, form A	1.6 mm dia up to DIN 1412, form A	to DIN 1412, form A	> 1.6 mm dia to DIN 1412, form A
Description	Standard drill for producing center holes to DIN 332, sheet 1, Form A (without protecting chamfer)			

Technical Specifications - **Form B** Center Drills			
Standard	DIN 333	GUH STD	ASA (USA Std.)
Point grind	relived cone	relived cone	relived cone
Point angle	118	118	118
Web thin	1.6 mm dia up to DIN 1412, form A	1.6 mm dia up to DIN 1412, form A	to DIN 1412, form A
Description	Special purpose drill for producing center holes to DIN 332, sheet 1, form B (with protecting countersink of 120 deg.)		
Series 591 has a reinforced neck for higher metal removal rates.			

Technical Specifications - **Form R** Center Drills		
Standard	DIN 333	GUH STD
Point grind	relived cone	relived cone
Point angle	118	118
Web thin	1.6 mm dia up to DIN 1412, form A	1.6 mm dia up to DIN 1412, form A
Description	Special purpose drill for producing center holes to DIN 332, sheet 1, form R (radiused)	
Radius form for high fracture resistance properties, precise concentricity of the point in relationship with the body and a protected center hole.		

◯ bright Ⓢ TiN

To order: Series number + mm, ex. 5518 3.000

Number Size

Center Drill/Countersink

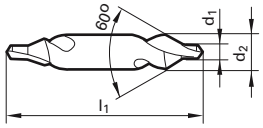
Non-flatted body, 60° angle

Tolerance information can be found in the Technical Section, Page 286

General Steels/Brass

Universal Steels

Cast Iron



Series	594
Standard	ASA
Substrate	HSS
Cut Direction	RH
Form	A
Surface Finish	◯

Order Code	Size	d1	d2	l1	
1.19	1	3/64	1/8	1 1/4	●
1.98	2	5/64	3/16	1 7/8	●
2.78	3	7/64	1/4	2	●
3.17	4	1/8	5/16	2 1/8	●
4.76	5	3/16	7/16	2 3/4	●
5.56	6	7/32	1/2	3	●
6.35	7	1/4	5/8	3 1/4	●
7.94	8	5/16	3/4	3 1/2	●

Series	595
Standard	ASA
Substrate	HSS
Cut Direction	RH
Form	B
Surface Finish	◯

Order Code	Size	d1	d2	l1	
1.19	11	3/64	1/8	1 1/4	●
1.59	12	5/16	3/16	1 7/8	●
2.38	13	3/32	1/4	2	●
2.78	14	7/64	5/16	2 1/8	●
3.97	15	5/32	7/16	2 3/4	●
4.76	16	3/16	1/2	3	●
5.56	17	7/32	5/8	3 1/4	●
6.35	18	1/4	3/4	3 1/2	●

Series	292	294
Standard	BRITISH 328	BRITISH 328
Substrate	HSS	HSS
Cut Direction	RH	LH
Form	A	A
Surface Finish	◯	◯

Order Code	Size	d1	d2	l1		
1.19	1	3/64	1/8	1 1/2	●	●
1.59	2	1/16	3/16	1	●	●
2.38	3	3/32	1/4	2	●	●
3.17	4	1/8	5/16	2 1/4	●	●
4.76	5	3/16	7/16	2 15/32	●	
6.35	6	1/4	5/8	3	●	
7.94	7	5/16	3/4	3 1/2	●	

Technical Specifications - **Form A** Center Drills				
Standard	DIN 333	GUH STD	British Std. 328	ASA (USA Std.)
Point grind	relived cone	relived cone	relived cone	relived cone
Point angle	118°	118°	118°	118°
Web thin	1.6 mm dia up to DIN 1412, form A	1.6 mm dia up to DIN 1412, form A	to DIN 1412, form A	> 1.6 mm dia to DIN 1412, form A
Description	Standard drill for producing center holes to DIN 332, sheet 1, Form A (without protecting chamfer)			

Technical Specifications - **Form B** Center Drills			
Standard	DIN 333	GUH STD	ASA (USA Std.)
Point grind	relived cone	relived cone	relived cone
Point angle	118	118	118
Web thin	1.6 mm dia up to DIN 1412, form A	1.6 mm dia up to DIN 1412, form A	to DIN 1412, form A
Description	Special purpose drill for producing center holes to DIN 332, sheet 1, form B (with protecting countersink of 120 deg.)		
Series 591 has a reinforced neck for higher metal removal rates.			

Technical Specifications - **Form R** Center Drills		
Standard	DIN 333	GUH STD
Point grind	relived cone	relived cone
Point angle	118	118
Web thin	1.6 mm dia up to DIN 1412, form A	1.6 mm dia up to DIN 1412, form A
Description	Special purpose drill for producing center holes to DIN 332, sheet 1, form R (radiused)	
Radius form for high fracture resistance properties, precise concentricity of the point in relationship with the body and a protected center hole.		

To order: Series number + mm, ex. 5518 3.000

Metric

Center Drill/Countersink

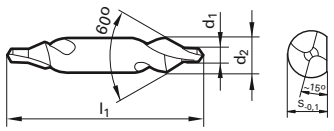
Flatted body

Tolerance information can be found in the Technical Section, Page 286

General Steels/Brass

Universal Steels

Cast Iron



Series	587	588
Standard	GUH STD	GUH STD
Substrate	HSS	HSS
Cut Direction	RH	RH
Form	A	R
Feature	60° angle	60° angle
Surface Finish	◯	◯

Order Code	d1	d2	l1	S		
1.600	1.60	4.00	35.5	3.25	●	●
2.000	2.00	5.00	40.0	4.20	●	●
2.500	2.50	6.30	45.0	5.35	●	●
3.150	3.15	8.00	50.0	6.95	●	●
4.000	4.00	10.00	56.0	8.40	●	●
5.000	5.00	12.50	63.0	10.95	●	●
6.300	6.30	16.00	71.0	14.00	●	●
8.000	8.00	20.00	80.0	17.90	●	●
10.000	10.00	25.00	100.0	22.50	●	

Series	589
Standard	GUH STD
Substrate	HSS
Cut Direction	RH
Form	B
Feature	60°/120° double angle
Surface Finish	◯

Order Code	d1	d2	l1	S	
1.600	1.60	6.30	45.0	5.35	●
2.000	2.00	8.00	50.0	6.95	●
2.500	2.50	10.00	56.0	8.40	●
3.150	3.15	11.20	60.0	10.00	●
4.000	4.00	14.00	67.0	12.65	●
5.000	5.00	18.00	75.0	16.40	●
6.300	6.30	20.00	80.0	17.90	●
8.000	8.00	25.00	100.0	22.50	●

Series	287	288
Standard	GUH STD	GUH STD
Substrate	HSS	HSS
Cut Direction	RH	RH
Form	A	R
Feature	60° angle	60° angle
Surface Finish	◯	◯

Order Code	d1	d2	l1	S		
1.600	1.60	5.00	40.0	4.20	●	●
2.000	2.00	6.30	45.0	5.35	●	●
2.500	2.50	8.00	50.0	6.85	●	●
3.150	3.15	10.00	56.0	8.40	●	●
4.000	4.00	12.50	63.0	10.65	●	●
5.000	5.00	16.00	71.0	13.65	●	●
6.300	6.30	20.00	80.0	17.40	●	

Series	289
Standard	GUH STD
Substrate	HSS
Cut Direction	RH
Form	B
Feature	60°/120° double angle
Surface Finish	◯

Order Code	d1	d2	l1	S	
1.600	1.60	8.00	50.0	6.50	●
2.000	2.00	10.00	56.0	7.95	●
2.500	2.50	11.20	63.0	9.50	●
3.150	3.15	14.00	71.0	12.00	●
4.000	4.00	16.00	80.0	14.40	●
5.000	5.00	20.00	90.0	18.40	●

◯ bright Ⓢ TiN

To order: Series number + mm, ex. 5518 3.000

GUHRING

MQL by GÜHRING

GM300

HSK/ISO TOOL HOLDERS, HSK CLAMPING SYSTEMS AND ACCESSORIES

- to ISO 12164, DIN 69893 and DIN 69871
- for transfer lines, machining and turning centers

Micro

Series 301

Micro-Precision

Cobalt, Micro-Precision (Type N), 118° point, reinforced straight shank, RH helix

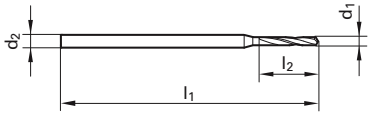
Shank Dia. = h8 tolerance range, Cut Dia. +0 / -0.004

Bright Finish

External Coolant

Reinforced Straight Shank

Speeds & Feeds information pg 344



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0020			0.050	1.000	25.00	0.30
0.0024			0.060	1.000	25.00	0.30
0.0028			0.070	1.000	25.00	0.30
0.0030			0.075	1.000	25.00	0.40
0.0031			0.080	1.000	25.00	0.40
0.0035			0.090	1.000	25.00	0.40
0.0039			0.100	1.000	25.00	0.50
0.0041			0.105	1.000	25.00	0.50
0.0043			0.110	1.000	25.00	0.50
0.0045			0.115	1.000	25.00	0.50
0.0047			0.120	1.000	25.00	0.50
0.0049			0.125	1.000	25.00	0.80
0.0050			0.128	1.000	25.00	0.80
0.0051			0.130	1.000	25.00	0.80
0.0055			0.140	1.000	25.00	0.80
0.0056			0.143	1.000	25.00	0.80
0.0057			0.145	1.000	25.00	0.80
0.0058			0.147	1.000	25.00	0.80
0.0059		97	0.150	1.000	25.00	0.80
0.0061			0.155	1.000	25.00	1.10
0.0063		96	0.160	1.000	25.00	1.10
0.0067		95	0.170	1.000	25.00	1.10
0.0069			0.175	1.000	25.00	1.10
0.0071		94	0.180	1.000	25.00	1.10
0.0075		93	0.190	1.000	25.00	1.10
0.0077			0.195	1.000	25.00	1.50
0.0079		92	0.200	1.000	25.00	1.50
0.0081			0.205	1.000	25.00	1.50
0.0083		91	0.210	1.000	25.00	1.50
0.0087		90	0.220	1.000	25.00	1.50
0.0089			0.225	1.000	25.00	1.50
0.0091		89	0.230	1.000	25.00	1.50
0.0093			0.235	1.000	25.00	1.50
0.0094		88	0.240	1.000	25.00	1.50
0.0096			0.245	1.000	25.00	1.90
0.0098		87	0.250	1.000	25.00	1.90
0.0100			0.255	1.000	25.00	1.90
0.0102			0.260	1.000	25.00	1.90
0.0104			0.265	1.000	25.00	1.90
0.0106		86	0.270	1.000	25.00	1.90
0.0108			0.275	1.000	25.00	1.90
0.0110		85	0.280	1.000	25.00	1.90
0.0114		84	0.290	1.000	25.00	1.90
0.0116			0.295	1.000	25.00	1.90
0.0118			0.300	1.000	25.00	1.90
0.0120			0.305	1.000	25.00	2.40
0.0122		83	0.310	1.000	25.00	2.40
0.0124			0.315	1.000	25.00	2.40
0.0126		82	0.320	1.000	25.00	2.40
0.0128			0.325	1.000	25.00	2.40
0.0130		81	0.330	1.000	25.00	2.40
0.0134		80	0.340	1.000	25.00	2.40
0.0136			0.345	1.000	25.00	2.40
0.0138			0.350	1.000	25.00	2.40

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0140			0.355	1.000	25.00	2.40
0.0142			0.360	1.000	25.00	2.40
0.0144			0.365	1.000	25.00	2.40
0.0146		79	0.370	1.000	25.00	2.40
0.0148			0.375	1.000	25.00	2.40
0.0150			0.380	1.000	25.00	2.40
0.0152			0.385	1.000	25.00	3.00
0.0154			0.390	1.000	25.00	3.00
0.0157	1/64		0.400	1.000	25.00	3.00
0.0159			0.405	1.000	25.00	3.00
0.0161		78	0.410	1.000	25.00	3.00
0.0163			0.415	1.000	25.00	3.00
0.0165			0.420	1.000	25.00	3.00
0.0167			0.425	1.000	25.00	3.00
0.0169			0.430	1.000	25.00	3.00
0.0170			0.432	1.000	25.00	3.00
0.0173			0.440	1.000	25.00	3.00
0.0175			0.445	1.000	25.00	3.00
0.0177			0.450	1.000	25.00	3.00
0.0181		77	0.460	1.000	25.00	3.00
0.0185			0.470	1.000	25.00	3.00
0.0187			0.475	1.000	25.00	3.00
0.0189			0.480	1.000	25.00	3.00
0.0191			0.485	1.000	25.00	3.40
0.0193			0.490	1.000	25.00	3.40
0.0195			0.495	1.000	25.00	3.40
0.0197			0.500	1.000	25.00	3.40
0.0199			0.505	1.000	25.00	3.40
0.0201		76	0.510	1.000	25.00	3.40
0.0203			0.515	1.000	25.00	3.40
0.0205			0.520	1.000	25.00	3.40
0.0207			0.525	1.000	25.00	3.40
0.0209		75	0.530	1.000	25.00	3.40
0.0211			0.535	1.000	25.00	3.90
0.0213			0.540	1.000	25.00	3.90
0.0215			0.545	1.000	25.00	3.90
0.0217			0.550	1.000	25.00	3.90
0.0219			0.555	1.000	25.00	3.90
0.0220			0.560	1.000	25.00	3.90
0.0224		74	0.570	1.000	25.00	3.90
0.0228			0.580	1.000	25.00	3.90
0.0230			0.585	1.000	25.00	3.90
0.0232			0.590	1.000	25.00	3.90
0.0234			0.595	1.000	25.00	3.90
0.0236			0.600	1.000	25.00	3.90
0.0238			0.605	1.000	25.00	4.20
0.0240		73	0.610	1.000	25.00	4.20
0.0242			0.615	1.000	25.00	4.20
0.0244			0.620	1.000	25.00	4.20
0.0246			0.625	1.000	25.00	4.20
0.0248			0.630	1.000	25.00	4.20
0.0249			0.632	1.000	25.00	4.20
0.0252		72	0.640	1.000	25.00	4.20
0.0256			0.650	1.000	25.00	4.20

To order: Series number + mm, ex. 5518 3.000

Series 301

Speeds & Feeds information pg 344

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.0258			0.655	1.000	25.00	4.20
0.0260		71	0.660	1.000	25.00	4.20
0.0262			0.665	1.000	25.00	4.20
0.0264			0.670	1.000	25.00	4.20
0.0266			0.675	1.000	25.00	4.80
0.0268			0.680	1.000	25.00	4.80
0.0272			0.690	1.000	25.00	4.80
0.0276			0.700	1.000	25.00	4.80
0.0278			0.705	1.000	25.00	4.80
0.0280		70	0.710	1.000	25.00	4.80
0.0283			0.720	1.000	25.00	4.80
0.0285			0.725	1.000	25.00	4.80
0.0287			0.730	1.000	25.00	4.80
0.0291		69	0.740	1.000	25.00	4.80
0.0295			0.750	1.000	25.00	4.80
0.0299			0.760	1.000	25.00	5.30
0.0303			0.770	1.000	25.00	5.30
0.0307			0.780	1.000	25.00	5.30
0.0311	1/32	68	0.790	1.000	25.00	5.30
0.0313			0.795	1.000	25.00	5.30
0.0315			0.800	1.500	25.00	5.30
0.0319		67	0.810	1.500	25.00	5.30
0.0323			0.820	1.500	25.00	5.30
0.0327			0.830	1.500	25.00	5.30
0.0331		66	0.840	1.500	25.00	5.30
0.0335			0.850	1.500	25.00	5.30
0.0339			0.860	1.500	25.00	6.00
0.0343			0.870	1.500	25.00	6.00
0.0346			0.880	1.500	25.00	6.00
0.0350		65	0.890	1.500	25.00	6.00
0.0354			0.900	1.500	25.00	6.00
0.0358		64	0.910	1.500	25.00	6.00
0.0362			0.920	1.500	25.00	6.00
0.0364			0.925	1.500	25.00	6.00
0.0366			0.930	1.500	25.00	6.00
0.0370		63	0.940	1.500	25.00	6.00
0.0374			0.950	1.500	25.00	6.00
0.0378			0.960	1.500	25.00	6.80
0.0382		62	0.970	1.500	25.00	6.80
0.0386			0.980	1.500	25.00	6.80
0.0390		61	0.990	1.500	25.00	6.80
0.0394			1.000	1.500	25.00	6.80
0.0398			1.010	1.500	25.00	6.80
0.0402		60	1.020	1.500	25.00	6.80
0.0406			1.030	1.500	25.00	6.80
0.0409		59	1.040	1.500	25.00	6.80
0.0413			1.050	1.500	25.00	6.80
0.0415			1.055	1.500	25.00	6.80
0.0417			1.060	1.500	25.00	6.80
0.0421		58	1.070	1.500	25.00	7.60
0.0425			1.080	1.500	25.00	7.60
0.0429		57	1.090	1.500	25.00	7.60
0.0431			1.095	1.500	25.00	7.60
0.0433			1.100	1.500	25.00	7.60
0.0437			1.110	1.500	25.00	7.60
0.0441			1.120	1.500	25.00	7.60
0.0445			1.130	1.500	25.00	7.60
0.0449			1.140	1.500	25.00	7.60

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.0453			1.150	1.500	25.00	7.60
0.0457			1.160	1.500	25.00	7.60
0.0461			1.170	1.500	25.00	7.60
0.0463			1.175	1.500	25.00	7.60
0.0465		56	1.180	1.500	25.00	7.60
0.0469	3/64		1.190	1.500	25.00	8.50
0.0472			1.200	1.500	25.00	8.50
0.0476			1.210	1.500	25.00	8.50
0.0480			1.220	1.500	25.00	8.50
0.0484			1.230	1.500	25.00	8.50
0.0488			1.240	1.500	25.00	8.50
0.0492			1.250	1.500	25.00	8.50
0.0496			1.260	1.500	25.00	8.50
0.0498			1.265	1.500	25.00	8.50
0.0500			1.270	1.500	25.00	8.50
0.0504			1.280	1.500	25.00	8.50
0.0508			1.290	1.500	25.00	8.50
0.0512			1.300	1.500	25.00	8.50
0.0516			1.310	1.500	25.00	8.50
0.0520		55	1.320	1.500	25.00	8.50
0.0524			1.330	1.500	25.00	9.50
0.0528			1.340	1.500	25.00	9.50
0.0531			1.350	1.500	25.00	9.50
0.0539			1.370	1.500	25.00	9.50
0.0543			1.380	1.500	25.00	9.50
0.0547			1.390	1.500	25.00	9.50
0.0551		54	1.400	1.500	25.00	9.50
0.0555			1.410	1.500	25.00	9.50
0.0559			1.420	1.500	25.00	9.50
0.0563			1.430	1.500	25.00	9.50
0.0567			1.440	1.500	25.00	9.50
0.0571			1.450	1.500	25.00	9.50
0.0575			1.460	2.000	30.00	9.50
0.0579			1.470	2.000	30.00	9.50
0.0591			1.500	2.000	30.00	9.50
0.0602			1.530	2.000	30.00	10.60
0.0610			1.550	2.000	30.00	10.60
0.0626	1/16		1.590	2.000	30.00	10.60
0.0630			1.600	2.000	30.00	10.60
0.0634		52	1.610	2.000	30.00	10.60
0.0650			1.650	2.000	30.00	10.60
0.0669		51	1.700	2.000	30.00	10.60
0.0673			1.710	2.000	30.00	11.80
0.0681			1.730	2.000	30.00	11.80
0.0687			1.745	2.000	30.00	11.80
0.0689			1.750	2.000	30.00	11.80
0.0699			1.775	2.000	30.00	11.80
0.0709			1.800	2.000	30.00	11.80
0.0720			1.830	2.000	30.00	11.80
0.0724			1.840	2.000	30.00	11.80
0.0728		49	1.850	2.000	30.00	11.80
0.0748			1.900	2.000	30.00	11.80
0.0756			1.920	2.000	30.00	13.20

Alternative Drill Series:

#660 Cobalt, Type N, 4xD, 118 pt, TiN
#6400 Carbide, Type N, 4xD, 140 pt, Super-A

Micro

Bright Finish

External Coolant

Reinforced Straight Shank

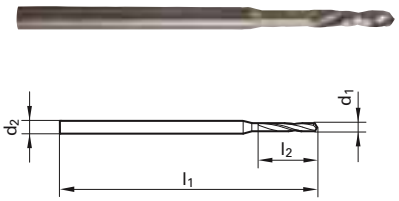
Speeds & Feeds information pg 344

Series 303

Micro-Precision, LH helix

Cobalt, Micro-Precision (Type N), 118° point, reinforced straight shank, LH helix

Shank Dia. = h8 tolerance range, Cut Dia. +0 / -0.004



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0051			0.130	1.000	25.00	0.80
0.0055			0.140	1.000	25.00	0.80
0.0059		97	0.150	1.000	25.00	0.80
0.0063		96	0.160	1.000	25.00	1.10
0.0067		95	0.170	1.000	25.00	1.10
0.0071		94	0.180	1.000	25.00	1.10
0.0073			0.185	1.000	25.00	1.10
0.0075		93	0.190	1.000	25.00	1.10
0.0077			0.195	1.000	25.00	1.50
0.0079		92	0.200	1.000	25.00	1.50
0.0083		91	0.210	1.000	25.00	1.50
0.0085			0.215	1.000	25.00	1.50
0.0087		90	0.220	1.000	25.00	1.50
0.0089			0.225	1.000	25.00	1.50
0.0091		89	0.230	1.000	25.00	1.50
0.0094		88	0.240	1.000	25.00	1.50
0.0096			0.245	1.000	25.00	1.90
0.0098		87	0.250	1.000	25.00	1.90
0.0100			0.255	1.000	25.00	1.90
0.0102			0.260	1.000	25.00	1.90
0.0104			0.265	1.000	25.00	1.90
0.0106		86	0.270	1.000	25.00	1.90
0.0110		85	0.280	1.000	25.00	1.90
0.0114		84	0.290	1.000	25.00	1.90
0.0116			0.295	1.000	25.00	1.90
0.0118			0.300	1.000	25.00	1.90
0.0122		83	0.310	1.000	25.00	2.40
0.0126		82	0.320	1.000	25.00	2.40
0.0130		81	0.330	1.000	25.00	2.40
0.0134		80	0.340	1.000	25.00	2.40
0.0138			0.350	1.000	25.00	2.40
0.0142			0.360	1.000	25.00	2.40
0.0146		79	0.370	1.000	25.00	2.40
0.0150			0.380	1.000	25.00	2.40
0.0154			0.390	1.000	25.00	3.00
0.0157	1/64		0.400	1.000	25.00	3.00
0.0161		78	0.410	1.000	25.00	3.00
0.0165			0.420	1.000	25.00	3.00
0.0169			0.430	1.000	25.00	3.00
0.0173			0.440	1.000	25.00	3.00
0.0177			0.450	1.000	25.00	3.00
0.0181		77	0.460	1.000	25.00	3.00
0.0185			0.470	1.000	25.00	3.00
0.0189			0.480	1.000	25.00	3.00
0.0193			0.490	1.000	25.00	3.40
0.0197			0.500	1.000	25.00	3.40
0.0201		76	0.510	1.000	25.00	3.40
0.0205			0.520	1.000	25.00	3.40
0.0207			0.525	1.000	25.00	3.40
0.0209		75	0.530	1.000	25.00	3.40
0.0211			0.535	1.000	25.00	3.90
0.0213			0.540	1.000	25.00	3.90
0.0215			0.545	1.000	25.00	3.90
0.0217			0.550	1.000	25.00	3.90

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0219			0.555	1.000	25.00	3.90
0.0220			0.560	1.000	25.00	3.90
0.0222			0.565	1.000	25.00	3.90
0.0224		74	0.570	1.000	25.00	3.90
0.0228			0.580	1.000	25.00	3.90
0.0232			0.590	1.000	25.00	3.90
0.0236			0.600	1.000	25.00	3.90
0.0240		73	0.610	1.000	25.00	4.20
0.0244			0.620	1.000	25.00	4.20
0.0248			0.630	1.000	25.00	4.20
0.0252		72	0.640	1.000	25.00	4.20
0.0256			0.650	1.000	25.00	4.20
0.0260		71	0.660	1.000	25.00	4.20
0.0264			0.670	1.000	25.00	4.20
0.0266			0.675	1.000	25.00	4.80
0.0268			0.680	1.000	25.00	4.80
0.0272			0.690	1.000	25.00	4.80
0.0276			0.700	1.000	25.00	4.80
0.0280		70	0.710	1.000	25.00	4.80
0.0283			0.720	1.000	25.00	4.80
0.0287			0.730	1.000	25.00	4.80
0.0291		69	0.740	1.000	25.00	4.80
0.0295			0.750	1.000	25.00	4.80
0.0299			0.760	1.000	25.00	5.30
0.0303			0.770	1.000	25.00	5.30
0.0307			0.780	1.000	25.00	5.30
0.0311	1/32	68	0.790	1.000	25.00	5.30
0.0315			0.800	1.500	25.00	5.30
0.0319		67	0.810	1.500	25.00	5.30
0.0323			0.820	1.500	25.00	5.30
0.0327			0.830	1.500	25.00	5.30
0.0331		66	0.840	1.500	25.00	5.30
0.0335			0.850	1.500	25.00	5.30
0.0339			0.860	1.500	25.00	6.00
0.0343			0.870	1.500	25.00	6.00
0.0346			0.880	1.500	25.00	6.00
0.0350		65	0.890	1.500	25.00	6.00
0.0354			0.900	1.500	25.00	6.00
0.0358		64	0.910	1.500	25.00	6.00
0.0360			0.915	1.500	25.00	6.00
0.0362			0.920	1.500	25.00	6.00
0.0366			0.930	1.500	25.00	6.00
0.0368			0.935	1.500	25.00	6.00
0.0370		63	0.940	1.500	25.00	6.00
0.0374			0.950	1.500	25.00	6.00
0.0378			0.960	1.500	25.00	6.80
0.0382		62	0.970	1.500	25.00	6.80
0.0386			0.980	1.500	25.00	6.80
0.0390		61	0.990	1.500	25.00	6.80
0.0394			1.000	1.500	25.00	6.80
0.0396			1.005	1.500	25.00	6.80
0.0398			1.010	1.500	25.00	6.80
0.0402		60	1.020	1.500	25.00	6.80
0.0406			1.030	1.500	25.00	6.80

To order: Series number + mm, ex. 5518 3.000

Series 303

Speeds & Feeds information pg 344

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0409		59	1.040	1.500	25.00	6.80
0.0413			1.050	1.500	25.00	6.80
0.0417			1.060	1.500	25.00	6.80
0.0421		58	1.070	1.500	25.00	7.60
0.0425			1.080	1.500	25.00	7.60
0.0429		57	1.090	1.500	25.00	7.60
0.0433			1.100	1.500	25.00	7.60
0.0437			1.110	1.500	25.00	7.60
0.0441			1.120	1.500	25.00	7.60
0.0453			1.150	1.500	25.00	7.60
0.0461			1.170	1.500	25.00	7.60
0.0465		56	1.180	1.500	25.00	7.60
0.0469	3/64		1.190	1.500	25.00	8.50
0.0472			1.200	1.500	25.00	8.50
0.0480			1.220	1.500	25.00	8.50
0.0492			1.250	1.500	25.00	8.50
0.0500			1.270	1.500	25.00	8.50
0.0508			1.290	1.500	25.00	8.50
0.0512			1.300	1.500	25.00	8.50
0.0520		55	1.320	1.500	25.00	8.50
0.0524			1.330	1.500	25.00	9.50
0.0531			1.350	1.500	25.00	9.50
0.0535			1.360	1.500	25.00	9.50
0.0551		54	1.400	1.500	25.00	9.50
0.0728		49	1.850	2.000	30.00	11.80

Alternative Drill Series:

#226 HSS, GT100, LH helix, 3xD, 118 pt, Oxide

5xD

Steam Oxide
>2.36 mm dia.

External Coolant

Straight Shank

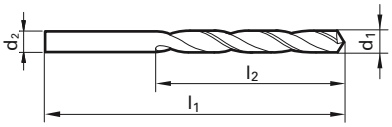
Speeds & Feeds
information pg 345

Series 305

General Purpose

Cobalt, general purpose (Type N), jobber length, 118° point, Form A web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Hardened Materials
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0079		92	0.200	19.00	2.50
0.0083		91	0.210	19.00	2.50
0.0087		90	0.220	19.00	2.50
0.0091		89	0.230	19.00	2.50
0.0098		87	0.250	19.00	3.00
0.0102			0.260	19.00	3.00
0.0106		86	0.270	19.00	3.00
0.0110		85	0.280	19.00	3.00
0.0118			0.300	19.00	3.00
0.0122		83	0.310	19.00	4.00
0.0126		82	0.320	19.00	4.00
0.0130		81	0.330	19.00	4.00
0.0134		80	0.340	19.00	4.00
0.0138			0.350	19.00	4.00
0.0146		79	0.370	19.00	4.00
0.0150			0.380	19.00	4.00
0.0157	1/64		0.400	20.00	5.00
0.0161		78	0.410	20.00	5.00
0.0165			0.420	20.00	5.00
0.0169			0.430	20.00	5.00
0.0173			0.440	20.00	5.00
0.0177			0.450	20.00	5.00
0.0181		77	0.460	20.00	5.00
0.0185			0.470	20.00	5.00
0.0189			0.480	20.00	5.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0193			0.490	22.00	6.00
0.0197			0.500	22.00	6.00
0.0201		76	0.510	22.00	6.00
0.0205			0.520	22.00	6.00
0.0209		75	0.530	22.00	6.00
0.0213			0.540	24.00	7.00
0.0217			0.550	24.00	7.00
0.0220			0.560	24.00	7.00
0.0224		74	0.570	24.00	7.00
0.0232			0.590	24.00	7.00
0.0236			0.600	24.00	7.00
0.0240		73	0.610	26.00	8.00
0.0244			0.620	26.00	8.00
0.0252		72	0.640	26.00	8.00
0.0256			0.650	26.00	8.00
0.0260		71	0.660	26.00	8.00
0.0264			0.670	26.00	8.00
0.0268			0.680	28.00	9.00
0.0276			0.700	28.00	9.00
0.0280		70	0.710	28.00	9.00
0.0283			0.720	28.00	9.00
0.0291		69	0.740	28.00	9.00
0.0295			0.750	28.00	9.00
0.0299			0.760	30.00	10.00
0.0303			0.770	30.00	10.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0307			0.780	30.00	10.00
0.0311	1/32	68	0.790	30.00	10.00
0.0315			0.800	30.00	10.00
0.0319		67	0.810	30.00	10.00
0.0323			0.820	30.00	10.00
0.0331		66	0.840	30.00	10.00
0.0335			0.850	30.00	10.00
0.0339			0.860	32.00	11.00
0.0343			0.870	32.00	11.00
0.0346			0.880	32.00	11.00
0.0350		65	0.890	32.00	11.00
0.0354			0.900	32.00	11.00
0.0358		64	0.910	32.00	11.00
0.0362			0.920	32.00	11.00
0.0370		63	0.940	32.00	11.00
0.0374			0.950	32.00	11.00
0.0378			0.960	34.00	12.00
0.0382		62	0.970	34.00	12.00
0.0390		61	0.990	34.00	12.00
0.0394			1.000	34.00	12.00
0.0398			1.010	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0406			1.030	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0413			1.050	34.00	12.00

To order: Series number + mm, ex. 5518 3.000

Series 305

Speeds & Feeds information pg 345

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.0421		58	1.070	36.00	14.00
0.0425			1.080	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0449			1.140	36.00	14.00
0.0453			1.150	36.00	14.00
0.0457			1.160	36.00	14.00
0.0461			1.170	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0480			1.220	38.00	16.00
0.0484			1.230	38.00	16.00
0.0492			1.250	38.00	16.00
0.0508			1.290	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0524			1.330	40.00	18.00
0.0531			1.350	40.00	18.00
0.0535			1.360	40.00	18.00
0.0539			1.370	40.00	18.00
0.0543			1.380	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0555			1.410	40.00	18.00
0.0559			1.420	40.00	18.00
0.0563			1.430	40.00	18.00
0.0567			1.440	40.00	18.00
0.0571			1.450	40.00	18.00
0.0583			1.480	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0598			1.520	43.00	20.00
0.0602			1.530	43.00	20.00
0.0610			1.550	43.00	20.00
0.0614			1.560	43.00	20.00
0.0618			1.570	43.00	20.00
0.0622			1.580	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0638			1.620	43.00	20.00
0.0646			1.640	43.00	20.00
0.0650			1.650	43.00	20.00
0.0654			1.660	43.00	20.00
0.0657			1.670	43.00	20.00
0.0661			1.680	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0673			1.710	46.00	22.00
0.0677			1.720	46.00	22.00
0.0681			1.730	46.00	22.00
0.0689			1.750	46.00	22.00
0.0693			1.760	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0705			1.790	46.00	22.00
0.0709			1.800	46.00	22.00
0.0713			1.810	46.00	22.00
0.0717			1.820	46.00	22.00
0.0720			1.830	46.00	22.00
0.0724			1.840	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0732			1.860	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0768			1.950	49.00	24.00
0.0776			1.970	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.0787			2.000	49.00	24.00
0.0791			2.010	49.00	24.00
0.0795			2.020	49.00	24.00
0.0799			2.030	49.00	24.00
0.0803			2.040	49.00	24.00
0.0807			2.050	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0878			2.230	53.00	27.00
0.0886			2.250	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0965			2.450	57.00	30.00
0.0972			2.470	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0992			2.520	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1150			2.920	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1169			2.970	61.00	33.00
0.1181			3.000	61.00	33.00
0.1193			3.030	65.00	36.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1240			3.150	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1311			3.330	65.00	36.00
0.1319			3.350	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.1516			3.850	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1622			4.120	75.00	43.00
0.1634			4.150	75.00	43.00
0.1642			4.170	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1752			4.450	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1831			4.650	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1870			4.750	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2067			5.250	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00
0.2130		3	5.410	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2224			5.650	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2280		1	5.790	93.00	57.00
0.2283			5.800	93.00	57.00
0.2303			5.850	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2378		B	6.040	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00

To order: Series number + mm, ex. 5518 3.000

Series 305

Speeds & Feeds information pg 345

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2539			6.450	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2610		G	6.630	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2736			6.950	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2776			7.050	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2854			7.250	109.00	69.00
0.2874			7.300	109.00	69.00
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2949		M	7.490	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3020		N	7.670	117.00	75.00
0.3031			7.700	117.00	75.00
0.3051			7.750	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3248			8.250	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3390		R	8.610	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3445			8.750	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3642			9.250	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3772		V	9.580	133.00	87.00
0.3780			9.600	133.00	87.00
0.3799			9.650	133.00	87.00
0.3819			9.700	133.00	87.00
0.3839			9.750	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3878			9.850	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3969		X	10.080	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4094			10.400	133.00	87.00
0.4130		Z	10.490	133.00	87.00
0.4134			10.500	133.00	87.00
0.4173			10.600	133.00	87.00
0.4213			10.700	142.00	94.00
0.4220	27/64		10.720	142.00	94.00
0.4232			10.750	142.00	94.00
0.4252			10.800	142.00	94.00
0.4291			10.900	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4429			11.250	142.00	94.00
0.4449			11.300	142.00	94.00
0.4488			11.400	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4567			11.600	142.00	94.00
0.4626			11.750	142.00	94.00
0.4646			11.800	142.00	94.00
0.4685			11.900	151.00	101.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4764			12.100	151.00	101.00
0.4803			12.200	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4882			12.400	151.00	101.00
0.4921			12.500	151.00	101.00
0.4961			12.600	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5039			12.800	151.00	101.00
0.5079			12.900	151.00	101.00
0.5118			13.000	151.00	101.00
0.5157	33/64		13.100	151.00	101.00
0.5197			13.200	151.00	101.00
0.5236			13.300	160.00	108.00
0.5311	17/32		13.490	160.00	108.00
0.5315			13.500	160.00	108.00
0.5354			13.600	160.00	108.00
0.5413			13.750	160.00	108.00
0.5433			13.800	160.00	108.00
0.5469	35/64		13.890	160.00	108.00
0.5512			14.000	160.00	108.00
0.5591			14.200	169.00	114.00
0.5626	9/16		14.290	169.00	114.00
0.5669			14.400	169.00	114.00
0.5709			14.500	169.00	114.00
0.5780	37/64		14.680	169.00	114.00
0.5807			14.750	169.00	114.00
0.5906			15.000	169.00	114.00
0.5945			15.100	178.00	120.00
0.6004			15.250	178.00	120.00
0.6024			15.300	178.00	120.00
0.6094	39/64		15.480	178.00	120.00
0.6102			15.500	178.00	120.00
0.6201			15.750	178.00	120.00
0.6248	5/8		15.870	178.00	120.00
0.6299			16.000	178.00	120.00
0.6496			16.500	184.00	125.00
0.6563	21/32		16.670	184.00	125.00
0.6693			17.000	184.00	125.00
0.6874	11/16		17.460	191.00	130.00
0.6890			17.500	191.00	130.00
0.7087			18.000	191.00	130.00
0.7283			18.500	198.00	135.00
0.7480			19.000	198.00	135.00
0.7677			19.500	205.00	140.00
0.7811	25/32		19.840	205.00	140.00
0.7874			20.000	205.00	140.00

Alternative Drill Series:

#651 HSS, GP, 5xD, 118 pt, TiN
#605 Cobalt, GU500, 5xD, 118 pt, Bright
#5519 Cobalt, GU500, 5xD, 118 pt, TiN
#732 Carbide, GP, 5xD, 130 pt, Bright

5xD

Steam Oxide
>6.00 mm dia.

External Coolant

Straight Shank

Speeds & Feeds
information pg 345

Series 308

General Purpose, LH helix

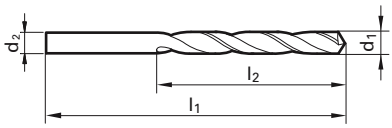
Cobalt, general purpose (Type N), jobber length, 118° point,
Form A web thinned >2.36mm dia., standard straight shank, LH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

Universal Steels

Hardened Materials



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0189			0.480	20.00	5.00
0.0197			0.500	22.00	6.00
0.0295			0.750	28.00	9.00
0.0307			0.780	30.00	10.00
0.0315			0.800	30.00	10.00
0.0354			0.900	32.00	11.00
0.0358		64	0.910	32.00	11.00
0.0366			0.930	32.00	11.00
0.0386			0.980	34.00	12.00
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0425			1.080	36.00	14.00
0.0433			1.100	36.00	14.00
0.0453			1.150	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0492			1.250	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0531			1.350	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0563			1.430	40.00	18.00
0.0571			1.450	40.00	18.00
0.0579			1.470	40.00	18.00
0.0587			1.490	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0610			1.550	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0661			1.680	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0677			1.720	46.00	22.00
0.0689			1.750	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0768			1.950	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0787			2.000	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0886			2.250	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1063			2.700	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1417			3.600	70.00	39.00
0.1437			3.650	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1594			4.050	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1929			4.900	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00
0.2130		3	5.410	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2756			7.000	109.00	69.00
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3110			7.900	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3390		R	8.610	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3504			8.900	125.00	81.00

To order: Series number + mm, ex. 5518 3.000

Series 308

Speeds & Feeds information pg 345

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3543			9.000	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3772		V	9.580	133.00	87.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4130		Z	10.490	133.00	87.00
0.4134			10.500	133.00	87.00
0.4331			11.000	142.00	94.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4374	7/16		11.110	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4744			12.050	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00

Alternative Drill Series:

#208 HSS, GP, LH Helix, 5xD, 118 pt, Oxide

10xD

Steam Oxide
>2.36 mm dia.

External Coolant

Straight Shank

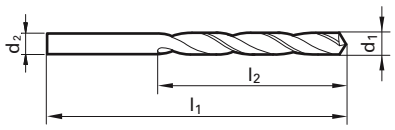
Speeds & Feeds
information pg 346

Series 317

General Purpose

Cobalt, general purpose (Type N), taper length, 118° point, Form A
web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Hardened Materials

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0197			0.500	32.00	12.00
0.0256			0.650	38.00	18.00
0.0276			0.700	42.00	21.00
0.0295			0.750	42.00	21.00
0.0315			0.800	46.00	25.00
0.0335			0.850	46.00	25.00
0.0354			0.900	51.00	29.00
0.0374			0.950	51.00	29.00
0.0394			1.000	56.00	33.00
0.0402		60	1.020	56.00	33.00
0.0433			1.100	60.00	37.00
0.0469	3/64		1.190	65.00	41.00
0.0472			1.200	65.00	41.00
0.0492			1.250	65.00	41.00
0.0512			1.300	65.00	41.00
0.0551		54	1.400	70.00	45.00
0.0591			1.500	70.00	45.00
0.0594		53	1.510	76.00	50.00
0.0610			1.550	76.00	50.00
0.0626	1/16		1.590	76.00	50.00
0.0630			1.600	76.00	50.00
0.0650			1.650	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0701		50	1.780	80.00	53.00
0.0709			1.800	80.00	53.00
0.0748			1.900	80.00	53.00
0.0768			1.950	85.00	56.00
0.0780	5/64		1.980	85.00	56.00
0.0787			2.000	85.00	56.00
0.0807			2.050	85.00	56.00
0.0827			2.100	85.00	56.00
0.0866			2.200	90.00	59.00
0.0906			2.300	90.00	59.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0965			2.450	95.00	62.00
0.0984			2.500	95.00	62.00
0.1024			2.600	95.00	62.00
0.1063			2.700	100.00	66.00
0.1094	7/64		2.780	100.00	66.00
0.1102			2.800	100.00	66.00
0.1142			2.900	100.00	66.00
0.1181			3.000	100.00	66.00
0.1201		31	3.050	106.00	69.00
0.1220			3.100	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1280			3.250	106.00	69.00
0.1299			3.300	106.00	69.00
0.1339			3.400	112.00	73.00
0.1358		29	3.450	112.00	73.00
0.1378			3.500	112.00	73.00
0.1417			3.600	112.00	73.00
0.1457			3.700	112.00	73.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1496		25	3.800	119.00	78.00
0.1535			3.900	119.00	78.00
0.1563	5/32		3.970	119.00	78.00
0.1575			4.000	119.00	78.00
0.1614			4.100	119.00	78.00
0.1654			4.200	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1720	11/64		4.370	126.00	82.00
0.1732			4.400	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1811			4.600	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1874	3/16		4.760	132.00	87.00
0.1890		12	4.800	132.00	87.00
0.1909		11	4.850	132.00	87.00
0.1929			4.900	132.00	87.00
0.1969			5.000	132.00	87.00
0.2008			5.100	132.00	87.00
0.2031	13/64		5.160	132.00	87.00
0.2047			5.200	132.00	87.00
0.2087			5.300	132.00	87.00
0.2126			5.400	139.00	91.00
0.2165			5.500	139.00	91.00
0.2189	7/32		5.560	139.00	91.00
0.2205			5.600	139.00	91.00
0.2244			5.700	139.00	91.00
0.2283			5.800	139.00	91.00
0.2323			5.900	139.00	91.00
0.2343	15/64		5.950	139.00	91.00
0.2362			6.000	139.00	91.00
0.2402			6.100	148.00	97.00
0.2441			6.200	148.00	97.00
0.2480			6.300	148.00	97.00
0.2500	1/4	E	6.350	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2598			6.600	148.00	97.00
0.2610		G	6.630	148.00	97.00
0.2638			6.700	148.00	97.00
0.2657	17/64	H	6.750	156.00	102.00
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2811	9/32	K	7.140	156.00	102.00
0.2835			7.200	156.00	102.00
0.2874			7.300	156.00	102.00
0.2913			7.400	156.00	102.00
0.2953			7.500	156.00	102.00
0.2969	19/64		7.540	165.00	109.00
0.2992			7.600	165.00	109.00
0.3031			7.700	165.00	109.00
0.3071			7.800	165.00	109.00
0.3110			7.900	165.00	109.00
0.3126	5/16		7.940	165.00	109.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3150			8.000	165.00	109.00
0.3189			8.100	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3280	21/64		8.330	165.00	109.00
0.3307			8.400	165.00	109.00
0.3346			8.500	165.00	109.00
0.3386			8.600	175.00	115.00
0.3425			8.700	175.00	115.00
0.3437	11/32		8.730	175.00	115.00
0.3465			8.800	175.00	115.00
0.3543			9.000	175.00	115.00
0.3583			9.100	175.00	115.00
0.3594	23/64		9.130	175.00	115.00
0.3622			9.200	175.00	115.00
0.3661			9.300	175.00	115.00
0.3701			9.400	175.00	115.00
0.3740			9.500	175.00	115.00
0.3748	3/8		9.520	184.00	121.00
0.3780			9.600	184.00	121.00
0.3819			9.700	184.00	121.00
0.3858		W	9.800	184.00	121.00
0.3898			9.900	184.00	121.00
0.3906	25/64		9.920	184.00	121.00
0.3937			10.000	184.00	121.00
0.3976			10.100	184.00	121.00
0.4016			10.200	184.00	121.00
0.4063	13/32		10.320	184.00	121.00
0.4134			10.500	184.00	121.00
0.4220	27/64		10.720	195.00	128.00
0.4331			11.000	195.00	128.00
0.4374	7/16		11.110	195.00	128.00
0.4409			11.200	195.00	128.00
0.4528			11.500	195.00	128.00
0.4531	29/64		11.510	195.00	128.00
0.4646			11.800	195.00	128.00
0.4689	15/32		11.910	205.00	134.00
0.4724			12.000	205.00	134.00
0.4843	31/64		12.300	205.00	134.00
0.4921			12.500	205.00	134.00
0.5000	1/2		12.700	205.00	134.00
0.5118			13.000	205.00	134.00
0.5157	33/64		13.100	205.00	134.00
0.5311	17/32		13.490	214.00	140.00
0.5315			13.500	214.00	140.00
0.5512			14.000	214.00	140.00
0.5626	9/16		14.290	220.00	144.00
0.5906			15.000	220.00	144.00
0.6094	39/64		15.480	227.00	149.00
0.6248	5/8		15.870	227.00	149.00
0.6299			16.000	227.00	149.00

Alternative Drill Series:

#217 HSS, GP, 10xD, 118 pt, Oxide
#667 HSS, GP, 10xD, 118 pt, TiN

To order: Series number + mm, ex. 5518 3.000

3xD

Steam Oxide
>2.36 mm dia.

External Coolant

Straight Shank

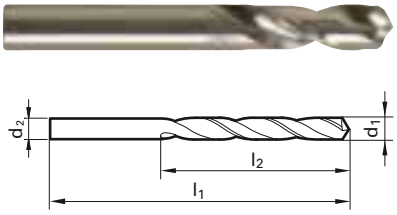
Speeds & Feeds
information pg 346

Series 329

Heavy Duty

Cobalt, Heavy Duty (Type GV120), stub length, 130° point, Form A
web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Stainless Steels
- Hardened Materials

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0157	1/64		0.400	19.00	2.50
0.0197			0.500	20.00	3.00
0.0201		76	0.510	20.00	3.00
0.0217			0.550	21.00	3.50
0.0224		74	0.570	21.00	3.50
0.0236			0.600	21.00	3.50
0.0240		73	0.610	22.00	4.00
0.0252		72	0.640	22.00	4.00
0.0256			0.650	22.00	4.00
0.0276			0.700	23.00	4.50
0.0287			0.730	23.00	4.50
0.0291		69	0.740	23.00	4.50
0.0295			0.750	23.00	4.50
0.0311	1/32	68	0.790	24.00	5.00
0.0315			0.800	24.00	5.00
0.0319		67	0.810	24.00	5.00
0.0323			0.820	24.00	5.00
0.0331		66	0.840	24.00	5.00
0.0335			0.850	24.00	5.00
0.0343			0.870	25.00	5.50
0.0354			0.900	25.00	5.50
0.0358		64	0.910	25.00	5.50
0.0370		63	0.940	25.00	5.50
0.0374			0.950	25.00	5.50
0.0382		62	0.970	26.00	6.00
0.0390		61	0.990	26.00	6.00
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0413			1.050	26.00	6.00
0.0417			1.060	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0453			1.150	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0469	3/64		1.190	28.00	7.00
0.0472			1.200	28.00	7.00
0.0484			1.230	28.00	7.00
0.0492			1.250	28.00	7.00
0.0504			1.280	28.00	7.00
0.0512			1.300	28.00	7.00
0.0520		55	1.320	28.00	7.00
0.0524			1.330	32.00	9.00
0.0531			1.350	32.00	9.00
0.0551		54	1.400	32.00	9.00
0.0571			1.450	32.00	9.00
0.0579			1.470	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0610			1.550	34.00	10.00
0.0618			1.570	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0650			1.650	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0681			1.730	36.00	11.00
0.0689			1.750	36.00	11.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0717			1.820	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	38.00	12.00
0.0768			1.950	38.00	12.00
0.0776			1.970	38.00	12.00
0.0780	5/64		1.980	38.00	12.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0799			2.030	38.00	12.00
0.0811		46	2.060	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0827			2.100	38.00	12.00
0.0846			2.150	40.00	13.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0886			2.250	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0913			2.320	40.00	13.00
0.0925			2.350	40.00	13.00
0.0929			2.360	40.00	13.00
0.0933		42	2.370	43.00	14.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0953			2.420	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0965			2.450	43.00	14.00
0.0972			2.470	43.00	14.00
0.0980		40	2.490	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1004			2.550	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1043			2.650	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1083			2.750	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1098		35	2.790	46.00	16.00
0.1102			2.800	46.00	16.00
0.1110		34	2.820	46.00	16.00
0.1130		33	2.870	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00
0.1189			3.020	49.00	18.00
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1240			3.150	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1280			3.250	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1358		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1398			3.550	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1441		27	3.660	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1476			3.750	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1516			3.850	55.00	22.00
0.1520		24	3.860	55.00	22.00
0.1535			3.900	55.00	22.00
0.1539		23	3.910	55.00	22.00
0.1543			3.920	55.00	22.00
0.1555			3.950	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1571		22	3.990	55.00	22.00
0.1575			4.000	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1594			4.050	55.00	22.00
0.1610		20	4.090	55.00	22.00
0.1614			4.100	55.00	22.00
0.1634			4.150	55.00	22.00
0.1654			4.200	55.00	22.00
0.1661		19	4.220	55.00	22.00
0.1673			4.250	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1728		17	4.390	58.00	24.00
0.1732			4.400	58.00	24.00
0.1752			4.450	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1799		15	4.570	58.00	24.00
0.1811			4.600	58.00	24.00
0.1819		14	4.620	58.00	24.00
0.1831			4.650	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1870			4.750	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1909		11	4.850	62.00	26.00
0.1929			4.900	62.00	26.00
0.1937		10	4.920	62.00	26.00

To order: Series number + mm, ex. 5518 3.000

Series 329

Speeds & Feeds information pg 346

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.1949			4.950	62.00	26.00
0.1961		9	4.980	62.00	26.00
0.1969			5.000	62.00	26.00
0.1992		8	5.060	62.00	26.00
0.2008			5.100	62.00	26.00
0.2012		7	5.110	62.00	26.00
0.2028			5.150	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2039		6	5.180	62.00	26.00
0.2047			5.200	62.00	26.00
0.2055		5	5.220	62.00	26.00
0.2067			5.250	62.00	26.00
0.2087			5.300	62.00	26.00
0.2091		4	5.310	66.00	28.00
0.2106			5.350	66.00	28.00
0.2126			5.400	66.00	28.00
0.2130		3	5.410	66.00	28.00
0.2146			5.450	66.00	28.00
0.2165			5.500	66.00	28.00
0.2185			5.550	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2209		2	5.610	66.00	28.00
0.2244			5.700	66.00	28.00
0.2264			5.750	66.00	28.00
0.2280		1	5.790	66.00	28.00
0.2283			5.800	66.00	28.00
0.2303			5.850	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2378		B	6.040	70.00	31.00
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2441			6.200	70.00	31.00
0.2461		D	6.250	70.00	31.00
0.2480			6.300	70.00	31.00
0.2488			6.320	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2539			6.450	70.00	31.00
0.2559			6.500	70.00	31.00
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2610		G	6.630	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2697			6.850	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2768		J	7.030	74.00	34.00
0.2776			7.050	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2854			7.250	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2949		M	7.490	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.2992			7.600	79.00	37.00
0.3020		N	7.670	79.00	37.00
0.3031			7.700	79.00	37.00
0.3051			7.750	79.00	37.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3161		O	8.030	79.00	37.00
0.3189			8.100	79.00	37.00
0.3209			8.150	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3248			8.250	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3319		Q	8.430	79.00	37.00
0.3346			8.500	79.00	37.00
0.3366			8.550	84.00	40.00
0.3386			8.600	84.00	40.00
0.3390		R	8.610	84.00	40.00
0.3425			8.700	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3445			8.750	84.00	40.00
0.3465			8.800	84.00	40.00
0.3480		S	8.840	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3563			9.050	84.00	40.00
0.3579		T	9.090	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3642			9.250	84.00	40.00
0.3661			9.300	84.00	40.00
0.3677		U	9.340	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3772		V	9.580	89.00	43.00
0.3780			9.600	89.00	43.00
0.3819			9.700	89.00	43.00
0.3839			9.750	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.3969		X	10.080	89.00	43.00
0.3976			10.100	89.00	43.00
0.4016			10.200	89.00	43.00
0.4039		Y	10.260	89.00	43.00
0.4055			10.300	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4094			10.400	89.00	43.00
0.4130		Z	10.490	89.00	43.00
0.4134			10.500	89.00	43.00
0.4173			10.600	89.00	43.00
0.4193			10.650	95.00	47.00
0.4220	27/64		10.720	95.00	47.00
0.4252			10.800	95.00	47.00
0.4291			10.900	95.00	47.00
0.4331			11.000	95.00	47.00
0.4370			11.100	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4409			11.200	95.00	47.00
0.4429			11.250	95.00	47.00
0.4449			11.300	95.00	47.00
0.4488			11.400	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4567			11.600	95.00	47.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.4606			11.700	95.00	47.00
0.4646			11.800	95.00	47.00
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00
0.4764			12.100	102.00	51.00
0.4803			12.200	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4882			12.400	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5039			12.800	102.00	51.00
0.5079			12.900	102.00	51.00
0.5118			13.000	102.00	51.00
0.5157	33/64		13.100	102.00	51.00
0.5197			13.200	102.00	51.00
0.5311	17/32		13.490	107.00	54.00
0.5315			13.500	107.00	54.00
0.5413			13.750	107.00	54.00
0.5469	35/64		13.890	107.00	54.00
0.5512			14.000	107.00	54.00
0.5551			14.100	111.00	56.00
0.5626	9/16		14.290	111.00	56.00
0.5709			14.500	111.00	56.00
0.5780	37/64		14.680	111.00	56.00
0.5807			14.750	111.00	56.00
0.5906			15.000	111.00	56.00
0.5937	19/32		15.080	115.00	58.00
0.6004			15.250	115.00	58.00
0.6094	39/64		15.480	115.00	58.00
0.6102			15.500	115.00	58.00
0.6248	5/8		15.870	115.00	58.00
0.6299			16.000	115.00	58.00
0.6378			16.200	119.00	60.00
0.6406	41/64		16.270	119.00	60.00
0.6496			16.500	119.00	60.00
0.6563	21/32		16.670	119.00	60.00
0.6693			17.000	119.00	60.00
0.6720	43/64		17.070	123.00	62.00
0.6874	11/16		17.460	123.00	62.00
0.6890			17.500	123.00	62.00
0.7031	45/64		17.860	123.00	62.00
0.7087			18.000	123.00	62.00
0.7283			18.500	127.00	64.00
0.7343	47/64		18.650	127.00	64.00
0.7480			19.000	127.00	64.00
0.7500	3/4		19.050	131.00	66.00
0.7657	49/64		19.450	131.00	66.00
0.7677			19.500	131.00	66.00
0.7811	25/32		19.840	131.00	66.00
0.7874			20.000	131.00	66.00
0.7972			20.250	136.00	68.00
0.8071			20.500	136.00	68.00
0.8126	13/16		20.640	136.00	68.00
0.8268			21.000	136.00	68.00
0.8465			21.500	141.00	70.00
0.8661			22.000	141.00	70.00
0.8740			22.200	141.00	70.00
0.9055			23.000	146.00	72.00
0.9449			24.000	151.00	75.00
0.9646			24.500	151.00	75.00
0.9843	63/64		25.000	151.00	75.00
1.0000	1		25.400	156.00	78.00

Alternative Drill Series:

#659 Cobalt, GV120, 3xD, 130 pt, TiN
#5524 Cobalt, GU500, 3xD, 118 pt, Bright

To order: Series number + mm, ex. 5518 3.000

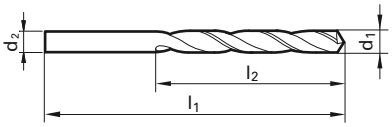
10xD

Series 336

GT100 Parabolic

Cobalt, GT 100 deep hole, taper length, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Nitrided lands/polished flutes >2.36mm dia.

External Coolant

Straight Shank

Speeds & Feeds information pg 347

Application Materials:

- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	56.00	33.00
0.0402		60	1.020	56.00	33.00
0.0409		59	1.040	56.00	33.00
0.0421		58	1.070	60.00	37.00
0.0429		57	1.090	60.00	37.00
0.0433			1.100	60.00	37.00
0.0465		56	1.180	60.00	37.00
0.0469	3/64		1.190	65.00	41.00
0.0472			1.200	65.00	41.00
0.0492			1.250	65.00	41.00
0.0512			1.300	65.00	41.00
0.0520		55	1.320	65.00	41.00
0.0551		54	1.400	70.00	45.00
0.0591			1.500	70.00	45.00
0.0594		53	1.510	76.00	50.00
0.0610			1.550	76.00	50.00
0.0626	1/16		1.590	76.00	50.00
0.0630			1.600	76.00	50.00
0.0634		52	1.610	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0689			1.750	80.00	53.00
0.0701		50	1.780	80.00	53.00
0.0709			1.800	80.00	53.00
0.0728		49	1.850	80.00	53.00
0.0748			1.900	80.00	53.00
0.0760		48	1.930	85.00	56.00
0.0780	5/64		1.980	85.00	56.00
0.0783		47	1.990	85.00	56.00
0.0787			2.000	85.00	56.00
0.0807			2.050	85.00	56.00
0.0811		46	2.060	85.00	56.00
0.0819		45	2.080	85.00	56.00
0.0827			2.100	85.00	56.00
0.0858		44	2.180	90.00	59.00
0.0866			2.200	90.00	59.00
0.0886			2.250	90.00	59.00
0.0890		43	2.260	90.00	59.00
0.0906			2.300	90.00	59.00
0.0925			2.350	90.00	59.00
0.0933		42	2.370	95.00	62.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0961		41	2.440	95.00	62.00
0.0965			2.450	95.00	62.00
0.0980		40	2.490	95.00	62.00
0.0984			2.500	95.00	62.00
0.0996		39	2.530	95.00	62.00
0.1004			2.550	95.00	62.00
0.1016		38	2.580	95.00	62.00
0.1024			2.600	95.00	62.00
0.1039		37	2.640	95.00	62.00
0.1063			2.700	100.00	66.00
0.1067		36	2.710	100.00	66.00
0.1083			2.750	100.00	66.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1094	7/64		2.780	100.00	66.00
0.1098		35	2.790	100.00	66.00
0.1102			2.800	100.00	66.00
0.1110		34	2.820	100.00	66.00
0.1122			2.850	100.00	66.00
0.1130		33	2.870	100.00	66.00
0.1142			2.900	100.00	66.00
0.1161		32	2.950	100.00	66.00
0.1181			3.000	100.00	66.00
0.1201		31	3.050	106.00	69.00
0.1220			3.100	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1283		30	3.260	106.00	69.00
0.1299			3.300	106.00	69.00
0.1339			3.400	112.00	73.00
0.1354			3.440	112.00	73.00
0.1358		29	3.450	112.00	73.00
0.1378			3.500	112.00	73.00
0.1406	9/64	28	3.570	112.00	73.00
0.1417			3.600	112.00	73.00
0.1441		27	3.660	112.00	73.00
0.1457			3.700	112.00	73.00
0.1469		26	3.730	112.00	73.00
0.1496		25	3.800	119.00	78.00
0.1520		24	3.860	119.00	78.00
0.1535			3.900	119.00	78.00
0.1539		23	3.910	119.00	78.00
0.1563	5/32		3.970	119.00	78.00
0.1571		22	3.990	119.00	78.00
0.1575			4.000	119.00	78.00
0.1591		21	4.040	119.00	78.00
0.1610		20	4.090	119.00	78.00
0.1614			4.100	119.00	78.00
0.1654			4.200	119.00	78.00
0.1661		19	4.220	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1720	11/64		4.370	126.00	82.00
0.1728		17	4.390	126.00	82.00
0.1732			4.400	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1799		15	4.570	126.00	82.00
0.1811			4.600	126.00	82.00
0.1819		14	4.620	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1874	3/16		4.760	132.00	87.00
0.1890		12	4.800	132.00	87.00
0.1909		11	4.850	132.00	87.00
0.1929			4.900	132.00	87.00
0.1937		10	4.920	132.00	87.00
0.1961		9	4.980	132.00	87.00
0.1969			5.000	132.00	87.00
0.1992		8	5.060	132.00	87.00
0.2008			5.100	132.00	87.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2012		7	5.110	132.00	87.00
0.2031	13/64		5.160	132.00	87.00
0.2039		6	5.180	132.00	87.00
0.2047			5.200	132.00	87.00
0.2055		5	5.220	132.00	87.00
0.2087			5.300	132.00	87.00
0.2091		4	5.310	139.00	91.00
0.2126			5.400	139.00	91.00
0.2130		3	5.410	139.00	91.00
0.2165			5.500	139.00	91.00
0.2189	7/32		5.560	139.00	91.00
0.2205			5.600	139.00	91.00
0.2244			5.700	139.00	91.00
0.2280		1	5.790	139.00	91.00
0.2283			5.800	139.00	91.00
0.2323			5.900	139.00	91.00
0.2343	15/64		5.950	139.00	91.00
0.2362			6.000	139.00	91.00
0.2378		B	6.040	148.00	97.00
0.2402			6.100	148.00	97.00
0.2421		C	6.150	148.00	97.00
0.2441			6.200	148.00	97.00
0.2461		D	6.250	148.00	97.00
0.2480			6.300	148.00	97.00
0.2500	1/4	E	6.350	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2571		F	6.530	148.00	97.00
0.2598			6.600	148.00	97.00
0.2610		G	6.630	148.00	97.00
0.2638			6.700	148.00	97.00
0.2657	17/64	H	6.750	156.00	102.00
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2768		J	7.030	156.00	102.00
0.2795			7.100	156.00	102.00
0.2811	9/32	K	7.140	156.00	102.00
0.2835			7.200	156.00	102.00
0.2874			7.300	156.00	102.00
0.2913			7.400	156.00	102.00
0.2953			7.500	156.00	102.00
0.2969	19/64		7.540	165.00	109.00
0.3020		N	7.670	165.00	109.00
0.3031			7.700	165.00	109.00
0.3071			7.800	165.00	109.00
0.3110			7.900	165.00	109.00
0.3126	5/16		7.940	165.00	109.00
0.3150			8.000	165.00	109.00
0.3161		O	8.030	165.00	109.00
0.3189			8.100	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3268			8.300	165.00	109.00
0.3307			8.400	165.00	109.00

To order: Series number + mm, ex. 5518 3.000

Series 336

Speeds & Feeds information pg 347

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3346			8.500	165.00	109.00
0.3386			8.600	175.00	115.00
0.3390		R	8.610	175.00	115.00
0.3425			8.700	175.00	115.00
0.3437	11/32		8.730	175.00	115.00
0.3465			8.800	175.00	115.00
0.3480		S	8.840	175.00	115.00
0.3504			8.900	175.00	115.00
0.3543			9.000	175.00	115.00
0.3579		T	9.090	175.00	115.00
0.3583			9.100	175.00	115.00
0.3622			9.200	175.00	115.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3661			9.300	175.00	115.00
0.3677		U	9.340	175.00	115.00
0.3701			9.400	175.00	115.00
0.3740			9.500	175.00	115.00
0.3748	3/8		9.520	184.00	121.00
0.3819			9.700	184.00	121.00
0.3839			9.750	184.00	121.00
0.3858		W	9.800	184.00	121.00
0.3898			9.900	184.00	121.00
0.3937			10.000	184.00	121.00
0.4016			10.200	184.00	121.00
0.4134			10.500	184.00	121.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4252			10.800	195.00	128.00
0.4331			11.000	195.00	128.00
0.4528			11.500	195.00	128.00
0.4646			11.800	195.00	128.00
0.4689	15/32		11.910	205.00	134.00
0.4724			12.000	205.00	134.00

Alternative Drill Series:

#535 HSS, GT100, 10xD, 130 pt, Bright
#668 HSS, GT100, 10xD, 130 pt, TiN
#390 Cobalt, GT100, 10xD, 130 pt, Bright

5xD

Steam Oxide

External Coolant

Morse Taper Shank

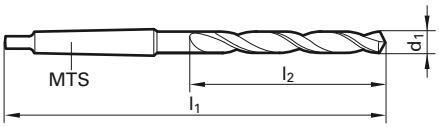
Speeds & Feeds information pg 347

Series 345

General Purpose

Cobalt, general purpose (Type N), 118˚ point, Form A web thinned all dia., Morse Taper shank, RH helix

Cut / Shank Dia. = h8 tolerance range



Application Materials:

Universal Steels

Hardened Materials

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.1181			3.000	MTS 1	114.00	33.00
0.1575			4.000	MTS 1	124.00	43.00
0.1969			5.000	MTS 1	133.00	52.00
0.2042			5.200	MTS 1	133.00	52.00
0.2165			5.500	MTS 1	135.00	57.00
0.2362			6.000	MTS 1	138.00	52.00
0.2441			6.200	MTS 1	144.00	63.00
0.2500	1/4		6.350	MTS 1	144.00	63.00
0.2559			6.500	MTS 1	144.00	63.00
0.2657	17/64	H	6.750	MTS 1	150.00	69.00
0.2756			7.000	MTS 1	150.00	69.00
0.3126	5/16		7.940	MTS 1	156.00	75.00
0.3425			8.700	MTS 1	162.00	81.00
0.3701			9.400	MTS 1	162.00	81.00
0.3748	3/8		9.520	MTS 1	168.00	87.00
0.3906	25/64		9.920	MTS 1	168.00	87.00
0.3937			10.000	MTS 1	168.00	87.00
0.3976			10.100	MTS 1	168.00	87.00
0.4016			10.200	MTS 1	168.00	87.00
0.4035			10.250	MTS 1	168.00	87.00
0.4055			10.300	MTS 1	168.00	87.00
0.4063	13/32		10.320	MTS 1	168.00	87.00
0.4134			10.500	MTS 1	168.00	87.00
0.4220	27/64		10.720	MTS 1	175.00	94.00
0.4232			10.750	MTS 1	175.00	94.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.4252			10.800	MTS 1	175.00	94.00
0.4331			11.000	MTS 1	175.00	94.00
0.4374	7/16		11.110	MTS 1	175.00	94.00
0.4409			11.200	MTS 1	175.00	94.00
0.4429			11.250	MTS 1	175.00	94.00
0.4528			11.500	MTS 1	175.00	94.00
0.4606			11.700	MTS 1	175.00	94.00
0.4626			11.750	MTS 1	175.00	94.00
0.4646			11.800	MTS 1	175.00	94.00
0.4689	15/32		11.910	MTS 1	182.00	101.00
0.4724			12.000	MTS 1	182.00	101.00
0.4764			12.100	MTS 1	182.00	101.00
0.4803			12.200	MTS 1	182.00	101.00
0.4823			12.250	MTS 1	182.00	101.00
0.4843	31/64		12.300	MTS 1	182.00	101.00
0.4921			12.500	MTS 1	182.00	101.00
0.5000	1/2		12.700	MTS 1	182.00	101.00
0.5020			12.750	MTS 1	182.00	101.00
0.5039			12.800	MTS 1	182.00	101.00
0.5118			13.000	MTS 1	182.00	101.00
0.5157	33/64		13.100	MTS 1	182.00	101.00
0.5197			13.200	MTS 1	182.00	101.00
0.5217			13.250	MTS 1	189.00	108.00
0.5311	17/32		13.490	MTS 1	189.00	108.00
0.5315			13.500	MTS 1	189.00	108.00

To order: Series number + mm, ex. 5518 3.000

Series 345

Speeds & Feeds information pg 347

Diameter (d1)				Shank	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	size	mm	mm
0.5354			13.600	MTS 1	189.00	108.00
0.5394			13.700	MTS 1	189.00	108.00
0.5413			13.750	MTS 1	189.00	108.00
0.5433			13.800	MTS 1	189.00	108.00
0.5469	35/64		13.890	MTS 1	189.00	108.00
0.5512			14.000	MTS 1	189.00	108.00
0.5551			14.100	MTS 2	212.00	114.00
0.5591			14.200	MTS 2	212.00	114.00
0.5610			14.250	MTS 2	212.00	114.00
0.5626	9/16		14.290	MTS 2	212.00	114.00
0.5709			14.500	MTS 2	212.00	114.00
0.5780	37/64		14.680	MTS 2	212.00	114.00
0.5807			14.750	MTS 2	212.00	114.00
0.5906			15.000	MTS 2	212.00	114.00
0.5937	19/32		15.080	MTS 2	218.00	120.00
0.5984			15.200	MTS 2	218.00	120.00
0.6004			15.250	MTS 2	218.00	120.00
0.6102			15.500	MTS 2	218.00	120.00
0.6201			15.750	MTS 2	218.00	120.00
0.6248	5/8		15.870	MTS 2	218.00	120.00
0.6260			15.900	MTS 2	218.00	120.00
0.6299			16.000	MTS 2	218.00	120.00
0.6398			16.250	MTS 2	223.00	125.00
0.6406	41/64		16.270	MTS 2	223.00	125.00
0.6457			16.400	MTS 2	223.00	125.00
0.6496			16.500	MTS 2	223.00	125.00
0.6563	21/32		16.670	MTS 2	223.00	125.00
0.6594			16.750	MTS 2	223.00	125.00
0.6693			17.000	MTS 2	223.00	125.00
0.6720	43/64		17.070	MTS 2	228.00	130.00
0.6791			17.250	MTS 2	228.00	130.00
0.6874	11/16		17.460	MTS 2	228.00	130.00
0.6890			17.500	MTS 2	228.00	130.00
0.6988			17.750	MTS 2	228.00	130.00
0.7031	45/64		17.860	MTS 2	228.00	130.00
0.7087			18.000	MTS 2	228.00	130.00
0.7185			18.250	MTS 2	233.00	135.00
0.7189	23/32		18.260	MTS 2	233.00	135.00
0.7283			18.500	MTS 2	233.00	135.00

Diameter (d1)				Shank	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	size	mm	mm
0.7343	47/64		18.650	MTS 2	233.00	135.00
0.7382			18.750	MTS 2	233.00	135.00
0.7480			19.000	MTS 2	233.00	135.00
0.7500	3/4		19.050	MTS 2	238.00	140.00
0.7579			19.250	MTS 2	238.00	140.00
0.7657	49/64		19.450	MTS 2	238.00	140.00
0.7677			19.500	MTS 2	238.00	140.00
0.7776			19.750	MTS 2	238.00	140.00
0.7811	25/32		19.840	MTS 2	238.00	140.00
0.7874			20.000	MTS 2	238.00	140.00
0.7972			20.250	MTS 2	243.00	145.00
0.8071			20.500	MTS 2	243.00	145.00
0.8126	13/16		20.640	MTS 2	243.00	145.00
0.8169			20.750	MTS 2	243.00	145.00
0.8268			21.000	MTS 2	243.00	145.00
0.8366			21.250	MTS 2	248.00	150.00
0.8465			21.500	MTS 2	248.00	150.00
0.8563			21.750	MTS 2	248.00	150.00
0.8661			22.000	MTS 2	248.00	150.00
0.8748	7/8		22.220	MTS 2	248.00	150.00
0.8760			22.250	MTS 2	248.00	150.00
0.8858			22.500	MTS 2	253.00	155.00
0.9055			23.000	MTS 2	253.00	155.00
0.9063	29/32		23.020	MTS 2	253.00	155.00
0.9252			23.500	MTS 3	276.00	155.00
0.9370			23.800	MTS 3	281.00	160.00
0.9374	15/16		23.810	MTS 3	281.00	160.00
0.9449			24.000	MTS 3	281.00	160.00
0.9547			24.250	MTS 3	281.00	160.00
0.9646			24.500	MTS 3	281.00	160.00
0.9843	63/64		25.000	MTS 3	281.00	160.00
0.9941			25.250	MTS 3	286.00	165.00
1.0000	1		25.400	MTS 3	286.00	165.00

Alternative Drill Series:

#245 HSS, GP, 5xD, 118 pt, Oxide
#654 HSS, GP, 5xD, 118 pt, TiN

10xD

Bright Finish

Coolant Through

Straight Shank

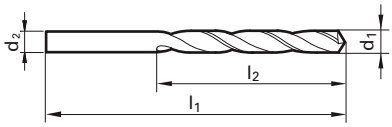
Speeds & Feeds information pg 348

Series 390

GT100 Coolant Fed Parabolic

HSS, GT 100 deep hole, taper length, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels
- Universal Steels
- Cast Iron
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	100.00	66.00
0.1299			3.300	106.00	69.00
0.1378			3.500	112.00	73.00
0.1575			4.000	119.00	78.00
0.1654			4.200	119.00	78.00
0.1772		16	4.500	126.00	82.00
0.1969			5.000	132.00	87.00
0.2165			5.500	139.00	91.00
0.2362			6.000	139.00	91.00
0.2559			6.500	148.00	97.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2677			6.800	156.00	102.00
0.2756			7.000	156.00	102.00
0.2953			7.500	156.00	102.00
0.3150			8.000	165.00	109.00
0.3346			8.500	165.00	109.00
0.3543			9.000	175.00	115.00
0.3740			9.500	175.00	115.00
0.3937			10.000	184.00	121.00
0.4016			10.200	184.00	121.00
0.4134			10.500	184.00	121.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4331			11.000	195.00	128.00
0.4528			11.500	195.00	128.00
0.4724			12.000	205.00	134.00
0.5118			13.000	205.00	134.00

Alternative Drill Series:

#1131 Cobalt, GT80IC, 5xD, 130 pt, Bright
#5525, Carbide, RT100U, 12xD, FIREX

10xD

Bright Finish

External Coolant

Straight Shank

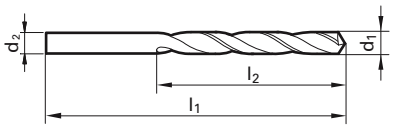
Speeds & Feeds information pg 348

Series 501

GT50 Parabolic

HSS, GT 50 deep hole, taper length, 130° point, Form A web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	56.00	33.00
0.0402		60	1.020	56.00	33.00
0.0409		59	1.040	56.00	33.00
0.0413			1.050	56.00	33.00
0.0421		58	1.070	60.00	37.00
0.0429		57	1.090	60.00	37.00
0.0433			1.100	60.00	37.00
0.0453			1.150	60.00	37.00
0.0465		56	1.180	60.00	37.00
0.0469	3/64		1.190	65.00	41.00
0.0472			1.200	65.00	41.00
0.0492			1.250	65.00	41.00
0.0512			1.300	65.00	41.00
0.0520		55	1.320	65.00	41.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0551		54	1.400	70.00	45.00
0.0591			1.500	70.00	45.00
0.0594		53	1.510	76.00	50.00
0.0610			1.550	76.00	50.00
0.0626	1/16		1.590	76.00	50.00
0.0630			1.600	76.00	50.00
0.0634		52	1.610	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0689			1.750	80.00	53.00
0.0701		50	1.780	80.00	53.00
0.0709			1.800	80.00	53.00
0.0728		49	1.850	80.00	53.00
0.0748			1.900	80.00	53.00
0.0768			1.950	85.00	56.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0780	5/64		1.980	85.00	56.00
0.0783		47	1.990	85.00	56.00
0.0787			2.000	85.00	56.00
0.0807			2.050	85.00	56.00
0.0811		46	2.060	85.00	56.00
0.0819		45	2.080	85.00	56.00
0.0827			2.100	85.00	56.00
0.0846			2.150	90.00	59.00
0.0858		44	2.180	90.00	59.00
0.0866			2.200	90.00	59.00
0.0886			2.250	90.00	59.00
0.0890		43	2.260	90.00	59.00
0.0906			2.300	90.00	59.00
0.0925			2.350	90.00	59.00

To order: Series number + mm, ex. 5518 3.000

Series 501

Speeds & Feeds information pg 348

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0933		42	2.370	95.00	62.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0961		41	2.440	95.00	62.00
0.0965			2.450	95.00	62.00
0.0980		40	2.490	95.00	62.00
0.0984			2.500	95.00	62.00
0.0992			2.520	95.00	62.00
0.0996		39	2.530	95.00	62.00
0.1004			2.550	95.00	62.00
0.1016		38	2.580	95.00	62.00
0.1024			2.600	95.00	62.00
0.1039		37	2.640	95.00	62.00
0.1063			2.700	100.00	66.00
0.1067		36	2.710	100.00	66.00
0.1083			2.750	100.00	66.00
0.1094	7/64		2.780	100.00	66.00
0.1098		35	2.790	100.00	66.00
0.1102			2.800	100.00	66.00
0.1110		34	2.820	100.00	66.00
0.1122			2.850	100.00	66.00
0.1130		33	2.870	100.00	66.00
0.1142			2.900	100.00	66.00
0.1161		32	2.950	100.00	66.00
0.1181			3.000	100.00	66.00
0.1201		31	3.050	106.00	69.00
0.1220			3.100	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1280			3.250	106.00	69.00
0.1283		30	3.260	106.00	69.00
0.1299			3.300	106.00	69.00
0.1319			3.350	106.00	69.00
0.1339			3.400	112.00	73.00
0.1358		29	3.450	112.00	73.00
0.1378			3.500	112.00	73.00
0.1406	9/64	28	3.570	112.00	73.00
0.1417			3.600	112.00	73.00
0.1437			3.650	112.00	73.00
0.1441		27	3.660	112.00	73.00
0.1457			3.700	112.00	73.00
0.1496		25	3.800	119.00	78.00
0.1520		24	3.860	119.00	78.00
0.1535			3.900	119.00	78.00
0.1539		23	3.910	119.00	78.00
0.1563	5/32		3.970	119.00	78.00
0.1571		22	3.990	119.00	78.00
0.1575			4.000	119.00	78.00
0.1591		21	4.040	119.00	78.00
0.1610		20	4.090	119.00	78.00
0.1614			4.100	119.00	78.00
0.1654			4.200	119.00	78.00
0.1661		19	4.220	119.00	78.00
0.1673			4.250	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1720	11/64		4.370	126.00	82.00
0.1728		17	4.390	126.00	82.00
0.1732			4.400	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1799		15	4.570	126.00	82.00
0.1811			4.600	126.00	82.00
0.1819		14	4.620	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1870			4.750	126.00	82.00
0.1874	3/16		4.760	132.00	87.00
0.1890		12	4.800	132.00	87.00
0.1909		11	4.850	132.00	87.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1929			4.900	132.00	87.00
0.1937		10	4.920	132.00	87.00
0.1961		9	4.980	132.00	87.00
0.1969			5.000	132.00	87.00
0.1988			5.050	132.00	87.00
0.1992		8	5.060	132.00	87.00
0.2008			5.100	132.00	87.00
0.2012		7	5.110	132.00	87.00
0.2031	13/64		5.160	132.00	87.00
0.2039		6	5.180	132.00	87.00
0.2047			5.200	132.00	87.00
0.2055		5	5.220	132.00	87.00
0.2087			5.300	132.00	87.00
0.2091		4	5.310	132.00	87.00
0.2126			5.400	139.00	91.00
0.2130		3	5.410	139.00	91.00
0.2165			5.500	139.00	91.00
0.2189	7/32		5.560	139.00	91.00
0.2205			5.600	139.00	91.00
0.2209		2	5.610	139.00	91.00
0.2244			5.700	139.00	91.00
0.2280		1	5.790	139.00	91.00
0.2283			5.800	139.00	91.00
0.2323			5.900	139.00	91.00
0.2339		A	5.940	139.00	91.00
0.2343	15/64		5.950	139.00	91.00
0.2362			6.000	139.00	91.00
0.2378		B	6.040	148.00	97.00
0.2402			6.100	148.00	97.00
0.2421		C	6.150	148.00	97.00
0.2441			6.200	148.00	97.00
0.2461		D	6.250	148.00	97.00
0.2480			6.300	148.00	97.00
0.2500	1/4	E	6.350	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2571		F	6.530	148.00	97.00
0.2598			6.600	148.00	97.00
0.2610		G	6.630	148.00	97.00
0.2638			6.700	148.00	97.00
0.2657	17/64	H	6.750	156.00	102.00
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2772			7.040	156.00	102.00
0.2795			7.100	156.00	102.00
0.2811	9/32	K	7.140	156.00	102.00
0.2835			7.200	156.00	102.00
0.2874			7.300	156.00	102.00
0.2902		L	7.370	156.00	102.00
0.2913			7.400	156.00	102.00
0.2949		M	7.490	156.00	102.00
0.2953			7.500	156.00	102.00
0.2969	19/64		7.540	165.00	109.00
0.2992			7.600	165.00	109.00
0.3020		N	7.670	165.00	109.00
0.3031			7.700	165.00	109.00
0.3071			7.800	165.00	109.00
0.3110			7.900	165.00	109.00
0.3126	5/16		7.940	165.00	109.00
0.3150			8.000	165.00	109.00
0.3161		O	8.030	165.00	109.00
0.3189			8.100	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3268			8.300	165.00	109.00
0.3280	21/64		8.330	165.00	109.00
0.3307			8.400	165.00	109.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3319		Q	8.430	165.00	109.00
0.3346			8.500	165.00	109.00
0.3386			8.600	175.00	115.00
0.3390		R	8.610	175.00	115.00
0.3425			8.700	175.00	115.00
0.3437	11/32		8.730	175.00	115.00
0.3465			8.800	175.00	115.00
0.3504			8.900	175.00	115.00
0.3543			9.000	175.00	115.00
0.3579		T	9.090	175.00	115.00
0.3583			9.100	175.00	115.00
0.3594	23/64		9.130	175.00	115.00
0.3622			9.200	175.00	115.00
0.3661			9.300	175.00	115.00
0.3677		U	9.340	175.00	115.00
0.3681			9.350	175.00	115.00
0.3701			9.400	175.00	115.00
0.3740			9.500	175.00	115.00
0.3748	3/8		9.520	184.00	121.00
0.3772		V	9.580	184.00	121.00
0.3780			9.600	184.00	121.00
0.3858		W	9.800	184.00	121.00
0.3898			9.900	184.00	121.00
0.3906	25/64		9.920	184.00	121.00
0.3937			10.000	184.00	121.00
0.3969		X	10.080	184.00	121.00
0.3976			10.100	184.00	121.00
0.4016			10.200	184.00	121.00
0.4039		Y	10.260	184.00	121.00
0.4055			10.300	184.00	121.00
0.4063	13/32		10.320	184.00	121.00
0.4094			10.400	184.00	121.00
0.4134			10.500	184.00	121.00
0.4173			10.600	184.00	121.00
0.4213			10.700	184.00	121.00
0.4220	27/64		10.720	195.00	128.00
0.4252			10.800	195.00	128.00
0.4331			11.000	195.00	128.00
0.4374	7/16		11.110	195.00	128.00
0.4409			11.200	195.00	128.00
0.4449			11.300	195.00	128.00
0.4488			11.400	195.00	128.00
0.4528			11.500	195.00	128.00
0.4531	29/64		11.510	195.00	128.00
0.4567			11.600	195.00	128.00
0.4626			11.750	195.00	128.00
0.4646			11.800	195.00	128.00
0.4685			11.900	205.00	134.00
0.4689	15/32		11.910	205.00	134.00
0.4724			12.000	205.00	134.00
0.4803			12.200	205.00	134.00
0.4843	31/64		12.300	205.00	134.00
0.4921			12.500	205.00	134.00
0.5000	1/2		12.700	205.00	134.00
0.5118			13.000	205.00	134.00
0.5157	33/64		13.100	205.00	134.00
0.5311	17/32		13.490	214.00	140.00
0.5469	35/64		13.890	214.00	140.00
0.5512			14.000	214.00	140.00

Alternative Drill Series:

#535 HSS, GT100, 10xD, 130 pt, Bright
#668 HSS, GT100, 10xD, 130 pt, Bright
#336 Cobalt, GT100, 10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

Extra Length #1

Nitrided lands/polished flutes >2.36mm dia.

External Coolant

Straight Shank

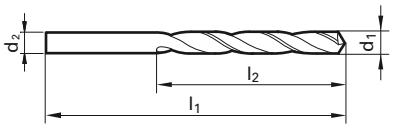
Speeds & Feeds information pg 349

Series 502

GT100 Parabolic

HSS, GT 100 deep hole, extra length #1, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels
- Aluminum & Alloys
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0768			1.950	125.00	85.00
0.0787			2.000	125.00	85.00
0.0807			2.050	125.00	85.00
0.0827			2.100	125.00	85.00
0.0866			2.200	135.00	90.00
0.0906			2.300	135.00	90.00
0.0933		42	2.370	150.00	100.00
0.0937	3/32		2.380	150.00	100.00
0.0945			2.400	150.00	100.00
0.0984			2.500	150.00	100.00
0.1004			2.550	150.00	100.00
0.1016		38	2.580	150.00	100.00
0.1024			2.600	150.00	100.00
0.1063			2.700	150.00	100.00
0.1094	7/64		2.780	150.00	100.00
0.1102			2.800	150.00	100.00
0.1122			2.850	150.00	100.00
0.1130		33	2.870	150.00	100.00
0.1142			2.900	150.00	100.00
0.1161		32	2.950	150.00	100.00
0.1181			3.000	150.00	100.00
0.1193			3.030	155.00	105.00
0.1220			3.100	155.00	105.00
0.1248	1/8		3.170	155.00	105.00
0.1260			3.200	155.00	105.00
0.1280			3.250	155.00	105.00
0.1299			3.300	155.00	105.00
0.1339			3.400	165.00	115.00
0.1378			3.500	165.00	115.00
0.1406	9/64	28	3.570	165.00	115.00
0.1417			3.600	165.00	115.00
0.1457			3.700	165.00	115.00
0.1476			3.750	165.00	115.00
0.1496		25	3.800	175.00	120.00
0.1520		24	3.860	175.00	120.00
0.1535			3.900	175.00	120.00
0.1563	5/32		3.970	175.00	120.00
0.1575			4.000	175.00	120.00
0.1614			4.100	175.00	120.00
0.1654			4.200	175.00	120.00
0.1693		18	4.300	185.00	125.00
0.1720	11/64		4.370	185.00	125.00
0.1732			4.400	185.00	125.00
0.1772		16	4.500	185.00	125.00
0.1799		15	4.570	185.00	125.00
0.1811			4.600	185.00	125.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1850		13	4.700	185.00	125.00
0.1874	3/16		4.760	195.00	135.00
0.1890		12	4.800	195.00	135.00
0.1929			4.900	195.00	135.00
0.1969			5.000	195.00	135.00
0.2008			5.100	195.00	135.00
0.2012		7	5.110	195.00	135.00
0.2031	13/64		5.160	195.00	135.00
0.2047			5.200	195.00	135.00
0.2087			5.300	195.00	135.00
0.2126			5.400	205.00	140.00
0.2165			5.500	205.00	140.00
0.2189	7/32		5.560	205.00	140.00
0.2205			5.600	205.00	140.00
0.2244			5.700	205.00	140.00
0.2264			5.750	205.00	140.00
0.2283			5.800	205.00	140.00
0.2323			5.900	205.00	140.00
0.2343	15/64		5.950	205.00	140.00
0.2362			6.000	205.00	140.00
0.2382			6.050	215.00	150.00
0.2402			6.100	215.00	150.00
0.2441			6.200	215.00	150.00
0.2461		D	6.250	215.00	150.00
0.2480			6.300	215.00	150.00
0.2500	1/4	E	6.350	215.00	150.00
0.2520			6.400	215.00	150.00
0.2559			6.500	215.00	150.00
0.2598			6.600	215.00	150.00
0.2638			6.700	215.00	150.00
0.2657	17/64	H	6.750	225.00	155.00
0.2677			6.800	225.00	155.00
0.2717		I	6.900	225.00	155.00
0.2756			7.000	225.00	155.00
0.2795			7.100	225.00	155.00
0.2835			7.200	225.00	155.00
0.2874			7.300	225.00	155.00
0.2913			7.400	225.00	155.00
0.2953			7.500	225.00	155.00
0.2969	19/64		7.540	240.00	165.00
0.2992			7.600	240.00	165.00
0.3031			7.700	240.00	165.00
0.3051			7.750	240.00	165.00
0.3071			7.800	240.00	165.00
0.3110			7.900	240.00	165.00
0.3126	5/16		7.940	240.00	165.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3150			8.000	240.00	165.00
0.3189			8.100	240.00	165.00
0.3228		P	8.200	240.00	165.00
0.3268			8.300	240.00	165.00
0.3280	21/64		8.330	240.00	165.00
0.3307			8.400	240.00	165.00
0.3319		Q	8.430	240.00	165.00
0.3346			8.500	240.00	165.00
0.3386			8.600	250.00	175.00
0.3425			8.700	250.00	175.00
0.3437	11/32		8.730	250.00	175.00
0.3465			8.800	250.00	175.00
0.3543			9.000	250.00	175.00
0.3622			9.200	250.00	175.00
0.3661			9.300	250.00	175.00
0.3701			9.400	250.00	175.00
0.3740			9.500	250.00	175.00
0.3748	3/8		9.520	265.00	185.00
0.3780			9.600	265.00	185.00
0.3819			9.700	265.00	185.00
0.3858		W	9.800	265.00	185.00
0.3898			9.900	265.00	185.00
0.3906	25/64		9.920	265.00	185.00
0.3937			10.000	265.00	185.00
0.4016			10.200	265.00	185.00
0.4063	13/32		10.320	265.00	185.00
0.4134			10.500	265.00	185.00
0.4220	27/64		10.720	280.00	195.00
0.4331			11.000	280.00	195.00
0.4374	7/16		11.110	280.00	195.00
0.4409			11.200	280.00	195.00
0.4528			11.500	280.00	195.00
0.4531	29/64		11.510	280.00	195.00
0.4646			11.800	280.00	195.00
0.4724			12.000	295.00	205.00
0.4921			12.500	295.00	205.00
0.5000	1/2		12.700	295.00	205.00
0.5118			13.000	295.00	205.00

Alternative Drill Series:

#670 HSS, GT100, >10xD, 130 pt, TiN
#618 Cobalt, GT100, >10xD, 130 pt, Bright
#524 HSS, GT50, >10xD, 130 pt, Bright
#235 HSS, GT100, >10xD, 118 pt, Oxide

To order: Series number + mm, ex. 5518 3.000

Extra Length #2

Nitrided lands/polished flutes >2.36mm dia.

External Coolant

Straight Shank

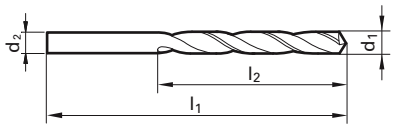
Speeds & Feeds information pg 349

Series 503

GT100 Parabolic

HSS, GT 100 deep hole, extra length #2, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels
- Aluminum & Alloys
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0906			2.300	170.00	115.00
0.1102			2.800	190.00	130.00
0.1181			3.000	190.00	130.00
0.1193			3.030	200.00	135.00
0.1220			3.100	200.00	135.00
0.1248	1/8		3.170	200.00	135.00
0.1260			3.200	200.00	135.00
0.1299			3.300	200.00	135.00
0.1339			3.400	210.00	145.00
0.1378			3.500	210.00	145.00
0.1406	9/64	28	3.570	210.00	145.00
0.1417			3.600	210.00	145.00
0.1457			3.700	210.00	145.00
0.1496		25	3.800	220.00	150.00
0.1535			3.900	220.00	150.00
0.1563	5/32		3.970	220.00	150.00
0.1575			4.000	220.00	150.00
0.1614			4.100	220.00	150.00
0.1654			4.200	220.00	150.00
0.1693		18	4.300	235.00	160.00
0.1720	11/64		4.370	235.00	160.00
0.1732			4.400	235.00	160.00
0.1772		16	4.500	235.00	160.00
0.1850		13	4.700	235.00	160.00
0.1874	3/16		4.760	245.00	170.00
0.1890		12	4.800	245.00	170.00
0.1929			4.900	245.00	170.00
0.1969			5.000	245.00	170.00
0.2008			5.100	245.00	170.00
0.2031	13/64		5.160	245.00	170.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2047			5.200	245.00	170.00
0.2087			5.300	245.00	170.00
0.2126			5.400	260.00	180.00
0.2165			5.500	260.00	180.00
0.2189	7/32		5.560	260.00	180.00
0.2244			5.700	260.00	180.00
0.2283			5.800	260.00	180.00
0.2323			5.900	260.00	180.00
0.2343	15/64		5.950	260.00	180.00
0.2362			6.000	260.00	180.00
0.2402			6.100	275.00	190.00
0.2421		C	6.150	275.00	190.00
0.2441			6.200	275.00	190.00
0.2480			6.300	275.00	190.00
0.2500	1/4	E	6.350	275.00	190.00
0.2520			6.400	275.00	190.00
0.2559			6.500	275.00	190.00
0.2598			6.600	275.00	190.00
0.2638			6.700	275.00	190.00
0.2657	17/64	H	6.750	290.00	200.00
0.2677			6.800	290.00	200.00
0.2717		I	6.900	290.00	200.00
0.2756			7.000	290.00	200.00
0.2811	9/32	K	7.140	290.00	200.00
0.2835			7.200	290.00	200.00
0.2953			7.500	290.00	200.00
0.2969	19/64		7.540	305.00	210.00
0.3071			7.800	305.00	210.00
0.3126	5/16		7.940	305.00	210.00
0.3150			8.000	305.00	210.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3228		P	8.200	305.00	210.00
0.3280	21/64		8.330	305.00	210.00
0.3346			8.500	305.00	210.00
0.3386			8.600	320.00	220.00
0.3437	11/32		8.730	320.00	220.00
0.3543			9.000	320.00	220.00
0.3583			9.100	320.00	220.00
0.3740			9.500	320.00	220.00
0.3748	3/8		9.520	340.00	235.00
0.3819			9.700	340.00	235.00
0.3858		W	9.800	340.00	235.00
0.3906	25/64		9.920	340.00	235.00
0.3937			10.000	340.00	235.00
0.4134			10.500	340.00	235.00
0.4220	27/64		10.720	365.00	250.00
0.4331			11.000	365.00	250.00
0.4374	7/16		11.110	365.00	250.00
0.4528			11.500	365.00	250.00
0.4531	29/64		11.510	365.00	250.00
0.4689	15/32		11.910	375.00	260.00
0.4724			12.000	375.00	260.00
0.4843	31/64		12.300	375.00	260.00
0.4921			12.500	375.00	260.00
0.5000	1/2		12.700	375.00	260.00
0.5118			13.000	375.00	260.00

Alternative Drill Series:

#671 HSS, GT100, >10xD, 130 pt, TiN
#619 Cobalt, GT100, >10xD, 130 pt, Bright

Extra Length #3

Nitrided lands/ polished flutes

External Coolant

Straight Shank

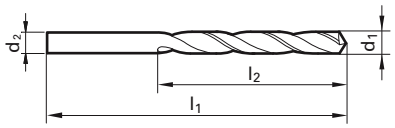
Speeds & Feeds information pg 350

Series 504

GT100 Parabolic

HSS, GT 100 deep hole, extra length #3, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels
- Aluminum & Alloys
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	240.00	160.00
0.1220			3.100	250.00	170.00
0.1248	1/8		3.170	250.00	170.00
0.1260			3.200	250.00	170.00
0.1299			3.300	250.00	170.00
0.1339			3.400	265.00	180.00
0.1378			3.500	265.00	180.00
0.1406	9/64	28	3.570	265.00	180.00
0.1417			3.600	265.00	180.00
0.1457			3.700	265.00	180.00
0.1496		25	3.800	280.00	190.00
0.1535			3.900	280.00	190.00
0.1563	5/32		3.970	280.00	190.00
0.1575			4.000	280.00	190.00
0.1614			4.100	280.00	190.00
0.1654			4.200	280.00	190.00
0.1693		18	4.300	295.00	200.00
0.1720	11/64		4.370	295.00	200.00
0.1732			4.400	295.00	200.00
0.1772		16	4.500	295.00	200.00
0.1811			4.600	295.00	200.00
0.1874	3/16		4.760	315.00	210.00
0.1890		12	4.800	315.00	210.00
0.1929			4.900	315.00	210.00
0.1969			5.000	315.00	210.00
0.2008			5.100	315.00	210.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2047			5.200	315.00	210.00
0.2165			5.500	330.00	225.00
0.2189	7/32		5.560	330.00	225.00
0.2283			5.800	330.00	225.00
0.2343	15/64		5.950	330.00	225.00
0.2362			6.000	330.00	225.00
0.2402			6.100	350.00	235.00
0.2441			6.200	350.00	235.00
0.2480			6.300	350.00	235.00
0.2500	1/4	E	6.350	350.00	235.00
0.2520			6.400	350.00	235.00
0.2559			6.500	350.00	235.00
0.2598			6.600	350.00	235.00
0.2638			6.700	350.00	235.00
0.2657	17/64	H	6.750	370.00	250.00
0.2677			6.800	370.00	250.00
0.2756			7.000	370.00	250.00
0.2811	9/32	K	7.140	370.00	250.00
0.2835			7.200	370.00	250.00
0.2953			7.500	370.00	250.00
0.2969	19/64		7.540	390.00	265.00
0.2992			7.600	390.00	265.00
0.3071			7.800	390.00	265.00
0.3110			7.900	390.00	265.00
0.3126	5/16		7.940	390.00	265.00
0.3150			8.000	390.00	265.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3228		P	8.200	390.00	265.00
0.3280	21/64		8.330	390.00	265.00
0.3346			8.500	390.00	265.00
0.3386			8.600	410.00	280.00
0.3437	11/32		8.730	410.00	280.00
0.3504			8.900	410.00	280.00
0.3543			9.000	410.00	280.00
0.3583			9.100	410.00	280.00
0.3622			9.200	410.00	280.00
0.3740			9.500	410.00	280.00
0.3748	3/8		9.520	430.00	295.00
0.3906	25/64		9.920	430.00	295.00
0.3937			10.000	430.00	295.00
0.4063	13/32		10.320	430.00	295.00
0.4134			10.500	430.00	295.00
0.4220	27/64		10.720	455.00	310.00
0.4331			11.000	455.00	310.00
0.4374	7/16		11.110	455.00	310.00
0.4528			11.500	455.00	310.00
0.4724			12.000	480.00	330.00
0.4921			12.500	480.00	330.00
0.5118			13.000	480.00	330.00

Alternative Drill Series:

#529 HSS, GT50, >10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

3xD

Series 515

GT 500 DZ High-performance

PM Cobalt, stub length, 130° cone-relief point, Special GN Type B web thinned, standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron

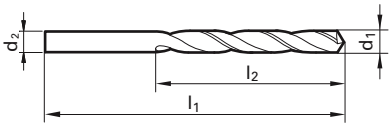
Twist Drills

(F) FIREX® coated

External Coolant

Straight Shank

Speeds & Feeds information pg 350



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0409		59	1.040	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0469	3/64		1.190	30.00	8.00
0.0472			1.200	30.00	8.00
0.0512			1.300	30.00	8.00
0.0520		55	1.320	30.00	8.00
0.0551		54	1.400	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0626	1/16		1.590	32.00	9.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	36.00	11.00
0.0780	5/64		1.980	36.00	11.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0811		46	2.060	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0827			2.100	38.00	12.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0933		42	2.370	43.00	14.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0980		40	2.490	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1098		35	2.790	46.00	16.00
0.1102			2.800	46.00	16.00
0.1110		34	2.820	46.00	16.00
0.1130		33	2.870	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1358		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1441		27	3.660	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1520		24	3.860	55.00	22.00
0.1535			3.900	55.00	22.00
0.1539		23	3.910	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1571		22	3.990	55.00	22.00
0.1575			4.000	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1610		20	4.090	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1661		19	4.220	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1728		17	4.390	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1799		15	4.570	58.00	24.00
0.1811			4.600	58.00	24.00
0.1819		14	4.620	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1909		11	4.850	62.00	26.00
0.1929			4.900	62.00	26.00
0.1937		10	4.920	62.00	26.00
0.1961		9	4.980	62.00	26.00
0.1969			5.000	62.00	26.00
0.1992		8	5.060	62.00	26.00
0.2008			5.100	62.00	26.00
0.2012		7	5.110	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2039		6	5.180	62.00	26.00
0.2047			5.200	62.00	26.00
0.2055		5	5.220	62.00	26.00
0.2087			5.300	62.00	26.00
0.2091		4	5.310	66.00	28.00
0.2126			5.400	66.00	28.00
0.2130		3	5.410	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2209		2	5.610	66.00	28.00
0.2244			5.700	66.00	28.00
0.2280		1	5.790	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2339		A	5.940	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2378		B	6.040	70.00	31.00
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2441			6.200	70.00	31.00
0.2461		D	6.250	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2610		G	6.630	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64		6.750	70.00	31.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2768		J	7.030	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2949		M	7.490	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	74.00	34.00
0.2992			7.600	79.00	37.00
0.3020		N	7.670	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3161		O	8.030	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3319		Q	8.430	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3390		R	8.610	84.00	40.00
0.3425			8.700	84.00	40.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes! (Available Spring 2010)

Series 515

Speeds & Feeds information pg 350

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3437	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3480		S	8.840	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3579		T	9.090	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3661			9.300	84.00	40.00
0.3677		U	9.340	84.00	40.00
0.3681			9.350	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	84.00	40.00
0.3772		V	9.580	89.00	43.00
0.3780			9.600	84.00	40.00
0.3819			9.700	84.00	40.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3858		W	9.800	89.00	43.00
0.3898			9.900	84.00	40.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.3969		X	10.080	89.00	43.00
0.4016			10.200	89.00	43.00
0.4039		Y	10.260	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4130		Z	10.490	89.00	43.00
0.4134			10.500	89.00	43.00
0.4220	27/64		10.720	89.00	43.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	84.00	40.00
0.4646			11.800	84.00	40.00
0.4689	15/32		11.910	95.00	47.00
0.4724			12.000	102.00	51.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4843	31/64		12.300	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5157	33/64		13.100	102.00	51.00
0.5311	17/32		13.490	107.00	54.00
0.5315			13.500	107.00	54.00
0.5512			14.000	107.00	54.00
0.5626	9/16		14.290	111.00	56.00

Alternative Drill Series:

#5521 PM Cobalt, GT500, 3xD, 130 pt, TiN
#659 Cobalt, GV120, 3xD, 130 pt, TiN
#223 HSS, GP, 3xD, 118 pt, Bright
#653 HSS, GP, 3xD, 118 pt, TiN

To order: Series number + mm, ex. 5518 3.000

Series 524

GT 50 Parabolic

HSS, GT 50 deep hole, extra length #1, 130° point, Form A web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Extra Length #1

Bright Finish

External Coolant

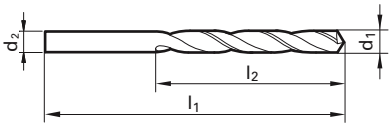
Straight Shank

Speeds & Feeds information pg 351

Application Materials:

General Steels

Aluminum & Alloys



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0787			2.000	125.00	85.00
0.0827			2.100	125.00	85.00
0.0866			2.200	135.00	90.00
0.0906			2.300	135.00	90.00
0.0925			2.350	135.00	90.00
0.0937	3/32		2.380	150.00	100.00
0.0945			2.400	150.00	100.00
0.0965			2.450	150.00	100.00
0.0984			2.500	150.00	100.00
0.1024			2.600	150.00	100.00
0.1094	7/64		2.780	150.00	100.00
0.1102			2.800	150.00	100.00
0.1142			2.900	150.00	100.00
0.1161		32	2.950	150.00	100.00
0.1181			3.000	150.00	100.00
0.1220			3.100	155.00	105.00
0.1248	1/8		3.170	155.00	105.00
0.1260			3.200	155.00	105.00
0.1299			3.300	155.00	105.00
0.1319			3.350	155.00	105.00
0.1339			3.400	165.00	115.00
0.1358		29	3.450	165.00	115.00
0.1378			3.500	165.00	115.00
0.1390			3.530	165.00	115.00
0.1406	9/64	28	3.570	165.00	115.00
0.1417			3.600	165.00	115.00
0.1457			3.700	165.00	115.00
0.1496		25	3.800	175.00	120.00
0.1535			3.900	175.00	120.00
0.1563	5/32		3.970	175.00	120.00
0.1575			4.000	175.00	120.00
0.1614			4.100	175.00	120.00
0.1654			4.200	175.00	120.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1673			4.250	175.00	120.00
0.1693		18	4.300	185.00	125.00
0.1720	11/64		4.370	185.00	125.00
0.1732			4.400	185.00	125.00
0.1772		16	4.500	185.00	125.00
0.1811			4.600	185.00	125.00
0.1850		13	4.700	185.00	125.00
0.1874	3/16		4.760	195.00	135.00
0.1890		12	4.800	195.00	135.00
0.1969			5.000	195.00	135.00
0.2008			5.100	195.00	135.00
0.2031	13/64		5.160	195.00	135.00
0.2047			5.200	195.00	135.00
0.2087			5.300	195.00	135.00
0.2126			5.400	205.00	140.00
0.2165			5.500	205.00	140.00
0.2189	7/32		5.560	205.00	140.00
0.2283			5.800	205.00	140.00
0.2343	15/64		5.950	205.00	140.00
0.2362			6.000	205.00	140.00
0.2402			6.100	215.00	150.00
0.2500	1/4	E	6.350	215.00	150.00
0.2520			6.400	215.00	150.00
0.2559			6.500	215.00	150.00
0.2598			6.600	215.00	150.00
0.2638			6.700	215.00	150.00
0.2657	17/64	H	6.750	225.00	155.00
0.2677			6.800	225.00	155.00
0.2756			7.000	225.00	155.00
0.2874			7.300	225.00	155.00
0.2953			7.500	225.00	155.00
0.2969	19/64		7.540	240.00	165.00
0.2992			7.600	240.00	165.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3071			7.800	240.00	165.00
0.3110			7.900	240.00	165.00
0.3126	5/16		7.940	240.00	165.00
0.3150			8.000	240.00	165.00
0.3189			8.100	240.00	165.00
0.3228		P	8.200	240.00	165.00
0.3280	21/64		8.330	240.00	165.00
0.3346			8.500	240.00	165.00
0.3386			8.600	250.00	175.00
0.3437	11/32		8.730	250.00	175.00
0.3504			8.900	250.00	175.00
0.3543			9.000	250.00	175.00
0.3594	23/64		9.130	250.00	175.00
0.3622			9.200	250.00	175.00
0.3740			9.500	250.00	175.00
0.3748	3/8		9.520	265.00	185.00
0.3937			10.000	265.00	185.00
0.4063	13/32		10.320	265.00	185.00
0.4134			10.500	265.00	185.00
0.4331			11.000	280.00	195.00
0.4374	7/16		11.110	280.00	195.00
0.4528			11.500	280.00	195.00
0.4689	15/32		11.910	295.00	205.00
0.4724			12.000	295.00	205.00
0.5000	1/2		12.700	295.00	205.00

Alternative Drill Series:

#502 HSS, GT100, >10xD, 130 pt, Bright
#670 HSS, GT100, >10xD, 130 pt, TiN
#618 Cobalt, GT100, >10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

Extra Length #1

Nitrided lands / steam oxide >16 mm

External Coolant

Morse Taper Shank

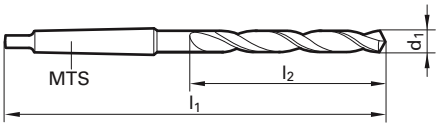
Speeds & Feeds information pg 351

Series 526

GT 100 Parabolic

HSS, GT 100 deep hole, extra length #1, 118° point, Form A web thinned all dia., Morse Taper shank, RH helix

Cut / Shank Dia. = h8 tolerance range



Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank Size	l1 mm	l2 mm
0.3150			8.000	MTS 1	265.00	165.00
0.3346			8.500	MTS 1	265.00	165.00
0.3465			8.800	MTS 1	275.00	175.00
0.3748	3/8		9.520	MTS 1	285.00	185.00
0.3906	25/64		9.920	MTS 1	285.00	185.00
0.3937			10.000	MTS 1	285.00	185.00
0.4063	13/32		10.320	MTS 1	285.00	185.00
0.4134			10.500	MTS 1	285.00	185.00
0.4220	27/64		10.720	MTS 1	300.00	195.00
0.4252			10.800	MTS 1	300.00	195.00
0.4331			11.000	MTS 1	300.00	195.00
0.4374	7/16		11.110	MTS 1	300.00	195.00
0.4528			11.500	MTS 1	300.00	195.00
0.4531	29/64		11.510	MTS 1	300.00	195.00
0.4724			12.000	MTS 1	310.00	205.00
0.4843	31/64		12.300	MTS 1	310.00	205.00
0.4921			12.500	MTS 1	310.00	205.00
0.5000	1/2		12.700	MTS 1	310.00	205.00
0.5079			12.900	MTS 1	310.00	205.00
0.5118			13.000	MTS 1	310.00	205.00
0.5311	17/32		13.490	MTS 1	325.00	220.00
0.5315			13.500	MTS 1	325.00	220.00
0.5512			14.000	MTS 1	325.00	220.00
0.5591			14.200	MTS 2	340.00	220.00
0.5626	9/16		14.290	MTS 2	340.00	220.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank Size	l1 mm	l2 mm
0.5709			14.500	MTS 2	340.00	220.00
0.5780	37/64		14.680	MTS 2	340.00	220.00
0.5906			15.000	MTS 2	340.00	220.00
0.6102			15.500	MTS 2	355.00	230.00
0.6248	5/8		15.870	MTS 2	355.00	230.00
0.6299			16.000	MTS 2	355.00	230.00
0.6496			16.500	MTS 2	355.00	230.00
0.6563	21/32		16.670	MTS 2	355.00	230.00
0.6693			17.000	MTS 2	355.00	230.00
0.6720	43/64		17.070	MTS 2	370.00	245.00
0.6874	11/16		17.460	MTS 2	370.00	245.00
0.6890			17.500	MTS 2	370.00	245.00
0.7087			18.000	MTS 2	370.00	245.00
0.7283			18.500	MTS 2	370.00	245.00
0.7480			19.000	MTS 2	370.00	245.00
0.7657	49/64		19.450	MTS 2	385.00	260.00
0.7677			19.500	MTS 2	385.00	260.00
1.0827			27.500	MTS 3	460.00	305.00
1.1220			28.500	MTS 3	460.00	305.00
1.1811			30.000	MTS 3	460.00	305.00
1.1874	1 3/16		30.160	MTS 3	480.00	320.00

Alternative Drill Series:

#620 Cobalt, GT100, >10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

Extra Length #2

Nitrided lands / steam oxide >16 mm

External Coolant

Morse Taper Shank

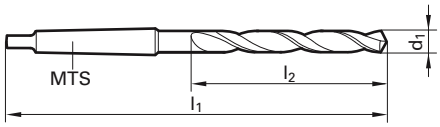
Speeds & Feeds information pg 352

Series 527

GT 100 Parabolic

HSS, GT 100 deep hole, extra length #2, 130° point, Form A web thinned all dia., Morse Taper shank, RH helix

Cut / Shank Dia. = h8 tolerance range



Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank Size	l1 mm	l2 mm
0.3150			8.000	MTS 1	330.00	210.00
0.3307			8.400	MTS 1	330.00	210.00
0.3346			8.500	MTS 1	330.00	210.00
0.3504			8.900	MTS 1	345.00	220.00
0.3937			10.000	MTS 1	360.00	235.00
0.4063	13/32		10.320	MTS 1	360.00	235.00
0.4134			10.500	MTS 1	360.00	235.00
0.4331			11.000	MTS 1	375.00	250.00
0.4374	7/16		11.110	MTS 1	375.00	250.00
0.4528			11.500	MTS 1	375.00	250.00
0.4531	29/64		11.510	MTS 1	375.00	250.00
0.4689	15/32		11.910	MTS 1	395.00	260.00
0.4724			12.000	MTS 1	395.00	260.00
0.4843	31/64		12.300	MTS 1	395.00	260.00
0.4921			12.500	MTS 1	395.00	260.00
0.5000	1/2		12.700	MTS 1	395.00	260.00
0.5118			13.000	MTS 1	395.00	260.00
0.5315			13.500	MTS 1	375.00	250.00
0.5469	35/64		13.890	MTS 1	375.00	250.00
0.5512			14.000	MTS 1	410.00	275.00
0.5591			14.200	MTS 2	425.00	275.00
0.5626	9/16		14.290	MTS 2	425.00	275.00
0.5709			14.500	MTS 2	425.00	275.00
0.5906			15.000	MTS 2	425.00	275.00
0.6102			15.500	MTS 2	445.00	295.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank Size	l1 mm	l2 mm
0.6299			16.000	MTS 2	445.00	295.00
0.6496			16.500	MTS 2	445.00	295.00
0.6693			17.000	MTS 2	445.00	295.00
0.6720	43/64		17.070	MTS 2	465.00	310.00
0.6890			17.500	MTS 2	465.00	310.00
0.7008			17.800	MTS 2	465.00	310.00
0.7087			18.000	MTS 2	465.00	310.00
0.7283			18.500	MTS 2	465.00	310.00
0.7480			19.000	MTS 2	465.00	310.00
0.7657	49/64		19.450	MTS 2	490.00	325.00
0.7677			19.500	MTS 2	490.00	325.00
0.8280	53/64		21.030	MTS 2	490.00	325.00
0.8594	55/64		21.830	MTS 2	515.00	345.00
0.9531	61/64		24.210	MTS 3	555.00	365.00
0.9646			24.500	MTS 3	555.00	365.00
1.0827			27.500	MTS 3	580.00	385.00
1.0937	1 3/32		27.780	MTS 3	580.00	385.00
1.1220			28.500	MTS 3	580.00	385.00
1.1319			28.750	MTS 3	580.00	385.00
1.1614			29.500	MTS 3	580.00	385.00

Alternative Drill Series:

#621 Cobalt, GT100, >10xD, 130 pt, Bright

5xD

Series 530

GT 500 DZ High-performance

PM Cobalt, jobber length, 130° cone relief point, Special GN Type B web thinned standard straight shank, RH helix

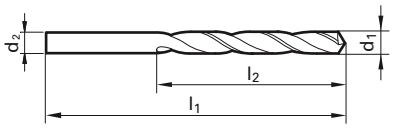
Cut / Shank Dia. = h8 tolerance range

FIREX® coated

External Coolant

Straight Shank

Speeds & Feeds information pg 352



$d_1 = d_2$

Application Materials:

- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0551		54	1.400	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	40.00	18.00
0.0626	1/16		1.590	40.00	18.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	46.00	22.00
0.0780	5/64		1.980	46.00	22.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00
0.2130		3	5.410	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2244			5.700	93.00	57.00
0.2280		1	5.790	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2378		B	6.040	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2610		G	6.630	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64		6.750	101.00	63.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2949		M	7.490	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	109.00	69.00
0.2992			7.600	117.00	75.00
0.3020		N	7.670	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3390		R	8.610	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00

Red indicates NEW sizes! (Available Spring 2010)

To order: Series number + mm, ex. 5518 3.000

Series 530

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Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3480		S	8.840	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	125.00	81.00
0.3772		V	9.580	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3969		X	10.080	133.00	87.00
0.4016			10.200	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4130		Z	10.490	133.00	87.00
0.4134			10.500	133.00	87.00
0.4220	27/64		10.720	133.00	87.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4689	15/32		11.910	142.00	94.00
0.4724			12.000	151.00	101.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5118			13.000	151.00	101.00
0.5157	33/64		13.100	151.00	101.00
0.5311	17/32		13.490	160.00	108.00
0.5315			13.500	160.00	108.00
0.5512			14.000	160.00	108.00
0.5626	9/16		14.290	169.00	114.00

Alternative Drill Series:

#5522 PM Cobalt, GT500, 5xD, 130 pt, TiN
#658 Cobalt, GT100, 5xD, 130 pt, TiN
#657 Cobalt, Ti, 5xD, 130 pt, TiN
#622 Cobalt, GT100, 5xD, 130 pt, Bright

10xD

Nitrided lands/polished flutes >2.36mm dia.

External Coolant

Straight Shank

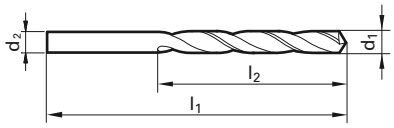
Speeds & Feeds information pg 353

Series 535

GT100 Parabolic

HSS, GT 100 deep hole, taper length, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels
- Aluminum & Alloys
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	56.00	33.00
0.0402		60	1.020	56.00	33.00
0.0409		59	1.040	56.00	33.00
0.0413			1.050	56.00	33.00
0.0421		58	1.070	60.00	37.00
0.0429		57	1.090	60.00	37.00
0.0433			1.100	60.00	37.00
0.0453			1.150	60.00	37.00
0.0465		56	1.180	60.00	37.00
0.0469	3/64		1.190	65.00	41.00
0.0472			1.200	65.00	41.00
0.0492			1.250	65.00	41.00
0.0512			1.300	65.00	41.00
0.0520		55	1.320	65.00	41.00
0.0531			1.350	70.00	45.00
0.0551		54	1.400	70.00	45.00
0.0571			1.450	70.00	45.00
0.0591			1.500	70.00	45.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0594		53	1.510	76.00	50.00
0.0598			1.520	76.00	50.00
0.0610			1.550	76.00	50.00
0.0626	1/16		1.590	76.00	50.00
0.0630			1.600	76.00	50.00
0.0650			1.650	76.00	50.00
0.0657			1.670	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0689			1.750	80.00	53.00
0.0701		50	1.780	80.00	53.00
0.0709			1.800	80.00	53.00
0.0728		49	1.850	80.00	53.00
0.0748			1.900	80.00	53.00
0.0760		48	1.930	85.00	56.00
0.0768			1.950	85.00	56.00
0.0780	5/64		1.980	85.00	56.00
0.0783		47	1.990	85.00	56.00
0.0787			2.000	85.00	56.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0807			2.050	85.00	56.00
0.0811		46	2.060	85.00	56.00
0.0819		45	2.080	85.00	56.00
0.0827			2.100	85.00	56.00
0.0846			2.150	90.00	59.00
0.0858		44	2.180	90.00	59.00
0.0866			2.200	90.00	59.00
0.0886			2.250	90.00	59.00
0.0890		43	2.260	90.00	59.00
0.0906			2.300	90.00	59.00
0.0925			2.350	90.00	59.00
0.0933		42	2.370	95.00	62.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0961		41	2.440	95.00	62.00
0.0965			2.450	95.00	62.00
0.0980		40	2.490	95.00	62.00
0.0984			2.500	95.00	62.00

To order: Series number + mm, ex. 5518 3.000

Series 535

Speeds & Feeds information pg 353

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.0996		39	2.530	95.00	62.00
0.1004			2.550	95.00	62.00
0.1016		38	2.580	95.00	62.00
0.1024			2.600	95.00	62.00
0.1039		37	2.640	95.00	62.00
0.1043			2.650	95.00	62.00
0.1063			2.700	100.00	66.00
0.1067		36	2.710	100.00	66.00
0.1083			2.750	100.00	66.00
0.1094	7/64		2.780	100.00	66.00
0.1098		35	2.790	100.00	66.00
0.1102			2.800	100.00	66.00
0.1110		34	2.820	100.00	66.00
0.1114			2.830	100.00	66.00
0.1122			2.850	100.00	66.00
0.1130		33	2.870	100.00	66.00
0.1142			2.900	100.00	66.00
0.1161		32	2.950	100.00	66.00
0.1181			3.000	100.00	66.00
0.1201		31	3.050	106.00	69.00
0.1220			3.100	106.00	69.00
0.1240			3.150	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1280			3.250	106.00	69.00
0.1283		30	3.260	106.00	69.00
0.1287			3.270	106.00	69.00
0.1299			3.300	106.00	69.00
0.1339			3.400	112.00	73.00
0.1358		29	3.450	112.00	73.00
0.1378			3.500	112.00	73.00
0.1406	9/64	28	3.570	112.00	73.00
0.1417			3.600	112.00	73.00
0.1441		27	3.660	112.00	73.00
0.1457			3.700	112.00	73.00
0.1469		26	3.730	112.00	73.00
0.1476			3.750	112.00	73.00
0.1496		25	3.800	119.00	78.00
0.1520		24	3.860	119.00	78.00
0.1535			3.900	119.00	78.00
0.1539		23	3.910	119.00	78.00
0.1563	5/32		3.970	119.00	78.00
0.1571		22	3.990	119.00	78.00
0.1575			4.000	119.00	78.00
0.1591		21	4.040	119.00	78.00
0.1610		20	4.090	119.00	78.00
0.1614			4.100	119.00	78.00
0.1634			4.150	119.00	78.00
0.1654			4.200	119.00	78.00
0.1661		19	4.220	119.00	78.00
0.1673			4.250	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1713			4.350	126.00	82.00
0.1720	11/64		4.370	126.00	82.00
0.1728		17	4.390	126.00	82.00
0.1732			4.400	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1799		15	4.570	126.00	82.00
0.1811			4.600	126.00	82.00
0.1819		14	4.620	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1870			4.750	126.00	82.00
0.1874	3/16		4.760	132.00	87.00
0.1890		12	4.800	132.00	87.00
0.1909		11	4.850	132.00	87.00
0.1929			4.900	132.00	87.00
0.1937		10	4.920	132.00	87.00
0.1961		9	4.980	132.00	87.00
0.1969			5.000	132.00	87.00
0.1988			5.050	132.00	87.00
0.1992		8	5.060	132.00	87.00
0.2008			5.100	132.00	87.00
0.2012		7	5.110	132.00	87.00
0.2031	13/64		5.160	132.00	87.00
0.2039		6	5.180	132.00	87.00
0.2047			5.200	132.00	87.00
0.2055		5	5.220	132.00	87.00
0.2067			5.250	132.00	87.00
0.2087			5.300	132.00	87.00
0.2091		4	5.310	139.00	91.00
0.2126			5.400	139.00	91.00
0.2130		3	5.410	139.00	91.00
0.2165			5.500	139.00	91.00
0.2189	7/32		5.560	139.00	91.00
0.2205			5.600	139.00	91.00
0.2209		2	5.610	139.00	91.00
0.2244			5.700	139.00	91.00
0.2264			5.750	139.00	91.00
0.2280		1	5.790	139.00	91.00
0.2283			5.800	139.00	91.00
0.2323			5.900	139.00	91.00
0.2339		A	5.940	139.00	91.00
0.2343	15/64		5.950	139.00	91.00
0.2362			6.000	139.00	91.00
0.2378		B	6.040	148.00	97.00
0.2382			6.050	148.00	97.00
0.2402			6.100	148.00	97.00
0.2421		C	6.150	148.00	97.00
0.2441			6.200	148.00	97.00
0.2461		D	6.250	148.00	97.00
0.2480			6.300	148.00	97.00
0.2500	1/4	E	6.350	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2571		F	6.530	148.00	97.00
0.2598			6.600	148.00	97.00
0.2610		G	6.630	148.00	97.00
0.2638			6.700	148.00	97.00
0.2657	17/64	H	6.750	156.00	102.00
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2768		J	7.030	156.00	102.00
0.2772			7.040	156.00	102.00
0.2795			7.100	156.00	102.00
0.2811	9/32	K	7.140	156.00	102.00
0.2835			7.200	156.00	102.00
0.2874			7.300	156.00	102.00
0.2902		L	7.370	156.00	102.00
0.2913			7.400	156.00	102.00
0.2933			7.450	156.00	102.00
0.2949		M	7.490	156.00	102.00
0.2953			7.500	156.00	102.00
0.2969	19/64		7.540	165.00	109.00
0.2992			7.600	165.00	109.00
0.3020		N	7.670	165.00	109.00
0.3031			7.700	165.00	109.00
0.3051			7.750	165.00	109.00
0.3071			7.800	165.00	109.00
0.3091			7.850	165.00	109.00
0.3110			7.900	165.00	109.00
0.3126	5/16		7.940	165.00	109.00
0.3150			8.000	165.00	109.00
0.3161		O	8.030	165.00	109.00
0.3189			8.100	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3268			8.300	165.00	109.00
0.3280	21/64		8.330	165.00	109.00
0.3307			8.400	165.00	109.00
0.3319		Q	8.430	165.00	109.00
0.3346			8.500	165.00	109.00
0.3386			8.600	175.00	115.00
0.3390		R	8.610	175.00	115.00
0.3425			8.700	175.00	115.00
0.3437	11/32		8.730	175.00	115.00
0.3465			8.800	175.00	115.00
0.3480		S	8.840	175.00	115.00
0.3504			8.900	175.00	115.00
0.3543			9.000	175.00	115.00
0.3579		T	9.090	175.00	115.00
0.3583			9.100	175.00	115.00
0.3594	23/64		9.130	175.00	115.00
0.3622			9.200	175.00	115.00
0.3642			9.250	175.00	115.00
0.3661			9.300	175.00	115.00
0.3681			9.350	175.00	115.00
0.3701			9.400	175.00	115.00
0.3740			9.500	175.00	115.00
0.3748	3/8		9.520	184.00	121.00
0.3780			9.600	184.00	121.00
0.3819			9.700	184.00	121.00
0.3858		W	9.800	184.00	121.00
0.3898			9.900	184.00	121.00
0.3906	25/64		9.920	184.00	121.00
0.3937			10.000	184.00	121.00
0.3969		X	10.080	184.00	121.00
0.3976			10.100	184.00	121.00
0.4016			10.200	184.00	121.00
0.4055			10.300	184.00	121.00
0.4063	13/32		10.320	184.00	121.00
0.4094			10.400	184.00	121.00
0.4130		Z	10.490	184.00	121.00
0.4134			10.500	184.00	121.00
0.4220	27/64		10.720	195.00	128.00
0.4252			10.800	195.00	128.00
0.4291			10.900	195.00	128.00
0.4331			11.000	195.00	128.00
0.4370			11.100	195.00	128.00
0.4374	7/16		11.110	195.00	128.00
0.4449			11.300	195.00	128.00
0.4488			11.400	195.00	128.00
0.4528			11.500	195.00	128.00
0.4531	29/64		11.510	195.00	128.00
0.4646			11.800	195.00	128.00
0.4685			11.900	205.00	134.00
0.4689	15/32		11.910	205.00	134.00
0.4724			12.000	205.00	134.00
0.4843	31/64		12.300	205.00	134.00
0.4921			12.500	205.00	134.00
0.4961			12.600	205.00	134.00
0.5000	1/2		12.700	205.00	134.00
0.5118			13.000	205.00	134.00
0.5157	33/64		13.100	205.00	134.00
0.5311	17/32		13.490	214.00	140.00
0.5315			13.500	214.00	140.00
0.5469	35/64		13.890	214.00	140.00
0.5472			13.900	214.00	140.00
0.5512			14.000	214.00	140.00

Alternative Drill Series:

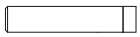
#668 HSS, GT100, 10xD, 130 pt, Bright
#336 Cobalt, GT100, 10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

Carbide NC Spot Drill

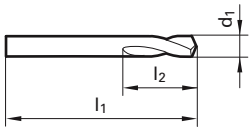
Carbide, NC spot - short, standard straight shank, RH helix

External Coolant



Straight Shank

Cut / Shank Dia. = h6 tolerance range



GUHRING Select

NEW!

GUHRING Select

GUHRING Select

Standard length

Series	557	568	723	556	567	724	546
Substrate	HSS	HSS	carbide	HSS	HSS	carbide	carbide
Point angle	90°	90°	90°	120°	120°	120°	142°
Surface Finish	◯	Ⓢ	◯	◯	Ⓢ	◯	◯

Order Code	dec.	fract.	mm	l1	l2							
3.00	0.1181		3.00	46.0	12.0	•	•		•	•		
4.00	0.1575		4.00	55.0	12.0	•	•		•	•		•
5.00	0.1969		5.00	62.0	14.0	•	•	•	•	•	•	•
6.00	0.2362		6.00	66.0	16.0	•	•	•	•	•	•	•
6.35	0.2500	1/4	6.35	70.0	17.0	•	•	•	•	•	•	
6.50	0.2559		6.50	70.0	17.0				•			
8.00	0.3150		8.00	79.0	21.0	•	•	•	•	•	•	•
9.52	0.3748	3/8	9.52	89.0	25.0	•	•	•	•	•	•	
10.00	0.3937		10.00	89.0	25.0	•	•	•	•	•	•	•
12.00	0.4724		12.00	102.0	30.0	•	•	•	•	•	•	•
12.70	0.5000	1/2	12.70	102.0	30.0	•	•	•	•	•	•	
15.87	0.6248	5/8	15.87	115.0	37.5	•	•	•	•	•	•	
16.00	0.6299		16.00	1115.0	37.5	•	•	•	•	•	•	•
19.05	0.7500	3/4	19.05	131.0	45.0	•	•	•	•	•	•	
20.00	0.7874		20.00	131.0	45.0	•	•	•	•	•	•	•
25.00	0.9843		25.00	151.0	53.0	•	•		•	•		
25.40	1.0000	1	25.40	156.0	53.0	•	•		•	•		

Long length

Series	559
Substrate	HSS
Point angle	90°
Surface Finish	◯

Order Code	dec.	fract.	mm	l1	l2	
6.35	0.2500	1/4	6.35	105.0	17.0	•
8.00	0.3150		8.00	118.0	21.0	•
9.52	0.3748	3/8	9.52	132.0	25.0	•
12.70	0.5000	1/2	12.70	159.0	30.0	•
15.87	0.6248	5/8	15.87	186.0	37.5	•
19.05	0.7500	3/4	19.05	213.0	45.0	•
25.40	1.0000	1	25.40	216.0	53.0	•

◯ bright Ⓢ TiN

To order: Series number + mm, ex. 5518 3.000

5xD

Nitrided lands/polished flutes >2.36mm dia.

External Coolant

Straight Shank

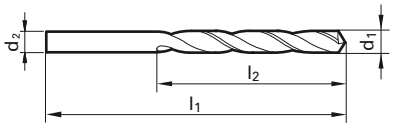
Speeds & Feeds information pg 353

Series 549

GT100 Parabolic

HSS, GT 100, jobber length, 130° point, Form A web thinned >1.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Cast Iron
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0236			0.600	24.00	7.00
0.0276			0.700	28.00	9.00
0.0280		70	0.710	28.00	9.00
0.0311	1/32	68	0.790	30.00	10.00
0.0315			0.800	30.00	10.00
0.0350		65	0.890	32.00	11.00
0.0374			0.950	32.00	11.00
0.0382		62	0.970	34.00	12.00
0.0390		61	0.990	34.00	12.00
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0413			1.050	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0453			1.150	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0480			1.220	38.00	16.00
0.0488			1.240	38.00	16.00
0.0492			1.250	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0531			1.350	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0571			1.450	40.00	18.00
0.0575			1.460	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0610			1.550	43.00	20.00
0.0614			1.560	43.00	20.00
0.0618			1.570	43.00	20.00
0.0622			1.580	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0638			1.620	43.00	20.00
0.0650			1.650	43.00	20.00
0.0654			1.660	43.00	20.00
0.0657			1.670	43.00	20.00
0.0661			1.680	43.00	20.00
0.0665			1.690	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0689			1.750	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0732			1.860	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0768			1.950	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0795			2.020	49.00	24.00
0.0807			2.050	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0886			2.250	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0917			2.330	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0953			2.420	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0965			2.450	57.00	30.00
0.0976			2.480	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1173			2.980	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1213			3.080	65.00	36.00
0.1220			3.100	65.00	36.00
0.1240			3.150	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1268			3.220	65.00	36.00
0.1272			3.230	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1319			3.350	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1398			3.550	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1409			3.580	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1449			3.680	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1524			3.870	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1555			3.950	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1752			4.450	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1791			4.550	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1831			4.650	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1870			4.750	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1949			4.950	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1988			5.050	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00

To order: Series number + mm, ex. 5518 3.000

Series 549

Speeds & Feeds information pg 353

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.2028			5.150	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2067			5.250	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2106			5.350	93.00	57.00
0.2126			5.400	93.00	57.00
0.2130		3	5.410	93.00	57.00
0.2146			5.450	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2224			5.650	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2280		1	5.790	93.00	57.00
0.2283			5.800	93.00	57.00
0.2303			5.850	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2378		B	6.040	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2610		G	6.630	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2689			6.830	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2772			7.040	109.00	69.00
0.2776			7.050	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2854			7.250	109.00	69.00
0.2874			7.300	109.00	69.00
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2949		M	7.490	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3020		N	7.670	117.00	75.00
0.3031			7.700	117.00	75.00
0.3051			7.750	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3248			8.250	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3390		R	8.610	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3445			8.750	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3642			9.250	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3681			9.350	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3772		V	9.580	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3839			9.750	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3969		X	10.080	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4094			10.400	133.00	87.00
0.4130		Z	10.490	133.00	87.00
0.4134			10.500	133.00	87.00
0.4173			10.600	133.00	87.00
0.4213			10.700	142.00	94.00
0.4220	27/64		10.720	142.00	94.00
0.4232			10.750	142.00	94.00
0.4252			10.800	142.00	94.00
0.4291			10.900	142.00	94.00
0.4331			11.000	142.00	94.00
0.4370			11.100	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4449			11.300	142.00	94.00
0.4488			11.400	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4567			11.600	142.00	94.00
0.4606			11.700	142.00	94.00
0.4626			11.750	142.00	94.00
0.4646			11.800	142.00	94.00
0.4685			11.900	151.00	101.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4764			12.100	151.00	101.00
0.4783			12.150	151.00	101.00
0.4803			12.200	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5020			12.750	151.00	101.00
0.5039			12.800	151.00	101.00
0.5079			12.900	151.00	101.00
0.5118			13.000	151.00	101.00
0.5157	33/64		13.100	151.00	101.00
0.5197			13.200	151.00	101.00
0.5311	17/32		13.490	160.00	108.00
0.5315			13.500	160.00	108.00
0.5354			13.600	160.00	108.00
0.5394			13.700	160.00	108.00
0.5469	35/64		13.890	160.00	108.00
0.5512			14.000	160.00	108.00
0.5626	9/16		14.290	169.00	114.00
0.5669			14.400	169.00	114.00
0.5709			14.500	169.00	114.00
0.5780	37/64		14.680	169.00	114.00
0.5906			15.000	169.00	114.00
0.5937	19/32		15.080	178.00	120.00
0.6094	39/64		15.480	178.00	120.00
0.6102			15.500	178.00	120.00
0.6201			15.750	178.00	120.00
0.6248	5/8		15.870	178.00	120.00
0.6299			16.000	178.00	120.00

Alternative Drill Series:

#652 HSS, GT100, 5xD, 118 pt, TiN
#622 Cobalt, GT100, 5xD, 130 pt, Bright
#658 Cobalt, GT100, 5xD, 130 pt, TiN
#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX

5xD

Nitrided lands/polished flutes >2.36mm dia.

External Coolant

Straight Shank

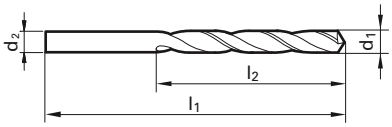
Speeds & Feeds information pg 354

Series 550

GT100 Parabolic, LH helix

HSS, GT 100, jobber length, 130° point, Form A web thinned all dia., standard straight shank, LH cut

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Cast Iron
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0531			1.350	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0571			1.450	40.00	18.00
0.0587			1.490	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0610			1.550	43.00	20.00
0.0622			1.580	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0650			1.650	43.00	20.00
0.0657			1.670	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0689			1.750	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0768			1.950	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0807			2.050	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0866			2.200	53.00	27.00
0.0886			2.250	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0917			2.330	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1051			2.670	61.00	33.00
0.1063			2.700	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	61.00	33.00
0.1189			3.020	65.00	36.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1240			3.150	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1319			3.350	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1516			3.850	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1713			4.350	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1752			4.450	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2280		1	5.790	93.00	57.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2382			6.050	101.00	63.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	109.00	69.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3937			10.000	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00

To order: Series number + mm, ex. 5518 3.000

Series 550

Speeds & Feeds information pg 354

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4055			10.300	133.00	87.00
0.4134			10.500	133.00	87.00
0.4252			10.800	142.00	94.00
0.4331			11.000	142.00	94.00
0.4370			11.100	142.00	94.00
0.4374	7/16		11.110	142.00	94.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4528			11.500	142.00	94.00
0.4606			11.700	142.00	94.00
0.4724			12.000	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00

Alternative Drill Series:

#208 HSS, GP, LH helix, 5xD, 118 pt, Oxide

10xD

Nitrided lands / steam oxide >16 mm

External Coolant

Morse Taper Shank

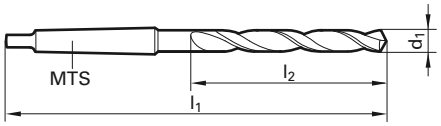
Speeds & Feeds information pg 354

Series 551

GT 100 Parabolic

HSS, GT 100 deep hole, bushing length, 130° point, Form A web thinned all dia., Morse Taper shank, RH helix

Cut / Shank Dia. = h8 tolerance range



Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank Size	l1 mm	l2 mm
0.2362			6.000	MTS 1	161.00	80.00
0.2559			6.500	MTS 1	167.00	86.00
0.2657	17/64	H	6.750	MTS 1	174.00	93.00
0.2953			7.500	MTS 1	174.00	93.00
0.3126	5/16		7.940	MTS 1	181.00	100.00
0.3280	21/64		8.330	MTS 1	181.00	100.00
0.3346			8.500	MTS 1	181.00	100.00
0.3543			9.000	MTS 1	188.00	107.00
0.3740			9.500	MTS 1	188.00	107.00
0.3748	3/8		9.520	MTS 1	197.00	116.00
0.3898			9.900	MTS 1	197.00	116.00
0.3906	25/64		9.920	MTS 1	197.00	116.00
0.3937			10.000	MTS 1	197.00	116.00
0.4016			10.200	MTS 1	197.00	116.00
0.4035			10.250	MTS 1	197.00	116.00
0.4055			10.300	MTS 1	197.00	116.00
0.4063	13/32		10.320	MTS 1	197.00	116.00
0.4134			10.500	MTS 1	197.00	116.00
0.4173			10.600	MTS 1	197.00	116.00
0.4220	27/64		10.720	MTS 1	206.00	125.00
0.4331			11.000	MTS 1	206.00	125.00
0.4374	7/16		11.110	MTS 1	206.00	125.00
0.4409			11.200	MTS 1	206.00	125.00
0.4528			11.500	MTS 1	206.00	125.00
0.4531	29/64		11.510	MTS 1	206.00	125.00
0.4646			11.800	MTS 1	206.00	125.00
0.4689	15/32		11.910	MTS 1	215.00	134.00
0.4724			12.000	MTS 1	215.00	134.00
0.4803			12.200	MTS 1	215.00	134.00
0.4843	31/64		12.300	MTS 1	215.00	134.00
0.4921			12.500	MTS 1	215.00	134.00
0.5000	1/2		12.700	MTS 1	215.00	134.00
0.5039			12.800	MTS 1	215.00	134.00
0.5118			13.000	MTS 1	215.00	134.00
0.5157	33/64		13.100	MTS 1	215.00	134.00
0.5197			13.200	MTS 1	215.00	134.00
0.5311	17/32		13.490	MTS 1	223.00	142.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank Size	l1 mm	l2 mm
0.5315			13.500	MTS 1	223.00	142.00
0.5433			13.800	MTS 1	223.00	142.00
0.5469	35/64		13.890	MTS 1	223.00	142.00
0.5512			14.000	MTS 1	223.00	142.00
0.5591			14.200	MTS 2	245.00	147.00
0.5626	9/16		14.290	MTS 2	245.00	147.00
0.5709			14.500	MTS 2	245.00	147.00
0.5807			14.750	MTS 2	245.00	147.00
0.5906			15.000	MTS 2	245.00	147.00
0.6004			15.250	MTS 2	251.00	153.00
0.6094	39/64		15.480	MTS 2	251.00	153.00
0.6102			15.500	MTS 2	251.00	153.00
0.6201			15.750	MTS 2	251.00	153.00
0.6248	5/8		15.870	MTS 2	251.00	153.00
0.6299			16.000	MTS 2	251.00	153.00
0.6406	41/64		16.270	MTS 2	257.00	159.00
0.6496			16.500	MTS 2	257.00	159.00
0.6563	21/32		16.670	MTS 2	257.00	159.00
0.6614			16.800	MTS 2	257.00	159.00
0.6693			17.000	MTS 2	257.00	159.00
0.6874	11/16		17.460	MTS 2	263.00	165.00
0.6890			17.500	MTS 2	263.00	165.00
0.7087			18.000	MTS 2	263.00	165.00
0.7189	23/32		18.260	MTS 2	269.00	171.00
0.7480			19.000	MTS 2	269.00	171.00
0.7500	3/4		19.050	MTS 2	275.00	177.00
0.7657	49/64		19.450	MTS 2	275.00	177.00
0.7677			19.500	MTS 2	275.00	177.00
0.7811	25/32		19.840	MTS 2	275.00	177.00
0.9374	15/16		23.810	MTS 3	327.00	206.00
1.1417			29.000	MTS 3	351.00	230.00
1.1874	1 3/16		30.160	MTS 3	360.00	239.00
1.2008			30.500	MTS 3	360.00	239.00
1.2205			31.000	MTS 3	360.00	239.00
1.2402			31.500	MTS 3	360.00	239.00

Alternative Drill Series: #656 HSS, GT100, 10xD, 130 pt, TiN

To order: Series number + mm, ex. 5518 3.000

3xD

Nitrided lands >2.36mm
steam oxide >16mm

External Coolant

Straight Shank

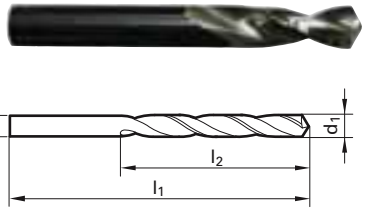
Speeds & Feeds
information pg 355

Series 552

GT80 Parabolic

HSS, GT 80, stub length, 130° point, Special web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0409		59	1.040	26.00	6.00
0.0413			1.050	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0453			1.150	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0469	3/64		1.190	28.00	7.00
0.0472			1.200	28.00	7.00
0.0492			1.250	28.00	7.00
0.0512			1.300	28.00	7.00
0.0520		55	1.320	28.00	7.00
0.0531			1.350	32.00	9.00
0.0551		54	1.400	32.00	9.00
0.0571			1.450	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0602			1.530	34.00	10.00
0.0610			1.550	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0650			1.650	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0681			1.730	36.00	11.00
0.0689			1.750	36.00	11.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0717			1.820	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	38.00	12.00
0.0768			1.950	38.00	12.00
0.0780	5/64		1.980	38.00	12.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0807			2.050	38.00	12.00
0.0811		46	2.060	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0827			2.100	38.00	12.00
0.0839			2.130	40.00	13.00
0.0846			2.150	40.00	13.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0886			2.250	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0913			2.320	40.00	13.00
0.0925			2.350	40.00	13.00
0.0933		42	2.370	43.00	14.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0965			2.450	43.00	14.00
0.0980		40	2.490	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1004			2.550	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1043			2.650	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1083			2.750	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1098		35	2.790	46.00	16.00
0.1102			2.800	46.00	16.00
0.1110		34	2.820	46.00	16.00
0.1130		33	2.870	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1240			3.150	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1280			3.250	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1299			3.300	49.00	18.00
0.1319			3.350	49.00	18.00
0.1339			3.400	52.00	20.00
0.1358		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1398			3.550	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1437			3.650	52.00	20.00
0.1441		27	3.660	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1476			3.750	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1520		24	3.860	55.00	22.00
0.1535			3.900	55.00	22.00
0.1539		23	3.910	55.00	22.00
0.1555			3.950	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1571		22	3.990	55.00	22.00
0.1575			4.000	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1594			4.050	55.00	22.00
0.1610		20	4.090	55.00	22.00
0.1614			4.100	55.00	22.00
0.1634			4.150	55.00	22.00
0.1654			4.200	55.00	22.00
0.1661		19	4.220	55.00	22.00
0.1673			4.250	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1713			4.350	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1728		17	4.390	58.00	24.00
0.1732			4.400	58.00	24.00
0.1752			4.450	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1799		15	4.570	58.00	24.00
0.1811			4.600	58.00	24.00
0.1819		14	4.620	58.00	24.00
0.1831			4.650	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1870			4.750	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1909		11	4.850	62.00	26.00
0.1929			4.900	62.00	26.00
0.1937		10	4.920	62.00	26.00
0.1961		9	4.980	62.00	26.00
0.1969			5.000	62.00	26.00
0.1992		8	5.060	62.00	26.00
0.2008			5.100	62.00	26.00
0.2012		7	5.110	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2039		6	5.180	62.00	26.00
0.2047			5.200	62.00	26.00
0.2055		5	5.220	62.00	26.00
0.2087			5.300	62.00	26.00
0.2091		4	5.310	66.00	28.00
0.2126			5.400	66.00	28.00
0.2130		3	5.410	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2209		2	5.610	66.00	28.00
0.2244			5.700	66.00	28.00
0.2280		1	5.790	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2339		A	5.940	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2378		B	6.040	70.00	31.00
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2441			6.200	70.00	31.00
0.2461		D	6.250	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00

To order: Series number + mm, ex. 5518 3.000

Series 552

Speeds & Feeds information pg 355

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2610		G	6.630	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2768		J	7.030	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2949		M	7.490	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.2992			7.600	79.00	37.00
0.3020		N	7.670	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3161		O	8.030	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3319		Q	8.430	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3390		R	8.610	84.00	40.00
0.3425			8.700	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3480		S	8.840	84.00	40.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3579		T	9.090	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3661			9.300	84.00	40.00
0.3677		U	9.340	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3772		V	9.580	89.00	43.00
0.3780			9.600	89.00	43.00
0.3819			9.700	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.3969		X	10.080	89.00	43.00
0.4016			10.200	89.00	43.00
0.4039		Y	10.260	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4130		Z	10.490	89.00	43.00
0.4134			10.500	89.00	43.00
0.4173			10.600	89.00	43.00
0.4220	27/64		10.720	95.00	47.00
0.4252			10.800	95.00	47.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4409			11.200	95.00	47.00
0.4449			11.300	95.00	47.00
0.4488			11.400	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4646			11.800	95.00	47.00
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4882			12.400	102.00	51.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5079			12.900	102.00	51.00
0.5118			13.000	102.00	51.00
0.5157	33/64		13.100	102.00	51.00
0.5311	17/32		13.490	107.00	54.00
0.5315			13.500	107.00	54.00
0.5469	35/64		13.890	107.00	54.00
0.5512			14.000	107.00	54.00
0.5626	9/16		14.290	111.00	56.00
0.5709			14.500	111.00	56.00
0.5780	37/64		14.680	111.00	56.00
0.5906			15.000	111.00	56.00
0.5937	19/32		15.080	115.00	58.00
0.6094	39/64		15.480	115.00	58.00
0.6102			15.500	115.00	58.00
0.6248	5/8		15.870	115.00	58.00
0.6299			16.000	115.00	58.00
0.6406	41/64		16.270	119.00	60.00
0.6496			16.500	119.00	60.00
0.6693			17.000	119.00	60.00
0.6720	43/64		17.070	123.00	62.00
0.6874	11/16		17.460	123.00	62.00
0.7031	45/64		17.860	123.00	62.00
0.7087			18.000	123.00	62.00
0.7189	23/32		18.260	127.00	64.00
0.7480			19.000	127.00	64.00
0.7500	3/4		19.050	131.00	66.00
0.7811	25/32		19.840	131.00	66.00
0.7874			20.000	131.00	66.00

Alternative Drill Series:

#225 HSS, GT80, 3xD, 130 pt, Bright
#553 HSS, GT100, 3xD, 130 pt, Bright
#5521 PM Cobalt, GT500, 3xD, 130 pt, TiN
#515 PM Cobalt, GT500, 3xD, 130 pt, FIREX

3xD

Nitrided lands >2.36mm
steam oxide >16mm

External Coolant

Straight Shank

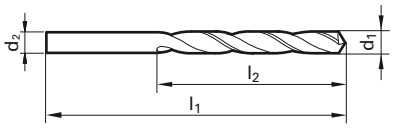
Speeds & Feeds
information pg 355

Series 553

GT80 Parabolic, LH helix

HSS, GT 80, stub length, 130° point, special web thinned all dia., standard straight shank, LH cut

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0453			1.150	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0472			1.200	28.00	7.00
0.0492			1.250	28.00	7.00
0.0512			1.300	28.00	7.00
0.0520		55	1.320	28.00	7.00
0.0531			1.350	32.00	9.00
0.0551		54	1.400	32.00	9.00
0.0571			1.450	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0610			1.550	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0650			1.650	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0689			1.750	36.00	11.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	38.00	12.00
0.0768			1.950	38.00	12.00
0.0780	5/64		1.980	38.00	12.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0807			2.050	38.00	12.00
0.0811		46	2.060	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0886			2.250	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0925			2.350	40.00	13.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1004			2.550	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1043			2.650	43.00	14.00
0.1067		36	2.710	46.00	16.00
0.1083			2.750	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1098		35	2.790	46.00	16.00
0.1102			2.800	46.00	16.00
0.1110		34	2.820	46.00	16.00
0.1130		33	2.870	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1240			3.150	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1339			3.400	52.00	20.00
0.1358		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1441		27	3.660	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1476			3.750	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1520		24	3.860	55.00	22.00
0.1535			3.900	55.00	22.00
0.1539		23	3.910	55.00	22.00
0.1555			3.950	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1571		22	3.990	55.00	22.00
0.1575			4.000	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1610		20	4.090	55.00	22.00
0.1634			4.150	55.00	22.00
0.1654			4.200	55.00	22.00
0.1661		19	4.220	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1732			4.400	58.00	24.00
0.1752			4.450	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1799		15	4.570	58.00	24.00
0.1811			4.600	58.00	24.00
0.1819		14	4.620	58.00	24.00
0.1831			4.650	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1909		11	4.850	62.00	26.00
0.1937		10	4.920	62.00	26.00
0.1961		9	4.980	62.00	26.00
0.1969			5.000	62.00	26.00
0.1992		8	5.060	62.00	26.00
0.2008			5.100	62.00	26.00
0.2012		7	5.110	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2039		6	5.180	62.00	26.00
0.2055		5	5.220	62.00	26.00
0.2087			5.300	62.00	26.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2209		2	5.610	66.00	28.00
0.2244			5.700	66.00	28.00
0.2280		1	5.790	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2339		A	5.940	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2461		D	6.250	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2559			6.500	70.00	31.00
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2610		G	6.630	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2768		J	7.030	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2949		M	7.490	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.3020		N	7.670	79.00	37.00
0.3031			7.700	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3319		Q	8.430	79.00	37.00
0.3346			8.500	79.00	37.00
0.3390		R	8.610	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3480		S	8.840	84.00	40.00
0.3543			9.000	84.00	40.00
0.3579		T	9.090	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3677		U	9.340	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00

To order: Series number + mm, ex. 5518 3.000

Series 553

Speeds & Feeds information pg 355

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.3772		V	9.580	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.4016			10.200	89.00	43.00
0.4039		Y	10.260	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4130		Z	10.490	89.00	43.00
0.4134			10.500	89.00	43.00
0.4220	27/64		10.720	95.00	47.00
0.4331			11.000	95.00	47.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5157	33/64		13.100	102.00	51.00
0.5311	17/32		13.490	107.00	54.00
0.5512			14.000	107.00	54.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.5626	9/16		14.290	111.00	56.00
0.6102			15.500	115.00	58.00
0.6248	5/8		15.870	115.00	58.00
0.7500	3/4		19.050	131.00	66.00
0.7874			20.000	131.00	66.00

Alternative Drill Series:

#226 HSS, GT100, LH Helix, 3xD, 118 pt, Oxide

To order: Series number + mm, ex. 5518 3.000

5xD

Bright Finish

External Coolant

Straight Shank

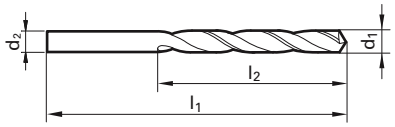
Speeds & Feeds information pg 356

Series 605

Type Ti

Cobalt, Type Ti, jobber length, self-centering 130° split point, web thinned >1.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Stainless Steels
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0118			0.300	19.00	3.00
0.0157	1/64		0.400	20.00	5.00
0.0173			0.440	20.00	5.00
0.0177			0.450	20.00	5.00
0.0197			0.500	22.00	6.00
0.0209		75	0.530	22.00	6.00
0.0217			0.550	24.00	7.00
0.0224		74	0.570	24.00	7.00
0.0228			0.580	24.00	7.00
0.0236			0.600	24.00	7.00
0.0252		72	0.640	26.00	8.00
0.0256			0.650	26.00	8.00
0.0276			0.700	28.00	9.00
0.0280		70	0.710	28.00	9.00
0.0283			0.720	28.00	9.00
0.0295			0.750	28.00	9.00
0.0299			0.760	30.00	10.00
0.0315			0.800	30.00	10.00
0.0319		67	0.810	30.00	10.00
0.0323			0.820	30.00	10.00
0.0327			0.830	30.00	10.00
0.0331		66	0.840	30.00	10.00
0.0335			0.850	30.00	10.00
0.0339			0.860	32.00	11.00
0.0343			0.870	32.00	11.00
0.0346			0.880	32.00	11.00
0.0354			0.900	32.00	11.00
0.0358		64	0.910	32.00	11.00
0.0362			0.920	32.00	11.00
0.0370		63	0.940	32.00	11.00
0.0374			0.950	32.00	11.00
0.0386			0.980	34.00	12.00
0.0390		61	0.990	34.00	12.00
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0404			1.025	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0413			1.050	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0425			1.080	36.00	14.00
0.0433			1.100	36.00	14.00
0.0449			1.140	36.00	14.00
0.0453			1.150	36.00	14.00
0.0457			1.160	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0476			1.210	38.00	16.00
0.0480			1.220	38.00	16.00
0.0484			1.230	38.00	16.00
0.0492			1.250	38.00	16.00
0.0508			1.290	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0531			1.350	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0571			1.450	40.00	18.00
0.0575			1.460	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0598			1.520	43.00	20.00
0.0602			1.530	43.00	20.00
0.0610			1.550	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0638			1.620	43.00	20.00
0.0650			1.650	43.00	20.00
0.0661			1.680	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0681			1.730	46.00	22.00
0.0689			1.750	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0717			1.820	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0768			1.950	49.00	24.00
0.0776			1.970	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0795			2.020	49.00	24.00
0.0799			2.030	49.00	24.00
0.0803			2.040	49.00	24.00
0.0807			2.050	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0835			2.120	49.00	24.00
0.0846			2.150	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0886			2.250	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0913			2.320	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0965			2.450	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1024			2.600	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1106			2.810	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1193			3.030	65.00	36.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1240			3.150	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1319			3.350	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1398			3.550	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1437			3.650	70.00	39.00
0.1457			3.700	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1535			3.900	75.00	43.00
0.1555			3.950	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1594			4.050	75.00	43.00
0.1614			4.100	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1713			4.350	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1791			4.550	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1870			4.750	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00

To order: Series number + mm, ex. 5518 3.000

Series 605

Speeds & Feeds information pg 356

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.1929			4.900	86.00	52.00
0.1969			5.000	86.00	52.00
0.1988			5.050	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2185			5.550	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2382			6.050	101.00	63.00
0.2394			6.080	101.00	63.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2972			7.550	117.00	75.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.4016			10.200	133.00	87.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4134			10.500	133.00	87.00
0.4173			10.600	133.00	87.00
0.4220	27/64		10.720	142.00	94.00
0.4252			10.800	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4449			11.300	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4606			11.700	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4803			12.200	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5118			13.000	151.00	101.00
0.5157	33/64		13.100	151.00	101.00
0.5311	17/32		13.490	160.00	108.00
0.5469	35/64		13.890	160.00	108.00
0.5512			14.000	160.00	108.00
0.5626	9/16		14.290	169.00	114.00
0.5709			14.500	169.00	114.00
0.5780	37/64		14.680	169.00	114.00
0.5906			15.000	169.00	114.00
0.6496			16.500	184.00	125.00

Alternative Drill Series:

#657 Cobalt, Ti, 5xD, 130 pt, TiN
#305 Cobalt, GP, 5xD, 118 pt, Oxide
#658 Cobalt, GT100, 5xD, 130 pt, TiN
#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX

5xD

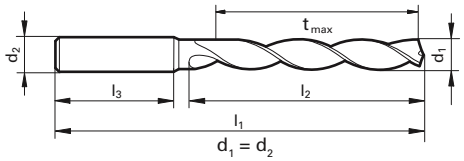
Series 609

Three-Flute High Precision

DK 460 UF Carbide, GS 200 U three-flute high precision, 5xD, self-centering 150° point, standard straight shank, RH helix

Cut / Shank Dia. = h7 tolerance range

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



S

TiN Coated

External Coolant

Straight Shank

Speeds & Feeds information pg 356

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron
- Stainless Steels
- Ti & Ni Alloys

Alternative Drill Series:

#1452 Carbide, GS200, 5xD, 150 U pt, TiN
#5518 Carbide, GS200, 5xD, 150 G pt, Bright

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	46.00	22.00
0.1220			3.100	49.00	24.00
0.1248	1/8		3.170	49.00	24.00
0.1260			3.200	49.00	24.00
0.1299			3.300	49.00	24.00
0.1339			3.400	52.00	27.00
0.1378			3.500	52.00	27.00
0.1406	9/64	28	3.570	52.00	27.00
0.1417			3.600	52.00	27.00
0.1457			3.700	52.00	27.00
0.1496		25	3.800	55.00	30.00
0.1535			3.900	55.00	30.00
0.1563	5/32		3.970	55.00	30.00
0.1575			4.000	55.00	30.00
0.1614			4.100	55.00	30.00
0.1654			4.200	55.00	30.00
0.1693		18	4.300	58.00	32.00
0.1720	11/64		4.370	58.00	32.00
0.1732			4.400	58.00	32.00
0.1772		16	4.500	58.00	32.00
0.1811			4.600	58.00	32.00
0.1850		13	4.700	58.00	32.00
0.1874	3/16		4.760	62.00	35.00
0.1890		12	4.800	62.00	35.00
0.1929			4.900	62.00	35.00
0.1969			5.000	62.00	35.00
0.2008			5.100	62.00	35.00
0.2031	13/64		5.160	62.00	35.00
0.2047			5.200	62.00	35.00
0.2087			5.300	62.00	35.00
0.2126			5.400	66.00	39.00
0.2165			5.500	66.00	39.00
0.2189	7/32		5.560	66.00	39.00
0.2205			5.600	66.00	39.00
0.2244			5.700	66.00	39.00
0.2283			5.800	66.00	39.00
0.2323			5.900	66.00	39.00
0.2343	15/64		5.950	66.00	39.00
0.2362			6.000	66.00	39.00
0.2402			6.100	70.00	42.00
0.2441			6.200	70.00	42.00
0.2480			6.300	70.00	42.00
0.2500	1/4	E	6.350	70.00	42.00
0.2520			6.400	70.00	42.00
0.2559			6.500	70.00	42.00
0.2598			6.600	70.00	42.00
0.2638			6.700	70.00	42.00
0.2657	17/64	H	6.750	74.00	45.00
0.2677			6.800	74.00	45.00
0.2717		I	6.900	74.00	45.00
0.2756			7.000	74.00	45.00
0.2795			7.100	74.00	45.00
0.2811	9/32	K	7.140	74.00	45.00
0.2835			7.200	74.00	45.00
0.2874			7.300	74.00	45.00
0.2913			7.400	74.00	45.00
0.2953			7.500	74.00	45.00
0.2969	19/64		7.540	79.00	48.00
0.2992			7.600	79.00	48.00
0.3031			7.700	79.00	48.00
0.3071			7.800	79.00	48.00
0.3110			7.900	79.00	48.00
0.3126	5/16		7.940	79.00	48.00
0.3150			8.000	79.00	48.00
0.3189			8.100	79.00	48.00
0.3228		P	8.200	79.00	48.00
0.3268			8.300	79.00	48.00
0.3280	21/64		8.330	79.00	48.00
0.3307			8.400	79.00	48.00
0.3346			8.500	79.00	48.00
0.3386			8.600	84.00	52.00
0.3425			8.700	84.00	52.00
0.3437	11/32		8.730	84.00	52.00
0.3465			8.800	84.00	52.00
0.3504			8.900	84.00	52.00
0.3543			9.000	84.00	52.00
0.3583			9.100	84.00	52.00
0.3594	23/64		9.130	84.00	52.00
0.3622			9.200	84.00	52.00
0.3661			9.300	84.00	52.00
0.3701			9.400	84.00	52.00
0.3740			9.500	84.00	52.00
0.3748	3/8		9.520	89.00	55.00
0.3780			9.600	89.00	55.00
0.3819			9.700	89.00	55.00
0.3858		W	9.800	89.00	55.00
0.3898			9.900	89.00	55.00
0.3906	25/64		9.920	89.00	55.00
0.3937			10.000	89.00	55.00
0.3976			10.100	89.00	55.00
0.4016			10.200	89.00	55.00
0.4055			10.300	89.00	55.00
0.4063	13/32		10.320	89.00	55.00
0.4094			10.400	89.00	55.00
0.4134			10.500	89.00	55.00
0.4173			10.600	89.00	55.00
0.4213			10.700	95.00	60.00
0.4220	27/64		10.720	95.00	60.00
0.4252			10.800	95.00	60.00
0.4291			10.900	95.00	60.00
0.4331			11.000	95.00	60.00
0.4370			11.100	95.00	60.00
0.4374	7/16		11.110	95.00	60.00
0.4409			11.200	95.00	60.00
0.4449			11.300	95.00	60.00
0.4488			11.400	95.00	60.00
0.4528			11.500	95.00	60.00
0.4531	29/64		11.510	95.00	60.00
0.4567			11.600	95.00	60.00
0.4606			11.700	95.00	60.00
0.4646			11.800	95.00	60.00
0.4685			11.900	102.00	65.00
0.4689	15/32		11.910	102.00	65.00
0.4724			12.000	102.00	65.00
0.4764			12.100	102.00	65.00
0.4803			12.200	102.00	65.00
0.4843	31/64		12.300	102.00	65.00
0.4882			12.400	102.00	65.00
0.4921			12.500	102.00	65.00
0.4961			12.600	102.00	65.00
0.5000	1/2		12.700	102.00	65.00
0.5039			12.800	102.00	65.00
0.5079			12.900	102.00	65.00
0.5118			13.000	102.00	65.00
0.5157	33/64		13.100	102.00	65.00
0.5197			13.200	102.00	65.00
0.5236			13.300	107.00	66.00
0.5276			13.400	107.00	66.00
0.5315			13.500	107.00	66.00
0.5354			13.600	107.00	66.00
0.5394			13.700	107.00	66.00
0.5433			13.800	107.00	66.00
0.5472			13.900	107.00	66.00
0.5512			14.000	107.00	66.00
0.5551			14.100	111.00	70.00
0.5591			14.200	111.00	70.00
0.5626	9/16		14.290	111.00	70.00
0.5630			14.300	111.00	70.00
0.5669			14.400	111.00	70.00
0.5709			14.500	111.00	70.00
0.5748			14.600	111.00	70.00
0.5787			14.700	111.00	70.00
0.5827			14.800	111.00	70.00
0.5866			14.900	111.00	70.00
0.5906			15.000	111.00	70.00
0.5945			15.100	115.00	73.00
0.5984			15.200	115.00	73.00
0.6024			15.300	115.00	73.00
0.6063			15.400	115.00	73.00
0.6102			15.500	115.00	73.00
0.6142			15.600	115.00	73.00
0.6181			15.700	115.00	73.00
0.6220			15.800	115.00	73.00
0.6248	5/8		15.870	115.00	73.00
0.6260			15.900	115.00	73.00
0.6693			17.000	119.00	73.00
0.7087			18.000	123.00	76.00
0.7283			18.500	127.00	76.00
0.7480			19.000	127.00	76.00
0.7500	3/4		19.050	131.00	79.00
0.7677			19.500	131.00	79.00
0.7874			20.000	131.00	79.00

To order: Series number + mm, ex. 5518 3.000

10xD

Bright Finish

External Coolant

Straight Shank

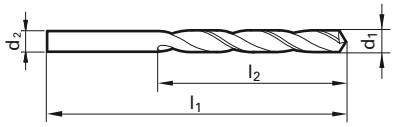
Speeds & Feeds information pg 357

Series 617

Type Ti

Cobalt, Type Ti, taper length, self-centering 130° split point, web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Stainless Steels
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	56.00	33.00
0.0433			1.100	60.00	37.00
0.0472			1.200	65.00	41.00
0.0512			1.300	65.00	41.00
0.0551		54	1.400	70.00	45.00
0.0571			1.450	70.00	45.00
0.0591			1.500	70.00	45.00
0.0626	1/16		1.590	76.00	50.00
0.0630			1.600	76.00	50.00
0.0650			1.650	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0689			1.750	80.00	53.00
0.0709			1.800	80.00	53.00
0.0728		49	1.850	80.00	53.00
0.0748			1.900	80.00	53.00
0.0768			1.950	85.00	56.00
0.0780	5/64		1.980	85.00	56.00
0.0787			2.000	85.00	56.00
0.0807			2.050	85.00	56.00
0.0827			2.100	85.00	56.00
0.0846			2.150	90.00	59.00
0.0866			2.200	90.00	59.00
0.0890		43	2.260	90.00	59.00
0.0906			2.300	90.00	59.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0965			2.450	95.00	62.00
0.0984			2.500	95.00	62.00
0.1004			2.550	95.00	62.00
0.1024			2.600	95.00	62.00
0.1063			2.700	100.00	66.00
0.1094	7/64		2.780	100.00	66.00
0.1102			2.800	100.00	66.00
0.1142			2.900	100.00	66.00
0.1161		32	2.950	100.00	66.00
0.1181			3.000	100.00	66.00
0.1201		31	3.050	106.00	69.00
0.1220			3.100	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1280			3.250	106.00	69.00
0.1299			3.300	106.00	69.00
0.1339			3.400	112.00	73.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1358		29	3.450	112.00	73.00
0.1378			3.500	112.00	73.00
0.1406	9/64	28	3.570	112.00	73.00
0.1417			3.600	112.00	73.00
0.1457			3.700	112.00	73.00
0.1496		25	3.800	119.00	78.00
0.1535			3.900	119.00	78.00
0.1563	5/32		3.970	119.00	78.00
0.1575			4.000	119.00	78.00
0.1594			4.050	119.00	78.00
0.1614			4.100	119.00	78.00
0.1654			4.200	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1732			4.400	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1811			4.600	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1874	3/16		4.760	132.00	87.00
0.1890		12	4.800	132.00	87.00
0.1929			4.900	132.00	87.00
0.1949			4.950	132.00	87.00
0.1969			5.000	132.00	87.00
0.1988			5.050	132.00	87.00
0.2008			5.100	132.00	87.00
0.2031	13/64		5.160	132.00	87.00
0.2047			5.200	132.00	87.00
0.2087			5.300	132.00	87.00
0.2126			5.400	139.00	91.00
0.2165			5.500	139.00	91.00
0.2189	7/32		5.560	139.00	91.00
0.2205			5.600	139.00	91.00
0.2244			5.700	139.00	91.00
0.2283			5.800	139.00	91.00
0.2323			5.900	139.00	91.00
0.2362			6.000	139.00	91.00
0.2402			6.100	148.00	97.00
0.2441			6.200	148.00	97.00
0.2480			6.300	148.00	97.00
0.2500	1/4	E	6.350	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2598			6.600	148.00	97.00
0.2638			6.700	148.00	97.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2657	17/64	H	6.750	156.00	102.00
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2795			7.100	156.00	102.00
0.2811	9/32	K	7.140	156.00	102.00
0.2835			7.200	156.00	102.00
0.2913			7.400	156.00	102.00
0.2953			7.500	156.00	102.00
0.2969	19/64		7.540	165.00	109.00
0.2992			7.600	165.00	109.00
0.3031			7.700	165.00	109.00
0.3071			7.800	165.00	109.00
0.3110			7.900	165.00	109.00
0.3126	5/16		7.940	165.00	109.00
0.3150			8.000	165.00	109.00
0.3189			8.100	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3307			8.400	165.00	109.00
0.3346			8.500	165.00	109.00
0.3425			8.700	175.00	115.00
0.3437	11/32		8.730	175.00	115.00
0.3504			8.900	175.00	115.00
0.3543			9.000	175.00	115.00
0.3740			9.500	175.00	115.00
0.3748	3/8		9.520	184.00	121.00
0.3780			9.600	184.00	121.00
0.3819			9.700	184.00	121.00
0.3937			10.000	184.00	121.00
0.4016			10.200	184.00	121.00
0.4134			10.500	184.00	121.00
0.4331			11.000	195.00	128.00
0.4374	7/16		11.110	195.00	128.00
0.4724			12.000	205.00	134.00
0.4921			12.500	205.00	134.00
0.5118			13.000	205.00	134.00

Alternative Drill Series:

#336 Cobalt, GT100, 10xD, 130 pt, Oxide
#669 Cobalt, Ti, 10xD, 130 pt, TiN
#535 HSS, GT100, 10xD, 130 pt, Oxide
#668 HSS, GT100, 10xD, 130 pt, TiN

Extra Length #1

Nitrided lands/ polished flutes

External Coolant

Straight Shank

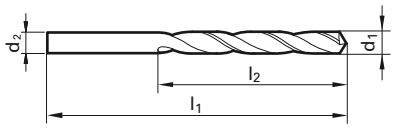
Speeds & Feeds information pg 357

Series 618

GT 100 Parabolic

Cobalt, GT 100 deep hole, extra length #1, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels
- Aluminum & Alloys
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1063			2.700	150.00	100.00
0.1142			2.900	150.00	100.00
0.1181			3.000	150.00	100.00
0.1220			3.100	155.00	105.00
0.1248	1/8		3.170	155.00	105.00
0.1260			3.200	155.00	105.00
0.1299			3.300	155.00	105.00
0.1339			3.400	165.00	115.00
0.1378			3.500	165.00	115.00
0.1417			3.600	165.00	115.00
0.1457			3.700	165.00	115.00
0.1496		25	3.800	175.00	120.00
0.1535			3.900	175.00	120.00
0.1563	5/32		3.970	175.00	120.00
0.1575			4.000	175.00	120.00
0.1614			4.100	175.00	120.00
0.1654			4.200	175.00	120.00
0.1693		18	4.300	185.00	125.00
0.1720	11/64		4.370	185.00	125.00
0.1732			4.400	185.00	125.00
0.1772		16	4.500	185.00	125.00
0.1811			4.600	185.00	125.00
0.1874	3/16		4.760	195.00	135.00
0.1890		12	4.800	195.00	135.00
0.1909		11	4.850	195.00	135.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1969			5.000	195.00	135.00
0.2008			5.100	195.00	135.00
0.2031	13/64		5.160	195.00	135.00
0.2047			5.200	195.00	135.00
0.2087			5.300	195.00	135.00
0.2126			5.400	205.00	140.00
0.2165			5.500	205.00	140.00
0.2189	7/32		5.560	205.00	140.00
0.2205			5.600	205.00	140.00
0.2244			5.700	205.00	140.00
0.2283			5.800	205.00	140.00
0.2362			6.000	205.00	140.00
0.2402			6.100	215.00	150.00
0.2441			6.200	215.00	150.00
0.2480			6.300	215.00	150.00
0.2500	1/4	E	6.350	215.00	150.00
0.2520			6.400	215.00	150.00
0.2559			6.500	215.00	150.00
0.2598			6.600	215.00	150.00
0.2638			6.700	215.00	150.00
0.2657	17/64	H	6.750	225.00	155.00
0.2677			6.800	225.00	155.00
0.2756			7.000	225.00	155.00
0.2811	9/32	K	7.140	225.00	155.00
0.2913			7.400	225.00	155.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2953			7.500	225.00	155.00
0.2969	19/64		7.540	240.00	165.00
0.3031			7.700	240.00	165.00
0.3126	5/16		7.940	240.00	165.00
0.3150			8.000	240.00	165.00
0.3228		P	8.200	240.00	165.00
0.3280	21/64		8.330	240.00	165.00
0.3307			8.400	240.00	165.00
0.3346			8.500	240.00	165.00
0.3425			8.700	250.00	175.00
0.3437	11/32		8.730	250.00	175.00
0.3465			8.800	250.00	175.00
0.3543			9.000	250.00	175.00
0.3594	23/64		9.130	250.00	175.00
0.3701			9.400	250.00	175.00
0.3740			9.500	250.00	175.00
0.3748	3/8		9.520	265.00	185.00
0.3819			9.700	265.00	185.00
0.3937			10.000	265.00	185.00

Alternative Drill Series:

#502 HSS, GT100, >10xD, 130 pt, Bright
#670 HSS, GT100, >10xD, 130 pt, TiN
#524 HSS, GT50, >10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

Extra Length #2

Nitrided lands/ polished flutes

External Coolant

Straight Shank

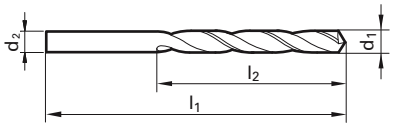
Speeds & Feeds information pg 358

Series 619

GT 100 Parabolic

Cobalt, GT 100 deep hole, extra length #2, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels
- Aluminum & Alloys
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	190.00	130.00
0.1248	1/8		3.170	200.00	135.00
0.1260			3.200	200.00	135.00
0.1299			3.300	200.00	135.00
0.1378			3.500	210.00	145.00
0.1406	9/64	28	3.570	210.00	145.00
0.1563	5/32		3.970	220.00	150.00
0.1575			4.000	220.00	150.00
0.1614			4.100	220.00	150.00
0.1654			4.200	220.00	150.00
0.1720	11/64		4.370	235.00	160.00
0.1772		16	4.500	235.00	160.00
0.1874	3/16		4.760	245.00	170.00
0.1890		12	4.800	245.00	170.00
0.1929			4.900	245.00	170.00
0.1969			5.000	245.00	170.00
0.2047			5.200	245.00	170.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2165			5.500	260.00	180.00
0.2189	7/32		5.560	260.00	180.00
0.2244			5.700	260.00	180.00
0.2343	15/64		5.950	260.00	180.00
0.2362			6.000	260.00	180.00
0.2402			6.100	275.00	190.00
0.2441			6.200	275.00	190.00
0.2500	1/4	E	6.350	275.00	190.00
0.2559			6.500	275.00	190.00
0.2638			6.700	275.00	190.00
0.2657	17/64	H	6.750	290.00	200.00
0.2756			7.000	290.00	200.00
0.2811	9/32	K	7.140	290.00	200.00
0.2913			7.400	290.00	200.00
0.2953			7.500	290.00	200.00
0.2969	19/64		7.540	305.00	210.00
0.3031			7.700	305.00	210.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3126	5/16		7.940	305.00	210.00
0.3150			8.000	305.00	210.00
0.3228		P	8.200	305.00	210.00
0.3346			8.500	305.00	210.00
0.3425			8.700	320.00	220.00
0.3437	11/32		8.730	320.00	220.00
0.3543			9.000	320.00	220.00
0.3740			9.500	320.00	220.00
0.3748	3/8		9.520	340.00	235.00
0.3937			10.000	340.00	235.00

Alternative Drill Series:

#503 HSS, GT100, >10xD, 130 pt, Bright
#671 HSS, GT100, >10xD, 130 pt, TiN
#528 HSS, GT50, >10xD, 130 pt, Bright

5xD

Nitrided lands/polished flutes >2.36mm dia.

External Coolant

Straight Shank

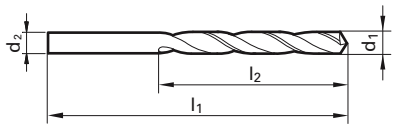
Speeds & Feeds information pg 358

Series 622

GT 100 Parabolic

Cobalt, GT 100, jobber length, 130° point,
Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels
- Aluminum & Alloys
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0413			1.050	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0453			1.150	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0492			1.250	38.00	16.00
0.0500			1.270	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0531			1.350	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0563			1.430	40.00	18.00
0.0571			1.450	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0610			1.550	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0650			1.650	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0756			1.920	49.00	24.00
0.0760		48	1.930	49.00	24.00
0.0768			1.950	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0807			2.050	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0886			2.250	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0953			2.420	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0965			2.450	57.00	30.00
0.0980		40	2.490	57.00	30.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1791			4.550	80.00	47.00
0.1799		15	4.570	80.00	47.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1870			4.750	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2067			5.250	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00
0.2130		3	5.410	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2280		1	5.790	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2378		B	6.040	101.00	63.00
0.2382			6.050	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2610		G	6.630	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2795			7.100	109.00	69.00

To order: Series number + mm, ex. 5518 3.000

Series 622

Speeds & Feeds information pg 358

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2949		M	7.490	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3020		N	7.670	117.00	75.00
0.3031			7.700	117.00	75.00
0.3051			7.750	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3390		R	8.610	125.00	81.00
0.3425			8.700	125.00	81.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3772		V	9.580	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3969		X	10.080	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4094			10.400	133.00	87.00
0.4134			10.500	133.00	87.00
0.4173			10.600	133.00	87.00
0.4213			10.700	142.00	94.00
0.4220	27/64		10.720	142.00	94.00
0.4252			10.800	142.00	94.00
0.4291			10.900	142.00	94.00
0.4331			11.000	142.00	94.00
0.4370			11.100	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4449			11.300	142.00	94.00
0.4488			11.400	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4567			11.600	142.00	94.00
0.4606			11.700	142.00	94.00
0.4646			11.800	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5118			13.000	151.00	101.00

Alternative Drill Series:

#658 Cobalt, GT100, 5xD, 130 pt, TiN
#652 HSS, GT100, 5xD, 130 pt, TiN

5xD

(S) TiN coated

External Coolant

Straight Shank

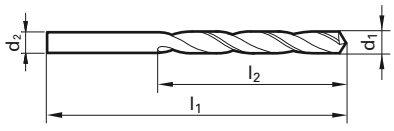
Speeds & Feeds information pg 359

Series 651

General Purpose

HSS, general purpose (Type N), jobber length, 118° point, Form A web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Cast Iron
- General Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0079		92	0.200	19.00	2.50
0.0098		87	0.250	19.00	3.00
0.0110		85	0.280	19.00	3.00
0.0118			0.300	19.00	3.00
0.0122		83	0.310	19.00	4.00
0.0130		81	0.330	19.00	4.00
0.0134		80	0.340	19.00	4.00
0.0142			0.360	19.00	4.00
0.0146		79	0.370	19.00	4.00
0.0150			0.380	19.00	4.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0154			0.390	20.00	5.00
0.0157	1/64		0.400	20.00	5.00
0.0161		78	0.410	20.00	5.00
0.0165			0.420	20.00	5.00
0.0169			0.430	20.00	5.00
0.0173			0.440	20.00	5.00
0.0177			0.450	20.00	5.00
0.0181		77	0.460	20.00	5.00
0.0185			0.470	20.00	5.00
0.0189			0.480	20.00	5.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0193			0.490	22.00	6.00
0.0197			0.500	22.00	6.00
0.0201		76	0.510	22.00	6.00
0.0205			0.520	22.00	6.00
0.0209		75	0.530	22.00	6.00
0.0213			0.540	24.00	7.00
0.0217			0.550	24.00	7.00
0.0224		74	0.570	24.00	7.00
0.0228			0.580	24.00	7.00
0.0232			0.590	24.00	7.00

To order: Series number + mm, ex. 5518 3.000

Series 651

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Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0236			0.600	24.00	7.00
0.0240		73	0.610	26.00	8.00
0.0248			0.630	26.00	8.00
0.0252		72	0.640	26.00	8.00
0.0256			0.650	26.00	8.00
0.0260		71	0.660	26.00	8.00
0.0268			0.680	28.00	9.00
0.0272			0.690	28.00	9.00
0.0276			0.700	28.00	9.00
0.0280		70	0.710	28.00	9.00
0.0283			0.720	28.00	9.00
0.0291		69	0.740	28.00	9.00
0.0295			0.750	28.00	9.00
0.0303			0.770	30.00	10.00
0.0307			0.780	30.00	10.00
0.0311	1/32	68	0.790	30.00	10.00
0.0315			0.800	30.00	10.00
0.0319		67	0.810	30.00	10.00
0.0323			0.820	30.00	10.00
0.0327			0.830	30.00	10.00
0.0331		66	0.840	30.00	10.00
0.0335			0.850	30.00	10.00
0.0339			0.860	32.00	11.00
0.0346			0.880	32.00	11.00
0.0350		65	0.890	32.00	11.00
0.0354			0.900	32.00	11.00
0.0358		64	0.910	32.00	11.00
0.0362			0.920	32.00	11.00
0.0366			0.930	32.00	11.00
0.0370		63	0.940	32.00	11.00
0.0374			0.950	32.00	11.00
0.0378			0.960	34.00	12.00
0.0382		62	0.970	34.00	12.00
0.0386			0.980	34.00	12.00
0.0390		61	0.990	34.00	12.00
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0406			1.030	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0413			1.050	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0425			1.080	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0437			1.110	36.00	14.00
0.0441			1.120	36.00	14.00
0.0445			1.130	36.00	14.00
0.0449			1.140	36.00	14.00
0.0453			1.150	36.00	14.00
0.0457			1.160	36.00	14.00
0.0461			1.170	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0476			1.210	38.00	16.00
0.0480			1.220	38.00	16.00
0.0488			1.240	38.00	16.00
0.0492			1.250	38.00	16.00
0.0496			1.260	38.00	16.00
0.0500			1.270	38.00	16.00
0.0504			1.280	38.00	16.00
0.0512			1.300	38.00	16.00
0.0516			1.310	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0528			1.340	40.00	18.00
0.0531			1.350	40.00	18.00
0.0551		54	1.400	40.00	18.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0559			1.420	40.00	18.00
0.0563			1.430	40.00	18.00
0.0571			1.450	40.00	18.00
0.0575			1.460	40.00	18.00
0.0579			1.470	40.00	18.00
0.0583			1.480	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0598			1.520	43.00	20.00
0.0602			1.530	43.00	20.00
0.0606			1.540	43.00	20.00
0.0610			1.550	43.00	20.00
0.0618			1.570	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0638			1.620	43.00	20.00
0.0646			1.640	43.00	20.00
0.0650			1.650	43.00	20.00
0.0661			1.680	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0673			1.710	46.00	22.00
0.0681			1.730	46.00	22.00
0.0689			1.750	46.00	22.00
0.0697			1.770	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0717			1.820	46.00	22.00
0.0720			1.830	46.00	22.00
0.0724			1.840	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0736			1.870	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0768			1.950	49.00	24.00
0.0772			1.960	49.00	24.00
0.0776			1.970	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0795			2.020	49.00	24.00
0.0799			2.030	49.00	24.00
0.0807			2.050	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0886			2.250	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0965			2.450	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1067		36	2.710	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1240			3.150	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1319			3.350	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1398			3.550	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1437			3.650	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1516			3.850	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1555			3.950	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1594			4.050	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1713			4.350	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1752			4.450	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1831			4.650	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1870			4.750	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1949			4.950	86.00	52.00

To order: Series number + mm, ex. 5518 3.000

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Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1988			5.050	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2067			5.250	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00
0.2130		3	5.410	93.00	57.00
0.2146			5.450	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2224			5.650	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2280		1	5.790	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2378		B	6.040	101.00	63.00
0.2382			6.050	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2610		G	6.630	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2697			6.850	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2854			7.250	109.00	69.00
0.2874			7.300	109.00	69.00
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2933			7.450	109.00	69.00
0.2949		M	7.490	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3020		N	7.670	117.00	75.00
0.3031			7.700	117.00	75.00
0.3051			7.750	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3248			8.250	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3390		R	8.610	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3445			8.750	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3484			8.850	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3642			9.250	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3760			9.550	133.00	87.00
0.3772		V	9.580	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3839			9.750	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3961			10.060	133.00	87.00
0.3969		X	10.080	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4035			10.250	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4094			10.400	133.00	87.00
0.4130		Z	10.490	133.00	87.00
0.4134			10.500	133.00	87.00
0.4154			10.550	133.00	87.00
0.4173			10.600	133.00	87.00
0.4213			10.700	142.00	94.00
0.4220	27/64		10.720	142.00	94.00
0.4232			10.750	142.00	94.00
0.4252			10.800	142.00	94.00
0.4291			10.900	142.00	94.00
0.4331			11.000	142.00	94.00
0.4370			11.100	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4429			11.250	142.00	94.00
0.4449			11.300	142.00	94.00
0.4488			11.400	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4587			11.650	142.00	94.00
0.4606			11.700	142.00	94.00
0.4646			11.800	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4764			12.100	151.00	101.00
0.4803			12.200	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4882			12.400	151.00	101.00
0.4921			12.500	151.00	101.00
0.4961			12.600	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5039			12.800	151.00	101.00
0.5079			12.900	151.00	101.00
0.5118			13.000	151.00	101.00
0.5157	33/64		13.100	151.00	101.00
0.5197			13.200	151.00	101.00
0.5217			13.250	160.00	108.00
0.5311	17/32		13.490	160.00	108.00
0.5315			13.500	160.00	108.00
0.5394			13.700	160.00	108.00
0.5433			13.800	160.00	108.00
0.5469	35/64		13.890	160.00	108.00
0.5472			13.900	160.00	108.00
0.5512			14.000	160.00	108.00
0.5591			14.200	169.00	114.00
0.5610			14.250	169.00	114.00
0.5626	9/16		14.290	169.00	114.00
0.5709			14.500	169.00	114.00
0.5748			14.600	169.00	114.00
0.5780	37/64		14.680	169.00	114.00
0.5807			14.750	169.00	114.00
0.5827			14.800	169.00	114.00
0.5906			15.000	169.00	114.00
0.5937	19/32		15.080	178.00	120.00
0.6004			15.250	178.00	120.00
0.6094	39/64		15.480	178.00	120.00
0.6102			15.500	178.00	120.00
0.6201			15.750	178.00	120.00
0.6220			15.800	178.00	120.00
0.6248	5/8		15.870	178.00	120.00
0.6299			16.000	178.00	120.00
0.6594			16.750	184.00	125.00
0.6693			17.000	184.00	125.00
0.6890			17.500	191.00	130.00
0.7087			18.000	191.00	130.00
0.7283			18.500	198.00	135.00
0.7480			19.000	198.00	135.00

Alternative Drill Series:

#205 HSS, GT100, 5xD, 118 pt, Bright
#657 Cobalt, Ti, 5xD, 130 pt, TiN
#305 Cobalt, GP, 5xD, 118 pt, Oxide
#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX

To order: Series number + mm, ex. 5518 3.000

5xD

Series 652

GT 100 Parabolic

HSS, GT 100, jobber length, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

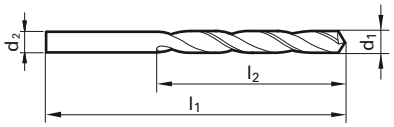
- General Steels
- Aluminum & Alloys
- Universal Steels

(S) TiN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 359



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0480			1.220	38.00	16.00
0.0492			1.250	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0531			1.350	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0571			1.450	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0602			1.530	43.00	20.00
0.0610			1.550	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0650			1.650	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0677			1.720	46.00	22.00
0.0689			1.750	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0768			1.950	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0965			2.450	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1122			2.850	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1594			4.050	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1752			4.450	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00
0.2130		3	5.410	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2244			5.700	93.00	57.00
0.2264			5.750	93.00	57.00
0.2280		1	5.790	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2378		B	6.040	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2610		G	6.630	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00

To order: Series number + mm, ex. 5518 3.000

Series 652

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Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2949		M	7.490	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3020		N	7.670	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3390		R	8.610	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3504			8.900	125.00	81.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3543			9.000	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.4016			10.200	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4130		Z	10.490	133.00	87.00
0.4134			10.500	133.00	87.00
0.4213			10.700	142.00	94.00
0.4220	27/64		10.720	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4606			11.700	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4764			12.100	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5039			12.800	151.00	101.00
0.5118			13.000	151.00	101.00
0.5157	33/64		13.100	151.00	101.00
0.5311	17/32		13.490	160.00	108.00
0.5315			13.500	160.00	108.00
0.5469	35/64		13.890	160.00	108.00
0.5512			14.000	160.00	108.00
0.5626	9/16		14.290	169.00	114.00
0.5906			15.000	169.00	114.00
0.6299			16.000	178.00	120.00

Alternative Drill Series:

#549 HSS, GT100, 5xD, 130 pt, Bright
#658 Cobalt, GT100, 5xD, 130 pt, TiN
#622 Cobalt, GT100, 5xD, 130 pt, Bright
#1221 Cobalt, GT100, 5xD, 130 pt, TiCN
#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX

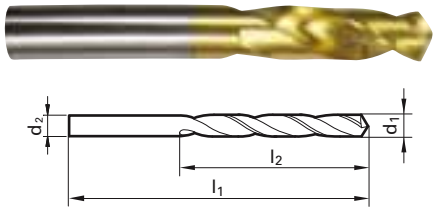
3xD

Series 653

General Purpose

HSS, general purpose (Type N), stub length, 118° point, Form A web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

TiN coated

External Coolant

Straight Shank

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Application Materials:

- Universal Steels
- Cast Iron
- General Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0197			0.500	20.00	3.00
0.0236			0.600	21.00	3.50
0.0276			0.700	23.00	4.50
0.0295			0.750	23.00	4.50
0.0315			0.800	24.00	5.00
0.0354			0.900	25.00	5.50
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0413			1.050	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0437			1.110	28.00	7.00
0.0453			1.150	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0469	3/64		1.190	28.00	7.00
0.0472			1.200	28.00	7.00
0.0492			1.250	28.00	7.00
0.0504			1.280	28.00	7.00
0.0512			1.300	28.00	7.00
0.0520		55	1.320	28.00	7.00
0.0531			1.350	32.00	9.00
0.0551		54	1.400	32.00	9.00
0.0571			1.450	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0610			1.550	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0650			1.650	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	38.00	12.00
0.0768			1.950	38.00	12.00
0.0780	5/64		1.980	38.00	12.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0811		46	2.060	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0827			2.100	38.00	12.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0886			2.250	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0925			2.350	40.00	13.00
0.0933		42	2.370	43.00	14.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0965			2.450	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1004			2.550	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1083			2.750	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1102			2.800	46.00	16.00
0.1130		33	2.870	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1280			3.250	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1358		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1437			3.650	52.00	20.00
0.1441		27	3.660	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1476			3.750	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1535			3.900	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1571		22	3.990	55.00	22.00
0.1575			4.000	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1610		20	4.090	55.00	22.00
0.1614			4.100	55.00	22.00
0.1634			4.150	55.00	22.00
0.1654			4.200	55.00	22.00
0.1673			4.250	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1799		15	4.570	58.00	24.00
0.1811			4.600	58.00	24.00
0.1819		14	4.620	58.00	24.00
0.1831			4.650	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1909		11	4.850	62.00	26.00
0.1929			4.900	62.00	26.00
0.1937		10	4.920	62.00	26.00
0.1961		9	4.980	62.00	26.00
0.1969			5.000	62.00	26.00
0.1988			5.050	62.00	26.00
0.1992		8	5.060	62.00	26.00
0.2008			5.100	62.00	26.00
0.2012		7	5.110	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2039		6	5.180	62.00	26.00
0.2047			5.200	62.00	26.00
0.2067			5.250	62.00	26.00
0.2087			5.300	62.00	26.00
0.2091		4	5.310	66.00	28.00
0.2126			5.400	66.00	28.00
0.2130		3	5.410	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2197			5.580	66.00	28.00
0.2205			5.600	66.00	28.00
0.2209		2	5.610	66.00	28.00
0.2244			5.700	66.00	28.00
0.2264			5.750	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2382			6.050	66.00	28.00
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2441			6.200	70.00	31.00
0.2461		D	6.250	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2539			6.450	70.00	31.00
0.2559			6.500	70.00	31.00
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2854			7.250	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2953			7.500	74.00	34.00

To order: Series number + mm, ex. 5518 3.000

Series 653

Speeds & Feeds information pg 360

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2969	19/64		7.540	79.00	37.00
0.2992			7.600	79.00	37.00
0.3020		N	7.670	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3161		O	8.030	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3248			8.250	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3319		Q	8.430	79.00	37.00
0.3346			8.500	79.00	37.00
0.3366			8.550	84.00	40.00
0.3386			8.600	84.00	40.00
0.3390		R	8.610	84.00	40.00
0.3425			8.700	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3445			8.750	84.00	40.00
0.3465			8.800	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3579		T	9.090	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3642			9.250	84.00	40.00
0.3661			9.300	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3772		V	9.580	89.00	43.00
0.3819			9.700	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3976			10.100	89.00	43.00
0.4016			10.200	89.00	43.00
0.4055			10.300	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4130		Z	10.490	89.00	43.00
0.4134			10.500	89.00	43.00
0.4173			10.600	89.00	43.00
0.4220	27/64		10.720	95.00	47.00
0.4232			10.750	95.00	47.00
0.4252			10.800	95.00	47.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4409			11.200	95.00	47.00
0.4449			11.300	95.00	47.00
0.4488			11.400	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4646			11.800	95.00	47.00
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00
0.4764			12.100	102.00	51.00
0.4803			12.200	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5039			12.800	102.00	51.00
0.5118			13.000	102.00	51.00
0.5157	33/64		13.100	102.00	51.00
0.5311	17/32		13.490	107.00	54.00
0.5315			13.500	107.00	54.00
0.5433			13.800	107.00	54.00
0.5469	35/64		13.890	107.00	54.00
0.5512			14.000	107.00	54.00
0.5626	9/16		14.290	111.00	56.00
0.5709			14.500	111.00	56.00
0.5827			14.800	111.00	56.00
0.5906			15.000	111.00	56.00
0.5937	19/32		15.080	115.00	58.00
0.6024			15.300	115.00	58.00
0.6102			15.500	115.00	58.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.6220			15.800	115.00	58.00
0.6248	5/8		15.870	115.00	58.00
0.6299			16.000	115.00	58.00
0.6406	41/64		16.270	119.00	60.00
0.6496			16.500	119.00	60.00
0.6563	21/32		16.670	119.00	60.00
0.6693			17.000	119.00	60.00
0.6874	11/16		17.460	123.00	62.00
0.6890			17.500	123.00	62.00
0.7031	45/64		17.860	123.00	62.00
0.7087			18.000	123.00	62.00
0.7185			18.250	127.00	64.00
0.7189	23/32		18.260	127.00	64.00
0.7283			18.500	127.00	64.00
0.7343	47/64		18.650	127.00	64.00
0.7480			19.000	127.00	64.00
0.7500	3/4		19.050	131.00	66.00
0.7677			19.500	131.00	66.00
0.7874			20.000	131.00	66.00
0.8071			20.500	136.00	68.00
0.8126	13/16		20.640	136.00	68.00
0.8268			21.000	136.00	68.00
0.8465			21.500	141.00	70.00
0.8661			22.000	141.00	70.00
0.8858			22.500	146.00	72.00
0.8906	57/64		22.620	146.00	72.00
0.9055			23.000	146.00	72.00
0.9220	59/64		23.420	146.00	72.00
0.9449			24.000	151.00	75.00
0.9646			24.500	151.00	75.00
0.9843	63/64		25.000	151.00	75.00
1.0000	1		25.400	156.00	78.00
1.1220			28.500	168.00	84.00

Alternative Drill Series:

#5524 Cobalt, GU500, 3xD, 118 pt, Bright
#223 HSS, GP, 3xD, 118 pt, Oxide
#730 Carbide, GP, 3xD, 118 pt, Bright
#2463 Carbide, GP, 3xD, 118 pt, FIREX

5xD

Series 654

General Purpose

HSS, general purpose (Type N), jobber length, 118° point, Form A web thinned all dia., Morse Taper shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

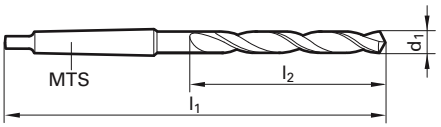
- Universal Steels
- Cast Iron
- General Steels

(S) TiN coated

External Coolant

Morse Taper Shank

Speeds & Feeds information pg 360



Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.1181			3.000	MTS 1	114.00	33.00
0.1720	11/64		4.370	MTS 1	128.00	47.00
0.1874	3/16		4.760	MTS 1	133.00	52.00
0.2031	13/64		5.160	MTS 1	133.00	52.00
0.2559			6.500	MTS 1	144.00	63.00
0.2657	17/64	H	6.750	MTS 1	150.00	69.00
0.2811	9/32	K	7.140	MTS 1	150.00	69.00
0.2969	19/64		7.540	MTS 1	156.00	75.00
0.3031			7.700	MTS 1	156.00	75.00
0.3126	5/16		7.940	MTS 1	156.00	75.00
0.3150			8.000	MTS 1	156.00	75.00
0.3228		P	8.200	MTS 1	156.00	75.00
0.3280	21/64		8.330	MTS 1	156.00	75.00
0.3437	11/32		8.730	MTS 1	162.00	81.00
0.3748	3/8		9.520	MTS 1	168.00	87.00
0.3858		W	9.800	MTS 1	168.00	87.00
0.3937			10.000	MTS 1	168.00	87.00
0.4016			10.200	MTS 1	168.00	87.00
0.4035			10.250	MTS 1	168.00	87.00
0.4063	13/32		10.320	MTS 1	168.00	87.00
0.4134			10.500	MTS 1	168.00	87.00
0.4220	27/64		10.720	MTS 1	175.00	94.00
0.4252			10.800	MTS 1	175.00	94.00
0.4331			11.000	MTS 1	175.00	94.00
0.4374	7/16		11.110	MTS 1	175.00	94.00
0.4409			11.200	MTS 1	175.00	94.00
0.4429			11.250	MTS 1	175.00	94.00
0.4528			11.500	MTS 1	175.00	94.00
0.4531	29/64		11.510	MTS 1	175.00	94.00
0.4626			11.750	MTS 1	175.00	94.00
0.4646			11.800	MTS 1	175.00	94.00
0.4689	15/32		11.910	MTS 1	182.00	101.00
0.4724			12.000	MTS 1	182.00	101.00
0.4803			12.200	MTS 1	182.00	101.00
0.4823			12.250	MTS 1	182.00	101.00
0.4843	31/64		12.300	MTS 1	182.00	101.00
0.4921			12.500	MTS 1	182.00	101.00
0.5000	1/2		12.700	MTS 1	182.00	101.00
0.5020			12.750	MTS 1	182.00	101.00
0.5039			12.800	MTS 1	182.00	101.00
0.5118			13.000	MTS 1	182.00	101.00
0.5157	33/64		13.100	MTS 1	182.00	101.00
0.5217			13.250	MTS 1	189.00	108.00
0.5311	17/32		13.490	MTS 1	189.00	108.00
0.5315			13.500	MTS 1	189.00	108.00
0.5413			13.750	MTS 1	189.00	108.00
0.5469	35/64		13.890	MTS 1	189.00	108.00
0.5512			14.000	MTS 1	189.00	108.00
0.5591			14.200	MTS 2	212.00	114.00
0.5610			14.250	MTS 2	212.00	114.00
0.5626	9/16		14.290	MTS 2	212.00	114.00
0.5709			14.500	MTS 2	212.00	114.00
0.5748			14.600	MTS 2	212.00	114.00
0.5780	37/64		14.680	MTS 2	212.00	114.00
0.5807			14.750	MTS 2	212.00	114.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
0.5906			15.000	MTS 2	212.00	114.00
0.5937	19/32		15.080	MTS 2	218.00	120.00
0.5945			15.100	MTS 2	218.00	120.00
0.6004			15.250	MTS 2	218.00	120.00
0.6094	39/64		15.480	MTS 2	218.00	120.00
0.6102			15.500	MTS 2	218.00	120.00
0.6201			15.750	MTS 2	218.00	120.00
0.6248	5/8		15.870	MTS 2	218.00	120.00
0.6299			16.000	MTS 2	218.00	120.00
0.6398			16.250	MTS 2	223.00	125.00
0.6406	41/64		16.270	MTS 2	223.00	125.00
0.6496			16.500	MTS 2	223.00	125.00
0.6563	21/32		16.670	MTS 2	223.00	125.00
0.6594			16.750	MTS 2	223.00	125.00
0.6693			17.000	MTS 2	223.00	125.00
0.6720	43/64		17.070	MTS 2	228.00	130.00
0.6791			17.250	MTS 2	228.00	130.00
0.6874	11/16		17.460	MTS 2	228.00	130.00
0.6890			17.500	MTS 2	228.00	130.00
0.6988			17.750	MTS 2	228.00	130.00
0.7087			18.000	MTS 2	228.00	130.00
0.7185			18.250	MTS 2	233.00	135.00
0.7189	23/32		18.260	MTS 2	233.00	135.00
0.7283			18.500	MTS 2	233.00	135.00
0.7343	47/64		18.650	MTS 2	233.00	135.00
0.7382			18.750	MTS 2	233.00	135.00
0.7480			19.000	MTS 2	233.00	135.00
0.7500	3/4		19.050	MTS 2	238.00	140.00
0.7579			19.250	MTS 2	238.00	140.00
0.7657	49/64		19.450	MTS 2	238.00	140.00
0.7677			19.500	MTS 2	238.00	140.00
0.7776			19.750	MTS 2	238.00	140.00
0.7811	25/32		19.840	MTS 2	238.00	140.00
0.7874			20.000	MTS 2	238.00	140.00
0.7972			20.250	MTS 2	243.00	145.00
0.8071			20.500	MTS 2	243.00	145.00
0.8126	13/16		20.640	MTS 2	243.00	145.00
0.8169			20.750	MTS 2	243.00	145.00
0.8268			21.000	MTS 2	243.00	145.00
0.8366			21.250	MTS 2	248.00	150.00
0.8437	27/32		21.430	MTS 2	248.00	150.00
0.8465			21.500	MTS 2	248.00	150.00
0.8563			21.750	MTS 2	248.00	150.00
0.8594	55/64		21.830	MTS 2	248.00	150.00
0.8661			22.000	MTS 2	248.00	150.00
0.8748	7/8		22.220	MTS 2	248.00	150.00
0.8858			22.500	MTS 2	253.00	155.00
0.9055			23.000	MTS 2	253.00	155.00
0.9252			23.500	MTS 3	276.00	155.00
0.9350			23.750	MTS 3	281.00	160.00
0.9374	15/16		23.810	MTS 3	281.00	160.00
0.9449			24.000	MTS 3	281.00	160.00
0.9646			24.500	MTS 3	281.00	160.00
0.9744			24.750	MTS 3	281.00	160.00
0.9843	63/64		25.000	MTS 3	281.00	160.00

To order: Series number + mm, ex. 5518 3.000

Series 654

Speeds & Feeds information pg 360

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank size	l1 mm	l2 mm
1.0000	1		25.400	MTS 3	286.00	165.00
1.0039			25.500	MTS 3	286.00	165.00
1.0236			26.000	MTS 3	286.00	165.00
1.0433			26.500	MTS 3	286.00	165.00
1.0626	1 1/16		26.990	MTS 3	291.00	170.00
1.0630			27.000	MTS 3	291.00	170.00
1.1024			28.000	MTS 3	291.00	170.00
1.1220			28.500	MTS 3	296.00	175.00
1.1248	1 1/8		28.570	MTS 3	296.00	175.00
1.1417			29.000	MTS 3	296.00	175.00
1.1614			29.500	MTS 3	296.00	175.00
1.1713			29.750	MTS 3	296.00	175.00
1.2008			30.500	MTS 3	301.00	180.00

Alternative Drill Series:

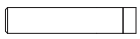
#345 Cobalt, GP, 5xD, 118 pt, Oxide
#661 Cobalt, GP, 5xD, 118 pt, TiN

5xD

S

TiN Coated

External Coolant



Straight Shank

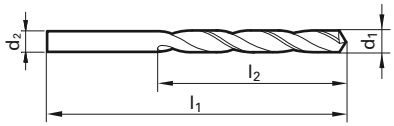
Speeds & Feeds information pg 361

Series 657

Type Ti

Cobalt, Type Ti, jobber length, self-centering 130° split point, web thinned >1.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Stainless Steels
- Hardened Materials
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0197			0.500	22.00	6.00
0.0209		75	0.530	22.00	6.00
0.0236			0.600	24.00	7.00
0.0256			0.650	26.00	8.00
0.0276			0.700	28.00	9.00
0.0295			0.750	28.00	9.00
0.0315			0.800	30.00	10.00
0.0335			0.850	30.00	10.00
0.0346			0.880	32.00	11.00
0.0354			0.900	32.00	11.00
0.0362			0.920	32.00	11.00
0.0370		63	0.940	32.00	11.00
0.0374			0.950	32.00	11.00
0.0394			1.000	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0413			1.050	34.00	12.00
0.0433			1.100	36.00	14.00
0.0453			1.150	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0476			1.210	38.00	16.00
0.0492			1.250	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0531			1.350	40.00	18.00
0.0547			1.390	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0571			1.450	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0610			1.550	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0650			1.650	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0689			1.750	46.00	22.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0768			1.950	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0787			2.000	49.00	24.00
0.0807			2.050	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0866			2.200	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0925			2.350	53.00	27.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1024			2.600	57.00	30.00
0.1063			2.700	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1457			3.700	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1713			4.350	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1929			4.900	86.00	52.00
0.1969			5.000	86.00	52.00
0.2008			5.100	86.00	52.00

To order: Series number + mm, ex. 5518 3.000

Series 657

Speeds & Feeds information pg 361

Alternative Drill Series:

#605 Cobalt, Ti, 5xD, 130 pt, Bright
#658 Cobalt, GT100, 5xD, 130 pt, TiN
#530 PM cobalt, GT500, 5xD, 130 pt, FIREX

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3366			8.550	125.00	81.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3543			9.000	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.4016			10.200	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4134			10.500	133.00	87.00
0.4252			10.800	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4528			11.500	142.00	94.00
0.4724			12.000	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5118			13.000	151.00	101.00

5xD

Ⓢ TiN coated

External Coolant

Straight Shank

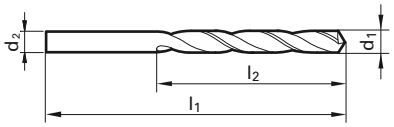
Speeds & Feeds information pg 361

Series 658

GT 100 Parabolic

Cobalt, GT 100, jobber length, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Universal Steels
- Stainless Steels
- Hardened Materials

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0413			1.050	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0433			1.100	36.00	14.00
0.0445			1.130	36.00	14.00
0.0453			1.150	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0531			1.350	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0571			1.450	40.00	18.00
0.0591			1.500	40.00	18.00
0.0610			1.550	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0642			1.630	43.00	20.00
0.0650			1.650	43.00	20.00
0.0669		51	1.700	43.00	20.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0768			1.950	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0807			2.050	49.00	24.00
0.0811		46	2.060	49.00	24.00

To order: Series number + mm, ex. 5518 3.000

Series 658

Speeds & Feeds information pg 361

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0925			2.350	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0965			2.450	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1004			2.550	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1043			2.650	57.00	30.00
0.1063			2.700	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1280			3.250	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1673			4.250	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3445			8.750	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4134			10.500	133.00	87.00
0.4220	27/64		10.720	142.00	94.00
0.4252			10.800	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4528			11.500	142.00	94.00
0.4606			11.700	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4921			12.500	151.00	101.00
0.5118			13.000	151.00	101.00

Alternative Drill Series:

#549 HSS, GT100, 5xD, 130 pt, Bright
#652 HSS, GT100, 5xD, 130 pt, TiN
#622 Cobalt, GT100, 5xD, 130 pt, Bright
#1221 Cobalt, GT100, 5xD, 130 pt, TiCN
#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX

3xD

TiN Coated

External Coolant

Straight Shank

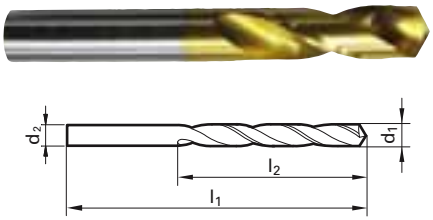
Speeds & Feeds information pg 362

Series 659

Heavy Duty

Cobalt, heavy duty (type GV120), stub length, 130° point, Form A web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Stainless Steels
- Hardened Materials
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0197			0.500	20.00	3.00
0.0236			0.600	21.00	3.50
0.0256			0.650	22.00	4.00
0.0276			0.700	23.00	4.50
0.0291		69	0.740	23.00	4.50
0.0295			0.750	23.00	4.50
0.0311	1/32	68	0.790	24.00	5.00
0.0315			0.800	24.00	5.00
0.0335			0.850	24.00	5.00
0.0354			0.900	25.00	5.50
0.0374			0.950	25.00	5.50
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0453			1.150	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0469	3/64		1.190	28.00	7.00
0.0472			1.200	28.00	7.00
0.0492			1.250	28.00	7.00
0.0512			1.300	28.00	7.00
0.0520		55	1.320	28.00	7.00
0.0551		54	1.400	32.00	9.00
0.0571			1.450	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0602			1.530	34.00	10.00
0.0618			1.570	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	38.00	12.00
0.0776			1.970	38.00	12.00
0.0780	5/64		1.980	38.00	12.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0827			2.100	38.00	12.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0886			2.250	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0933		42	2.370	43.00	14.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0965			2.450	43.00	14.00
0.0980		40	2.490	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1004			2.550	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1102			2.800	46.00	16.00
0.1110		34	2.820	46.00	16.00
0.1122			2.850	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1280			3.250	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1358		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1441		27	3.660	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1520		24	3.860	55.00	22.00
0.1535			3.900	55.00	22.00
0.1539		23	3.910	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1575			4.000	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1610		20	4.090	55.00	22.00
0.1614			4.100	55.00	22.00
0.1634			4.150	55.00	22.00
0.1654			4.200	55.00	22.00
0.1673			4.250	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1728		17	4.390	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1811			4.600	58.00	24.00
0.1819		14	4.620	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1909		11	4.850	62.00	26.00
0.1929			4.900	62.00	26.00
0.1937		10	4.920	62.00	26.00
0.1969			5.000	62.00	26.00
0.1992		8	5.060	62.00	26.00
0.2008			5.100	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2047			5.200	62.00	26.00
0.2055		5	5.220	62.00	26.00
0.2087			5.300	62.00	26.00
0.2091		4	5.310	66.00	28.00
0.2126			5.400	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2209		2	5.610	66.00	28.00
0.2244			5.700	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2339		A	5.940	66.00	28.00
0.2362			6.000	66.00	28.00
0.2378		B	6.040	70.00	31.00
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2441			6.200	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3307			8.400	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3425			8.700	84.00	40.00

To order: Series number + mm, ex. 5518 3.000

Series 659

Speeds & Feeds information pg 362

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3437	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3480		S	8.840	84.00	40.00
0.3543			9.000	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3661			9.300	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3780			9.600	89.00	43.00
0.3819			9.700	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.4016			10.200	89.00	43.00
0.4035			10.250	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4134			10.500	89.00	43.00
0.4220	27/64		10.720	95.00	47.00
0.4291			10.900	95.00	47.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4724			12.000	102.00	51.00
0.4764			12.100	102.00	51.00
0.4803			12.200	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5039			12.800	102.00	51.00
0.5118			13.000	102.00	51.00
0.5236			13.300	107.00	54.00
0.5311	17/32		13.490	107.00	54.00
0.5512			14.000	107.00	54.00
0.5626	9/16		14.290	111.00	56.00
0.5709			14.500	111.00	56.00
0.5906			15.000	111.00	56.00
0.6102			15.500	115.00	58.00

Alternative Drill Series:

#329 Cobalt, GV120, 3xD, 130 pt, Oxide
#5524 Cobalt, GU500, 3xD, 118 pt, Bright
#653 HSS, GP, 3xD, 118 pt, TiN

Micro

Ⓢ TiN coated

External Coolant

Reinforced Straight Shank

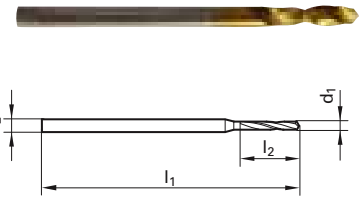
Speeds & Feeds information pg 362

Series 660

Micro-Precision

Cobalt, Micro-Precision (Type N), 118° point, reinforced straight shank, RH helix

Shank Dia. = h8 tolerance range, Cut Dia. +0 / -0.004



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank dia.	l1 mm	l2 mm
0.0050			0.128	1.000	25.00	0.80
0.0063		96	0.160	1.000	25.00	1.10
0.0067		95	0.170	1.000	25.00	1.10
0.0071		94	0.180	1.000	25.00	1.10
0.0075		93	0.190	1.000	25.00	1.10
0.0079		92	0.200	1.000	25.00	1.50
0.0083		91	0.210	1.000	25.00	1.50
0.0087		90	0.220	1.000	25.00	1.50
0.0091		89	0.230	1.000	25.00	1.50
0.0093			0.235	1.000	25.00	1.50
0.0094		88	0.240	1.000	25.00	1.50
0.0096			0.245	1.000	25.00	1.90
0.0098		87	0.250	1.000	25.00	1.90
0.0100			0.255	1.000	25.00	1.90
0.0102			0.260	1.000	25.00	1.90
0.0104			0.265	1.000	25.00	1.90
0.0106		86	0.270	1.000	25.00	1.90
0.0110		85	0.280	1.000	25.00	1.90
0.0114		84	0.290	1.000	25.00	1.90
0.0118			0.300	1.000	25.00	1.90
0.0120			0.305	1.000	25.00	2.40
0.0122		83	0.310	1.000	25.00	2.40
0.0126		82	0.320	1.000	25.00	2.40
0.0130		81	0.330	1.000	25.00	2.40
0.0134		80	0.340	1.000	25.00	2.40
0.0138			0.350	1.000	25.00	2.40
0.0142			0.360	1.000	25.00	2.40
0.0146		79	0.370	1.000	25.00	2.40
0.0150			0.380	1.000	25.00	2.40
0.0154			0.390	1.000	25.00	3.00
0.0157	1/64		0.400	1.000	25.00	3.00
0.0161		78	0.410	1.000	25.00	3.00
0.0165			0.420	1.000	25.00	3.00
0.0169			0.430	1.000	25.00	3.00
0.0173			0.440	1.000	25.00	3.00
0.0177			0.450	1.000	25.00	3.00
0.0181		77	0.460	1.000	25.00	3.00
0.0185			0.470	1.000	25.00	3.00
0.0189			0.480	1.000	25.00	3.00
0.0193			0.490	1.000	25.00	3.40
0.0197			0.500	1.000	25.00	3.40
0.0201		76	0.510	1.000	25.00	3.40
0.0205			0.520	1.000	25.00	3.40
0.0209		75	0.530	1.000	25.00	3.40
0.0213			0.540	1.000	25.00	3.90
0.0217			0.550	1.000	25.00	3.90
0.0220			0.560	1.000	25.00	3.90
0.0224		74	0.570	1.000	25.00	3.90
0.0228			0.580	1.000	25.00	3.90
0.0232			0.590	1.000	25.00	3.90
0.0236			0.600	1.000	25.00	3.90
0.0240		73	0.610	1.000	25.00	4.20
0.0244			0.620	1.000	25.00	4.20
0.0248			0.630	1.000	25.00	4.20

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank dia.	l1 mm	l2 mm
0.0252		72	0.640	1.000	25.00	4.20
0.0256			0.650	1.000	25.00	4.20
0.0260		71	0.660	1.000	25.00	4.20
0.0264			0.670	1.000	25.00	4.20
0.0268			0.680	1.000	25.00	4.80
0.0272			0.690	1.000	25.00	4.80
0.0276			0.700	1.000	25.00	4.80
0.0280		70	0.710	1.000	25.00	4.80
0.0283			0.720	1.000	25.00	4.80
0.0287			0.730	1.000	25.00	4.80
0.0291		69	0.740	1.000	25.00	4.80
0.0295			0.750	1.000	25.00	4.80
0.0299			0.760	1.000	25.00	5.30
0.0303			0.770	1.000	25.00	5.30
0.0307			0.780	1.000	25.00	5.30
0.0311	1/32	68	0.790	1.000	25.00	5.30
0.0315			0.800	1.500	25.00	5.30
0.0319		67	0.810	1.500	25.00	5.30
0.0323			0.820	1.500	25.00	5.30
0.0327			0.830	1.500	25.00	5.30
0.0331		66	0.840	1.500	25.00	5.30
0.0335			0.850	1.500	25.00	5.30
0.0339			0.860	1.500	25.00	6.00
0.0343			0.870	1.500	25.00	6.00
0.0346			0.880	1.500	25.00	6.00
0.0354			0.900	1.500	25.00	6.00
0.0358		64	0.910	1.500	25.00	6.00
0.0370		63	0.940	1.500	25.00	6.00
0.0374			0.950	1.500	25.00	6.00
0.0382		62	0.970	1.500	25.00	6.80
0.0386			0.980	1.500	25.00	6.80
0.0394			1.000	1.500	25.00	6.80
0.0402		60	1.020	1.500	25.00	6.80
0.0409		59	1.040	1.500	25.00	6.80
0.0413			1.050	1.500	25.00	6.80
0.0421		58	1.070	1.500	25.00	7.60
0.0425			1.080	1.500	25.00	7.60
0.0433			1.100	1.500	25.00	7.60
0.0453			1.150	1.500	25.00	7.60
0.0465		56	1.180	1.500	25.00	7.60
0.0469	3/64		1.190	1.500	25.00	8.50
0.0472			1.200	1.500	25.00	8.50
0.0492			1.250	1.500	25.00	8.50
0.0512			1.300	1.500	25.00	8.50
0.0531			1.350	1.500	25.00	9.50
0.0547			1.390	1.500	25.00	9.50
0.0551		54	1.400	1.500	25.00	9.50
0.0559			1.420	1.500	25.00	9.50
0.0571			1.450	1.500	25.00	9.50
0.0591			1.500	2.000	30.00	9.50
0.0709			1.800	2.000	30.00	11.80

Alternative Drill Series:

#301 Cobalt, Type N, 4xD, 118 pt, Bright
#6400 Carbide, Type N, 4xD, 140 pt, Super-A

To order: Series number + mm, ex. 5518 3.000

5xD

Series 664

General Purpose, LH helix

HSS, general purpose (Type N), jobber length, 118° point, Form A web thinned >2.36mm dia., standard straight shank, LH cut

Cut / Shank Dia. = h8 tolerance range

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

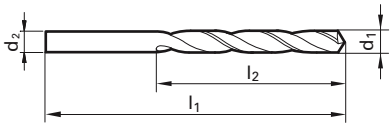
Twist Drills

(S) TiN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 363



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0157	1/64		0.400	20.00	5.00
0.0165			0.420	20.00	5.00
0.0169			0.430	20.00	5.00
0.0177			0.450	20.00	5.00
0.0236			0.600	24.00	7.00
0.0264			0.670	26.00	8.00
0.0295			0.750	28.00	9.00
0.0303			0.770	30.00	10.00
0.0315			0.800	30.00	10.00
0.0354			0.900	32.00	11.00
0.0366			0.930	32.00	11.00
0.0374			0.950	32.00	11.00
0.0382		62	0.970	34.00	12.00
0.0394			1.000	34.00	12.00
0.0413			1.050	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0453			1.150	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0492			1.250	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0531			1.350	40.00	18.00
0.0551		54	1.400	40.00	18.00
0.0559			1.420	40.00	18.00
0.0571			1.450	40.00	18.00
0.0591			1.500	40.00	18.00
0.0610			1.550	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0650			1.650	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0689			1.750	46.00	22.00
0.0709			1.800	46.00	22.00
0.0717			1.820	46.00	22.00
0.0728		49	1.850	46.00	22.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0748			1.900	46.00	22.00
0.0787			2.000	49.00	24.00
0.0807			2.050	49.00	24.00
0.0827			2.100	49.00	24.00
0.0846			2.150	53.00	27.00
0.0866			2.200	53.00	27.00
0.0906			2.300	53.00	27.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0965			2.450	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1457			3.700	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1929			4.900	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2559			6.500	101.00	63.00
0.2969	19/64		7.540	117.00	75.00
0.3071			7.800	117.00	75.00
0.3437	11/32		8.730	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.4016			10.200	133.00	87.00

Alternative Drill Series:

#208 HSS, GP, LH Helix, 5xD, 118 pt, Oxide
#308 Cobalt, GP, LH Helix, 5xD, 118 pt, Oxide

10xD

Series 666

General Purpose

HSS, general purpose (Type N), bushing length, 118° point, Form A
web thinned >2.36mm dia., straight shank (tang >3mm) shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

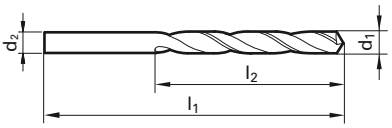
- General Steels/Brass
- Universal Steels
- Cast Iron

(S) TiN coated

External Coolant

Straight Shank, DIN tang >3mm dia.

Speeds & Feeds information pg 363



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	48.00	26.00
0.0433			1.100	50.00	28.00
0.0472			1.200	52.00	30.00
0.0512			1.300	52.00	30.00
0.0551		54	1.400	55.00	33.00
0.0591			1.500	55.00	33.00
0.0630			1.600	58.00	35.00
0.0669		51	1.700	58.00	35.00
0.0709			1.800	62.00	38.00
0.0748			1.900	62.00	38.00
0.0780	5/64		1.980	66.00	41.00
0.0787			2.000	66.00	41.00
0.0827			2.100	66.00	41.00
0.0866			2.200	70.00	44.00
0.0906			2.300	70.00	44.00
0.0945			2.400	74.00	47.00
0.0984			2.500	74.00	47.00
0.1024			2.600	74.00	47.00
0.1063			2.700	79.00	51.00
0.1102			2.800	79.00	51.00
0.1142			2.900	79.00	51.00
0.1181			3.000	79.00	51.00
0.1220			3.100	84.00	55.00
0.1260			3.200	84.00	55.00
0.1299			3.300	84.00	55.00
0.1339			3.400	91.00	60.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1378			3.500	91.00	60.00
0.1406	9/64	28	3.570	91.00	60.00
0.1417			3.600	91.00	60.00
0.1457			3.700	91.00	60.00
0.1496		25	3.800	96.00	64.00
0.1535			3.900	96.00	64.00
0.1575			4.000	96.00	64.00
0.1614			4.100	96.00	64.00
0.1654			4.200	96.00	64.00
0.1693		18	4.300	102.00	69.00
0.1732			4.400	102.00	69.00
0.1772		16	4.500	102.00	69.00
0.1811			4.600	102.00	69.00
0.1890		12	4.800	108.00	74.00
0.1929			4.900	108.00	74.00
0.1969			5.000	108.00	74.00
0.2008			5.100	108.00	74.00
0.2047			5.200	108.00	74.00
0.2087			5.300	108.00	74.00
0.2126			5.400	116.00	80.00
0.2165			5.500	116.00	80.00
0.2205			5.600	116.00	80.00
0.2244			5.700	116.00	80.00
0.2283			5.800	116.00	80.00
0.2362			6.000	116.00	80.00
0.2402			6.100	124.00	86.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2441			6.200	124.00	86.00
0.2480			6.300	124.00	86.00
0.2559			6.500	124.00	86.00
0.2598			6.600	124.00	86.00
0.2638			6.700	124.00	86.00
0.2677			6.800	133.00	93.00
0.2717		I	6.900	133.00	93.00
0.2756			7.000	133.00	93.00
0.2835			7.200	133.00	93.00
0.2874			7.300	133.00	93.00
0.2953			7.500	133.00	93.00
0.3031			7.700	142.00	100.00
0.3071			7.800	142.00	100.00
0.3110			7.900	142.00	100.00
0.3126	5/16		7.940	142.00	100.00
0.3150			8.000	142.00	100.00
0.3228		P	8.200	142.00	100.00
0.3307			8.400	142.00	100.00
0.3346			8.500	142.00	100.00
0.3543			9.000	151.00	107.00
0.4528			11.500	173.00	125.00

Alternative Drill Series:

#667 HSS, GP, 10xD, 118 pt, TiN

To order: Series number + mm, ex. 5518 3.000

>10xD

Series 667

General Purpose

HSS, general purpose (Type N), taper length, 118° point, Form A web thinned >2.36mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

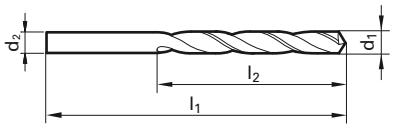
Twist Drills

(S) TiN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 364



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0197			0.500	32.00	12.00
0.0236			0.600	35.00	15.00
0.0256			0.650	38.00	18.00
0.0276			0.700	42.00	21.00
0.0295			0.750	42.00	21.00
0.0315			0.800	46.00	25.00
0.0335			0.850	46.00	25.00
0.0354			0.900	51.00	29.00
0.0374			0.950	51.00	29.00
0.0394			1.000	56.00	33.00
0.0413			1.050	56.00	33.00
0.0433			1.100	60.00	37.00
0.0453			1.150	60.00	37.00
0.0472			1.200	65.00	41.00
0.0492			1.250	65.00	41.00
0.0512			1.300	65.00	41.00
0.0531			1.350	70.00	45.00
0.0551		54	1.400	70.00	45.00
0.0571			1.450	70.00	45.00
0.0591			1.500	70.00	45.00
0.0610			1.550	76.00	50.00
0.0626	1/16		1.590	76.00	50.00
0.0630			1.600	76.00	50.00
0.0650			1.650	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0689			1.750	80.00	53.00
0.0709			1.800	80.00	53.00
0.0728		49	1.850	80.00	53.00
0.0748			1.900	80.00	53.00
0.0760		48	1.930	85.00	56.00
0.0768			1.950	85.00	56.00
0.0780	5/64		1.980	85.00	56.00
0.0787			2.000	85.00	56.00
0.0807			2.050	85.00	56.00
0.0827			2.100	85.00	56.00
0.0866			2.200	90.00	59.00
0.0886			2.250	90.00	59.00
0.0906			2.300	90.00	59.00
0.0925			2.350	90.00	59.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0961		41	2.440	95.00	62.00
0.0965			2.450	95.00	62.00
0.0984			2.500	95.00	62.00
0.1004			2.550	95.00	62.00
0.1024			2.600	95.00	62.00
0.1043			2.650	95.00	62.00
0.1063			2.700	100.00	66.00
0.1083			2.750	100.00	66.00
0.1094	7/64		2.780	100.00	66.00
0.1102			2.800	100.00	66.00
0.1122			2.850	100.00	66.00
0.1142			2.900	100.00	66.00
0.1161		32	2.950	100.00	66.00
0.1181			3.000	100.00	66.00
0.1201		31	3.050	106.00	69.00
0.1220			3.100	106.00	69.00
0.1240			3.150	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1280			3.250	106.00	69.00
0.1299			3.300	106.00	69.00
0.1319			3.350	106.00	69.00
0.1339			3.400	112.00	73.00
0.1378			3.500	112.00	73.00
0.1398			3.550	112.00	73.00
0.1406	9/64	28	3.570	112.00	73.00
0.1417			3.600	112.00	73.00
0.1437			3.650	112.00	73.00
0.1457			3.700	112.00	73.00
0.1496		25	3.800	119.00	78.00
0.1516			3.850	119.00	78.00
0.1535			3.900	119.00	78.00
0.1555			3.950	119.00	78.00
0.1563	5/32		3.970	119.00	78.00
0.1575			4.000	119.00	78.00
0.1594			4.050	119.00	78.00
0.1614			4.100	119.00	78.00
0.1654			4.200	119.00	78.00
0.1673			4.250	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1720	11/64		4.370	126.00	82.00
0.1732			4.400	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1811			4.600	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1870			4.750	126.00	82.00
0.1874	3/16		4.760	132.00	87.00
0.1890		12	4.800	132.00	87.00
0.1909		11	4.850	132.00	87.00
0.1929			4.900	132.00	87.00
0.1937		10	4.920	132.00	87.00
0.1961		9	4.980	132.00	87.00
0.1969			5.000	132.00	87.00
0.2008			5.100	132.00	87.00
0.2031	13/64		5.160	132.00	87.00
0.2047			5.200	132.00	87.00
0.2067			5.250	132.00	87.00
0.2087			5.300	132.00	87.00
0.2126			5.400	139.00	91.00
0.2165			5.500	139.00	91.00
0.2189	7/32		5.560	139.00	91.00
0.2205			5.600	139.00	91.00
0.2209		2	5.610	139.00	91.00
0.2244			5.700	139.00	91.00
0.2280		1	5.790	139.00	91.00
0.2283			5.800	139.00	91.00
0.2323			5.900	139.00	91.00
0.2362			6.000	139.00	91.00
0.2402			6.100	148.00	97.00
0.2441			6.200	148.00	97.00
0.2461		D	6.250	148.00	97.00
0.2480			6.300	148.00	97.00
0.2500	1/4	E	6.350	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2598			6.600	148.00	97.00
0.2638			6.700	148.00	97.00
0.2657	17/64	H	6.750	156.00	102.00
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2795			7.100	156.00	102.00
0.2811	9/32	K	7.140	156.00	102.00
0.2835			7.200	156.00	102.00
0.2874			7.300	156.00	102.00
0.2902		L	7.370	156.00	102.00
0.2913			7.400	156.00	102.00
0.2953			7.500	156.00	102.00
0.2969	19/64		7.540	165.00	109.00
0.3031			7.700	165.00	109.00
0.3071			7.800	165.00	109.00
0.3110			7.900	165.00	109.00
0.3126	5/16		7.940	165.00	109.00
0.3150			8.000	165.00	109.00
0.3189			8.100	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3268			8.300	165.00	109.00
0.3307			8.400	165.00	109.00
0.3346			8.500	165.00	109.00
0.3386			8.600	175.00	115.00
0.3425			8.700	175.00	115.00
0.3437	11/32		8.730	175.00	115.00
0.3465			8.800	175.00	115.00
0.3504			8.900	175.00	115.00
0.3543			9.000	175.00	115.00
0.3583			9.100	175.00	115.00
0.3594	23/64		9.130	175.00	115.00
0.3622			9.200	175.00	115.00
0.3661			9.300	175.00	115.00
0.3701			9.400	175.00	115.00
0.3740			9.500	175.00	115.00
0.3748	3/8		9.520	184.00	121.00
0.3780			9.600	184.00	121.00
0.3819			9.700	184.00	121.00
0.3858		W	9.800	184.00	121.00
0.3898			9.900	184.00	121.00
0.3906	25/64		9.920	184.00	121.00
0.3937			10.000	184.00	121.00
0.4016			10.200	184.00	121.00
0.4063	13/32		10.320	184.00	121.00
0.4134			10.500	184.00	121.00

To order: Series number + mm, ex. 5518 3.000

Series 667

Speeds & Feeds information pg 364

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4173			10.600	184.00	121.00
0.4220	27/64		10.720	195.00	128.00
0.4252			10.800	195.00	128.00
0.4331			11.000	195.00	128.00
0.4374	7/16		11.110	195.00	128.00
0.4528			11.500	195.00	128.00
0.4531	29/64		11.510	195.00	128.00
0.4689	15/32		11.910	205.00	134.00
0.4724			12.000	205.00	134.00
0.4921			12.500	205.00	134.00
0.5000	1/2		12.700	205.00	134.00
0.5118			13.000	205.00	134.00
0.5311	17/32		13.490	214.00	140.00
0.5315			13.500	214.00	140.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.5433			13.800	214.00	140.00
0.5469	35/64		13.890	214.00	140.00
0.5512			14.000	214.00	140.00
0.5626	9/16		14.290	220.00	144.00
0.5709			14.500	220.00	144.00
0.5780	37/64		14.680	220.00	144.00
0.5807			14.750	220.00	144.00
0.5906			15.000	220.00	144.00
0.5937	19/32		15.080	227.00	149.00
0.6094	39/64		15.480	227.00	149.00
0.6102			15.500	227.00	149.00
0.6248	5/8		15.870	227.00	149.00
0.6299			16.000	227.00	149.00
0.6496			16.500	235.00	154.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.6563	21/32		16.670	235.00	154.00
0.6594			16.750	235.00	154.00
0.6693			17.000	235.00	154.00
0.6874	11/16		17.460	241.00	158.00
0.7087			18.000	241.00	158.00
0.7185			18.250	247.00	162.00

Alternative Drill Series:

#217 HSS, GP, 10xD, 118 pt, Oxide
#317 Cobalt, GP, 10xD, 118 pt, Oxide
#617 Cobalt, Ti, 10xD, 130 pt, Bright
#669 Cobalt, Ti, 10xD, 130 pt, TiN

10xD

Ⓢ TiN coated

External Coolant

Straight Shank

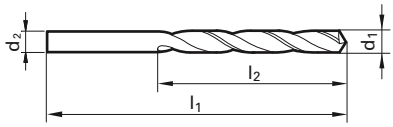
Speeds & Feeds information pg 364

Series 668

GT 100 Parabolic

HSS, GT 100 deep hole, taper length, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General SteelsBrass
- Aluminum & Alloys
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	56.00	33.00
0.0429		57	1.090	60.00	37.00
0.0433			1.100	60.00	37.00
0.0465		56	1.180	60.00	37.00
0.0469	3/64		1.190	65.00	41.00
0.0472			1.200	65.00	41.00
0.0512			1.300	65.00	41.00
0.0520		55	1.320	65.00	41.00
0.0551		54	1.400	70.00	45.00
0.0591			1.500	70.00	45.00
0.0594		53	1.510	76.00	50.00
0.0626	1/16		1.590	76.00	50.00
0.0630			1.600	76.00	50.00
0.0650			1.650	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0709			1.800	80.00	53.00
0.0728		49	1.850	80.00	53.00
0.0748			1.900	80.00	53.00
0.0760		48	1.930	85.00	56.00
0.0768			1.950	85.00	56.00
0.0780	5/64		1.980	85.00	56.00
0.0783		47	1.990	85.00	56.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0787			2.000	85.00	56.00
0.0811		46	2.060	85.00	56.00
0.0819		45	2.080	85.00	56.00
0.0827			2.100	85.00	56.00
0.0858		44	2.180	90.00	59.00
0.0866			2.200	90.00	59.00
0.0886			2.250	90.00	59.00
0.0890		43	2.260	90.00	59.00
0.0906			2.300	90.00	59.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0980		40	2.490	95.00	62.00
0.0984			2.500	95.00	62.00
0.0996		39	2.530	95.00	62.00
0.1016		38	2.580	95.00	62.00
0.1024			2.600	95.00	62.00
0.1039		37	2.640	95.00	62.00
0.1063			2.700	100.00	66.00
0.1067		36	2.710	100.00	66.00
0.1094	7/64		2.780	100.00	66.00
0.1102			2.800	100.00	66.00
0.1110		34	2.820	100.00	66.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1130		33	2.870	100.00	66.00
0.1142			2.900	100.00	66.00
0.1161		32	2.950	100.00	66.00
0.1181			3.000	100.00	66.00
0.1201		31	3.050	106.00	69.00
0.1220			3.100	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1299			3.300	106.00	69.00
0.1339			3.400	112.00	73.00
0.1358		29	3.450	112.00	73.00
0.1378			3.500	112.00	73.00
0.1406	9/64	28	3.570	112.00	73.00
0.1417			3.600	112.00	73.00
0.1457			3.700	112.00	73.00
0.1469		26	3.730	112.00	73.00
0.1496		25	3.800	119.00	78.00
0.1520		24	3.860	119.00	78.00
0.1524			3.870	119.00	78.00
0.1535			3.900	119.00	78.00
0.1563	5/32		3.970	119.00	78.00
0.1575			4.000	119.00	78.00

To order: Series number + mm, ex. 5518 3.000

Series 668

Speeds & Feeds information pg 364

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.1591		21	4.040	119.00	78.00
0.1610		20	4.090	119.00	78.00
0.1614			4.100	119.00	78.00
0.1654			4.200	119.00	78.00
0.1661		19	4.220	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1720	11/64		4.370	126.00	82.00
0.1732			4.400	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1811			4.600	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1874	3/16		4.760	132.00	87.00
0.1890		12	4.800	132.00	87.00
0.1909		11	4.850	132.00	87.00
0.1929			4.900	132.00	87.00
0.1933			4.910	132.00	87.00
0.1937		10	4.920	132.00	87.00
0.1969			5.000	132.00	87.00
0.1992		8	5.060	132.00	87.00
0.2008			5.100	132.00	87.00
0.2031	13/64		5.160	132.00	87.00
0.2047			5.200	132.00	87.00
0.2087			5.300	132.00	87.00
0.2091		4	5.310	139.00	91.00
0.2126			5.400	139.00	91.00
0.2165			5.500	139.00	91.00
0.2189	7/32		5.560	139.00	91.00
0.2205			5.600	139.00	91.00
0.2244			5.700	139.00	91.00
0.2283			5.800	139.00	91.00
0.2323			5.900	139.00	91.00
0.2343	15/64		5.950	139.00	91.00
0.2362			6.000	139.00	91.00
0.2378		B	6.040	148.00	97.00
0.2402			6.100	148.00	97.00
0.2421		C	6.150	148.00	97.00
0.2441			6.200	148.00	97.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.2461		D	6.250	148.00	97.00
0.2480			6.300	148.00	97.00
0.2500	1/4	E	6.350	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2571		F	6.530	148.00	97.00
0.2598			6.600	148.00	97.00
0.2638			6.700	148.00	97.00
0.2657	17/64	H	6.750	156.00	102.00
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2795			7.100	156.00	102.00
0.2811	9/32	K	7.140	156.00	102.00
0.2835			7.200	156.00	102.00
0.2854			7.250	156.00	102.00
0.2874			7.300	156.00	102.00
0.2913			7.400	156.00	102.00
0.2953			7.500	156.00	102.00
0.2992			7.600	165.00	109.00
0.3031			7.700	165.00	109.00
0.3071			7.800	165.00	109.00
0.3110			7.900	165.00	109.00
0.3126	5/16		7.940	165.00	109.00
0.3150			8.000	165.00	109.00
0.3189			8.100	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3268			8.300	165.00	109.00
0.3307			8.400	165.00	109.00
0.3319		Q	8.430	165.00	109.00
0.3346			8.500	165.00	109.00
0.3386			8.600	175.00	115.00
0.3390		R	8.610	175.00	115.00
0.3425			8.700	175.00	115.00
0.3437	11/32		8.730	175.00	115.00
0.3465			8.800	175.00	115.00
0.3504			8.900	175.00	115.00

Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.3543			9.000	175.00	115.00
0.3583			9.100	175.00	115.00
0.3594	23/64		9.130	175.00	115.00
0.3661			9.300	175.00	115.00
0.3677		U	9.340	175.00	115.00
0.3701			9.400	175.00	115.00
0.3740			9.500	175.00	115.00
0.3748	3/8		9.520	184.00	121.00
0.3780			9.600	184.00	121.00
0.3819			9.700	184.00	121.00
0.3858		W	9.800	184.00	121.00
0.3898			9.900	184.00	121.00
0.3906	25/64		9.920	184.00	121.00
0.3937			10.000	184.00	121.00
0.4016			10.200	184.00	121.00
0.4063	13/32		10.320	184.00	121.00
0.4134			10.500	184.00	121.00
0.4220	27/64		10.720	195.00	128.00
0.4331			11.000	195.00	128.00
0.4374	7/16		11.110	195.00	128.00
0.4528			11.500	195.00	128.00
0.4531	29/64		11.510	195.00	128.00
0.4689	15/32		11.910	205.00	134.00
0.4724			12.000	205.00	134.00
0.4843	31/64		12.300	205.00	134.00
0.4921			12.500	205.00	134.00
0.5000	1/2		12.700	205.00	134.00
0.5118			13.000	205.00	134.00
0.5157	33/64		13.100	205.00	134.00
0.5512			14.000	214.00	140.00

Alternative Drill Series:

#535 HSS, GT100, 10xD, 130 pt, Bright
#336 Cobalt, GT100, 10xD, 130 pt, Bright

10xD

Series 669

Type Ti

Cobalt, Type Ti, taper length, self-centering 130° split point, web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

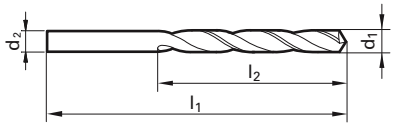
- Universal Steels
- Stainless Steels
- Hardened Materials
- Ti & Ni Alloys

(S) TiN Coated

External Coolant

Straight Shank

Speeds & Feeds information pg 365



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	56.00	33.00
0.0551		54	1.400	70.00	45.00
0.0591			1.500	70.00	45.00
0.0626	1/16		1.590	76.00	50.00
0.0630			1.600	76.00	50.00
0.0650			1.650	76.00	50.00
0.0669		51	1.700	76.00	50.00
0.0709			1.800	80.00	53.00
0.0748			1.900	80.00	53.00
0.0780	5/64		1.980	85.00	56.00
0.0787			2.000	85.00	56.00
0.0827			2.100	85.00	56.00
0.0866			2.200	90.00	59.00
0.0906			2.300	90.00	59.00
0.0937	3/32		2.380	95.00	62.00
0.0945			2.400	95.00	62.00
0.0984			2.500	95.00	62.00
0.1024			2.600	95.00	62.00
0.1063			2.700	100.00	66.00
0.1094	7/64		2.780	100.00	66.00
0.1102			2.800	100.00	66.00
0.1142			2.900	100.00	66.00
0.1181			3.000	100.00	66.00
0.1220			3.100	106.00	69.00
0.1248	1/8		3.170	106.00	69.00
0.1260			3.200	106.00	69.00
0.1280			3.250	106.00	69.00
0.1299			3.300	106.00	69.00
0.1339			3.400	112.00	73.00
0.1378			3.500	112.00	73.00
0.1406	9/64	28	3.570	112.00	73.00
0.1417			3.600	112.00	73.00
0.1457			3.700	112.00	73.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1496		25	3.800	119.00	78.00
0.1535			3.900	119.00	78.00
0.1563	5/32		3.970	119.00	78.00
0.1575			4.000	119.00	78.00
0.1614			4.100	119.00	78.00
0.1654			4.200	119.00	78.00
0.1693		18	4.300	126.00	82.00
0.1732			4.400	126.00	82.00
0.1772		16	4.500	126.00	82.00
0.1850		13	4.700	126.00	82.00
0.1874	3/16		4.760	132.00	87.00
0.1890		12	4.800	132.00	87.00
0.1929			4.900	132.00	87.00
0.1969			5.000	132.00	87.00
0.2008			5.100	132.00	87.00
0.2031	13/64		5.160	132.00	87.00
0.2047			5.200	132.00	87.00
0.2087			5.300	132.00	87.00
0.2165			5.500	139.00	91.00
0.2189	7/32		5.560	139.00	91.00
0.2205			5.600	139.00	91.00
0.2244			5.700	139.00	91.00
0.2283			5.800	139.00	91.00
0.2323			5.900	139.00	91.00
0.2362			6.000	139.00	91.00
0.2402			6.100	148.00	97.00
0.2441			6.200	148.00	97.00
0.2480			6.300	148.00	97.00
0.2500	1/4	E	6.350	148.00	97.00
0.2520			6.400	148.00	97.00
0.2559			6.500	148.00	97.00
0.2598			6.600	148.00	97.00
0.2638			6.700	148.00	97.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2657	17/64	H	6.750	156.00	102.00
0.2677			6.800	156.00	102.00
0.2717		I	6.900	156.00	102.00
0.2756			7.000	156.00	102.00
0.2795			7.100	156.00	102.00
0.2811	9/32	K	7.140	156.00	102.00
0.2874			7.300	156.00	102.00
0.2913			7.400	156.00	102.00
0.2953			7.500	156.00	102.00
0.2969	19/64		7.540	165.00	109.00
0.2992			7.600	165.00	109.00
0.3031			7.700	165.00	109.00
0.3071			7.800	165.00	109.00
0.3110			7.900	165.00	109.00
0.3126	5/16		7.940	165.00	109.00
0.3150			8.000	165.00	109.00
0.3228		P	8.200	165.00	109.00
0.3307			8.400	165.00	109.00
0.3346			8.500	165.00	109.00
0.3437	11/32		8.730	175.00	115.00
0.3543			9.000	175.00	115.00
0.3740			9.500	175.00	115.00
0.3748	3/8		9.520	184.00	121.00
0.3937			10.000	184.00	121.00

Alternative Drill Series:

#617 Cobalt, Ti, 10xD, 130 pt, Bright
#336 Cobalt, GT100, 10xD, 130 pt, Oxide
#535 HSS, GT100, 10xD, 130 pt, Oxide
#668 HSS, GT100, 10xD, 130 pt, TiN

To order: Series number + mm, ex. 5518 3.000

Extra Length #1

Ⓢ TiN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 365

Series 670

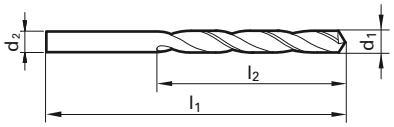
GT 100 Parabolic

HSS, GT 100 deep hole, extra length #1, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Universal Steels



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0780	5/64		1.980	125.00	85.00
0.0787			2.000	125.00	85.00
0.0827			2.100	125.00	85.00
0.0866			2.200	135.00	90.00
0.0906			2.300	135.00	90.00
0.0937	3/32		2.380	150.00	100.00
0.0945			2.400	150.00	100.00
0.0984			2.500	150.00	100.00
0.1102			2.800	150.00	100.00
0.1161		32	2.950	150.00	100.00
0.1181			3.000	150.00	100.00
0.1220			3.100	155.00	105.00
0.1248	1/8		3.170	155.00	105.00
0.1260			3.200	155.00	105.00
0.1268			3.220	155.00	105.00
0.1299			3.300	155.00	105.00
0.1378			3.500	165.00	115.00
0.1406	9/64	28	3.570	165.00	115.00
0.1417			3.600	165.00	115.00
0.1496		25	3.800	175.00	120.00
0.1535			3.900	175.00	120.00
0.1539		23	3.910	175.00	120.00
0.1563	5/32		3.970	175.00	120.00
0.1575			4.000	175.00	120.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1614			4.100	175.00	120.00
0.1654			4.200	175.00	120.00
0.1720	11/64		4.370	185.00	125.00
0.1772		16	4.500	185.00	125.00
0.1811			4.600	185.00	125.00
0.1874	3/16		4.760	195.00	135.00
0.1890		12	4.800	195.00	135.00
0.1969			5.000	195.00	135.00
0.2008			5.100	195.00	135.00
0.2031	13/64		5.160	195.00	135.00
0.2047			5.200	195.00	135.00
0.2165			5.500	205.00	140.00
0.2189	7/32		5.560	205.00	140.00
0.2362			6.000	205.00	140.00
0.2402			6.100	215.00	150.00
0.2441			6.200	215.00	150.00
0.2500	1/4	E	6.350	215.00	150.00
0.2559			6.500	215.00	150.00
0.2638			6.700	215.00	150.00
0.2756			7.000	225.00	155.00
0.2811	9/32	K	7.140	225.00	155.00
0.2953			7.500	225.00	155.00
0.2969	19/64		7.540	240.00	165.00
0.3126	5/16		7.940	240.00	165.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3150			8.000	240.00	165.00
0.3346			8.500	240.00	165.00
0.3386			8.600	250.00	175.00
0.3437	11/32		8.730	250.00	175.00
0.3465			8.800	250.00	175.00
0.3543			9.000	250.00	175.00
0.3740			9.500	250.00	175.00
0.3748	3/8		9.520	265.00	185.00
0.3906	25/64		9.920	265.00	185.00
0.3937			10.000	265.00	185.00
0.4331			11.000	280.00	195.00
0.4724			12.000	295.00	205.00
0.4921			12.500	295.00	205.00

Alternative Drill Series:

#618 Cobalt, GT100, >10xD, 130 pt, Bright
#502 HSS, GT100, >10xD, 130 pt, Bright
#524 HSS, GT50, >10xD, 130 pt, Bright
#235 HSS, GT100, >10xD, 118 pt, Oxide

Extra Length #2

(S) TiN coated

External Coolant

Straight Shank

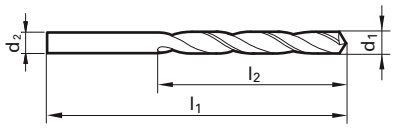
Speeds & Feeds information pg 366

Series 671

GT 100 Parabolic

HSS, GT 100 deep hole, extra length #2, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Aluminum & Alloys
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	190.00	130.00
0.1220			3.100	200.00	135.00
0.1248	1/8		3.170	200.00	135.00
0.1260			3.200	200.00	135.00
0.1339			3.400	210.00	145.00
0.1378			3.500	210.00	145.00
0.1406	9/64	28	3.570	210.00	145.00
0.1496		25	3.800	220.00	150.00
0.1563	5/32		3.970	220.00	150.00
0.1575			4.000	220.00	150.00
0.1610		20	4.090	220.00	150.00
0.1673			4.250	220.00	150.00
0.1720	11/64		4.370	235.00	160.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1732			4.400	235.00	160.00
0.1772		16	4.500	235.00	160.00
0.1811			4.600	235.00	160.00
0.1874	3/16		4.760	245.00	170.00
0.1890		12	4.800	245.00	170.00
0.1969			5.000	245.00	170.00
0.2008			5.100	245.00	170.00
0.2087			5.300	245.00	170.00
0.2165			5.500	260.00	180.00
0.2189	7/32		5.560	260.00	180.00
0.2343	15/64		5.950	260.00	180.00
0.2362			6.000	260.00	180.00
0.2402			6.100	275.00	190.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2500	1/4	E	6.350	275.00	190.00
0.2520			6.400	275.00	190.00
0.2559			6.500	275.00	190.00
0.2677			6.800	290.00	200.00
0.2756			7.000	290.00	200.00
0.2953			7.500	290.00	200.00
0.3126	5/16		7.940	305.00	210.00
0.3150			8.000	305.00	210.00

Alternative Drill Series:

#503 HSS, GT100, >10xD, 130 pt, Bright
#619 Cobalt, GT100, >10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

3xD

Bright finish

External Coolant

Straight Shank

Speeds & Feeds information pg 366

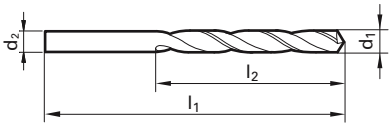
GUHRING Select

Series 730

General Purpose

DK 460 UF Carbide, general purpose (Type N), stub length, 118° faceted point, Form A web thinned >2.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h7 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- General Steels/Brass
- Cast Iron
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0197			0.500	20.00	3.00
0.0236			0.600	21.00	3.50
0.0276			0.700	23.00	4.50
0.0315			0.800	24.00	5.00
0.0354			0.900	25.00	5.50
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0409		59	1.040	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0469	3/64		1.190	28.00	7.00
0.0472			1.200	28.00	7.00
0.0512			1.300	28.00	7.00
0.0520		55	1.320	30.00	8.00
0.0551		54	1.400	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	38.00	12.00
0.0781	5/64		1.980	38.00	12.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0811		46	2.060	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0827			2.100	38.00	12.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0886			2.250	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0933		42	2.370	43.00	14.00
0.0938	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0980		40	2.490	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1098		35	2.790	46.00	16.00
0.1102			2.800	46.00	16.00
0.1110		34	2.820	46.00	16.00
0.1130		33	2.870	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00
0.1200			3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1360		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64		3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1441		27	3.660	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1520		24	3.860	55.00	22.00
0.1535			3.900	55.00	22.00
0.1539		23	3.910	55.00	22.00
0.1562	5/32		3.970	55.00	22.00
0.1571		22	3.990	55.00	22.00
0.1575			4.000	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1661		19	4.220	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1719	11/64		4.370	58.00	24.00
0.1730		17	4.390	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1799		15	4.570	58.00	24.00
0.1811			4.600	58.00	24.00
0.1819		14	4.620	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1875	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1910		11	4.850	62.00	26.00
0.1929			4.900	62.00	26.00
0.1935		10	4.920	62.00	26.00
0.1961		9	4.980	62.00	26.00
0.1969			5.000	62.00	26.00
0.1992		8	5.060	62.00	26.00
0.2008			5.100	62.00	26.00
0.2012		7	5.110	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2039		6	5.180	62.00	26.00
0.2047			5.200	62.00	26.00
0.2055		5	5.220	62.00	26.00
0.2087			5.300	62.00	26.00
0.2091		4	5.310	66.00	28.00
0.2126			5.400	66.00	28.00
0.2130		3	5.410	66.00	28.00
0.2165			5.500	66.00	28.00
0.2188	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2205			5.620	66.00	28.00
0.2244			5.700	66.00	28.00
0.2280		1	5.790	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2338			5.940	66.00	28.00
0.2344	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2377			6.040	70.00	31.00
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2441			6.200	70.00	31.00
0.2461		D	6.250	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2570			6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2610		G	6.630	70.00	31.00
0.2638			6.700	74.00	34.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2768		J	7.030	74.00	34.00
0.2795			7.100	74.00	34.00
0.2812	9/32		7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2949		M	7.490	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.2992			7.600	79.00	37.00
0.3019			7.670	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3161		O	8.030	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3281	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3319		Q	8.430	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes! (Available Spring 2010)

Series 730

Speeds & Feeds information pg 366

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3390		R	8.610	84.00	40.00
0.3425			8.700	84.00	40.00
0.3438	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3480		S	8.840	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3578			9.090	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3661			9.300	84.00	40.00
0.3677		U	9.340	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3772		V	9.580	89.00	43.00
0.3780			9.600	89.00	43.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3819			9.700	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.3969		X	10.080	89.00	43.00
0.4016			10.200	89.00	43.00
0.4039		Y	10.260	89.00	43.00
0.4055			10.300	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4130		Z	10.490	89.00	43.00
0.4134			10.500	89.00	43.00
0.4220	27/64		10.720	95.00	47.00
0.4331			11.000	95.00	47.00
0.4375	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4688	15/32		11.910	102.00	51.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4724			12.000	102.00	51.00
0.4844	31/64		12.300	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5311	17/32		13.490	107.00	54.00
0.5512			14.000	107.00	54.00
0.5626	9/16		14.290	111.00	56.00
0.5906			15.000	111.00	56.00
0.6248	5/8		15.870	115.00	58.00
0.6299			16.000	115.00	58.00

Alternative Drill Series:

#2463 Carbide, GP, 3xD, 118 pt, FIREX
#5521 PM Cobalt, GT500, 3xD, 130 pt, TiN
#515 PM Cobalt, GT500, 3xD, 130 pt, FIREX
#329 Cobalt, GV120, 3xD, 130 pt, Oxide

5xD

Bright finish

External Coolant

Straight Shank

Speeds & Feeds information pg 367

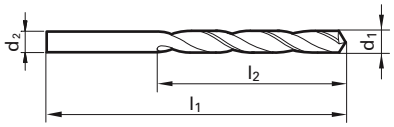
GUHRING Select

Series 732

General Purpose

DK 460 UF carbide, general purpose (Type N), jobber length, 118° faceted point, Form A web thinned >2.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h7 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- General Steels/Brass
- Cast Iron
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0551		54	1.400	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	40.00	18.00
0.0626	1/16		1.590	40.00	18.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0669		51	1.700	43.00	20.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0961		41	2.440	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00

Red indicates NEW sizes! (Available Spring 2010)

To order: Series number + mm, ex. 5518 3.000

Series 732

Speeds & Feeds information pg 367

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1562	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2130		3	5.410	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2244			5.700	93.00	57.00
0.2280		1	5.790	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2378		B	6.040	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2610		G	6.630	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2949		M	7.490	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3020		N	7.670	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3390		R	8.610	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3772		V	9.580	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3969		X	10.080	133.00	87.00
0.4016			10.200	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4055			10.300	133.00	87.00
0.4062	13/32		10.320	133.00	87.00
0.4130		Z	10.490	133.00	87.00
0.4134			10.500	133.00	87.00
0.4220	27/64		10.720	142.00	94.00
0.4331			11.000	142.00	94.00
0.4375	7/16		11.110	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4688	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.5000	1/2		12.700	151.00	101.00

Alternative Drill Series:

#2464 Carbide, GP, 118 pt, FIREX Coated
#2601 Carbide, GT100, 130 pt, Bright
#2602 Carbide, GT100, 130 pt, TiN

4xD

Bright finish

Coolant Through

Reinforced Straight Shank

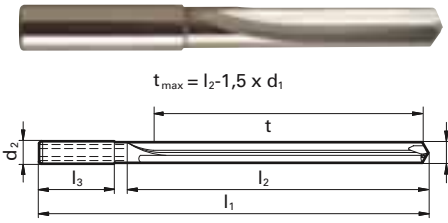
Speeds & Feeds information pg 367

Series 768

RT 150 GG

DK 460 UF Carbide, RT 150 GG straight flute high penetration, 4xD, 120° point, Specal web thinned all dia., reinforced straight shank, RH cut

Cut Dia. = m7 tolerance range, Shank Dia. = h6



Application Materials:

- Aluminum & Alloys
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	24.00
0.1220			3.100	6.000	66.00	24.00
0.1260			3.200	6.000	66.00	24.00
0.1299			3.300	6.000	66.00	24.00
0.1339			3.400	6.000	66.00	24.00
0.1378			3.500	6.000	66.00	24.00
0.1417			3.600	6.000	66.00	24.00
0.1457			3.700	6.000	66.00	24.00
0.1496		25	3.800	6.000	74.00	30.00
0.1535			3.900	6.000	74.00	30.00
0.1575			4.000	6.000	74.00	30.00
0.1614			4.100	6.000	74.00	30.00
0.1654			4.200	6.000	74.00	30.00
0.1693		18	4.300	6.000	74.00	30.00
0.1732			4.400	6.000	74.00	30.00
0.1772		16	4.500	6.000	74.00	30.00
0.1811			4.600	6.000	74.00	30.00
0.1850		13	4.700	6.000	74.00	30.00
0.1890		12	4.800	6.000	74.00	36.00
0.1929			4.900	6.000	74.00	36.00
0.1969			5.000	6.000	74.00	36.00
0.2008			5.100	6.000	74.00	36.00
0.2031	13/64		5.160	6.000	74.00	36.00
0.2047			5.200	6.000	74.00	36.00
0.2087			5.300	6.000	74.00	36.00
0.2126			5.400	6.000	74.00	36.00
0.2165			5.500	6.000	74.00	36.00
0.2189	7/32		5.560	6.000	74.00	36.00
0.2205			5.600	6.000	74.00	36.00
0.2244			5.700	6.000	74.00	36.00
0.2283			5.800	6.000	74.00	36.00
0.2323			5.900	6.000	74.00	36.00
0.2343	15/64		5.950	6.000	74.00	36.00
0.2362			6.000	6.000	74.00	36.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2480			6.300	8.000	91.00	53.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2598			6.600	8.000	91.00	53.00
0.2638			6.700	8.000	91.00	53.00
0.2657	17/64	H	6.750	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717		I	6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00
0.2795			7.100	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2835			7.200	8.000	91.00	53.00
0.2874			7.300	8.000	91.00	53.00
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.2969	19/64		7.540	8.000	91.00	53.00
0.2992			7.600	8.000	91.00	53.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.3031			7.700	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3110			7.900	8.000	91.00	53.00
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00
0.3268			8.300	10.000	103.00	61.00
0.3280	21/64		8.330	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3465			8.800	10.000	103.00	61.00
0.3504			8.900	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3583			9.100	10.000	103.00	61.00
0.3594	23/64		9.130	10.000	103.00	61.00
0.3622			9.200	10.000	103.00	61.00
0.3661			9.300	10.000	103.00	61.00
0.3701			9.400	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3780			9.600	10.000	103.00	61.00
0.3819			9.700	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3898			9.900	10.000	103.00	61.00
0.3906	25/64		9.920	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.4016			10.200	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4220	27/64		10.720	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4409			11.200	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4531	29/64		11.510	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4843	31/64		12.300	14.000	124.00	74.00
0.4921			12.500	14.000	124.00	74.00
0.5000	1/2		12.700	14.000	124.00	74.00
0.5118			13.000	14.000	124.00	74.00
0.5315			13.500	14.000	124.00	74.00
0.5512			14.000	14.000	124.00	74.00
0.5709			14.500	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6496			16.500	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00

To order: Series number + mm, ex. 5518 3.000

Series 768

Speeds & Feeds information pg 367

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.7087			18.000	18.000	143.00	93.00
0.7283			18.500	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#769 Carbide, RT150GG, 7xD, 120 pt, Bright
#6068 K20 Carbide, RT150GG, 4xD,130 pt, Bright
#1183 Carbide, RT100, 5xD, 140 U pt, TiN

7xD

Bright finish

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 368

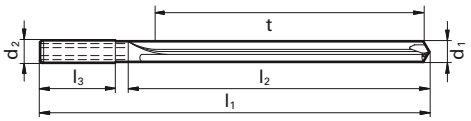
Series 769

RT 150 GG

DK 460 UF Carbide, RT 150 GG straight flute high penetration, 7xD, 120° point, Specal web thinned all dia., reinforced straight shank, RH cut

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



Application Materials:

Aluminum & Alloys

Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	74.00	36.00
0.1220			3.100	6.000	74.00	36.00
0.1260			3.200	6.000	74.00	36.00
0.1299			3.300	6.000	74.00	36.00
0.1339			3.400	6.000	74.00	36.00
0.1378			3.500	6.000	74.00	36.00
0.1417			3.600	6.000	74.00	36.00
0.1457			3.700	6.000	74.00	36.00
0.1496		25	3.800	6.000	97.00	45.00
0.1535			3.900	6.000	97.00	45.00
0.1575			4.000	6.000	97.00	45.00
0.1614			4.100	6.000	97.00	45.00
0.1654			4.200	6.000	97.00	45.00
0.1693		18	4.300	6.000	97.00	45.00
0.1732			4.400	6.000	97.00	45.00
0.1772		16	4.500	6.000	97.00	45.00
0.1850		13	4.700	6.000	97.00	45.00
0.1890		12	4.800	6.000	97.00	57.00
0.1929			4.900	6.000	97.00	57.00
0.1969			5.000	6.000	97.00	57.00
0.2031	13/64		5.160	6.000	97.00	57.00
0.2165			5.500	6.000	97.00	57.00
0.2362			6.000	6.000	97.00	57.00
0.2500	1/4	E	6.350	8.000	116.00	76.00
0.2559			6.500	8.000	116.00	76.00
0.2677			6.800	8.000	116.00	76.00
0.2756			7.000	8.000	116.00	76.00
0.2811	9/32	K	7.140	8.000	116.00	76.00
0.2953			7.500	8.000	116.00	76.00
0.3071			7.800	8.000	116.00	76.00
0.3126	5/16		7.940	8.000	116.00	76.00
0.3150			8.000	8.000	116.00	76.00
0.3280	21/64		8.330	10.000	139.00	95.00
0.3346			8.500	10.000	139.00	95.00
0.3437	11/32		8.730	10.000	139.00	95.00
0.3543			9.000	10.000	139.00	95.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.3594	23/64		9.130	10.000	139.00	95.00
0.3740			9.500	10.000	139.00	95.00
0.3748	3/8		9.520	10.000	139.00	95.00
0.3937			10.000	10.000	139.00	95.00
0.4016			10.200	12.000	163.00	114.00
0.4063	13/32		10.320	12.000	163.00	114.00
0.4134			10.500	12.000	163.00	114.00
0.4220	27/64		10.720	12.000	163.00	114.00
0.4331			11.000	12.000	163.00	114.00
0.4374	7/16		11.110	12.000	163.00	114.00
0.4528			11.500	12.000	163.00	114.00
0.4531	29/64		11.510	12.000	163.00	114.00
0.4724			12.000	12.000	163.00	114.00
0.4843	31/64		12.300	14.000	182.00	133.00
0.4921			12.500	14.000	182.00	133.00
0.5000	1/2		12.700	14.000	182.00	133.00
0.5118			13.000	14.000	182.00	133.00
0.5315			13.500	14.000	182.00	133.00
0.5512			14.000	14.000	182.00	133.00
0.5709			14.500	16.000	204.00	152.00
0.5906			15.000	16.000	204.00	152.00
0.6102			15.500	16.000	204.00	152.00
0.6299			16.000	16.000	204.00	152.00
0.6496			16.500	18.000	223.00	171.00
0.6693			17.000	18.000	223.00	171.00
0.6890			17.500	18.000	223.00	171.00
0.7087			18.000	18.000	223.00	171.00
0.7283			18.500	20.000	244.00	190.00
0.7480			19.000	20.000	244.00	190.00
0.7677			19.500	20.000	244.00	190.00
0.7874			20.000	20.000	244.00	190.00

Alternative Drill Series:

#768 Carbide,RT150GG, 4xD, 120 pt, Bright
#6069 Carbide,RT150GG, 4xD, 130 pt, Bright
#5512 Carbide, RT100, 7xD, 140 pt, FIREX

To order: Series number + mm, ex. 5518 3.000

15xD

Series 773

RT 150 GN, Negative Helix

DK 460 UF Carbide, RT 150 GG straight flute high penetration, 15xD, 120° point, special web thin, reinforced straight shank, LH helix, RH cut

Cut Dia. = m7 tolerance range, Shank Dia. = h6

Application Materials:

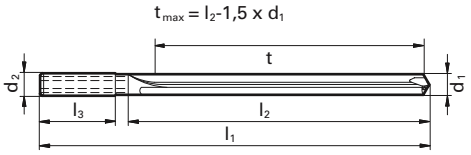
- Aluminum & Alloys
- Cast Iron

Bright finish

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 368



Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1969			5.000	6.000	145.00	105.00
0.2362			6.000	6.000	145.00	105.00
0.3150			8.000	8.000	180.00	137.00
0.3543			9.000	10.000	217.00	170.00
0.3937			10.000	10.000	217.00	170.00
0.4331			11.000	12.000	258.00	205.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4724			12.000	12.000	258.00	205.00
0.5512			14.000	14.000	290.00	236.00

Alternative Drill Series:

#5513 Carbide, RT150GG, 10xD, 120 pt, Bright
#503 HSS, GT100, >10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

5xD

Diamond Coated

External Coolant

Straight Shank

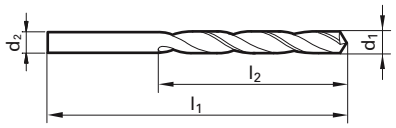
Contact Tech Support for feeds & speeds

Series 1068

90° Jobber Drill for Composite Materials

Carbide, 90° faceted point geometry, diamond coated tip

Diameter tolerance -.0005" / Shank tolerance h6



$d_1 = d_2$

Application Materials:

Composites

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0980			2.489	43.00	14.00
0.1285			3.264	49.00	18.00
0.1420			3.607	52.00	20.00
0.1665		19*	4.229	58.00	24.00
0.1734		17*	4.404	58.00	24.00
0.1915			4.864	62.00	26.00
0.2220			5.639	66.00	28.00
0.2510	1/4*		6.375	70.00	31.00
0.3135	5/16*		7.963	79.00	37.00
0.3760	3/8*		9.550	89.00	43.00
0.4385	7/16*		11.138	95.00	47.00
0.5010	1/2*		12.725	102.00	51.00

*Approximate final hole size

Material-specific design and grade to machine carbon fiber-reinforced polymer (CFRP) composite materials by minimizing delamination and increasing tool life.

Special 90° point angle increases hole quality, with low thrust and improved hole quality.

Diamond coated for resistance to abrasion wear. Combination of point design, substrate, and coating provides longer tool life with substantially less cutting force.

Coming in Spring 2010: Carbide Ultra Drills as stocked standards

4-flute drills for hand and machine drilling, designed for carbon, glass fiber materials and laminated composites. This tool can be used for enlarging existing holes in skin panels or drilling from solid.

Achieve a reamer-class finish with maximum heat dispersement while drilling. Contact Technical Support at (800) 776-6170 for further information.

5xD

Bright finish

Coolant Through

Reinforced Straight Shank w/Whistle Notch

Speeds & Feeds information pg 370

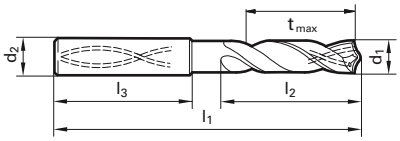
Series 1131

GT 80 Parabolic

Cobalt, GT 80 IC, jobber length, 130° point, special web thinned all dia., reinforced straight shank w/whistle notch, RH helix

Cut / Shank Dia. = h8 tolerance range

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



Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1969			5.000	6.000	82.00	44.00
0.2165			5.500	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3346			8.500	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.4016			10.200	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4921			12.500	14.000	124.00	77.00
0.5000	1/2		12.700	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5311	17/32		13.490	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5626	9/16		14.290	16.000	133.00	83.00
0.5709			14.500	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.5937	19/32		15.080	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6248	5/8		15.870	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6496			16.500	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7283			18.500	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#1132 Cobalt, GT80IC, 5xD, 130 pt, TiN

To order: Series number + mm, ex. 5518 3.000

5xD

Series 1132

GT 80 Parabolic

Cobalt, GT 80 IC, jobber length, 130° point, Specal web thinned all dia., reinforced straight shank w/whistle notch, RH helix

Application Materials:

- Hardened Materials
- Universal Steels
- Stainless Steels
- Cast Iron

(S) TiN coated

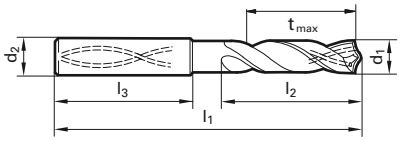
Coolant Through

Reinforced Straight Shank w/Whistle Notch

Speeds & Feeds information pg 371

Cut / Shank Dia. = h8 tolerance range

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



Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1969			5.000	6.000	82.00	44.00
0.2165			5.500	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3346			8.500	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.4016			10.200	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4921			12.500	14.000	124.00	77.00
0.5000	1/2		12.700	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5311	17/32		13.490	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5626	9/16		14.290	16.000	133.00	83.00
0.5709			14.500	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.5937	19/32		15.080	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6248	5/8		15.870	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6496			16.500	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7283			18.500	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#1131 Cobalt, GT80IC, 5xD, 130 pt, Bright

5xD

Series 1183

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 5xD, self-centering 140° SU point, reinforced straight shank w/whistle notch, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Cast Iron

(S) TiN coated

Coolant Through

Reinforced Straight Shank w/Whistle Notch

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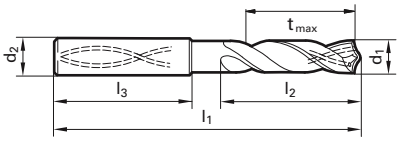
$t_{max} = l_2 - 1{,}5 \times d_1$



Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	28.00
0.1220			3.100	6.000	66.00	28.00
0.1260			3.200	6.000	66.00	28.00
0.1299			3.300	6.000	66.00	28.00
0.1339			3.400	6.000	66.00	28.00
0.1378			3.500	6.000	66.00	28.00
0.1417			3.600	6.000	66.00	28.00
0.1457			3.700	6.000	66.00	28.00
0.1496		25	3.800	6.000	74.00	36.00
0.1535			3.900	6.000	74.00	36.00
0.1575			4.000	6.000	74.00	36.00
0.1614			4.100	6.000	74.00	36.00
0.1654			4.200	6.000	74.00	36.00
0.1693		18	4.300	6.000	74.00	36.00
0.1720	11/64		4.370	6.000	74.00	36.00
0.1732			4.400	6.000	74.00	36.00
0.1772		16	4.500	6.000	74.00	36.00
0.1811			4.600	6.000	74.00	36.00
0.1830			4.650	6.000	74.00	36.00
0.1850		13	4.700	6.000	74.00	36.00
0.1874	3/16		4.760	6.000	82.00	44.00
0.1890		12	4.800	6.000	82.00	44.00
0.1929			4.900	6.000	82.00	44.00
0.1969			5.000	6.000	82.00	44.00
0.2008			5.100	6.000	82.00	44.00
0.2031	13/64		5.160	6.000	82.00	44.00
0.2047			5.200	6.000	82.00	44.00
0.2087			5.300	6.000	82.00	44.00
0.2126			5.400	6.000	82.00	44.00
0.2165			5.500	6.000	82.00	44.00
0.2189	7/32		5.560	6.000	82.00	44.00
0.2205			5.600	6.000	82.00	44.00
0.2244			5.700	6.000	82.00	44.00
0.2283			5.800	6.000	82.00	44.00
0.2323			5.900	6.000	82.00	44.00
0.2343	15/64		5.950	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2480			6.300	8.000	91.00	53.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2598			6.600	8.000	91.00	53.00
0.2638			6.700	8.000	91.00	53.00
0.2657	17/64	H	6.750	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717		I	6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00
0.2795			7.100	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2835			7.200	8.000	91.00	53.00
0.2874			7.300	8.000	91.00	53.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.2969	19/64		7.540	8.000	91.00	53.00
0.2992			7.600	8.000	91.00	53.00
0.3031			7.700	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3110			7.900	8.000	91.00	53.00
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00
0.3268			8.300	10.000	103.00	61.00
0.3280	21/64		8.330	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3465			8.800	10.000	103.00	61.00
0.3504			8.900	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3583			9.100	10.000	103.00	61.00
0.3594	23/64		9.130	10.000	103.00	61.00
0.3622			9.200	10.000	103.00	61.00
0.3661			9.300	10.000	103.00	61.00
0.3701			9.400	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3780			9.600	10.000	103.00	61.00
0.3819			9.700	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3898			9.900	10.000	103.00	61.00
0.3906	25/64		9.920	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.3976			10.100	12.000	118.00	71.00
0.4016			10.200	12.000	118.00	71.00
0.4055			10.300	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4094			10.400	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4173			10.600	12.000	118.00	71.00
0.4213			10.700	12.000	118.00	71.00
0.4220	27/64		10.720	12.000	118.00	71.00
0.4252			10.800	12.000	118.00	71.00
0.4291			10.900	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4370			11.100	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4409			11.200	12.000	118.00	71.00
0.4449			11.300	12.000	118.00	71.00
0.4488			11.400	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4531	29/64		11.510	12.000	118.00	71.00

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

Series 1183

Speeds & Feeds information pg 371

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4567			11.600	12.000	118.00	71.00
0.4606			11.700	12.000	118.00	71.00
0.4646			11.800	12.000	118.00	71.00
0.4685			11.900	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4764			12.100	14.000	124.00	77.00
0.4803			12.200	14.000	124.00	77.00
0.4843	31/64		12.300	14.000	124.00	77.00
0.4882			12.400	14.000	124.00	77.00
0.4921			12.500	14.000	124.00	77.00
0.4961			12.600	14.000	124.00	77.00
0.5000	1/2		12.700	14.000	124.00	77.00
0.5039			12.800	14.000	124.00	77.00
0.5079			12.900	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5157	33/64		13.100	14.000	124.00	77.00
0.5197			13.200	14.000	124.00	77.00
0.5236			13.300	14.000	124.00	77.00
0.5276			13.400	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5354			13.600	14.000	124.00	77.00
0.5394			13.700	14.000	124.00	77.00
0.5433			13.800	14.000	124.00	77.00
0.5469	35/64		13.890	14.000	124.00	77.00
0.5472			13.900	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5551			14.100	16.000	133.00	83.00
0.5591			14.200	16.000	133.00	83.00
0.5626	9/16		14.290	16.000	133.00	83.00
0.5630			14.300	16.000	133.00	83.00
0.5669			14.400	16.000	133.00	83.00
0.5709			14.500	16.000	133.00	83.00
0.5748			14.600	16.000	133.00	83.00
0.5780	37/64		14.680	16.000	133.00	83.00
0.5787			14.700	16.000	133.00	83.00
0.5827			14.800	16.000	133.00	83.00
0.5866			14.900	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.5945			15.100	16.000	133.00	83.00
0.5984			15.200	16.000	133.00	83.00
0.6024			15.300	16.000	133.00	83.00
0.6063			15.400	16.000	133.00	83.00
0.6094	39/64		15.480	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6142			15.600	16.000	133.00	83.00
0.6181			15.700	16.000	133.00	83.00
0.6220			15.800	16.000	133.00	83.00
0.6248	5/8		15.870	16.000	133.00	83.00
0.6260			15.900	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6339			16.100	18.000	143.00	93.00
0.6378			16.200	18.000	143.00	93.00
0.6406	41/64		16.270	18.000	143.00	93.00
0.6417			16.300	18.000	143.00	93.00
0.6457			16.400	18.000	143.00	93.00
0.6496			16.500	18.000	143.00	93.00
0.6535			16.600	18.000	143.00	93.00
0.6575			16.700	18.000	143.00	93.00
0.6614			16.800	18.000	143.00	93.00
0.6654			16.900	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6720	43/64		17.070	18.000	143.00	93.00
0.6732			17.100	18.000	143.00	93.00
0.6772			17.200	18.000	143.00	93.00
0.6811			17.300	18.000	143.00	93.00
0.6850			17.400	18.000	143.00	93.00
0.6874	11/16		17.460	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.6929			17.600	18.000	143.00	93.00
0.6969			17.700	18.000	143.00	93.00
0.7008			17.800	18.000	143.00	93.00
0.7031	45/64		17.860	18.000	143.00	93.00
0.7047			17.900	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7126			18.100	20.000	153.00	101.00
0.7165			18.200	20.000	153.00	101.00
0.7205			18.300	20.000	153.00	101.00
0.7244			18.400	20.000	153.00	101.00
0.7283			18.500	20.000	153.00	101.00
0.7323			18.600	20.000	153.00	101.00
0.7343	47/64		18.650	20.000	153.00	101.00
0.7362			18.700	20.000	153.00	101.00
0.7402			18.800	20.000	153.00	101.00
0.7441			18.900	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7500	3/4		19.050	20.000	153.00	101.00
0.7520			19.100	20.000	153.00	101.00
0.7559			19.200	20.000	153.00	101.00
0.7598			19.300	20.000	153.00	101.00
0.7657	49/64		19.450	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7717			19.600	20.000	153.00	101.00
0.7756			19.700	20.000	153.00	101.00
0.7795			19.800	20.000	153.00	101.00
0.7835			19.900	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#5511 Carbide, RT100, 5xD, 140 U pt, FIREX
#1662 Carbide, RT100, 5xD, 140 F pt, TiN
#1243 Carbide, RT100, 5xD, 140 U pt, TiN
#5515 Carbide, RT100, 5xD, 140 U pt, FIREX

3xD

Series 1184

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 3xD, self-centering 140° SU point, reinforced straight shank with whistle notch, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

Application Materials:

- Universal Steels
- General Steels/Brass
- Cast Iron

(S) TiN coated

External Coolant

Reinforced Straight Shank w/Whistle Notch

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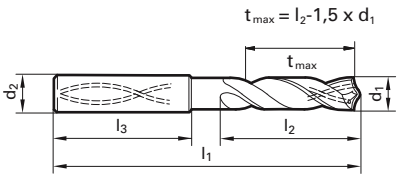


Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	62.00	20.00
0.1220			3.100	6.000	62.00	20.00
0.1248	1/8		3.170	6.000	62.00	20.00
0.1260			3.200	6.000	62.00	20.00
0.1299			3.300	6.000	62.00	20.00
0.1339			3.400	6.000	62.00	20.00
0.1378			3.500	6.000	62.00	20.00
0.1406	9/64	28	3.570	6.000	62.00	20.00
0.1417			3.600	6.000	62.00	20.00
0.1457			3.700	6.000	62.00	20.00
0.1496		25	3.800	6.000	66.00	24.00
0.1535			3.900	6.000	66.00	24.00
0.1563	5/32		3.970	6.000	66.00	24.00
0.1575			4.000	6.000	66.00	24.00
0.1614			4.100	6.000	66.00	24.00
0.1654			4.200	6.000	66.00	24.00
0.1693		18	4.300	6.000	66.00	24.00
0.1720	11/64		4.370	6.000	66.00	24.00
0.1732			4.400	6.000	66.00	24.00
0.1772		16	4.500	6.000	66.00	24.00
0.1811			4.600	6.000	66.00	24.00
0.1850		13	4.700	6.000	66.00	24.00
0.1874	3/16		4.760	6.000	66.00	28.00
0.1890		12	4.800	6.000	66.00	28.00
0.1929			4.900	6.000	66.00	28.00
0.1969			5.000	6.000	66.00	28.00
0.2008			5.100	6.000	66.00	28.00
0.2031	13/64		5.160	6.000	66.00	28.00
0.2047			5.200	6.000	66.00	28.00
0.2087			5.300	6.000	66.00	28.00
0.2126			5.400	6.000	66.00	28.00
0.2165			5.500	6.000	66.00	28.00
0.2189	7/32		5.560	6.000	66.00	28.00
0.2205			5.600	6.000	66.00	28.00
0.2244			5.700	6.000	66.00	28.00
0.2283			5.800	6.000	66.00	28.00
0.2323			5.900	6.000	66.00	28.00
0.2343	15/64		5.950	6.000	66.00	28.00
0.2362			6.000	6.000	66.00	28.00
0.2402			6.100	8.000	79.00	34.00
0.2441			6.200	8.000	79.00	34.00
0.2480			6.300	8.000	79.00	34.00
0.2500	1/4	E	6.350	8.000	79.00	34.00
0.2520			6.400	8.000	79.00	34.00
0.2559			6.500	8.000	79.00	34.00
0.2598			6.600	8.000	79.00	34.00
0.2638			6.700	8.000	79.00	34.00
0.2657	17/64	H	6.750	8.000	79.00	34.00
0.2677			6.800	8.000	79.00	34.00
0.2717		I	6.900	8.000	79.00	34.00
0.2756			7.000	8.000	79.00	34.00
0.2795			7.100	8.000	79.00	41.00
0.2811	9/32	K	7.140	8.000	79.00	41.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2835			7.200	8.000	79.00	41.00
0.2874			7.300	8.000	79.00	41.00
0.2913			7.400	8.000	79.00	41.00
0.2953			7.500	8.000	79.00	41.00
0.2969	19/64		7.540	8.000	79.00	41.00
0.2992			7.600	8.000	79.00	41.00
0.3031			7.700	8.000	79.00	41.00
0.3071			7.800	8.000	79.00	41.00
0.3110			7.900	8.000	79.00	41.00
0.3126	5/16		7.940	8.000	79.00	41.00
0.3150			8.000	8.000	79.00	41.00
0.3189			8.100	10.000	89.00	47.00
0.3228		P	8.200	10.000	89.00	47.00
0.3268			8.300	10.000	89.00	47.00
0.3280	21/64		8.330	10.000	89.00	47.00
0.3307			8.400	10.000	89.00	47.00
0.3346			8.500	10.000	89.00	47.00
0.3386			8.600	10.000	89.00	47.00
0.3425			8.700	10.000	89.00	47.00
0.3437	11/32		8.730	10.000	89.00	47.00
0.3465			8.800	10.000	89.00	47.00
0.3504			8.900	10.000	89.00	47.00
0.3543			9.000	10.000	89.00	47.00
0.3583			9.100	10.000	89.00	47.00
0.3594	23/64		9.130	10.000	89.00	47.00
0.3622			9.200	10.000	89.00	47.00
0.3661			9.300	10.000	89.00	47.00
0.3701			9.400	10.000	89.00	47.00
0.3740			9.500	10.000	89.00	47.00
0.3748	3/8		9.520	10.000	89.00	47.00
0.3780			9.600	10.000	89.00	47.00
0.3819			9.700	10.000	89.00	47.00
0.3858		W	9.800	10.000	89.00	47.00
0.3898			9.900	10.000	89.00	47.00
0.3906	25/64		9.920	10.000	89.00	47.00
0.3937			10.000	10.000	89.00	47.00
0.3976			10.100	12.000	102.00	55.00
0.4016			10.200	12.000	102.00	55.00
0.4055			10.300	12.000	102.00	55.00
0.4063	13/32		10.320	12.000	102.00	55.00
0.4094			10.400	12.000	102.00	55.00
0.4134			10.500	12.000	102.00	55.00
0.4173			10.600	12.000	102.00	55.00
0.4213			10.700	12.000	102.00	55.00
0.4220	27/64		10.720	12.000	102.00	55.00
0.4252			10.800	12.000	102.00	55.00
0.4291			10.900	12.000	102.00	55.00
0.4331			11.000	12.000	102.00	55.00
0.4370			11.100	12.000	102.00	55.00
0.4374	7/16		11.110	12.000	102.00	55.00
0.4409			11.200	12.000	102.00	55.00
0.4449			11.300	12.000	102.00	55.00
0.4488			11.400	12.000	102.00	55.00

To order: Series number + mm, ex. 5518 3.000

Series 1184

Speeds & Feeds information pg 372

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4528			11.500	12.000	102.00	55.00
0.4531	29/64		11.510	12.000	102.00	55.00
0.4567			11.600	12.000	102.00	55.00
0.4606			11.700	12.000	102.00	55.00
0.4646			11.800	12.000	102.00	55.00
0.4685			11.900	12.000	102.00	55.00
0.4689	15/32		11.910	12.000	102.00	55.00
0.4724			12.000	12.000	102.00	55.00
0.4764			12.100	14.000	107.00	60.00
0.4803			12.200	14.000	107.00	60.00
0.4843	31/64		12.300	14.000	107.00	60.00
0.4882			12.400	14.000	107.00	60.00
0.4921			12.500	14.000	107.00	60.00
0.4961			12.600	14.000	107.00	60.00
0.5000	1/2		12.700	14.000	107.00	60.00
0.5039			12.800	14.000	107.00	60.00
0.5118			13.000	14.000	107.00	60.00
0.5157	33/64		13.100	14.000	107.00	60.00
0.5197			13.200	14.000	107.00	60.00
0.5236			13.300	14.000	107.00	60.00
0.5315			13.500	14.000	107.00	60.00
0.5354			13.600	14.000	107.00	60.00
0.5394			13.700	14.000	107.00	60.00
0.5433			13.800	14.000	107.00	60.00
0.5469	35/64		13.890	14.000	107.00	60.00
0.5472			13.900	14.000	107.00	60.00
0.5512			14.000	14.000	107.00	60.00
0.5591			14.200	16.000	115.00	65.00
0.5626	9/16		14.290	16.000	115.00	65.00
0.5630			14.300	16.000	115.00	65.00
0.5669			14.400	16.000	115.00	65.00
0.5709			14.500	16.000	115.00	65.00
0.5748			14.600	16.000	115.00	65.00
0.5787			14.700	16.000	115.00	65.00
0.5827			14.800	16.000	115.00	65.00
0.5906			15.000	16.000	115.00	65.00
0.5945			15.100	16.000	115.00	65.00
0.5984			15.200	16.000	115.00	65.00
0.6063			15.400	16.000	115.00	65.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.6094	39/64		15.480	16.000	115.00	65.00
0.6102			15.500	16.000	115.00	65.00
0.6142			15.600	16.000	115.00	65.00
0.6181			15.700	16.000	115.00	65.00
0.6220			15.800	16.000	115.00	65.00
0.6248	5/8		15.870	16.000	115.00	65.00
0.6260			15.900	16.000	115.00	65.00
0.6299			16.000	16.000	115.00	65.00
0.6339			16.100	18.000	123.00	73.00
0.6378			16.200	18.000	123.00	73.00
0.6406	41/64		16.270	18.000	123.00	73.00
0.6417			16.300	18.000	123.00	73.00
0.6496			16.500	18.000	123.00	73.00
0.6614			16.800	18.000	123.00	73.00
0.6693			17.000	18.000	123.00	73.00
0.6811			17.300	18.000	123.00	73.00
0.6874	11/16		17.460	18.000	123.00	73.00
0.6890			17.500	18.000	123.00	73.00
0.6969			17.700	18.000	123.00	73.00
0.7008			17.800	18.000	123.00	73.00
0.7031	45/64		17.860	18.000	123.00	73.00
0.7087			18.000	18.000	123.00	73.00
0.7126			18.100	20.000	131.00	79.00
0.7205			18.300	20.000	131.00	79.00
0.7283			18.500	20.000	131.00	79.00
0.7343	47/64		18.650	20.000	131.00	79.00
0.7480			19.000	20.000	131.00	79.00
0.7500	3/4		19.050	20.000	131.00	79.00
0.7559			19.200	20.000	131.00	79.00
0.7677			19.500	20.000	131.00	79.00
0.7717			19.600	20.000	131.00	79.00
0.7795			19.800	20.000	131.00	79.00
0.7874			20.000	20.000	131.00	79.00

Alternative Drill Series:

#1242 Carbide, RT100, 3xD, 140 U pt, TiN
#5514 Carbide, RT100, 3xD, 140 U pt, FIREX
#1702 Carbide, RT100, 3xD, 140 F pt, TiN

5xD

Series 1221

GT 100 Parabolic

Cobalt, GT 100, jobber length, 130° point, Form A web thinned all dia., standard straight shank, RH helix

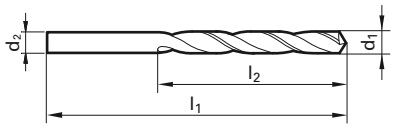
Cut / Shank Dia. = h8 tolerance range

TiCN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 372



$d_1 = d_2$

Application Materials:

- Universal Steels
- Stainless Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1476			3.750	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1587			4.030	75.00	43.00
0.1594			4.050	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1929			4.900	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2008			5.100	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3150			8.000	117.00	75.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.4016			10.200	133.00	87.00
0.4134			10.500	133.00	87.00
0.4213			10.700	142.00	94.00
0.4220	27/64		10.720	142.00	94.00
0.4252			10.800	142.00	94.00
0.4331			11.000	142.00	94.00
0.4528			11.500	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00

Alternative Drill Series:

#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX
#622 Cobalt, GT100, 5xD, 130 pt, Bright
#549 HSS, GT100, 5xD, 130 pt, Bright
#652 HSS, GT100, 5xD, 130 pt, TiN

To order: Series number + mm, ex. 5518 3.000

5xD

Series 1223

GT 100 Parabolic

Cobalt, GT 100, jobber length, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron

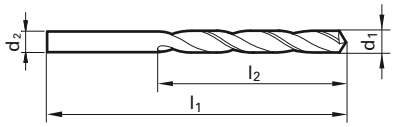
A

TiAlN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 373



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1417			3.600	70.00	39.00
0.1457			3.700	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1587			4.030	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1594			4.050	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2992			7.600	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3752			9.530	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4134			10.500	133.00	87.00
0.4213			10.700	142.00	94.00
0.4220	27/64		10.720	142.00	94.00
0.4252			10.800	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4409			11.200	142.00	94.00
0.4528			11.500	142.00	94.00
0.4606			11.700	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00

Alternative Drill Series:

#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX
#622 Cobalt, GT100, 5xD, 130 pt, Bright
#652 HSS, GT100, 5xD, 130 pt, TiN
#549 HSS, GT100, 5xD, 130 pt, Bright

3xD

Series 1242

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 3xD,
self-centering 140° SU point, standard straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

Application Materials:

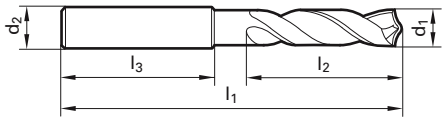
- Universal Steels
- General Steels/Brass
- Cast Iron

(S) TiN coated

External Coolant

Straight Shank

Speeds & Feeds
information pg 373



d1 = d2

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	46.00	16.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1457			3.700	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1535			3.900	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1575			4.000	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1811			4.600	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1929			4.900	62.00	26.00
0.1969			5.000	62.00	26.00
0.2008			5.100	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2047			5.200	62.00	26.00
0.2087			5.300	62.00	26.00
0.2126			5.400	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2244			5.700	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2402			6.100	70.00	31.00
0.2441			6.200	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2598			6.600	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2913			7.400	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.2992			7.600	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3425			8.700	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3661			9.300	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3780			9.600	89.00	43.00
0.3819			9.700	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.3976			10.100	89.00	43.00
0.4016			10.200	89.00	43.00
0.4055			10.300	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4094			10.400	89.00	43.00
0.4134			10.500	89.00	43.00
0.4173			10.600	89.00	43.00
0.4213			10.700	95.00	47.00
0.4220	27/64		10.720	95.00	47.00
0.4252			10.800	95.00	47.00
0.4291			10.900	95.00	47.00
0.4331			11.000	95.00	47.00
0.4370			11.100	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4409			11.200	95.00	47.00
0.4449			11.300	95.00	47.00
0.4488			11.400	95.00	47.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4567			11.600	95.00	47.00
0.4606			11.700	95.00	47.00
0.4646			11.800	95.00	47.00
0.4685			11.900	102.00	51.00
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5315			13.500	107.00	54.00
0.5512			14.000	107.00	54.00
0.5709			14.500	111.00	56.00
0.5906			15.000	111.00	56.00
0.6102			15.500	115.00	58.00
0.6299			16.000	115.00	58.00

Alternative Drill Series:

#1702 Carbide, RT100, 3xD, 140 F pt, TiN
#1184 Carbide, RT100, 3xD, 140 U pt, TiN
#5514 Carbide, RT100, 3xD, 140 U pt, FIREX

To order: Series number + mm, ex. 5518 3.000

5xD

Series 1243

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 5xD, self-centering
140° SU point, standard straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

Application Materials:

- Universal Steels
- General Steels/Brass
- Cast Iron

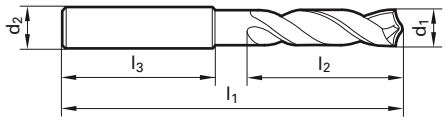
Twist Drills

(S) TiN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 374



d1 = d2

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1969			5.000	73.00	34.00
0.2008			5.100	76.00	38.00
0.2031	13/64		5.160	76.00	38.00
0.2047			5.200	76.00	38.00
0.2087			5.300	76.00	38.00
0.2126			5.400	76.00	38.00
0.2165			5.500	76.00	38.00
0.2189	7/32		5.560	81.00	41.00
0.2205			5.600	81.00	41.00
0.2244			5.700	81.00	41.00
0.2283			5.800	81.00	41.00
0.2323			5.900	81.00	41.00
0.2343	15/64		5.950	81.00	41.00
0.2362			6.000	81.00	41.00
0.2402			6.100	81.00	41.00
0.2441			6.200	81.00	41.00
0.2480			6.300	81.00	41.00
0.2500	1/4	E	6.350	81.00	41.00
0.2520			6.400	81.00	41.00
0.2559			6.500	81.00	41.00
0.2598			6.600	83.00	43.00
0.2638			6.700	83.00	43.00
0.2657	17/64	H	6.750	83.00	43.00
0.2677			6.800	83.00	43.00
0.2717		I	6.900	83.00	43.00
0.2756			7.000	83.00	43.00
0.2795			7.100	87.00	45.00
0.2811	9/32	K	7.140	87.00	45.00
0.2835			7.200	87.00	45.00
0.2874			7.300	87.00	45.00
0.2913			7.400	87.00	45.00
0.2953			7.500	87.00	45.00
0.2969	19/64		7.540	90.00	48.00
0.2992			7.600	90.00	48.00
0.3031			7.700	90.00	48.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3071			7.800	90.00	48.00
0.3110			7.900	90.00	48.00
0.3126	5/16		7.940	90.00	48.00
0.3150			8.000	90.00	48.00
0.3189			8.100	96.00	53.00
0.3228		P	8.200	96.00	53.00
0.3268			8.300	96.00	53.00
0.3280	21/64		8.330	96.00	53.00
0.3307			8.400	96.00	53.00
0.3346			8.500	96.00	53.00
0.3386			8.600	98.00	55.00
0.3425			8.700	98.00	55.00
0.3437	11/32		8.730	98.00	55.00
0.3465			8.800	98.00	55.00
0.3504			8.900	98.00	55.00
0.3543			9.000	98.00	55.00
0.3583			9.100	102.00	58.00
0.3594	23/64		9.130	102.00	58.00
0.3622			9.200	102.00	58.00
0.3661			9.300	102.00	58.00
0.3701			9.400	102.00	58.00
0.3740			9.500	102.00	58.00
0.3748	3/8		9.520	105.00	60.00
0.3780			9.600	105.00	60.00
0.3819			9.700	105.00	60.00
0.3858		W	9.800	105.00	60.00
0.3898			9.900	105.00	60.00
0.3906	25/64		9.920	105.00	60.00
0.3937			10.000	105.00	60.00
0.3976			10.100	112.00	66.00
0.4016			10.200	112.00	66.00
0.4055			10.300	112.00	66.00
0.4063	13/32		10.320	112.00	66.00
0.4094			10.400	112.00	66.00
0.4134			10.500	112.00	66.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4173			10.600	114.00	68.00
0.4213			10.700	114.00	68.00
0.4220	27/64		10.720	114.00	68.00
0.4252			10.800	114.00	68.00
0.4291			10.900	114.00	68.00
0.4331			11.000	114.00	68.00
0.4370			11.100	118.00	71.00
0.4374	7/16		11.110	118.00	71.00
0.4409			11.200	118.00	71.00
0.4449			11.300	118.00	71.00
0.4488			11.400	118.00	71.00
0.4528			11.500	118.00	71.00
0.4531	29/64		11.510	121.00	73.00
0.4567			11.600	121.00	73.00
0.4606			11.700	121.00	73.00
0.4646			11.800	121.00	73.00
0.4685			11.900	121.00	73.00
0.4689	15/32		11.910	121.00	73.00
0.4724			12.000	121.00	73.00
0.4921			12.500	135.00	76.00
0.5000	1/2		12.700	137.00	78.00
0.5118			13.000	137.00	78.00
0.5315			13.500	144.00	84.00
0.5512			14.000	147.00	86.00
0.5709			14.500	151.00	89.00
0.5906			15.000	153.00	91.00
0.6102			15.500	157.00	94.00
0.6299			16.000	160.00	96.00

Alternative Drill Series:

#5515 Carbide, RT100, 5xD, 140 U pt, FIREX
#5511 Carbide, RT100, 5xD, 140 U pt, FIREX
#1183 Carbide, RT100, 5xD, 140 U pt, TiN

5xD

Bright Finish

External Coolant

Straight Shank

Speeds & Feeds information pg 374

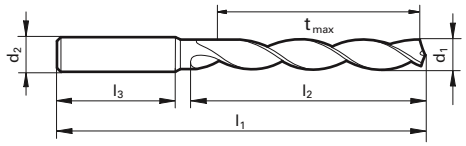
Series 1452

Three-Flute High Precision

DK 460 UF Carbide, GS 200 U three-flute high precision, 5xD, self-centering 150° point, standard straight shank, RH helix

Cut / Shank Dia. = h7 tolerance range

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



d1 = d2

Application Materials:

- General Steels/Brass
- Cast Iron
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	46.00	22.00
0.1201		31	3.050	46.00	22.00
0.1220			3.100	49.00	24.00
0.1248	1/8		3.170	49.00	24.00
0.1260			3.200	49.00	24.00
0.1299			3.300	49.00	24.00
0.1339			3.400	52.00	27.00
0.1358		29	3.450	52.00	27.00
0.1378			3.500	52.00	27.00
0.1406	9/64	28	3.570	52.00	27.00
0.1417			3.600	52.00	27.00
0.1457			3.700	52.00	27.00
0.1496		25	3.800	55.00	30.00
0.1535			3.900	55.00	30.00
0.1563	5/32		3.970	55.00	30.00
0.1575			4.000	55.00	30.00
0.1614			4.100	55.00	30.00
0.1654			4.200	55.00	30.00
0.1693		18	4.300	58.00	32.00
0.1720	11/64		4.370	58.00	32.00
0.1732			4.400	58.00	32.00
0.1772		16	4.500	58.00	32.00
0.1811			4.600	58.00	32.00
0.1850		13	4.700	58.00	32.00
0.1874	3/16		4.760	62.00	35.00
0.1890		12	4.800	62.00	35.00
0.1929			4.900	62.00	35.00
0.1969			5.000	62.00	35.00
0.2008			5.100	62.00	35.00
0.2031	13/64		5.160	62.00	35.00
0.2047			5.200	62.00	35.00
0.2087			5.300	62.00	35.00
0.2126			5.400	66.00	39.00
0.2165			5.500	66.00	39.00
0.2189	7/32		5.560	66.00	39.00
0.2205			5.600	66.00	39.00
0.2244			5.700	66.00	39.00
0.2283			5.800	66.00	39.00
0.2323			5.900	66.00	39.00
0.2343	15/64		5.950	66.00	39.00
0.2362			6.000	66.00	39.00
0.2402			6.100	70.00	42.00
0.2421		C	6.150	70.00	42.00
0.2441			6.200	70.00	42.00
0.2480			6.300	70.00	42.00
0.2500	1/4	E	6.350	70.00	42.00
0.2520			6.400	70.00	42.00
0.2559			6.500	70.00	42.00
0.2598			6.600	70.00	42.00
0.2638			6.700	70.00	42.00
0.2657	17/64	H	6.750	74.00	45.00
0.2677			6.800	74.00	45.00
0.2717		I	6.900	74.00	45.00
0.2756			7.000	74.00	45.00
0.2795			7.100	74.00	45.00
0.2811	9/32	K	7.140	74.00	45.00
0.2835			7.200	74.00	45.00
0.2874			7.300	74.00	45.00
0.2913			7.400	74.00	45.00
0.2953			7.500	74.00	45.00
0.2969	19/64		7.540	79.00	48.00
0.2992			7.600	79.00	48.00
0.3031			7.700	79.00	48.00
0.3071			7.800	79.00	48.00
0.3110			7.900	79.00	48.00
0.3126	5/16		7.940	79.00	48.00
0.3150			8.000	79.00	48.00
0.3189			8.100	79.00	48.00
0.3228		P	8.200	79.00	48.00
0.3268			8.300	79.00	48.00
0.3280	21/64		8.330	79.00	48.00
0.3307			8.400	79.00	48.00
0.3319		Q	8.430	79.00	48.00
0.3346			8.500	79.00	48.00
0.3386			8.600	84.00	52.00
0.3425			8.700	84.00	52.00
0.3437	11/32		8.730	84.00	52.00
0.3465			8.800	84.00	52.00
0.3504			8.900	84.00	52.00
0.3543			9.000	84.00	52.00
0.3583			9.100	84.00	52.00
0.3594	23/64		9.130	84.00	52.00
0.3622			9.200	84.00	52.00
0.3661			9.300	84.00	52.00
0.3701			9.400	84.00	52.00
0.3740			9.500	84.00	52.00
0.3748	3/8		9.520	89.00	55.00
0.3780			9.600	89.00	55.00
0.3819			9.700	89.00	55.00
0.3858		W	9.800	89.00	55.00
0.3898			9.900	89.00	55.00
0.3906	25/64		9.920	89.00	55.00
0.3937			10.000	89.00	55.00
0.3976			10.100	89.00	55.00
0.4016			10.200	89.00	55.00
0.4055			10.300	89.00	55.00
0.4063	13/32		10.320	89.00	55.00
0.4094			10.400	89.00	55.00
0.4134			10.500	89.00	55.00
0.4173			10.600	89.00	55.00
0.4213			10.700	95.00	60.00
0.4220	27/64		10.720	95.00	60.00
0.4252			10.800	95.00	60.00
0.4291			10.900	95.00	60.00
0.4331			11.000	95.00	60.00
0.4370			11.100	95.00	60.00
0.4374	7/16		11.110	95.00	60.00
0.4409			11.200	95.00	60.00
0.4449			11.300	95.00	60.00
0.4488			11.400	95.00	60.00
0.4528			11.500	95.00	60.00
0.4531	29/64		11.510	95.00	60.00
0.4567			11.600	95.00	60.00
0.4606			11.700	95.00	60.00
0.4646			11.800	95.00	60.00
0.4685			11.900	102.00	65.00
0.4689	15/32		11.910	102.00	65.00
0.4724			12.000	102.00	65.00
0.4764			12.100	102.00	65.00
0.4803			12.200	102.00	65.00
0.4843	31/64		12.300	102.00	65.00
0.4882			12.400	102.00	65.00
0.4921			12.500	102.00	65.00
0.4961			12.600	102.00	65.00
0.5000	1/2		12.700	102.00	65.00
0.5039			12.800	102.00	65.00
0.5079			12.900	102.00	65.00
0.5118			13.000	102.00	65.00
0.5157	33/64		13.100	102.00	65.00
0.5197			13.200	102.00	65.00
0.5236			13.300	107.00	66.00
0.5276			13.400	107.00	66.00
0.5315			13.500	107.00	66.00
0.5354			13.600	107.00	66.00
0.5394			13.700	107.00	66.00
0.5433			13.800	107.00	66.00
0.5472			13.900	107.00	66.00
0.5512			14.000	107.00	66.00
0.5551			14.100	111.00	70.00
0.5591			14.200	111.00	70.00
0.5626	9/16		14.290	111.00	70.00
0.5630			14.300	111.00	70.00
0.5669			14.400	111.00	70.00
0.5709			14.500	111.00	70.00
0.5748			14.600	111.00	70.00
0.5787			14.700	111.00	70.00
0.5827			14.800	111.00	70.00
0.5866			14.900	111.00	70.00
0.5906			15.000	111.00	70.00
0.5945			15.100	115.00	73.00
0.5984			15.200	115.00	73.00
0.6024			15.300	115.00	73.00
0.6063			15.400	115.00	73.00
0.6102			15.500	115.00	73.00
0.6142			15.600	115.00	73.00
0.6181			15.700	115.00	73.00
0.6220			15.800	115.00	73.00
0.6248	5/8		15.870	115.00	73.00
0.6260			15.900	115.00	73.00
0.6299			16.000	115.00	73.00
0.6406	41/64		16.270	115.00	73.00
0.6496			16.500	119.00	73.00

To order: Series number + mm, ex. 5518 3.000

Series 1452

Speeds & Feeds information pg 374

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.6563	21/32		16.670	119.00	73.00
0.6693			17.000	119.00	73.00
0.6874	11/16		17.460	123.00	76.00
0.6890			17.500	123.00	76.00
0.7087			18.000	123.00	76.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.7283			18.500	127.00	76.00
0.7480			19.000	127.00	76.00
0.7500	3/4		19.050	131.00	79.00
0.7677			19.500	131.00	79.00
0.7874			20.000	131.00	79.00

Alternative Drill Series:

#609 Carbide, GS200, 5xD, 150 U pt, Bright
#5518 Carbide, GS200, 5xD, 150 G pt, Bright

5xD

Ⓢ TiN coated

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 375

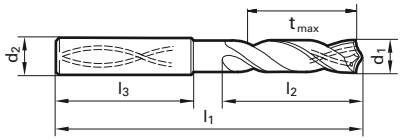
Series 1662

RT 100 F High Penetration

DK 460 UF Carbide, RT 100 F high penetration, 5xD, self-centering 140° SF point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Cast Iron
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	28.00
0.1220			3.100	6.000	66.00	28.00
0.1248	1/8		3.170	6.000	66.00	28.00
0.1260			3.200	6.000	66.00	28.00
0.1299			3.300	6.000	66.00	28.00
0.1339			3.400	6.000	66.00	28.00
0.1378			3.500	6.000	66.00	28.00
0.1406	9/64		3.570	6.000	66.00	28.00
0.1417			3.600	6.000	66.00	28.00
0.1457			3.700	6.000	66.00	28.00
0.1496			3.800	6.000	74.00	36.00
0.1535			3.900	6.000	74.00	36.00
0.1563	5/32		3.970	6.000	74.00	36.00
0.1575			4.000	6.000	74.00	36.00
0.1614			4.100	6.000	74.00	36.00
0.1654			4.200	6.000	74.00	36.00
0.1693		18	4.300	6.000	74.00	36.00
0.1720	11/64		4.370	6.000	74.00	36.00
0.1732			4.400	6.000	74.00	36.00
0.1772		16	4.500	6.000	74.00	36.00
0.1811			4.600	6.000	74.00	36.00
0.1850		13	4.700	6.000	74.00	36.00
0.1874	3/16		4.760	6.000	82.00	44.00
0.1890		12	4.800	6.000	82.00	44.00
0.1929			4.900	6.000	82.00	44.00
0.1969			5.000	6.000	82.00	44.00
0.2008			5.100	6.000	82.00	44.00
0.2031	13/64		5.160	6.000	82.00	44.00
0.2047			5.200	6.000	82.00	44.00
0.2087			5.300	6.000	82.00	44.00
0.2126			5.400	6.000	82.00	44.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2165			5.500	6.000	82.00	44.00
0.2189	7/32		5.560	6.000	82.00	44.00
0.2205			5.600	6.000	82.00	44.00
0.2244			5.700	6.000	82.00	44.00
0.2283			5.800	6.000	82.00	44.00
0.2323			5.900	6.000	82.00	44.00
0.2343	15/64		5.950	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2480			6.300	8.000	91.00	53.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2598			6.600	8.000	91.00	53.00
0.2638			6.700	8.000	91.00	53.00
0.2657	17/64	H	6.750	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717		I	6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00
0.2795			7.100	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2835			7.200	8.000	91.00	53.00
0.2874			7.300	8.000	91.00	53.00
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.2969	19/64		7.540	8.000	91.00	53.00
0.2992			7.600	8.000	91.00	53.00
0.3031			7.700	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3110			7.900	8.000	91.00	53.00

To order: Series number + mm, ex. 5518 3.000

Series 1662

Speeds & Feeds information pg 375

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00
0.3268			8.300	10.000	103.00	61.00
0.3280	21/64		8.330	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3465			8.800	10.000	103.00	61.00
0.3504			8.900	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3583			9.100	10.000	103.00	61.00
0.3594	23/64		9.130	10.000	103.00	61.00
0.3622			9.200	10.000	103.00	61.00
0.3661			9.300	10.000	103.00	61.00
0.3701			9.400	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3780			9.600	10.000	103.00	61.00
0.3819			9.700	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3898			9.900	10.000	103.00	61.00
0.3906	25/64		9.920	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.3976			10.100	12.000	118.00	71.00
0.4016			10.200	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4220	27/64		10.720	12.000	118.00	71.00
0.4252			10.800	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4370			11.100	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4409			11.200	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4531	29/64		11.510	12.000	118.00	71.00
0.4606			11.700	12.000	118.00	71.00
0.4646			11.800	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4764			12.100	14.000	124.00	77.00
0.4803			12.200	14.000	124.00	77.00
0.4843	31/64		12.300	14.000	124.00	77.00
0.4921			12.500	14.000	124.00	77.00
0.5000	1/2		12.700	14.000	124.00	77.00
0.5039			12.800	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5196			13.200	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5433			13.800	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5551			14.100	16.000	133.00	83.00
0.5709			14.500	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6496			16.500	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7480			19.000	20.000	143.00	93.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#5511 Carbide, RT100, 5xD, 140 U pt, FIREX
#2479 Carbide, RT100, 5xD, 140 U pt, nano-FIREX
#8511 Carbide, RT100VA, 5xD, 140 VA pt, nano-A

To order: Series number + mm, ex. 5518 3.000

3xD

Series 1702

RT 100 F High Penetration

DK 460 UF Carbide, RT 100 F high penetration, 3xD, self-centering
140° SF point, standard straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Cast Iron
- Aluminum & Alloys

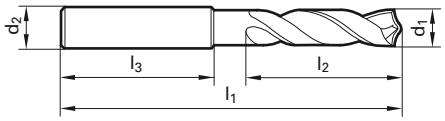
Twist Drills

(S) TiN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 375



d1 = d2

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1181			3.000	46.00	16.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1457			3.700	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1535			3.900	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1575			4.000	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1811			4.600	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1929			4.900	62.00	26.00
0.1969			5.000	62.00	26.00
0.2008			5.100	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2047			5.200	62.00	26.00
0.2087			5.300	62.00	26.00
0.2126			5.400	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2244			5.700	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2402			6.100	70.00	31.00
0.2441			6.200	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2598			6.600	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2913			7.400	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.2992			7.600	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3425			8.700	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3622			9.200	84.00	40.00
0.3661			9.300	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3780			9.600	89.00	43.00
0.3819			9.700	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.4016			10.200	89.00	43.00
0.4055			10.300	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4134			10.500	89.00	43.00
0.4213			10.700	89.00	43.00
0.4220	27/64		10.720	95.00	47.00
0.4252			10.800	95.00	47.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4646			11.800	102.00	51.00
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5315			13.500	107.00	54.00
0.5512			14.000	107.00	54.00
0.5709			14.500	111.00	56.00
0.5906			15.000	111.00	56.00

Alternative Drill Series:

#1242 Carbide, RT100, 3xD, 140 U pt, TiN
#8510 Carbide, RT100VA, 3xD, 140 VA pt, nano-A
#5514 Carbide, RT100, 3xD, 140 U pt, FIREX

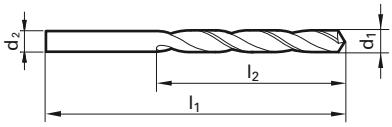
5xD

Series 2458

Type Ti

Cobalt, Type Ti, jobber length, self-centering 130° split point, web thinned >1.0mm dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

FIREX® Coated

External Coolant

Straight Shank

Speeds & Feeds information pg 376

Application Materials:

- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys
- Universal Steels

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0157	1/64		0.400	20.00	5.00
0.0394			1.000	34.00	12.00
0.0433			1.100	36.00	14.00
0.0469	3/64		1.190	38.00	16.00
0.0472			1.200	38.00	16.00
0.0512			1.300	38.00	16.00
0.0551		54	1.400	40.00	18.00
0.0591			1.500	40.00	18.00
0.0598			1.520	43.00	20.00
0.0602			1.530	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0650			1.650	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0709			1.800	46.00	22.00
0.0748			1.900	46.00	22.00
0.0780	5/64		1.980	49.00	24.00
0.0787			2.000	49.00	24.00
0.0807			2.050	49.00	24.00
0.0827			2.100	49.00	24.00
0.0866			2.200	53.00	27.00
0.0906			2.300	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0984			2.500	57.00	30.00
0.1024			2.600	57.00	30.00
0.1063			2.700	61.00	33.00
0.1083			2.750	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1142			2.900	61.00	33.00
0.1181			3.000	61.00	33.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1280			3.250	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1457			3.700	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1614			4.100	75.00	43.00
0.1634			4.150	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661			4.220	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1929			4.900	86.00	52.00
0.1969			5.000	86.00	52.00
0.1988			5.050	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4094			10.400	133.00	87.00
0.4134			10.500	133.00	87.00
0.4220	27/64		10.720	142.00	94.00
0.4252			10.800	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.5000			11.200	142.00	94.00
0.5000			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5118			13.000	151.00	101.00
0.5157	33/64		13.100	151.00	101.00
0.5311	17/32		13.490	160.00	108.00
0.5512			14.000	160.00	108.00
0.5626	9/16		14.290	169.00	114.00
0.5709			14.500	169.00	114.00
0.5906			15.000	169.00	114.00

Alternative Drill Series:

#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX
#657 Cobalt, Ti, 5xD, 130 pt, TiN
#605 Cobalt, Ti, 5xD, 130 pt, Bright

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

3xD

FIREX® Coated

External Coolant

Straight Shank

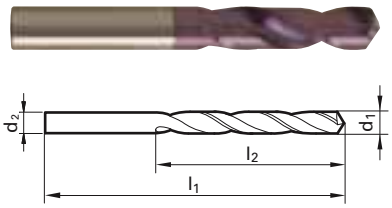
Speeds & Feeds
information pg 376

Series 2463

General Purpose

DK 460 UF Carbide, general purpose (Type N), stub length, 118° faceted point, standard straight shank, RH helix

Cut / Shank Dia. = h7 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	26.00	6.00
0.0402		60	1.020	26.00	6.00
0.0409		59	1.040	26.00	6.00
0.0421		58	1.070	28.00	7.00
0.0429		57	1.090	28.00	7.00
0.0433			1.100	28.00	7.00
0.0465		56	1.180	28.00	7.00
0.0469	3/64		1.190	30.00	8.00
0.0472			1.200	30.00	8.00
0.0512			1.300	30.00	8.00
0.0520		55	1.320	30.00	8.00
0.0551		54	1.400	32.00	9.00
0.0591			1.500	32.00	9.00
0.0594		53	1.510	34.00	10.00
0.0626	1/16		1.590	34.00	10.00
0.0630			1.600	34.00	10.00
0.0634		52	1.610	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0701		50	1.780	36.00	11.00
0.0709			1.800	36.00	11.00
0.0728		49	1.850	36.00	11.00
0.0748			1.900	36.00	11.00
0.0760		48	1.930	38.00	12.00
0.0780	5/64		1.980	38.00	12.00
0.0783		47	1.990	38.00	12.00
0.0787			2.000	38.00	12.00
0.0811		46	2.060	38.00	12.00
0.0819		45	2.080	38.00	12.00
0.0827			2.100	38.00	12.00
0.0858		44	2.180	40.00	13.00
0.0866			2.200	40.00	13.00
0.0885			2.250	40.00	13.00
0.0890		43	2.260	40.00	13.00
0.0906			2.300	40.00	13.00
0.0933		42	2.370	43.00	14.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0961		41	2.440	43.00	14.00
0.0980		40	2.490	43.00	14.00
0.0984			2.500	43.00	14.00
0.0996		39	2.530	43.00	14.00
0.1016		38	2.580	43.00	14.00
0.1024			2.600	43.00	14.00
0.1039		37	2.640	43.00	14.00
0.1063			2.700	46.00	16.00
0.1067		36	2.710	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1098		35	2.790	46.00	16.00
0.1102			2.800	46.00	16.00
0.1110		34	2.820	46.00	16.00
0.1130		33	2.870	46.00	16.00
0.1142			2.900	46.00	16.00
0.1161		32	2.950	46.00	16.00
0.1181			3.000	46.00	16.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1201		31	3.050	49.00	18.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1283		30	3.260	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1358		29	3.450	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1441		27	3.660	52.00	20.00
0.1457			3.700	52.00	20.00
0.1469		26	3.730	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1520		24	3.860	55.00	22.00
0.1535			3.900	55.00	22.00
0.1539		23	3.910	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1571		22	3.990	55.00	22.00
0.1575			4.000	55.00	22.00
0.1591		21	4.040	55.00	22.00
0.1610		20	4.090	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1661		19	4.220	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1728		17	4.390	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1799		15	4.570	58.00	24.00
0.1811			4.600	58.00	24.00
0.1819		14	4.620	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1909		11	4.850	62.00	26.00
0.1929			4.900	62.00	26.00
0.1937		10	4.920	62.00	26.00
0.1961		9	4.980	62.00	26.00
0.1969			5.000	62.00	26.00
0.1992		8	5.060	62.00	26.00
0.2008			5.100	62.00	26.00
0.2012		7	5.110	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2039		6	5.180	62.00	26.00
0.2047			5.200	62.00	26.00
0.2055		5	5.220	62.00	26.00
0.2087			5.300	62.00	26.00
0.2091		4	5.310	66.00	28.00
0.2126			5.400	66.00	28.00
0.2130		3	5.410	66.00	28.00
0.2165			5.500	66.00	28.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2209		2	5.610	66.00	28.00
0.2244			5.700	66.00	28.00
0.2280		1	5.790	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2339		A	5.940	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2378		B	6.040	70.00	31.00
0.2402			6.100	70.00	31.00
0.2421		C	6.150	70.00	31.00
0.2441			6.200	70.00	31.00
0.2461		D	6.250	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2571		F	6.530	70.00	31.00
0.2598			6.600	70.00	31.00
0.2610		G	6.630	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64	H	6.750	74.00	34.00
0.2677			6.800	74.00	34.00
0.2717			6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2768		J	7.030	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2902		L	7.370	74.00	34.00
0.2913			7.400	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	79.00	37.00
0.2992			7.600	79.00	37.00
0.3020		N	7.670	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3161		O	8.030	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228			8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3319		Q	8.430	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3390		R	8.610	84.00	40.00
0.3425			8.700	84.00	40.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes! (Available Spring 2010)

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Diameter (d1)				l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm
0.3437	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3480		S	8.840	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3579		T	9.090	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3661			9.300	84.00	40.00
0.3677		U	9.340	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	89.00	43.00
0.3772		V	9.580	89.00	43.00
0.3780			9.600	89.00	43.00
0.3819			9.700	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.3969		X	10.080	89.00	43.00
0.4016			10.200	89.00	43.00
0.4039		Y	10.260	89.00	43.00
0.4055			10.300	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4130		Z	10.490	89.00	43.00
0.4134			10.500	89.00	43.00
0.4220	27/64		10.720	95.00	47.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4531	29/64		11.510	95.00	47.00
0.4689	15/32		11.910	102.00	51.00
0.4724			12.000	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5311	17/32		13.490	107.00	54.00
0.5512			14.000	107.00	54.00
0.5626	9/16		14.290	111.00	56.00
0.5906			15.000	111.00	56.00
0.6299			16.000	115.00	58.00

Alternative Drill Series:

#730 Carbide, GP, 3xD, 118 pt, Bright
#5521 PM Cobalt, GT500, 3xD, 130 pt, TiN
#515 PM Cobalt, GT500, 3xD, 130 pt, FIREX
#659 Cobalt, GV120, 3xD, 130 pt, TiN

To order: Series number + mm, ex. 5518 3.000

5xD

Ⓕ FIREX® Coated

External Coolant

Straight Shank

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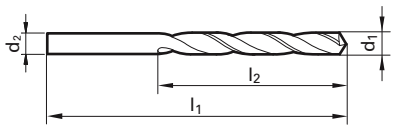
GUHRING Select

Series 2464

General Purpose

DK 460 UF Carbide, general purpose (Type N), jobber length, 118° faceted point, standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0402		60	1.020	34.00	12.00
0.0409		59	1.040	34.00	12.00
0.0421		58	1.070	36.00	14.00
0.0429		57	1.090	36.00	14.00
0.0433			1.100	36.00	14.00
0.0465		56	1.180	36.00	14.00
0.0469	3/64		1.190	36.00	14.00
0.0472			1.200	38.00	16.00
0.0512			1.300	38.00	16.00
0.0520		55	1.320	38.00	16.00
0.0551		54	1.400	40.00	18.00
0.0591			1.500	40.00	18.00
0.0594		53	1.510	43.00	20.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0634		52	1.610	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0701		50	1.780	46.00	22.00
0.0709			1.800	46.00	22.00
0.0728		49	1.850	46.00	22.00
0.0748			1.900	46.00	22.00
0.0760		48	1.930	49.00	24.00
0.0780	5/64		1.980	49.00	24.00
0.0783		47	1.990	49.00	24.00
0.0787			2.000	49.00	24.00
0.0811		46	2.060	49.00	24.00
0.0819		45	2.080	49.00	24.00
0.0827			2.100	49.00	24.00
0.0858		44	2.180	53.00	27.00
0.0866			2.200	53.00	27.00
0.0890		43	2.260	53.00	27.00
0.0906			2.300	53.00	27.00
0.0933		42	2.370	57.00	30.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0961		41	2.440	57.00	30.00
0.0980		40	2.490	57.00	30.00
0.0984			2.500	57.00	30.00
0.0996		39	2.530	57.00	30.00
0.1016		38	2.580	57.00	30.00
0.1024			2.600	57.00	30.00
0.1039		37	2.640	57.00	30.00
0.1063			2.700	61.00	33.00
0.1067		36	2.710	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1098		35	2.790	61.00	33.00
0.1102			2.800	61.00	33.00
0.1110		34	2.820	61.00	33.00
0.1130		33	2.870	61.00	33.00
0.1142			2.900	61.00	33.00
0.1161		32	2.950	61.00	33.00
0.1181			3.000	61.00	33.00
0.1201		31	3.050	65.00	36.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1283		30	3.260	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1358		29	3.450	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1441		27	3.660	70.00	39.00
0.1457			3.700	70.00	39.00
0.1469		26	3.730	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1520		24	3.860	75.00	43.00
0.1535			3.900	75.00	43.00
0.1539		23	3.910	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1571		22	3.990	75.00	43.00
0.1575			4.000	75.00	43.00
0.1591		21	4.040	75.00	43.00
0.1610		20	4.090	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1661		19	4.220	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1728		17	4.390	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1799		15	4.570	80.00	47.00
0.1811			4.600	80.00	47.00
0.1819		14	4.620	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1909		11	4.850	86.00	52.00
0.1929			4.900	86.00	52.00
0.1937		10	4.920	86.00	52.00
0.1961		9	4.980	86.00	52.00
0.1969			5.000	86.00	52.00
0.1992		8	5.060	86.00	52.00
0.2008			5.100	86.00	52.00
0.2012		7	5.110	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2039		6	5.180	86.00	52.00
0.2047			5.200	86.00	52.00
0.2055		5	5.220	86.00	52.00
0.2087			5.300	86.00	52.00
0.2091		4	5.310	93.00	57.00
0.2126			5.400	93.00	57.00
0.2130		3	5.410	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2205			5.600	93.00	57.00
0.2209		2	5.610	93.00	57.00
0.2244			5.700	93.00	57.00
0.2280		1	5.790	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2339		A	5.940	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2378		B	6.040	101.00	63.00
0.2402			6.100	101.00	63.00
0.2421		C	6.150	101.00	63.00
0.2441			6.200	101.00	63.00
0.2461		D	6.250	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2571		F	6.530	101.00	63.00
0.2598			6.600	101.00	63.00
0.2610		G	6.630	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64	H	6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2768		J	7.030	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2902		L	7.370	109.00	69.00
0.2913			7.400	109.00	69.00
0.2949		M	7.490	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3020		N	7.670	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3161		O	8.030	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3319		Q	8.430	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3390		R	8.610	125.00	81.00
0.3425			8.700	125.00	81.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes! (Available Spring 2010)

Series 2464

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Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3480		S	8.840	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3579		T	9.090	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3677		U	9.340	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3772		V	9.580	133.00	87.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3969		X	10.080	133.00	87.00
0.4016			10.200	133.00	87.00
0.4039		Y	10.260	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4130		Z	10.490	133.00	87.00
0.4134			10.500	133.00	87.00
0.4220	27/64		10.720	142.00	94.00
0.4331			11.000	142.00	94.00

Diameter (d1)					
Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.4374	7/16		11.110	142.00	94.00
0.4528			11.500	142.00	94.00
0.4531	29/64		11.510	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.5000	1/2		12.700	151.00	101.00

Alternative Drill Series:

#732 Carbide, GP, 5xD, 118 pt, Bright
#2602 Carbide, GT100, 5xD, 130 pt, TiN
#5522 PM Cobalt, GT500, 5xD, 130 pt, TiN

To order: Series number + mm, ex. 5518 3.000

3xD

Series 2477

RT 100 X High Penetration

DK 460 UF Carbide, RT 100 X high penetration, 3xD, self-centering 140° SU point, reinforced straight shank, RH helix

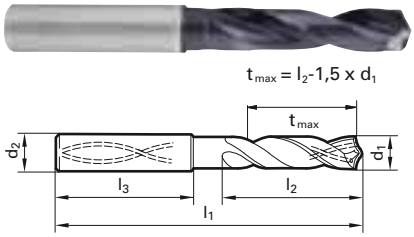
Cut Dia. = m7 tolerance range, Shank Dia. = h6

Ⓝ nano-FIREX® coated

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 377



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	62.00	20.00
0.1220			3.100	6.000	62.00	20.00
0.1248	1/8		3.170	6.000	62.00	20.00
0.1260			3.200	6.000	62.00	20.00
0.1280			3.250	6.000	62.00	20.00
0.1299			3.300	6.000	62.00	20.00
0.1339			3.400	6.000	62.00	20.00
0.1378			3.500	6.000	62.00	20.00
0.1406	9/64	28	3.570	6.000	62.00	20.00
0.1417			3.600	6.000	62.00	20.00
0.1457			3.700	6.000	62.00	20.00
0.1496		25	3.800	6.000	66.00	24.00
0.1535			3.900	6.000	66.00	24.00
0.1563	5/32		3.970	6.000	66.00	24.00
0.1575			4.000	6.000	66.00	24.00
0.1591		21	4.040	6.000	66.00	24.00
0.1614			4.100	6.000	66.00	24.00
0.1654			4.200	6.000	66.00	24.00
0.1693			4.300	6.000	66.00	24.00
0.1720	11/64		4.370	6.000	66.00	24.00
0.1732			4.400	6.000	66.00	24.00
0.1772		16	4.500	6.000	66.00	24.00
0.1811			4.600	6.000	66.00	24.00
0.1831			4.650	6.000	66.00	24.00
0.1850			4.700	6.000	66.00	24.00
0.1874	3/16		4.760	6.000	66.00	28.00
0.1890		12	4.800	6.000	66.00	28.00
0.1929			4.900	6.000	66.00	28.00
0.1969			5.000	6.000	66.00	28.00
0.2008			5.100	6.000	66.00	28.00
0.2012		7	5.110	6.000	66.00	28.00
0.2031	13/64		5.160	6.000	66.00	28.00
0.2047			5.200	6.000	66.00	28.00
0.2087			5.300	6.000	66.00	28.00
0.2126			5.400	6.000	66.00	28.00
0.2130		3	5.410	6.000	66.00	28.00
0.2165			5.500	6.000	66.00	28.00
0.2185			5.550	6.000	66.00	28.00
0.2189	7/32		5.560	6.000	66.00	28.00
0.2205			5.600	6.000	66.00	28.00
0.2224			5.650	6.000	66.00	28.00
0.2244			5.700	6.000	66.00	28.00
0.2283			5.800	6.000	66.00	28.00
0.2323			5.900	6.000	66.00	28.00
0.2343	15/64		5.950	6.000	66.00	28.00
0.2362			6.000	6.000	66.00	28.00
0.2402			6.100	8.000	79.00	34.00
0.2441			6.200	8.000	79.00	34.00
0.2480			6.300	8.000	79.00	34.00
0.2500	1/4	E	6.350	8.000	79.00	34.00
0.2520			6.400	8.000	79.00	34.00
0.2559			6.500	8.000	79.00	34.00
0.2571		F	6.530	8.000	79.00	34.00
0.2598			6.600	8.000	79.00	34.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2638			6.700	8.000	79.00	34.00
0.2657	17/64	H	6.750	8.000	79.00	34.00
0.2677			6.800	8.000	79.00	34.00
0.2717		I	6.900	8.000	79.00	34.00
0.2756			7.000	8.000	79.00	34.00
0.2795			7.100	8.000	79.00	41.00
0.2811	9/32	K	7.140	8.000	79.00	41.00
0.2835			7.200	8.000	79.00	41.00
0.2874			7.300	8.000	79.00	41.00
0.2913			7.400	8.000	79.00	41.00
0.2953			7.500	8.000	79.00	41.00
0.2969	19/64		7.540	8.000	79.00	41.00
0.2972			7.550	8.000	79.00	41.00
0.2992			7.600	8.000	79.00	41.00
0.3031			7.700	8.000	79.00	41.00
0.3071			7.800	8.000	79.00	41.00
0.3110			7.900	8.000	79.00	41.00
0.3126	5/16		7.940	8.000	79.00	41.00
0.3150			8.000	8.000	79.00	41.00
0.3189			8.100	10.000	89.00	47.00
0.3228		P	8.200	10.000	89.00	47.00
0.3268			8.300	10.000	89.00	47.00
0.3280	21/64		8.330	10.000	89.00	47.00
0.3307			8.400	10.000	89.00	47.00
0.3346			8.500	10.000	89.00	47.00
0.3386			8.600	10.000	89.00	47.00
0.3425			8.700	10.000	89.00	47.00
0.3437	11/32		8.730	10.000	89.00	47.00
0.3465			8.800	10.000	89.00	47.00
0.3504			8.900	10.000	89.00	47.00
0.3543			9.000	10.000	89.00	47.00
0.3583			9.100	10.000	89.00	47.00
0.3594	23/64		9.130	10.000	89.00	47.00
0.3622			9.200	10.000	89.00	47.00
0.3642			9.250	10.000	89.00	47.00
0.3661			9.300	10.000	89.00	47.00
0.3677		U	9.340	10.000	89.00	47.00
0.3701			9.400	10.000	89.00	47.00
0.3740			9.500	10.000	89.00	47.00
0.3748	3/8		9.520	10.000	89.00	47.00
0.3759			9.550	10.000	89.00	47.00
0.3780			9.600	10.000	89.00	47.00
0.3819			9.700	10.000	89.00	47.00
0.3858		W	9.800	10.000	89.00	47.00
0.3898			9.900	10.000	89.00	47.00
0.3906	25/64		9.920	10.000	89.00	47.00
0.3937			10.000	10.000	89.00	47.00
0.3976			10.100	12.000	102.00	55.00
0.4016			10.200	12.000	102.00	55.00
0.4055			10.300	12.000	102.00	55.00
0.4063	13/32		10.320	12.000	102.00	55.00
0.4094			10.400	12.000	102.00	55.00
0.4134			10.500	12.000	102.00	55.00
0.4173			10.600	12.000	102.00	55.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes!

Series 2477

Speeds & Feeds information pg 377

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4213			10.700	12.000	102.00	55.00
0.4220	27/64		10.720	12.000	102.00	55.00
0.4252			10.800	12.000	102.00	55.00
0.4291			10.900	12.000	102.00	55.00
0.4331			11.000	12.000	102.00	55.00
0.4370			11.100	12.000	102.00	55.00
0.4374	7/16		11.110	12.000	102.00	55.00
0.4409			11.200	12.000	102.00	55.00
0.4449			11.300	12.000	102.00	55.00
0.4488			11.400	12.000	102.00	55.00
0.4528			11.500	12.000	102.00	55.00
0.4531	29/64		11.510	12.000	102.00	55.00
0.4567			11.600	12.000	102.00	55.00
0.4606			11.700	12.000	102.00	55.00
0.4646			11.800	12.000	102.00	55.00
0.4685			11.900	12.000	102.00	55.00
0.4689	15/32		11.910	12.000	102.00	55.00
0.4724			12.000	12.000	102.00	55.00
0.4764			12.100	14.000	107.00	60.00
0.4803			12.200	14.000	107.00	60.00
0.4843	31/64		12.300	14.000	107.00	60.00
0.4882			12.400	14.000	107.00	60.00
0.4921			12.500	14.000	107.00	60.00
0.4961			12.600	14.000	107.00	60.00
0.5000	1/2		12.700	14.000	107.00	60.00
0.5039			12.800	14.000	107.00	60.00
0.5079			12.900	14.000	107.00	60.00
0.5118			13.000	14.000	107.00	60.00
0.5157			13.100	14.000	107.00	60.00
0.5197			13.200	14.000	107.00	60.00
0.5236			13.300	14.000	107.00	60.00
0.5276			13.400	14.000	107.00	60.00
0.5311	17/32		13.490	14.000	107.00	60.00
0.5315			13.500	14.000	107.00	60.00
0.5354			13.600	14.000	107.00	60.00
0.5394			13.700	14.000	107.00	60.00
0.5433			13.800	14.000	107.00	60.00
0.5469	35/64		13.890	14.000	107.00	60.00
0.5472			13.900	14.000	107.00	60.00
0.5512			14.000	14.000	107.00	60.00
0.5551			14.100	16.000	115.00	65.00
0.5591			14.200	16.000	115.00	65.00
0.5626	9/16		14.290	16.000	115.00	65.00
0.5630			14.300	16.000	115.00	65.00
0.5669			14.400	16.000	115.00	65.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.5709			14.500	16.000	115.00	65.00
0.5748			14.600	16.000	115.00	65.00
0.5780	37/64		14.680	16.000	115.00	65.00
0.5787			14.700	16.000	115.00	65.00
0.5827			14.800	16.000	115.00	65.00
0.5866			14.900	16.000	115.00	65.00
0.5906			15.000	16.000	115.00	65.00
0.5937	19/32		15.080	16.000	115.00	65.00
0.5945			15.100	16.000	115.00	65.00
0.5984			15.200	16.000	115.00	65.00
0.6024			15.300	16.000	115.00	65.00
0.6094	39/64		15.480	16.000	115.00	65.00
0.6102			15.500	16.000	115.00	65.00
0.6142			15.600	16.000	115.00	65.00
0.6181			15.700	16.000	115.00	65.00
0.6220			15.800	16.000	115.00	65.00
0.6248			15.870	16.000	115.00	65.00
0.6260			15.900	16.000	115.00	65.00
0.6299			16.000	16.000	115.00	65.00
0.6378			16.200	18.000	123.00	73.00
0.6406	41/64		16.270	18.000	123.00	73.00
0.6496			16.500	18.000	123.00	73.00
0.6563	21/32		16.670	18.000	123.00	73.00
0.6654			16.900	18.000	123.00	73.00
0.6693			17.000	18.000	123.00	73.00
0.6720	43/64		17.070	18.000	123.00	73.00
0.6874	11/16		17.460	18.000	123.00	73.00
0.6890			17.500	18.000	131.00	79.00
0.7031	45/64		17.860	18.000	131.00	79.00
0.7087			18.000	18.000	131.00	79.00
0.7189	23/32		18.260	20.000	131.00	79.00
0.7283			18.500	20.000	131.00	79.00
0.7441			18.900	20.000	131.00	79.00
0.7480			19.000	20.000	131.00	79.00
0.7500	3/4		19.050	20.000	131.00	79.00
0.7579			19.250	20.000	131.00	79.00
0.7598			19.300	20.000	131.00	79.00
0.7656	49/64		19.446	20.000	131.00	79.00
0.7811	25/32		19.840	20.000	131.00	79.00
0.7874			20.000	20.000	131.00	79.00

Alternative Drill Series:

#5510 Carbide, RT100, 3xD, 140 U pt, FIREX
#8510 Carbide, RT100VA, 3xD, 140 U pt, nano-TiAlN

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

5xD

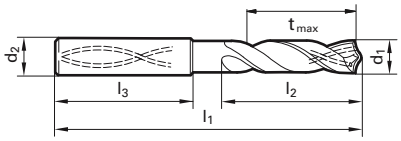
Series 2479

RT 100 X High Penetration

DK 460 UF Carbide, RT 100 X high penetration, 5xD, self-centering 140° SU point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



(N) nano-FIREX® coated

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 378

Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	28.00
0.1220			3.100	6.000	66.00	28.00
0.1248	1/8		3.170	6.000	66.00	28.00
0.1260			3.200	6.000	66.00	28.00
0.1280			3.250	6.000	66.00	28.00
0.1299			3.300	6.000	66.00	28.00
0.1339			3.400	6.000	66.00	28.00
0.1378			3.500	6.000	66.00	28.00
0.1406	9/64	28	3.570	6.000	66.00	28.00
0.1417			3.600	6.000	66.00	28.00
0.1457			3.700	6.000	66.00	28.00
0.1496		25	3.800	6.000	74.00	36.00
0.1535			3.900	6.000	74.00	36.00
0.1563	5/32		3.970	6.000	74.00	36.00
0.1575			4.000	6.000	74.00	36.00
0.1591		21	4.040	6.000	74.00	36.00
0.1614			4.100	6.000	74.00	36.00
0.1654			4.200	6.000	74.00	36.00
0.1693		18	4.300	6.000	74.00	36.00
0.1720	11/64		4.370	6.000	74.00	36.00
0.1732			4.400	6.000	74.00	36.00
0.1772		16	4.500	6.000	74.00	36.00
0.1811			4.600	6.000	74.00	36.00
0.1831			4.650	6.000	74.00	36.00
0.1850		13	4.700	6.000	74.00	36.00
0.1874	3/16		4.760	6.000	82.00	44.00
0.1890		12	4.800	6.000	82.00	44.00
0.1929			4.900	6.000	82.00	44.00
0.1969			5.000	6.000	82.00	44.00
0.2008			5.100	6.000	82.00	44.00
0.2012		7	5.110	6.000	82.00	44.00
0.2031	13/64		5.160	6.000	82.00	44.00
0.2047			5.200	6.000	82.00	44.00
0.2087			5.300	6.000	82.00	44.00
0.2126			5.400	6.000	82.00	44.00
0.2130		3	5.410	6.000	82.00	44.00
0.2165			5.500	6.000	82.00	44.00
0.2185			5.550	6.000	82.00	44.00
0.2189	7/32		5.560	6.000	82.00	44.00
0.2205			5.600	6.000	82.00	44.00
0.2224			5.650	6.000	82.00	44.00
0.2244			5.700	6.000	82.00	44.00
0.2283			5.800	6.000	82.00	44.00
0.2323			5.900	6.000	82.00	44.00
0.2343	15/64		5.950	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2480			6.300	8.000	91.00	53.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2571		F	6.530	8.000	91.00	53.00
0.2598			6.600	8.000	91.00	53.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2638			6.700	8.000	91.00	53.00
0.2657	17/64	H	6.750	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717		I	6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00
0.2795			7.100	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2835			7.200	8.000	91.00	53.00
0.2874			7.300	8.000	91.00	53.00
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.2969	19/64		7.540	8.000	91.00	53.00
0.2972			7.550	8.000	91.00	53.00
0.2992			7.600	8.000	91.00	53.00
0.3012			7.650	8.000	91.00	53.00
0.3031			7.700	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3110			7.900	8.000	91.00	53.00
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00
0.3268			8.300	10.000	103.00	61.00
0.3280	21/64		8.330	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3465			8.800	10.000	103.00	61.00
0.3504			8.900	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3583			9.100	10.000	103.00	61.00
0.3594	23/64		9.130	10.000	103.00	61.00
0.3622			9.200	10.000	103.00	61.00
0.3642			9.250	10.000	103.00	61.00
0.3661			9.300	10.000	103.00	61.00
0.3677		U	9.340	10.000	103.00	61.00
0.3701			9.400	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3760			9.550	10.000	103.00	61.00
0.3780			9.600	10.000	103.00	61.00
0.3819			9.700	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3898			9.900	10.000	103.00	61.00
0.3906	25/64		9.920	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.3976			10.100	12.000	118.00	71.00
0.4016			10.200	12.000	118.00	71.00
0.4055			10.300	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4094			10.400	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes!

Series 2479

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Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4173			10.600	12.000	118.00	71.00
0.4213			10.700	12.000	118.00	71.00
0.4220	27/64		10.720	12.000	118.00	71.00
0.4252			10.800	12.000	118.00	71.00
0.4291			10.900	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4370			11.100	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4409			11.200	12.000	118.00	71.00
0.4449			11.300	12.000	118.00	71.00
0.4488			11.400	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4531			11.510	12.000	118.00	71.00
0.4567			11.600	12.000	118.00	71.00
0.4606			11.700	12.000	118.00	71.00
0.4646			11.800	12.000	118.00	71.00
0.4685			11.900	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4764			12.100	14.000	124.00	77.00
0.4803			12.200	14.000	124.00	77.00
0.4843	31/64		12.300	14.000	124.00	77.00
0.4882			12.400	14.000	124.00	77.00
0.4921			12.500	14.000	124.00	77.00
0.4961			12.600	14.000	124.00	77.00
0.5000	1/2		12.700	14.000	124.00	77.00
0.5039			12.800	14.000	124.00	77.00
0.5079			12.900	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5157			13.100	14.000	124.00	77.00
0.5197			13.200	14.000	124.00	77.00
0.5236			13.300	14.000	124.00	77.00
0.5276			13.400	14.000	124.00	77.00
0.5311	17/32		13.490	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5354			13.600	14.000	124.00	77.00
0.5394			13.700	14.000	124.00	77.00
0.5433			13.800	14.000	124.00	77.00
0.5469	35/64		13.890	14.000	124.00	77.00
0.5472			13.900	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5551			14.100	16.000	133.00	83.00
0.5591			14.200	16.000	133.00	83.00
0.5626	9/16		14.290	16.000	133.00	83.00
0.5669			14.400	16.000	133.00	83.00
0.5709			14.500	16.000	133.00	83.00
0.5748			14.600	16.000	133.00	83.00
0.5780	37/64		14.680	16.000	133.00	83.00
0.5787			14.700	16.000	133.00	83.00
0.5827			14.800	16.000	133.00	83.00
0.5866			14.900	16.000	133.00	83.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.5906			15.000	16.000	133.00	83.00
0.5937	19/32		15.080	16.000	133.00	83.00
0.5945			15.100	16.000	133.00	83.00
0.5984			15.200	16.000	133.00	83.00
0.6024			15.300	16.000	133.00	83.00
0.6063			15.400	16.000	133.00	83.00
0.6094	39/64		15.480	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6142			15.600	16.000	133.00	83.00
0.6181			15.700	16.000	133.00	83.00
0.6220			15.800	16.000	133.00	83.00
0.6248	5/8		15.870	16.000	133.00	83.00
0.6260			15.900	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6331			16.080	18.000	143.00	93.00
0.6406	41/64		16.270	18.000	143.00	93.00
0.6496			16.500	18.000	143.00	93.00
0.6563	21/32		16.670	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6720	43/64		17.070	18.000	143.00	93.00
0.6874	11/16		17.460	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.7031	45/64		17.860	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7189	23/32		18.260	20.000	153.00	101.00
0.7283			18.500	20.000	153.00	101.00
0.7441			18.900	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7500	3/4		19.050	20.000	153.00	101.00
0.7579			19.250	20.000	153.00	101.00
0.7598			19.300	20.000	153.00	101.00
0.7656	49/64		19.446	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7811	25/32		19.840	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#5511 Carbide, RT100, 5xD, 140 U pt, FIREX
#8511 Carbide, RT100VA, 5xD, 140 U pt, nano-TiAlN
#1662, Carbide, RT100, 5xD, 140 U pt, TiN

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

8xD

Bright Finish

External Coolant

Straight Shank

Speeds & Feeds
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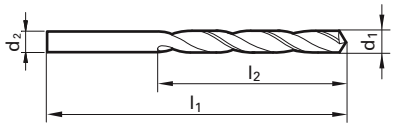
Series 2601

GT 100 Parabolic

DK 460 UF Carbide, GT 100, jobber length, 130° point, Form A
web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

Aluminum & Alloys

Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1248	1/8		3.170	69.85	41.28
0.1260			3.200	69.85	41.28
0.1283		30	3.260	69.85	41.28
0.1299			3.300	73.03	44.45
0.1339			3.400	73.03	44.45
0.1358		29	3.450	73.03	44.45
0.1378			3.500	73.03	44.45
0.1406	9/64	28	3.570	73.03	44.45
0.1441		27	3.660	76.20	47.63
0.1469		26	3.730	76.20	47.63
0.1496		25	3.800	76.20	47.63
0.1520		24	3.860	79.38	50.80
0.1539		23	3.910	79.38	50.80
0.1563	5/32		3.970	79.38	50.80
0.1571		22	3.990	79.38	50.80
0.1575			4.000	82.55	53.98
0.1591		21	4.040	82.55	53.98
0.1610		20	4.090	82.55	53.98
0.1661		19	4.220	82.55	53.98
0.1693		18	4.300	82.55	53.98
0.1720	11/64		4.370	82.55	53.98
0.1728		17	4.390	85.73	55.56
0.1772		16	4.500	85.73	55.56
0.1799		15	4.570	85.73	55.56
0.1819		14	4.620	85.73	55.56
0.1850		13	4.700	88.90	58.72
0.1874	3/16		4.760	88.90	58.72
0.1890		12	4.800	88.90	58.72
0.1909		11	4.850	88.90	58.72
0.1937		10	4.920	92.08	61.93
0.1961		9	4.980	92.08	61.93
0.1969			5.000	92.08	61.93
0.1992		8	5.060	92.08	61.93
0.2012		7	5.110	92.08	61.93
0.2031	13/64		5.160	92.08	61.93

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2039		6	5.180	95.25	63.50
0.2055		5	5.220	95.25	63.50
0.2091		4	5.310	95.25	63.50
0.2130		3	5.410	95.25	63.50
0.2165			5.500	95.25	63.50
0.2189	7/32		5.560	95.25	63.50
0.2209		2	5.610	98.43	66.68
0.2280		1	5.790	98.43	66.68
0.2339		A	5.940	98.43	66.68
0.2343	15/64		5.950	98.43	66.68
0.2362			6.000	101.60	69.85
0.2378		B	6.040	101.60	69.85
0.2421		C	6.150	101.60	69.85
0.2461		D	6.250	101.60	69.85
0.2500	1/4	E	6.350	101.60	69.85
0.2559			6.500	104.78	73.03
0.2571		F	6.530	104.78	73.03
0.2610		G	6.630	104.78	73.03
0.2657	17/64	H	6.750	104.78	73.03
0.2717		I	6.900	104.78	73.03
0.2756			7.000	104.78	73.03
0.2768		J	7.030	104.78	73.03
0.2811	9/32	K	7.140	107.95	74.63
0.2902		L	7.370	107.95	74.63
0.2949		M	7.490	111.13	77.80
0.2953			7.500	111.13	77.80
0.2969	19/64		7.540	111.13	77.80
0.3020		N	7.670	111.13	77.80
0.3126	5/16		7.940	114.30	80.98
0.3150			8.000	114.30	80.98
0.3161		O	8.030	114.30	80.98
0.3228		P	8.200	117.48	84.15
0.3280	21/64		8.330	117.48	84.15
0.3319		Q	8.430	120.65	87.33
0.3346			8.500	120.65	87.33

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3390		R	8.610	120.65	87.33
0.3437	11/32		8.730	120.65	87.33
0.3480		S	8.840	123.83	88.90
0.3543			9.000	123.83	88.90
0.3579		T	9.090	123.83	88.90
0.3594	23/64		9.130	123.83	88.90
0.3677		U	9.340	127.00	92.08
0.3740			9.500	127.00	92.08
0.3748	3/8		9.520	127.00	92.08
0.3772		V	9.580	127.00	92.08
0.3858		W	9.800	130.18	95.25
0.3906	25/64		9.920	130.18	95.25
0.3937			10.000	130.18	95.25
0.3969		X	10.080	130.18	95.25
0.4039		Y	10.260	133.35	98.43
0.4063	13/32		10.320	133.35	98.43
0.4130		Z	10.490	133.35	98.43
0.4134			10.500	133.35	98.43
0.4220	27/64		10.720	136.53	100.03
0.4331			11.000	139.70	103.20
0.4374	7/16		11.110	139.70	103.20
0.4528			11.500	142.88	106.36
0.4531	29/64		11.510	142.88	106.36
0.4689	15/32		11.910	146.05	109.55
0.4724			12.000	149.23	111.13
0.4843	31/64		12.300	149.23	111.13
0.4921			12.500	152.40	114.30
0.5000	1/2		12.700	152.40	114.30

Alternative Drill Series:

#2602 Carbide, GT100, 5xD, 130 pt, TiN
#732 Carbide, GP, 5xD, 118 pt, Bright
#5522 PM Cobalt, GT500, 5xD, 130 pt, TiN

8xD

Series 2602

GT 100 Parabolic

DK 460 UF Carbide, GT 100, jobber length, 130° point, Form A web thinned all dia., standard straight shank, RH helix

Cut / Shank Dia. = h8 tolerance range

Application Materials:

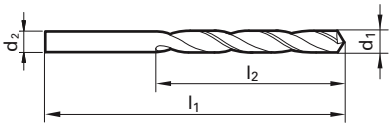
- General Steels/Brass
- Aluminum & Alloys
- Cast Iron

(S) TiN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 380



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1248	1/8		3.170	69.85	41.28
0.1260			3.200	69.85	41.28
0.1283		30	3.260	69.85	41.28
0.1299			3.300	73.03	44.45
0.1339			3.400	73.03	44.45
0.1358		29	3.450	73.03	44.45
0.1378			3.500	73.03	44.45
0.1406	9/64	28	3.570	73.03	44.45
0.1441		27	3.660	76.20	47.63
0.1469		26	3.730	76.20	47.63
0.1496		25	3.800	76.20	47.63
0.1520		24	3.860	79.38	50.80
0.1539		23	3.910	79.38	50.80
0.1563	5/32		3.970	79.38	50.80
0.1571		22	3.990	79.38	50.80
0.1575			4.000	82.55	53.98
0.1591		21	4.040	82.55	53.98
0.1610		20	4.090	82.55	53.98
0.1661		19	4.220	82.55	53.98
0.1693		18	4.300	82.55	53.98
0.1720	11/64		4.370	82.55	53.98
0.1728		17	4.390	85.73	55.56
0.1772		16	4.500	85.73	55.56
0.1799		15	4.570	85.73	55.56
0.1819		14	4.620	85.73	55.56
0.1850		13	4.700	88.90	58.72
0.1874	3/16		4.760	88.90	58.72
0.1890		12	4.800	88.90	58.72
0.1909		11	4.850	88.90	58.72
0.1937		10	4.920	92.08	61.93
0.1961		9	4.980	92.08	61.93
0.1969			5.000	92.08	61.93
0.1992		8	5.060	92.08	61.93
0.2012		7	5.110	92.08	61.93
0.2031	13/64		5.160	92.08	61.93
0.2039		6	5.180	95.25	63.50

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.2055		5	5.220	95.25	63.50
0.2091		4	5.310	95.25	63.50
0.2130		3	5.410	95.25	63.50
0.2165			5.500	95.25	63.50
0.2189	7/32		5.560	95.25	63.50
0.2209		2	5.610	98.43	66.68
0.2280		1	5.790	98.43	66.68
0.2339		A	5.940	98.43	66.68
0.2343	15/64		5.950	98.43	66.68
0.2362			6.000	101.60	69.85
0.2378		B	6.040	101.60	69.85
0.2421		C	6.150	101.60	69.85
0.2461		D	6.250	101.60	69.85
0.2500	1/4	E	6.350	101.60	69.85
0.2559			6.500	104.78	73.03
0.2571		F	6.530	104.78	73.03
0.2610		G	6.630	104.78	73.03
0.2657	17/64	H	6.750	104.78	73.03
0.2717		I	6.900	104.78	73.03
0.2756			7.000	104.78	73.03
0.2768		J	7.030	104.78	73.03
0.2811	9/32	K	7.140	107.95	74.63
0.2902		L	7.370	107.95	74.63
0.2949		M	7.490	111.13	77.80
0.2953			7.500	111.13	77.80
0.2969	19/64		7.540	111.13	77.80
0.3020		N	7.670	111.13	77.80
0.3126	5/16		7.940	114.30	80.98
0.3150			8.000	114.30	80.98
0.3161		O	8.030	114.30	80.98
0.3228		P	8.200	117.48	84.15
0.3280	21/64		8.330	117.48	84.15
0.3319		Q	8.430	120.65	87.33
0.3346			8.500	120.65	87.33
0.3390		R	8.610	120.65	87.33
0.3437	11/32		8.730	120.65	87.33

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3480		S	8.840	123.83	88.90
0.3543			9.000	123.83	88.90
0.3579		T	9.090	123.83	88.90
0.3594	23/64		9.130	123.83	88.90
0.3677		U	9.340	127.00	92.08
0.3740			9.500	127.00	92.08
0.3748	3/8		9.520	127.00	92.08
0.3772		V	9.580	127.00	92.08
0.3858		W	9.800	130.18	95.25
0.3906	25/64		9.920	130.18	95.25
0.3937			10.000	130.18	95.25
0.3969		X	10.080	130.18	95.25
0.4039		Y	10.260	133.35	98.43
0.4063	13/32		10.320	133.35	98.43
0.4130		Z	10.490	133.35	98.43
0.4134			10.500	133.35	98.43
0.4220	27/64		10.720	136.53	100.03
0.4331			11.000	139.70	103.20
0.4374	7/16		11.110	139.70	103.20
0.4528			11.500	142.88	106.36
0.4531	29/64		11.510	142.88	106.36
0.4689	15/32		11.910	146.05	109.55
0.4724			12.000	149.23	111.13
0.4843	31/64		12.300	149.23	111.13
0.4921			12.500	152.40	114.30
0.5000	1/2		12.700	152.40	114.30

Alternative Drill Series:

#2601 Carbide, GT100, 5xD, 130 pt, Bright
#732 Carbide, GP, 5xD, 118 pt, Bright
#2464 Carbide, GP, 5xD, 118 pt, FIREX
#5522 PM Cobalt, GT500, 5xD, 130 pt, TiN

To order: Series number + mm, ex. 5518 3.000

Indexable Insert Drills

Guhring's HT/RT 800 WP ultra-fine carbide indexable insert drills deliver feed rates up to 10x higher than conventional tooling. These cost-effective drill series have many features which enable them to outperform both conventional spade drills and carbide-tipped brazed tools across a wide variety of materials.

Key features include:

DK 460 UF (K40) carbide inserts - ultra-fine grain carbide developed by Guhring is 50-60% tougher than common carbide grades.

Aggressive 140° SF point geometry reduces axial thrust loading and heat generation, improving tool life and providing freer cutting action.

Coolant-through, full-helix flute design for improved chip evacuation and heat reduction.

FIREX® coating increases drill surface hardness to over 90 Rc and greatly improves heat resistance of the insert.

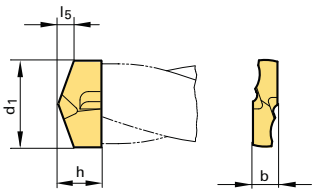
Guhring's HT/RT800 WP ultra-fine carbide indexable insert drills deliver feed rates up to 10x higher than conventional tooling. These cost-effective drill series have many features which enable them to outperform both conventional spade drills and carbide-tipped brazed drills across a wide variety of work-piece materials.

RT 800 WP Indexable Insert Drills

Inserts

DK 460 UF carbide, self-centering 140° SF point, RH cut

Cut Dia. = h7 tolerance range



Speeds & Feeds
information pg 381-382

② Application Materials:

Series 2747

- Aluminum & Alloys

Series 1047

- General Steels/Brass
- Universal Steels

Series 2485

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

① Choose your diameter (metric or inch)

② Choose the appropriate insert for your workpiece material

③ Note the holder size for that insert diameter; select a holder (3xD, 5xD or 7xD) from the following page.

①

③

Dia fract.	Dia mm	h mm	b mm	l5 mm	Series 2747 (bright)	Series 1047 (TiN)	Series 2485 (FIREX)	Holder Size (see next pg)
	16.000	8.00	4.50	2.9	•	•	•	0.1
41/64	16.270	8.00	4.50	3.0	•	•	•	
	16.500	8.00	4.50	3.0	•	•	•	
21/32	16.670	8.00	4.50	3.0	•	•	•	
	17.000	8.00	4.50	3.1	•	•	•	
43/64	17.070	8.00	4.50	3.1	•	•	•	0.2
11/16	17.460	8.00	4.50	3.1	•	•	•	
	17.500	8.00	5.00	3.2	•	•	•	
45/64	17.860	8.00	5.00	3.3	•	•	•	
	18.000	8.00	5.00	3.3	•	•	•	1.1
23/32	18.260	8.00	5.00	3.3	•	•	•	
	18.500	8.00	5.00	3.4	•	•	•	
47/64	18.650	8.00	5.00	3.4	•	•	•	
	19.000	8.00	5.00	3.5	•	•	•	
3/4	19.050	8.00	5.00	3.5	•	•	•	1.2
	19.250	8.00	5.00	3.5	•	•	•	
49/64	19.450	8.00	5.00	3.5	•	•	•	
	19.500	8.00	5.00	3.5	•	•	•	
25/32	19.840	8.00	5.00	3.6	•	•	•	
	20.000	8.00	5.00	3.6	•	•	•	
51/64	20.240	8.80	5.50	3.6	•	•	•	2.1
	20.500	8.80	5.50	3.7	•	•	•	
13/16	20.640	8.80	5.50	3.8	•	•	•	
	21.000	8.80	5.50	3.8	•	•	•	
53/64	21.030	8.80	5.50	3.8	•	•	•	2.2
27/32	21.430	8.80	5.50	3.9	•	•	•	
	21.500	8.80	5.50	3.9	•	•	•	
55/64	21.830	8.80	5.50	4.0	•	•	•	
	22.000	8.80	5.50	4.0	•	•	•	
7/8	22.220	8.80	5.50	4.0	•	•	•	
	22.500	8.80	5.50	4.1	•	•	•	
57/64	22.620	10.00	6.30	4.1	•	•	•	3.1
	23.000	10.00	6.30	4.2	•	•	•	
29/32	23.020	10.00	6.30	4.2	•	•	•	
59/64	23.420	10.00	6.30	4.3	•	•	•	
	23.500	10.00	6.30	4.3	•	•	•	
15/16	23.810	10.00	6.30	4.3	•	•	•	
	24.000	10.00	6.30	4.4	•	•	•	

Dia fract.	Dia mm	h mm	b mm	l5 mm	Series 2747 (bright)	Series 1047 (TiN)	Series 2485 (FIREX)	Holder Size (see next pg)
61/64	24.210	10.00	6.30	4.4	•	•	•	3.2
	24.500	10.00	6.30	4.5	•	•	•	
31/32	24.610	10.00	6.30	4.5	•	•	•	
63/64	25.000	10.00	6.30	4.5	•	•	•	
1	25.400	10.00	6.30	4.6	•	•	•	
	25.500	10.00	6.30	4.6	•	•	•	
	26.000	11.60	7.30	4.7	•	•	•	4.1
	26.500	11.60	7.30	4.8	•	•	•	
	27.000	11.60	7.30	4.9	•	•	•	
	27.500	11.60	7.30	5.0	•	•	•	
	28.000	11.60	7.30	5.1	•	•	•	4.2
	28.500	11.60	7.30	5.2	•	•	•	
	29.000	11.60	7.30	5.3	•	•	•	
	29.500	11.60	7.30	5.4	•	•	•	
	30.000	13.60	8.50	5.5	•	•	•	5.1
	30.500	13.60	8.50	5.6	•	•	•	
	31.000	13.60	8.50	5.6	•	•	•	
	31.500	13.60	8.50	5.7	•	•	•	
	32.000	13.60	8.50	5.8	•	•	•	
	32.500	13.60	8.50	5.9	•	•	•	5.2
	33.000	13.60	8.50	6.0	•	•	•	
	33.500	13.60	8.50	6.1	•	•	•	
	34.000	13.60	8.50	6.2	•	•	•	
	34.500	13.60	8.50	6.3	•	•	•	
	35.000	16.00	10.00	6.4	•	•	•	6.1
	36.000	16.00	10.00	6.6	•	•	•	
	37.000	16.00	10.00	6.7	•	•	•	
	37.500	16.00	10.00	6.8	•	•	•	
	38.000	16.00	10.00	6.9	•	•	•	6.2
	39.000	16.00	10.00	7.1	•	•	•	
	40.000	16.00	10.00	7.3	•	•	•	
	40.500	16.00	10.00	7.4	•	•	•	

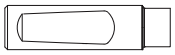
To order: Series number + mm, ex. 5518 3.000

RT 800 WP Indexable Insert Drills

Bodies

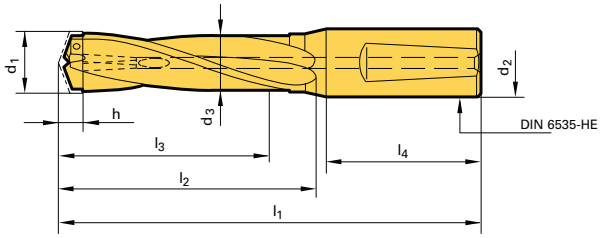
HSS, full-helix flute, nickel treated

Coolant Through



Reinforced Straight Shank w/Whistle Notch

Shank Dia. = h6 tolerance range



③

Holder Size	Order No.	Insert Range mm	d1 mm	d2 mm	d2 in	d3 mm	l4 mm	Series 5242 (3xD) l1 mm	Series 5242 (3xD) l2 mm	Series 5242 (3xD) l3 mm	Series 5243 (5xD) l1 mm	Series 5243 (5xD) l2 mm	Series 5243 (5xD) l3 mm	Series 5248 (7xD) l1 mm	Series 5248 (7xD) l2 mm	Series 5248 (7xD) l3 mm
0.1	17.000	16.00-17.00	15.70	20.00		15.7	50	130	76	54	166	112	90	202	148	126
	17.005	16.00-17.00	15.70		3/4	15.7	50									
0.2	17.990	17.00-17.86	16.70	20.00		16.7	50	130	76	54	166	112	90	202	148	126
	17.995	17.00-17.86	16.70		3/4	16.7	50									
1.1	19.000	18.00-19.05	17.70	20.00		17.7	50	138	84	60	178	124	100	218	164	140
	19.005	18.00-19.05	17.70		3/4	17.7	50									
1.2	20.000	19.00-20.00	18.70	20.00		18.7	50	138	84	60	178	124	100	218	164	140
	20.005	19.00-20.00	18.70		3/4	18.7	50									
2.1	21.000	20.24-21.03	19.70	25.00		19.7	56	153	93	66	197	137	110	241	181	154
	21.005	20.24-21.03	19.70		1.00	19.7	56									
2.2	22.500	21.00-22.50	20.70	25.00		20.7	56	153	93	66	197	137	110	241	181	154
	22.505	21.00-22.50	20.70		1.00	20.7	56									
3.1	24.000	22.62-24.00	22.20	25.00		22.2	56	161	101	72	209	149	120	257	197	168
	24.005	22.62-24.00	22.20		1.00	22.2	56									
3.2	25.500	24.00-25.50	23.70	25.00		23.7	56	170	110	78	222	162	130	274	214	182
	25.505	24.00-25.50	23.70		1.00	23.7	56									
4.1	27.500	26.00-27.50	25.20	32.00		25.2	60	182	118	84	238	174	140	294	230	196
	27.505	26.00-27.50	25.20		1 1/4	25.2	60									
4.2	29.500	27.50-29.50	27.20	32.00		27.2	60	190	126	90	250	186	150	310	246	210
	29.505	27.50-29.50	27.20		1 1/4	27.2	60									
5.1	32.000	30.00-32.00	29.20	32.00		29.2	60	198	134	96	262	198	160	326	262	224
	32.005	30.00-32.00	29.20		1 1/4	29.2	60									
5.2	34.500	32.00-34.50	31.70	32.00		31.7	60	206	142	102	274	210	170	342	278	238
	34.505	32.00-34.50	31.70		1 1/4	31.7	60									
6.1	37.500	35.00-37.50	34.00	32.00		34.0	60	218	154	114	292	228	190	366	302	266
	37.505	35.00-37.50	34.00		1 1/4	34.0	60									
6.2	40.500	37.50-40.50	37.00	32.00		37.0	60	231	167	120	311	247	200	391	327	280
	40.505	37.50-40.50	37.00		1 1/4	37.0	60									

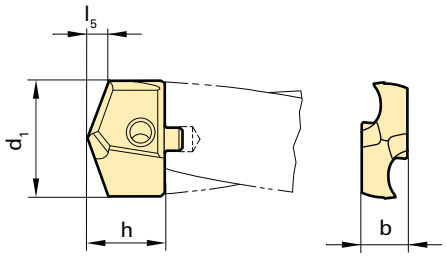
To order: Series number + mm, ex. 5518 3.000

HT 800 WP Indexable Insert Drills

Inserts

DK 460 UF carbide, self-centering 140° SF point, RH cut

Cut Dia. = h7 tolerance range



Speeds & Feeds
information pg 382-383

② Application Materials:

Series 4024*

- Aluminum & Alloys

Series 4025*

- General Steels/Brass
- Universal Steels

Series 4026*

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

① Choose your diameter (metric or inch)

② Choose the appropriate insert for your workpiece material

③ Note the holder size for that insert diameter; select a holder (3xD, 5xD or 7xD) from the following page.

Dia fract.	Dia mm	h mm	b mm	l5 mm	Series 4024* (bright)	Series 4025* (TiN)	Series 4026* (FIREX)	Holder Size (see next pg)
	11.500	7.50	4.50	2.1	•	•	•	
29/64	11.510	7.50	4.50	2.1	•	•	•	
	11.700	7.50	4.50	2.1	•	•	•	115
	11.800	7.50	4.50	2.1	•	•	•	
15/32	11.910	7.50	4.50	2.2	•	•	•	
	12.000	7.50	5.00	2.2	•	•	•	
	12.100	7.50	5.00	2.2	•	•	•	120
	12.200	7.50	5.00	2.2	•	•	•	
31/64	12.300	7.50	5.00	2.2	•	•	•	
	12.500	7.50	5.00	2.3	•	•	•	
	12.600	7.50	5.00	2.3	•	•	•	
1/2	12.700	7.50	5.00	2.3	•	•	•	125
	12.800	7.50	5.00	2.3	•	•	•	
	12.900	7.50	5.00	2.3	•	•	•	
	13.000	8.50	5.50	2.3	•	•	•	
33/64	13.100	8.50	5.50	2.4	•	•	•	130
17/32	13.490	8.50	5.50	2.4	•	•	•	
	13.500	8.50	5.50	2.4	•	•	•	
	13.600	8.50	5.50	2.4	•	•	•	135
	13.700	8.50	5.50	2.4	•	•	•	
	13.800	8.50	5.50	2.5	•	•	•	
35/64	13.890	8.50	5.50	2.5	•	•	•	
	14.000	9.60	6.00	2.5	•	•	•	
	14.100	9.60	6.00	2.5	•	•	•	140
9/16	14.290	9.60	6.00	2.6	•	•	•	
	14.400	9.60	6.00	2.6	•	•	•	

Dia fract.	Dia mm	h mm	b mm	l5 mm	Series 4024* (bright)	Series 4025* (TiN)	Series 4026* (FIREX)	Holder Size (see next pg)
	14.500	9.60	6.00	2.6	•	•	•	
	14.600	9.60	6.00	2.7	•	•	•	
37/64	14.680	9.60	6.00	2.7	•	•	•	145
	14.700	9.60	6.00	2.7	•	•	•	
	14.800	9.60	6.00	2.7	•	•	•	
	15.000	9.80	6.00	2.7	•	•	•	
19/32	15.080	9.80	6.00	2.7	•	•	•	
	15.100	9.80	6.00	2.7	•	•	•	150
	15.200	9.80	6.00	2.8	•	•	•	
	15.300	9.80	6.00	2.8	•	•	•	
39/64	15.480	9.80	6.00	2.8	•	•	•	
	15.500	9.80	6.00	2.8	•	•	•	
	15.700	9.80	6.00	2.9	•	•	•	155
	15.800	9.80	6.00	2.9	•	•	•	
5/8	15.870	9.80	6.00	2.9	•	•	•	

* While supplies last.
Refer to page 185 for new style inserts
Series #4112, #4113, #4114

To order: Series number + mm, ex. 5518 3.000

HT 800 WP

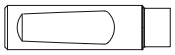
Indexable Insert Drills

Bodies

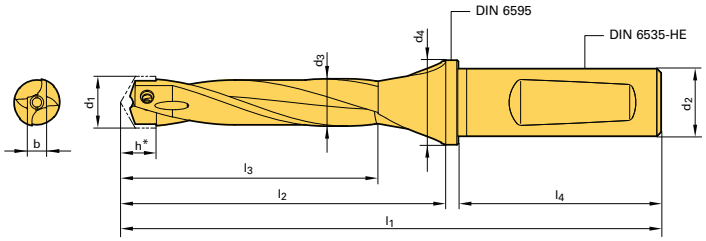
HSS, full-helix flute, nickel treated

Shank Dia. = h6 tolerance range

Coolant Through



Reinforced Straight Shank
w/Whistle Notch



③

Holder Size	Order No.	Insert Range mm	d1 mm	d2 mm	d2 in	d3 mm	l4 mm	Series 4042* (3xD) l1 mm	l2 mm	l3 mm	Series 4043* (5xD) l1 mm	l2 mm	l3 mm	Series 4048* (7xD) l1 mm	l2 mm	l3 mm
115	11.500	11.50-11.91	11.20	16.00		11.2	48	103	51	36	127	75	60	151	99	84
	11.505	11.50-11.91	11.20		5/8	11.2	48									
120	12.000	12.00-12.30	11.70	16.00		11.7	48	111	59	42	139	87	70	167	115	98
	12.005	12.00-12.30	11.70		5/8	11.7	48									
125	12.500	12.50-12.90	12.20	16.00		12.2	48	111	59	42	139	87	70	167	115	98
	12.505	12.50-12.90	12.20		5/8	12.2	48									
130	13.000	13.00-13.49	12.70	16.00		12.7	48	111	59	42	139	87	70	167	115	98
	13.005	13.00-13.49	12.70		5/8	12.7	48									
135	13.500	13.50-13.89	13.20	16.00		13.2	48	111	59	42	139	87	70	167	115	98
	13.505	13.50-13.89	13.20		5/8	13.2	48									
140	14.000	14.00-14.40	13.70	20.00		13.7	50	122	68	48	154	100	80	186	132	112
	14.005	14.00-14.40	13.70		3/4	13.7	50									
145	14.500	14.50-14.80	14.20	20.00		14.2	50	122	68	48	154	100	80	186	132	112
	14.505	14.50-14.80	14.20		3/4	14.2	50									
150	15.000	15.00-15.48	14.70	20.00		14.7	50	122	68	48	154	100	80	186	132	112
	15.005	15.00-15.48	14.70		3/4	14.7	50									
155	15.500	15.50-15.87	15.20	20.00		15.2	50	122	68	48	154	100	80	186	132	112
	15.505	15.50-15.87	15.20		3/4	15.2	50									

* While supplies last.
Refer to page 187 for new style bodies
Series #4107, #4108, #4109

HT 800 WP
RT 800 WP

Spare Parts / Accessories

Indexable Insert Drills

Clamping screws for HT 800

Series 4071

For holder size	Size	OAL	with Torx	Order Code
115	M2.2	10.0	T7	2.200
120/125	M2.2	11.0	T7	2.201
130/135	M2.5	12.0	T8	2.500
140/145	M3	12.95	T9	3.000
150/155	M3	13.95	T9	3.001

Clamping screws for RT 800

Series 1071

For holder size	Size	OAL	with Torx	Order Code
0	M3	6.00	T6	3.006
1-2	M3	7.00	T6	3.000
3	M3.5	8.00	T7	3.500
4	M4	9.00	T8	4.000
5	M4.5	10.00	T8	4.500

Torx Bits RT800

Series 4917

For Torx	Drive	OAL	Order Code
T6	1/4" hex	25	6.000
T7	1/4" hex	25	7.000
T8	1/4" hex	25	8.000
T10	1/4" hex	25	10.000

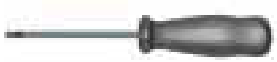
Screw driver HT 800

Series 1612

For holder size	for Torx	Order Code
115-125	T7	7.001
130/135	T8	8.001
140-155	T9	9.001

Screw driver RT 800

Series 1612



For holder size	for Torx	Order Code
0-2	T6	6.000
3	T7	7.001
4-5	T8	8.000

Torque Key RT800

Series 4915

Type	Drive	OAL	Torque Nm	Order Code
A	1/4"	160	1-5	5.001

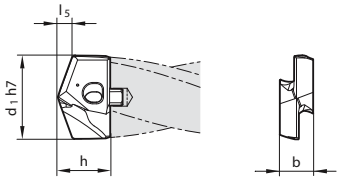
To order: Series number + mm, ex. 5518 3.000

HT 800 WP Indexable Insert Drills

NEW! Inserts

DK 460 UF carbide, self-centering 140° SF point, RH cut

Cut Dia. = h7 tolerance range



Speeds & Feeds
information pg 387-388

① Choose your diameter (metric or inch)

② Choose the appropriate coating for your workpiece material

③ Note the holder size for that insert diameter; select a holder (3xD, 5xD or 7xD) from the following page.

② Application Materials:

Series 4114

Aluminum & Alloys

Series 4113

Cast Iron

Series 4112

General Steels/Brass

Universal Steels

Stainless Steels

Hardened Materials

① ③

Dia fract.	Dia mm	h mm	b mm	l5 mm	Series 4114 bright	Series 4113 FIREX	Series 4112 nano-FIREX	Holder Size (see next pg)
	11.00	7.5	4.5	2.1	•	•	•	110
	11.20	7.5	4.5	2.1	•	•	•	
	11.50	7.5	4.5	2.1	•	•	•	115
29/64	11.51	7.5	4.5	2.1	•	•	•	
	11.70	7.5	4.5	2.1	•	•	•	
	11.80	7.5	4.5	2.1	•	•	•	
15/32	11.91	7.5	4.5	2.2	•	•	•	
	12.00	7.8	5.0	2.2	•	•	•	120
	12.10	7.8	5.0	2.2	•	•	•	
	12.20	7.8	5.0	2.2	•	•	•	
31/64	12.30	7.8	5.0	2.2	•	•	•	
	12.50	7.8	5.0	2.3	•	•	•	125
	12.60	7.8	5.0	2.3	•	•	•	
1/2	12.70	7.8	5.0	2.3	•	•	•	
	12.80	7.8	5.0	2.3	•	•	•	
	12.90	7.8	5.0	2.3	•	•	•	
	13.00	8.6	5.5	2.4	•	•	•	130
33/64	13.10	8.6	5.5	2.4	•	•	•	
17/32	13.49	8.6	5.5	2.4	•	•	•	
	13.50	8.6	5.5	2.4	•	•	•	135
	13.60	8.6	5.5	2.4	•	•	•	
	13.70	8.6	5.5	2.4	•	•	•	
	13.80	8.6	5.5	2.5	•	•	•	
35/64	13.89	8.6	5.5	2.5	•	•	•	
	14.00	9.7	6.0	2.5	•	•	•	140
	14.10	9.7	6.0	2.5	•	•	•	
9/16	14.29	9.7	6.0	2.6	•	•	•	
	14.40	9.7	6.0	2.6	•	•	•	
	14.50	9.7	6.0	2.6	•	•	•	145
	14.60	9.7	6.0	2.7	•	•	•	
37/64	14.68	9.7	6.0	2.7	•	•	•	
	14.70	9.7	6.0	2.7	•	•	•	
	14.80	9.7	6.0	2.7	•	•	•	
	15.00	9.9	6.0	2.7	•	•	•	150
19/32	15.08	9.9	6.0	2.7	•	•	•	
	15.10	9.9	6.0	2.7	•	•	•	
	15.20	9.9	6.0	2.8	•	•	•	
	15.30	9.9	6.0	2.8	•	•	•	
39/64	15.48	9.9	6.0	2.8	•	•	•	
	15.50	9.9	6.0	2.8	•	•	•	155
	15.60	9.9	6.0	2.9	•	•	•	
	15.70	9.9	6.0	2.9	•	•	•	
	15.80	9.9	6.0	2.9	•	•	•	
5/8	15.87	9.9	6.0	2.9	•	•	•	
	16.00	11.1	7.0	2.9	•	•	•	160
41/64	16.27	11.1	7.0	3.0	•	•	•	
	16.50	11.1	7.0	3.0	•	•	•	165
21/32	16.67	11.1	7.0	3.0	•	•	•	
	17.00	11.1	7.0	3.1	•	•	•	170
43/64	17.07	11.1	7.0	3.1	•	•	•	
11/16	17.46	11.1	7.0	3.1	•	•	•	
	17.50	11.1	7.0	3.2	•	•	•	175
	17.60	11.1	7.0	3.2	•	•	•	
45/64	17.86	11.1	7.0	3.3	•	•	•	
	18.00	12.5	8.0	3.3	•	•	•	180
23/32	18.26	12.5	8.0	3.3	•	•	•	
	18.50	12.5	8.0	3.4	•	•	•	185
47/64	18.65	12.5	8.0	3.4	•	•	•	
	19.00	12.5	8.0	3.5	•	•	•	190
3/4	19.05	12.5	8.0	3.5	•	•	•	
49/64	19.45	12.5	8.0	3.5	•	•	•	
	19.50	12.5	8.0	3.5	•	•	•	195
	19.60	12.5	8.0	3.6	•	•	•	
25/32	19.84	12.5	8.0	3.6	•	•	•	
	20.00	13.8	9.0	3.6	•	•	•	200
51/64	20.24	13.8	9.0	3.6	•	•	•	
	20.50	13.8	9.0	3.7	•	•	•	205
13/16	20.64	13.8	9.0	3.8	•	•	•	
	21.00	13.8	9.0	3.8	•	•	•	210
53/64	21.03	13.8	9.0	3.8	•	•	•	
	21.10	13.8	9.0	3.9	•	•	•	
27/32	21.43	13.8	9.0	3.9	•	•	•	
	21.50	13.8	9.0	3.9	•	•	•	215
55/64	21.83	13.8	9.0	4.0	•	•	•	
	22.00	15.2	10.0	4.0	•	•	•	220
7/8	22.22	15.2	10.0	4.0	•	•	•	
	22.50	15.2	10.0	4.1	•	•	•	225
57/64	22.62	15.2	10.0	4.1	•	•	•	
	23.00	15.2	10.0	4.2	•	•	•	230
29/32	23.02	15.2	10.0	4.2	•	•	•	
59/64	23.42	15.2	10.0	4.3	•	•	•	
	23.50	15.2	10.0	4.3	•	•	•	235
15/16	23.81	15.2	10.0	4.3	•	•	•	
	24.00	15.7	11.0	4.4	•	•	•	240
	24.10	15.7	11.0	4.4	•	•	•	
61/64	24.21	15.7	11.0	4.4	•	•	•	
	24.50	15.7	11.0	4.5	•	•	•	245
31/32	24.61	15.7	11.0	4.5	•	•	•	
	25.00	15.7	11.0	4.5	•	•	•	250
1	25.40	15.7	11.0	4.6	•	•	•	
	25.50	15.7	11.0	4.6	•	•	•	255

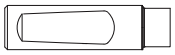
To order: Series number + mm, ex. 5518 3.000

HT 800 WP Indexable Insert Drills

NEW! Bodies

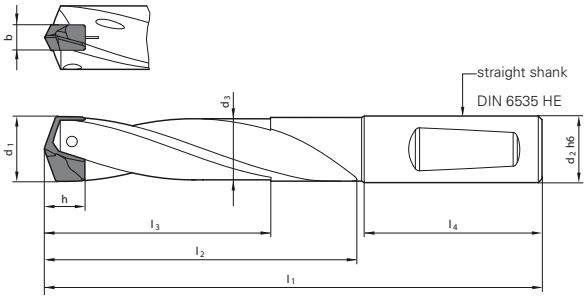
HSS, full-helix flute, nickel treated

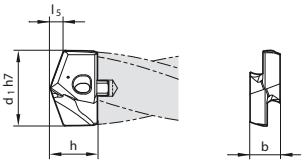
Coolant Through



Reinforced Straight Shank w/ Whistle Notch

Shank Dia. = h6 tolerance range





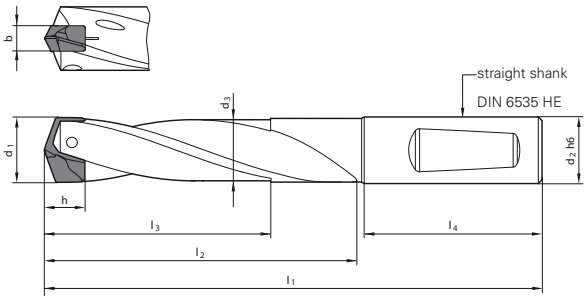
③

d1								Series 4107 (3xD)			Series 4108 (5xD)			Series 4109 (7xD)		
Holder Size	Order No.	Insert Range mm	d1 mm	d2 mm	d2 in	d3 mm	l4 mm	l1 mm	l2 mm	l3 mm	l1 mm	l2 mm	l3 mm	l1 mm	l2 mm	l3 mm
110	11.000	11.00-11.49		12.00			45.00	101.00	54.00	36.60	124.00	77.00	59.60	147.00	100.00	82.60
110	11.005	11.00-11.49		12.70	1/2		45.00									
115	11.500	11.50-11.99		12.00			45.00	103.00	56.00	38.10	127.00	80.00	62.10	151.00	104.00	86.10
115	11.505	11.50-11.99		12.70	1/2		45.00									
120	12.000	12.00-12.49		12.00			45.00	106.00	59.00	39.70	131.00	84.00	64.70	156.00	109.00	89.70
120	12.005	12.00-12.49		12.70	1/2		45.00									
125	12.500	12.50-12.99		14.00			45.00	108.00	61.00	41.30	134.00	87.00	67.30	160.00	113.00	93.30
125	12.505	12.50-12.99		15.875	5/8		45.00									
130	13.000	13.00-13.49		14.00			45.00	110.00	63.00	42.90	137.00	90.00	69.90	164.00	117.00	96.90
130	13.005	13.00-13.49		15.875	5/8		45.00									
135	13.500	13.50-13.99		14.00			45.00	113.00	66.00	44.60	141.00	94.00	72.60	169.00	122.00	100.60
135	13.505	13.50-13.99		15.875	5/8		45.00									
140	14.000	14.00-14.49		14.00			45.00	115.00	68.00	46.20	144.00	97.00	75.20	173.00	126.00	104.20
140	14.005	14.00-14.49		15.875	5/8		45.00									
145	14.500	14.50-14.99		16.00			48.00	120.00	70.00	47.80	150.00	100.00	77.80	180.00	130.00	107.80
145	14.505	14.50-14.99		15.875	5/8		48.00									
150	15.000	15.00-15.49		16.00			48.00	123.00	73.00	49.30	154.00	104.00	80.30	185.00	135.00	111.30
150	15.005	15.00-15.49		15.875	5/8		48.00									
155	15.500	15.50-15.99		16.00			48.00	125.00	75.00	50.90	157.00	107.00	82.90	189.00	139.00	114.90
155	15.505	15.50-15.99		15.875	5/8		48.00									
160	16.000	16.00-16.49		16.00			48.00	127.00	77.00	52.90	160.00	110.00	85.90	193.00	143.00	118.90
160	16.005	16.00-16.49		15.875	5/8		48.00									
165	16.500	16.50-16.99		18.00			48.00	130.00	80.00	54.10	164.00	114.00	88.10	198.00	148.00	122.10
165	16.505	16.50-16.99		19.05	3/4		48.00									
170	17.000	17.00-17.49		18.00			48.00	132.00	82.00	55.80	167.00	117.00	90.80	202.00	152.00	125.80
170	17.005	17.00-17.49		19.05	3/4		48.00									
175	17.500	17.50-17.99		18.00			48.00	134.00	84.00	57.40	170.00	120.00	93.40	206.00	156.00	129.40
175	17.505	17.50-17.99		19.05	3/4		48.00									
180	18.000	18.00-18.49		18.00			48.00	137.00	87.00	58.90	174.00	124.00	95.90	211.00	161.00	132.90
180	18.005	18.00-18.49		19.05	3/4		48.00									
185	18.500	18.50-18.99		20.00			50.00	141.00	89.00	60.50	179.00	127.00	98.50	217.00	165.00	136.50
185	18.505	18.50-18.99		19.05	3/4		50.00									
190	19.000	19.00-19.49		20.00			50.00	143.00	91.00	62.10	182.00	130.00	101.10	221.00	169.00	140.10
190	19.005	19.00-19.49		19.05	3/4		50.00									

To order: Series number + mm, ex. 5518 3.000

HT 800 WP Indexable Insert Drills

NEW! Bodies



d1								Series 4107 (3xD)			Series 4108 (5xD)			Series 4109 (7xD)		
Holder Size	Order No.	Insert Range mm	d1 mm	d2 mm	d2 in	d3 mm	l4 mm	l1 mm	l2 mm	l3 mm	l1 mm	l2 mm	l3 mm	l1 mm	l2 mm	l3 mm
195	19.500	19.50-19.99		20.00			50.00	146.00	94.00	63.70	186.00	134.00	103.70	226.00	174.00	143.70
195	19.505	19.50-19.99		19.05	3/4		50.00									
200	20.000	20.00-20.49		20.00			50.00	148.00	96.00	65.30	189.00	137.00	106.30	230.00	178.00	147.30
200	20.005	20.00-20.49		19.05	3/4		50.00									
205	20.500	20.50-20.99		25.00			56.00	159.00	99.00	67.00	201.00	141.00	109.00	243.00	183.00	151.00
205	20.505	20.50-20.99		25.40	1.0”		56.00									
210	21.000	21.00-21.49		25.00			56.00	161.00	101.00	68.60	204.00	144.00	111.60	247.00	187.00	154.60
210	21.005	21.00-21.49		25.40	1.0”		56.00									
215	21.500	21.50-21.99		25.00			56.00	163.00	103.00	70.10	207.00	147.00	114.10	251.00	191.00	158.10
215	21.505	21.50-21.99		25.40	1.0”		56.00									
220	22.000	22.00-22.49		25.00			56.00	165.00	105.00	71.70	210.00	150.00	116.70	255.00	195.00	161.70
220	22.005	22.00-22.49		25.40	1.0”		56.00									
225	22.500	22.50-22.99		25.00			56.00	168.00	108.00	73.30	214.00	154.00	119.30	260.00	200.00	165.30
225	22.505	22.50-22.99		25.40	1.0”		56.00									
230	23.000	23.00-23.49		25.00			56.00	170.00	110.00	74.90	217.00	157.00	121.90	264.00	204.00	168.90
230	23.005	23.00-23.49		25.40	1.0”		56.00									
235	23.500	23.50-23.99		25.00			56.00	173.00	113.00	76.50	221.00	161.00	124.50	269.00	209.00	172.50
235	23.505	23.50-23.99		25.40	1.0”		56.00									
240	24.000	24.00-24.49		25.00			56.00	175.00	115.00	78.10	224.00	164.00	127.10	273.00	213.00	176.10
240	24.005	24.00-24.49		25.40	1.0”		56.00									
245	24.500	24.50-24.99		25.00			56.00	177.00	117.00	79.70	227.00	167.00	129.70	277.00	217.00	179.70
245	24.505	24.50-24.99		25.40	1.0”		56.00									
250	25.000	25.00-25.49		25.00			56.00	180.00	120.00	81.30	231.00	171.00	132.30	282.00	222.00	183.30
250	25.005	25.00-25.49		25.40	1.0”		56.00									
255	25.500	25.50-25.99		32.00			60.00	187.00	122.00	82.90	239.00	174.00	134.90	291.00	226.00	186.90
255	25.505	25.50-25.99		31.75			60.00									

To order: Series number + mm, ex. 5518 3.000

LT 800 WP Drilling System

Until recently, the economical production of deep and especially large holes above 40 mm diameter with carbide tools was only achievable with the assistance of costly special tooling. The successful development of LT 800 WP now provides a modular and therefore cost-effective solution for this difficult area of machining. This modular system has an amazing range of up to 100 mm diameter and 12 x D!

The holder is equipped with coolant ducts, the interchangeable inserts are produced from ultra-fine grade carbide. Other featrues and advantages are:

Optimal adaptability to every machining task due to the combination possibilities of different tool holders (i.e. HSK, ISO taper, VDI), with extensions, reductions and drill heads with interchangeable inserts.

Powerful ‘double cutting edge’ thanks to lightly modified LTT ISO indexable inserts with curcular lands positioned in pairs.

Simple replacement of the drill hed and the interchangeable insert.

Accurate spotting provided by the interchangeable insert with special Ratio point geometry.

Good support through the complete drilling depth thanks to double-sided lands.

Last but not least: LT 800 WP is ideally suited as a core drill for enlarging of drilled holes. Also remarkable is the fact that, depending on diameter and material, holes up to 12xD can be produced, i.e. gun drilling.

Please go to www.guhring.com for further informationadn for literature on the LT 800 WP. Or contact technical support at (800) 776-6170.

7xD

nano-FIREX® coated

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 387

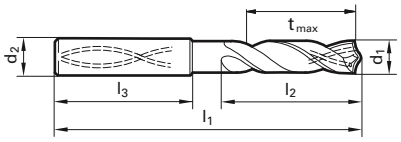
Series 4044

RT 100 X High Penetration

DK 460 UF Carbide, RT 100 X high penetration, 7xD, self-centering 140° SU point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	70.00	30.00
0.1220			3.100	6.000	70.00	30.00
0.1248	1/8		3.170	6.000	70.00	30.00
0.1260			3.200	6.000	70.00	30.00
0.1280			3.250	6.000	70.00	30.00
0.1299			3.300	6.000	70.00	30.00
0.1339			3.400	6.000	75.00	37.50
0.1378			3.500	6.000	75.00	37.50
0.1406	9/64	28	3.570	6.000	75.00	37.50
0.1417			3.600	6.000	75.00	37.50
0.1457			3.700	6.000	75.00	37.50
0.1496		25	3.800	6.000	75.00	37.50
0.1535			3.900	6.000	75.00	37.50
0.1563	5/32		3.970	6.000	75.00	37.50
0.1575			4.000	6.000	75.00	37.50
0.1591		21	4.040	6.000	75.00	37.50
0.1614			4.100	6.000	75.00	37.50
0.1654			4.200	6.000	75.00	37.50
0.1693			4.300	6.000	85.00	45.00
0.1720	11/64		4.370	6.000	85.00	45.00
0.1732			4.400	6.000	85.00	45.00
0.1772			4.500	6.000	85.00	45.00
0.1811			4.600	6.000	85.00	45.00
0.1830			4.650	6.000	85.00	45.00
0.1850			4.700	6.000	85.00	45.00
0.1874	3/16		4.760	6.000	90.00	50.00
0.1890			4.800	6.000	90.00	50.00
0.1929			4.900	6.000	90.00	50.00
0.1969			5.000	6.000	90.00	50.00
0.2008			5.100	6.000	90.00	50.00
0.2012		7	5.110	6.000	90.00	50.00
0.2031	13/64		5.160	6.000	90.00	50.00
0.2047			5.200	6.000	90.00	50.00
0.2087			5.300	6.000	90.00	50.00
0.2126			5.400	6.000	90.00	50.00
0.2130		3	5.410	6.000	90.00	50.00
0.2165			5.500	6.000	97.00	57.00
0.2189	7/32		5.560	6.000	97.00	57.00
0.2205			5.600	6.000	97.00	57.00
0.2244			5.700	6.000	97.00	57.00
0.2283			5.800	6.000	97.00	57.00
0.2323			5.900	6.000	97.00	57.00
0.2343	15/64		5.950	6.000	97.00	57.00
0.2362			6.000	6.000	97.00	57.00
0.2402			6.100	6.000	97.00	57.00
0.2441			6.200	8.000	106.00	66.00
0.2480			6.300	8.000	106.00	66.00
0.2500	1/4	E	6.350	8.000	106.00	66.00
0.2520			6.400	8.000	106.00	66.00
0.2559			6.500	8.000	106.00	66.00
0.2571		F	6.530	8.000	106.00	66.00
0.2598			6.600	8.000	106.00	66.00
0.2638			6.700	8.000	106.00	66.00
0.2657	17/64	H	6.750	8.000	106.00	66.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2677			6.800	8.000	106.00	66.00
0.2717		I	6.900	8.000	116.00	76.00
0.2756			7.000	8.000	116.00	76.00
0.2795			7.100	8.000	116.00	76.00
0.2811	9/32	K	7.140	8.000	116.00	76.00
0.2835			7.200	8.000	116.00	76.00
0.2874			7.300	8.000	116.00	76.00
0.2913			7.400	8.000	116.00	76.00
0.2953			7.500	8.000	116.00	76.00
0.2969	19/64		7.540	8.000	116.00	76.00
0.2992			7.600	8.000	116.00	76.00
0.3031			7.700	8.000	116.00	76.00
0.3071			7.800	8.000	116.00	76.00
0.3110			7.900	8.000	116.00	76.00
0.3126	5/16		7.940	8.000	116.00	76.00
0.3150			8.000	8.000	116.00	76.00
0.3189			8.100	10.000	131.00	87.00
0.3228		P	8.200	10.000	131.00	87.00
0.3268			8.300	10.000	131.00	87.00
0.3280	21/64		8.330	10.000	131.00	87.00
0.3307			8.400	10.000	131.00	87.00
0.3346			8.500	10.000	131.00	87.00
0.3386			8.600	10.000	131.00	87.00
0.3425			8.700	10.000	131.00	87.00
0.3437	11/32		8.730	10.000	131.00	87.00
0.3465			8.800	10.000	131.00	87.00
0.3504			8.900	10.000	131.00	87.00
0.3543			9.000	10.000	131.00	87.00
0.3583			9.100	10.000	139.00	95.00
0.3594	23/64		9.130	10.000	139.00	95.00
0.3622			9.200	10.000	139.00	95.00
0.3642			9.250	10.000	139.00	95.00
0.3661			9.300	10.000	139.00	95.00
0.3677		U	9.340	10.000	139.00	95.00
0.3701			9.400	10.000	139.00	95.00
0.3740			9.500	10.000	139.00	95.00
0.3748	3/8		9.520	10.000	139.00	95.00
0.3780			9.600	10.000	139.00	95.00
0.3819			9.700	10.000	139.00	95.00
0.3858		W	9.800	10.000	139.00	95.00
0.3898			9.900	10.000	139.00	95.00
0.3906	25/64		9.920	10.000	139.00	95.00
0.3937			10.000	10.000	139.00	95.00
0.3976			10.100	12.000	155.00	106.00
0.3937			10.200	12.000	155.00	106.00
0.4055			10.300	12.000	155.00	106.00
0.4063	13/32		10.320	12.000	155.00	106.00
0.4094			10.400	12.000	155.00	106.00
0.4134			10.500	12.000	155.00	106.00
0.4173			10.600	12.000	155.00	106.00
0.4213			10.700	12.000	155.00	106.00
0.4220	27/64		10.720	12.000	155.00	106.00
0.4252			10.800	12.000	155.00	106.00
0.4291			10.900	12.000	155.00	106.00

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

Series 4044

Speeds & Feeds information pg 387

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4331			11.000	12.000	155.00	106.00
0.4370			11.100	12.000	155.00	106.00
0.4374	7/16		11.110	12.000	163.00	114.00
0.4409			11.200	12.000	163.00	114.00
0.4449			11.300	12.000	155.00	106.00
0.4488			11.400	12.000	155.00	106.00
0.4528			11.500	12.000	163.00	114.00
0.4531	29/64		11.510	12.000	155.00	106.00
0.4567			11.600	12.000	155.00	106.00
0.4606			11.700	12.000	155.00	106.00
0.4646			11.800	12.000	163.00	114.00
0.4685			11.900	12.000	163.00	114.00
0.4689	15/32		11.910	12.000	163.00	114.00
0.4724			12.000	12.000	163.00	114.00
0.4764			12.100	14.000	182.00	133.00
0.4803			12.200	14.000	182.00	133.00
0.4843	31/64		12.300	14.000	182.00	133.00
0.4921			12.500	14.000	182.00	133.00
0.5000	1/2		12.700	14.000	182.00	133.00
0.5118			13.000	14.000	182.00	133.00
0.5157			13.100	14.000	182.00	133.00
0.5311	17/32		13.490	14.000	182.00	133.00
0.5315			13.500	14.000	182.00	133.00
0.5469	35/64		13.890	14.000	182.00	133.00
0.5512			14.000	14.000	182.00	133.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.5551			14.100	16.000	204.00	152.00
0.5591			14.200	16.000	204.00	152.00
0.5626	9/16		14.290	16.000	204.00	152.00
0.5709			14.500	16.000	204.00	152.00
0.5906			15.000	16.000	204.00	152.00
0.5945			15.100	16.000	204.00	152.00
0.6094	39/64		15.480	16.000	204.00	152.00
0.6102			15.500	16.000	204.00	152.00
0.6248	5/8		15.870	16.000	204.00	152.00
0.6299			16.000	16.000	204.00	152.00
0.6496			16.500	18.000	223.00	171.00
0.6654			16.900	18.000	223.00	171.00
0.6693			17.000	18.000	223.00	171.00
0.6890			17.500	18.000	223.00	171.00
0.7087			18.000	18.000	223.00	171.00
0.7283			18.500	20.000	244.00	190.00
0.7441			18.900	20.000	244.00	190.00
0.7480			19.000	20.000	244.00	190.00
0.7500	3/4		19.050	20.000	244.00	190.00
0.7677			19.500	20.000	244.00	190.00
0.7874			20.000	20.000	244.00	190.00

Alternative Drill Series:

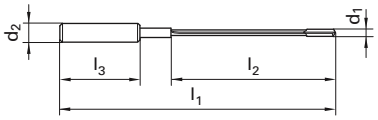
#5512 Carbide, RT100, 7xD, 140 U pt, FIREX

EB 100

Single flute gun drill

DK 460 UF Carbide, Type G point, standard driver, RH cut

Cut Dia. = h5 tolerance range, Shank Dia. = h6



Bright Finish

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 390-391

Application Materials:

- General Steels/Brass
- Universal Steels
- Cast Iron
- Aluminum & Alloys

Series 5024 45mm flute length

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0472			1.200	4.000	90.00	45.00
0.0591			1.500	4.000	90.00	45.00
0.0630			1.600	4.000	90.00	45.00
0.0787			2.000	4.000	90.00	45.00
0.0984			2.500	10.000	100.00	45.00
0.1063			2.700	10.000	100.00	45.00
0.1181			3.000	10.000	100.00	45.00
0.1260			3.200	10.000	100.00	45.00

Series 5020 80mm flute length

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0472			1.200	4.000	125.00	80.00
0.0591			1.500	4.000	125.00	80.00
0.0630			1.600	4.000	125.00	80.00
0.0787			2.000	4.000	125.00	80.00
0.0984			2.500	10.000	135.00	80.00
0.1063			2.700	10.000	135.00	80.00
0.1181			3.000	10.000	135.00	80.00
0.1260			3.200	10.000	135.00	80.00
0.1378			3.500	10.000	135.00	80.00
0.1575			4.000	10.000	135.00	80.00
0.1654			4.200	10.000	135.00	80.00
0.1772		16	4.500	10.000	135.00	80.00
0.1969			5.000	10.000	135.00	80.00

Series 5026 120mm flute length

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0591			1.500	4.000	165.00	120.00
0.0630			1.600	4.000	165.00	120.00
0.0787			2.000	4.000	165.00	120.00
0.0984			2.500	10.000	175.00	120.00
0.1063			2.700	10.000	175.00	120.00
0.1181			3.000	10.000	175.00	120.00
0.1260			3.200	10.000	175.00	120.00
0.1378			3.500	10.000	175.00	120.00
0.1575			4.000	10.000	175.00	120.00
0.1654			4.200	10.000	175.00	120.00
0.1772		16	4.500	10.000	175.00	120.00
0.1969			5.000	10.000	175.00	120.00

Series 5021 160mm flute length

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0591			1.500	4.000	205.00	160.00
0.0630			1.600	4.000	205.00	160.00
0.0787			2.000	4.000	205.00	160.00
0.0984			2.500	10.000	215.00	160.00
0.1063			2.700	10.000	215.00	160.00
0.1181			3.000	10.000	215.00	160.00
0.1260			3.200	10.000	215.00	160.00
0.1378			3.500	10.000	215.00	160.00
0.1575			4.000	10.000	215.00	160.00
0.1654			4.200	10.000	215.00	160.00
0.1772		16	4.500	10.000	215.00	160.00
0.1969			5.000	10.000	215.00	160.00
0.2362			6.000	16.000	225.00	160.00
0.3150			8.000	16.000	225.00	160.00

To order: Series number + mm, ex. 5518 3.000

3xD

FIREX® coated

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 393

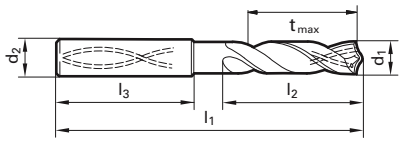
Series 5510

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 3xD, self-centering 140° SU point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	62.00	20.00
0.1220			3.100	6.000	62.00	20.00
0.1248	1/8		3.170	6.000	62.00	20.00
0.1260			3.200	6.000	62.00	20.00
0.1280			3.250	6.000	62.00	20.00
0.1299			3.300	6.000	62.00	20.00
0.1339			3.400	6.000	62.00	20.00
0.1378			3.500	6.000	62.00	20.00
0.1406	9/64	28	3.570	6.000	62.00	20.00
0.1417			3.600	6.000	62.00	20.00
0.1457			3.700	6.000	62.00	20.00
0.1496		25	3.800	6.000	66.00	24.00
0.1535			3.900	6.000	66.00	24.00
0.1563	5/32		3.970	6.000	66.00	24.00
0.1575			4.000	6.000	66.00	24.00
0.1591		21	4.040	6.000	66.00	24.00
0.1614			4.100	6.000	66.00	24.00
0.1654			4.200	6.000	66.00	24.00
0.1693			4.300	6.000	66.00	24.00
0.1720	11/64		4.370	6.000	66.00	24.00
0.1732			4.400	6.000	66.00	24.00
0.1772		16	4.500	6.000	66.00	24.00
0.1811			4.600	6.000	66.00	24.00
0.1831			4.650	6.000	66.00	24.00
0.1850		13	4.700	6.000	66.00	28.00
0.1874	3/16		4.760	6.000	66.00	28.00
0.1890		12	4.800	6.000	66.00	28.00
0.1929			4.900	6.000	66.00	28.00
0.1969			5.000	6.000	66.00	28.00
0.2008			5.100	6.000	66.00	28.00
0.2012		7	5.110	6.000	66.00	28.00
0.2031	13/64		5.160	6.000	66.00	28.00
0.2047			5.200	6.000	66.00	28.00
0.2087			5.300	6.000	66.00	28.00
0.2126			5.400	6.000	66.00	28.00
0.2130		3	5.410	6.000	66.00	28.00
0.2165			5.500	6.000	66.00	28.00
0.2185			5.550	6.000	66.00	28.00
0.2189	7/32		5.560	6.000	66.00	28.00
0.2205			5.600	6.000	66.00	28.00
0.2244			5.700	6.000	66.00	28.00
0.2283			5.800	6.000	66.00	28.00
0.2323			5.900	6.000	66.00	28.00
0.2343	15/64		5.950	6.000	66.00	28.00
0.2362			6.000	6.000	66.00	28.00
0.2402			6.100	8.000	79.00	34.00
0.2441			6.200	8.000	79.00	34.00
0.2480			6.300	8.000	79.00	34.00
0.2500	1/4	E	6.350	8.000	79.00	34.00
0.2520			6.400	8.000	79.00	34.00
0.2559			6.500	8.000	79.00	34.00
0.2571		F	6.530	8.000	79.00	34.00
0.2598			6.600	8.000	79.00	34.00
0.2638			6.700	8.000	79.00	34.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2657	17/64	H	6.750	8.000	79.00	34.00
0.2677			6.800	8.000	79.00	34.00
0.2717		I	6.900	8.000	79.00	34.00
0.2756			7.000	8.000	79.00	34.00
0.2795			7.100	8.000	79.00	41.00
0.2811	9/32	K	7.140	8.000	79.00	41.00
0.2835			7.200	8.000	79.00	41.00
0.2874			7.300	8.000	79.00	41.00
0.2913			7.400	8.000	79.00	41.00
0.2953			7.500	8.000	79.00	41.00
0.2969	19/64		7.540	8.000	79.00	41.00
0.2992			7.600	8.000	79.00	41.00
0.3031			7.700	8.000	79.00	41.00
0.3071			7.800	8.000	79.00	41.00
0.3110			7.900	8.000	79.00	41.00
0.3126	5/16		7.940	8.000	79.00	41.00
0.3150			8.000	8.000	79.00	41.00
0.3189			8.100	10.000	89.00	47.00
0.3228		P	8.200	10.000	89.00	47.00
0.3268			8.300	10.000	89.00	47.00
0.3280	21/64		8.330	10.000	89.00	47.00
0.3307			8.400	10.000	89.00	47.00
0.3346			8.500	10.000	89.00	47.00
0.3386			8.600	10.000	89.00	47.00
0.3425			8.700	10.000	89.00	47.00
0.3437	11/32		8.730	10.000	89.00	47.00
0.3465			8.800	10.000	89.00	47.00
0.3504			8.900	10.000	89.00	47.00
0.3543			9.000	10.000	89.00	47.00
0.3583			9.100	10.000	89.00	47.00
0.3594	23/64		9.130	10.000	89.00	47.00
0.3622			9.200	10.000	89.00	47.00
0.3642			9.250	10.000	89.00	47.00
0.3661			9.300	10.000	89.00	47.00
0.3677		U	9.340	10.000	89.00	47.00
0.3701			9.400	10.000	89.00	47.00
0.3740			9.500	10.000	89.00	47.00
0.3748	3/8		9.520	10.000	89.00	47.00
0.3760			9.550	10.000	89.00	47.00
0.3780			9.600	10.000	89.00	47.00
0.3819			9.700	10.000	89.00	47.00
0.3858		W	9.800	10.000	89.00	47.00
0.3898			9.900	10.000	89.00	47.00
0.3906	25/64		9.920	10.000	89.00	47.00
0.3937			10.000	10.000	89.00	47.00
0.3976			10.100	12.000	102.00	55.00
0.4016			10.200	12.000	102.00	55.00
0.4055			10.300	12.000	102.00	55.00
0.4063	13/32		10.320	12.000	102.00	55.00
0.4094			10.400	12.000	102.00	55.00
0.4134			10.500	12.000	102.00	55.00
0.4173			10.600	12.000	102.00	55.00
0.4213			10.700	12.000	102.00	55.00
0.4220	27/64		10.720	12.000	102.00	55.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes!

Series 5510

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Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4252			10.800	12.000	102.00	55.00
0.4291			10.900	12.000	102.00	55.00
0.4331			11.000	12.000	102.00	55.00
0.4370			11.100	12.000	102.00	55.00
0.4374	7/16		11.110	12.000	102.00	55.00
0.4409			11.200	12.000	102.00	55.00
0.4449			11.300	12.000	102.00	55.00
0.4488			11.400	12.000	102.00	55.00
0.4528			11.500	12.000	102.00	55.00
0.4531	29/64		11.510	12.000	102.00	55.00
0.4567			11.600	12.000	102.00	55.00
0.4606			11.700	12.000	102.00	55.00
0.4645			11.800	12.000	102.00	55.00
0.4685			11.900	12.000	102.00	55.00
0.4689	15/32		11.910	12.000	102.00	55.00
0.4724			12.000	12.000	102.00	55.00
0.4764			12.100	14.000	107.00	60.00
0.4803			12.200	14.000	107.00	60.00
0.4843	31/64		12.300	14.000	107.00	60.00
0.4882			12.400	14.000	107.00	60.00
0.4921			12.500	14.000	107.00	60.00
0.4961			12.600	14.000	107.00	60.00
0.5000	1/2		12.700	14.000	107.00	60.00
0.5039			12.800	14.000	107.00	60.00
0.5079			12.900	14.000	107.00	60.00
0.5118			13.000	14.000	107.00	60.00
0.5157			13.100	14.000	107.00	60.00
0.5197			13.200	14.000	107.00	60.00
0.5236			13.300	14.000	107.00	60.00
0.5276			13.400	14.000	107.00	60.00
0.5311	17/32		13.490	14.000	107.00	60.00
0.5315			13.500	14.000	107.00	60.00
0.5354			13.600	14.000	107.00	60.00
0.5394			13.700	14.000	107.00	60.00
0.5433			13.800	14.000	107.00	60.00
0.5469	35/64		13.890	14.000	107.00	60.00
0.5472			13.900	14.000	107.00	60.00
0.5512			14.000	14.000	107.00	60.00
0.5551			14.100	16.000	115.00	65.00
0.5591			14.200	16.000	115.00	65.00
0.5626	9/16		14.290	16.000	115.00	65.00
0.5630			14.300	16.000	115.00	65.00
0.5669			14.400	16.000	115.00	65.00
0.5709			14.500	16.000	115.00	65.00
0.5748			14.600	16.000	115.00	65.00
0.5780	37/64		14.680	16.000	115.00	65.00
0.5787			14.700	16.000	115.00	65.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.5827			14.800	16.000	115.00	65.00
0.5866			14.900	16.000	115.00	65.00
0.5906			15.000	16.000	115.00	65.00
0.5937	19/32		15.080	16.000	115.00	65.00
0.5945			15.100	16.000	115.00	65.00
0.5984			15.200	16.000	115.00	65.00
0.6024			15.300	16.000	115.00	65.00
0.6063			15.400	16.000	115.00	65.00
0.6094	39/64		15.480	16.000	115.00	65.00
0.6102			15.500	16.000	115.00	65.00
0.6142			15.600	16.000	115.00	65.00
0.6181			15.700	16.000	115.00	65.00
0.6220			15.800	16.000	115.00	65.00
0.6248	5/8		15.870	16.000	115.00	65.00
0.6260			15.900	16.000	115.00	65.00
0.6299			16.000	16.000	115.00	65.00
0.6331			16.080	16.000	115.00	65.00
0.6378			16.200	18.000	115.00	65.00
0.6406	41/64		16.270	16.000	115.00	65.00
0.6496			16.500	18.000	123.00	73.00
0.6563	21/32		16.670	18.000	123.00	73.00
0.6654			16.900	18.000	123.00	73.00
0.6693			17.000	18.000	123.00	73.00
0.6720	43/64		17.070	18.000	123.00	73.00
0.6874	11/16		17.460	18.000	123.00	73.00
0.6890			17.500	18.000	123.00	73.00
0.6929			17.600	18.000	123.00	73.00
0.6968			17.700	18.000	123.00	73.00
0.7031	45/64		17.860	18.000	123.00	73.00
0.7087			18.000	18.000	123.00	73.00
0.7189	23/32		18.260	20.000	131.00	79.00
0.7283			18.500	20.000	131.00	79.00
0.7441			18.900	20.000	131.00	79.00
0.7480			19.000	20.000	131.00	79.00
0.7500	3/4		19.050	20.000	131.00	79.00
0.7579			19.250	20.000	131.00	79.00
0.7598			19.300	20.000	131.00	79.00
0.7656	49/64		19.446	20.000	131.00	79.00
0.7677			19.500	20.000	131.00	79.00
0.7811	25/32		19.840	20.000	131.00	79.00
0.7874			20.000	20.000	131.00	79.00

Alternative Drill Series:

#5514 Carbide, RT100, 3xD, 140 U pt, FIREX
#2477 Carbide, RT100U, 3xD, 140 U pt, nano-FIREX
#8510 Carbide, RT100VA, 3xD, 140 VA pt, nano-A

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

5xD

FIREX® coated

Coolant Through

Reinforced Straight Shank

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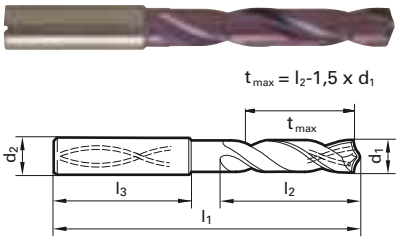
Series 5511

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 5xD, self-centering 140° SU point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	28.00
0.1220			3.100	6.000	66.00	28.00
0.1248	1/8		3.170	6.000	66.00	28.00
0.1260			3.200	6.000	66.00	28.00
0.1280			3.250	6.000	66.00	28.00
0.1299			3.300	6.000	66.00	28.00
0.1339			3.400	6.000	66.00	28.00
0.1378			3.500	6.000	66.00	28.00
0.1406	9/64	28	3.570	6.000	66.00	28.00
0.1417			3.600	6.000	66.00	28.00
0.1457			3.700	6.000	66.00	28.00
0.1496		25	3.800	6.000	74.00	36.00
0.1535			3.900	6.000	74.00	36.00
0.1563	5/32		3.970	6.000	74.00	36.00
0.1575			4.000	6.000	74.00	36.00
0.1591		21	4.040	6.000	74.00	36.00
0.1614			4.100	6.000	74.00	36.00
0.1654			4.200	6.000	74.00	36.00
0.1693		18	4.300	6.000	74.00	36.00
0.1720	11/64		4.370	6.000	74.00	36.00
0.1732			4.400	6.000	74.00	36.00
0.1772		16	4.500	6.000	74.00	36.00
0.1811			4.600	6.000	74.00	36.00
0.1831			4.650	6.000	74.00	36.00
0.1850		13	4.700	6.000	74.00	36.00
0.1874	3/16		4.760	6.000	82.00	44.00
0.1890		12	4.800	6.000	82.00	44.00
0.1929			4.900	6.000	82.00	44.00
0.1969			5.000	6.000	82.00	44.00
0.2008			5.100	6.000	82.00	44.00
0.2012		7	5.110	6.000	82.00	44.00
0.2031	13/64		5.160	6.000	82.00	44.00
0.2047			5.200	6.000	82.00	44.00
0.2087			5.300	6.000	82.00	44.00
0.2126			5.400	6.000	82.00	44.00
0.2130		3	5.410	6.000	82.00	44.00
0.2165			5.500	6.000	82.00	44.00
0.2185			5.550	6.000	82.00	44.00
0.2189	7/32		5.560	6.000	82.00	44.00
0.2205			5.600	6.000	82.00	44.00
0.2244			5.700	6.000	82.00	44.00
0.2283			5.800	6.000	82.00	44.00
0.2323			5.900	6.000	82.00	44.00
0.2343	15/64		5.950	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2480			6.300	8.000	91.00	53.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2571		F	6.530	8.000	91.00	53.00
0.2598			6.600	8.000	91.00	53.00
0.2638			6.700	8.000	91.00	53.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2657	17/64	H	6.750	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717		I	6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00
0.2795			7.100	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2835			7.200	8.000	91.00	53.00
0.2874			7.300	8.000	91.00	53.00
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.2969	19/64		7.540	8.000	91.00	53.00
0.2992			7.600	8.000	91.00	53.00
0.3031			7.700	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3110			7.900	8.000	91.00	53.00
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00
0.3268			8.300	10.000	103.00	61.00
0.3280	21/64		8.330	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3465			8.800	10.000	103.00	61.00
0.3504			8.900	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3583			9.100	10.000	103.00	61.00
0.3594	23/64		9.130	10.000	103.00	61.00
0.3622			9.200	10.000	103.00	61.00
0.3642			9.250	10.000	103.00	61.00
0.3661			9.300	10.000	103.00	61.00
0.3677		U	9.340	10.000	103.00	61.00
0.3701			9.400	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3780			9.600	10.000	103.00	61.00
0.3819			9.700	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3898			9.900	10.000	103.00	61.00
0.3906	25/64		9.920	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.3976			10.100	12.000	118.00	71.00
0.4016			10.200	12.000	118.00	71.00
0.4055			10.300	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4094			10.400	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4173			10.600	12.000	118.00	71.00
0.4213			10.700	12.000	118.00	71.00
0.4220	27/64		10.720	12.000	118.00	71.00
0.4252			10.800	12.000	118.00	71.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes!

Series 5511

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Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4291			10.900	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4370			11.100	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4409			11.200	12.000	118.00	71.00
0.4449			11.300	12.000	118.00	71.00
0.4488			11.400	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4531	29/64		11.510	12.000	118.00	71.00
0.4567			11.600	12.000	118.00	71.00
0.4606			11.700	12.000	118.00	71.00
0.4646			11.800	12.000	118.00	71.00
0.4685			11.900	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4764			12.100	14.000	124.00	77.00
0.4803			12.200	14.000	124.00	77.00
0.4843	31/64		12.300	14.000	124.00	77.00
0.4882			12.400	14.000	124.00	77.00
0.4921			12.500	14.000	124.00	77.00
0.4961			12.600	14.000	124.00	77.00
0.5000	1/2		12.700	14.000	124.00	77.00
0.5039			12.800	14.000	124.00	77.00
0.5079			12.900	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5157			13.100	14.000	124.00	77.00
0.5197			13.200	14.000	124.00	77.00
0.5236			13.300	14.000	124.00	77.00
0.5276			13.400	14.000	124.00	77.00
0.5311	17/32		13.490	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5354			13.600	14.000	124.00	77.00
0.5394			13.700	14.000	124.00	77.00
0.5433			13.800	14.000	124.00	77.00
0.5469	35/64		13.890	14.000	124.00	77.00
0.5472			13.900	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5551			14.100	16.000	133.00	83.00
0.5591			14.200	16.000	133.00	83.00
0.5626	9/16		14.290	16.000	133.00	83.00
0.5630			14.300	16.000	133.00	83.00
0.5669			14.400	16.000	133.00	83.00
0.5709			14.500	16.000	133.00	83.00
0.5748			14.600	16.000	133.00	83.00
0.5780	37/64		14.680	16.000	133.00	83.00
0.5787			14.700	16.000	133.00	83.00
0.5827			14.800	16.000	133.00	83.00
0.5866			14.900	16.000	133.00	83.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.5906			15.000	16.000	133.00	83.00
0.5937	19/32		15.080	16.000	133.00	83.00
0.5945			15.100	16.000	133.00	83.00
0.5984			15.200	16.000	133.00	83.00
0.6024			15.300	16.000	133.00	83.00
0.6063			15.400	16.000	133.00	83.00
0.6094	39/64		15.480	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6142			15.600	16.000	133.00	83.00
0.6181			15.700	16.000	133.00	83.00
0.6220			15.800	16.000	133.00	83.00
0.6248	5/8		15.870	16.000	133.00	83.00
0.6260			15.900	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6331			16.080	18.000	143.00	93.00
0.6406	41/64		16.270	18.000	143.00	93.00
0.6496			16.500	18.000	143.00	93.00
0.6563	21/32		16.670	18.000	143.00	93.00
0.6575			16.700	18.000	143.00	93.00
0.6654			16.900	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6720	43/64		17.070	18.000	143.00	93.00
0.6874	11/16		17.460	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.6969			17.700	18.000	143.00	93.00
0.7031	45/64		17.860	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7283			18.500	20.000	153.00	101.00
0.7362			18.700	20.000	153.00	101.00
0.7441			18.900	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7500	3/4		19.050	20.000	153.00	101.00
0.7543			19.160	20.000	153.00	101.00
0.7579			19.250	20.000	153.00	101.00
0.7598			19.300	20.000	153.00	101.00
0.7656	49/64		19.446	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7756			19.700	20.000	153.00	101.00
0.7811	25/32		19.840	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#2479 Carbide, RT100, 5xD, 140 U pt, nano-FIREX
#8511 Carbide, RT100VA, 5xD, 140 VA pt, nano-A
#5611 Carbide, RT100, 5xD, 140 U pt, FIREX
#1662 Carbide, RT100, 5xD, 140 F pt, TiN

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

7xD

FIREX® coated

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 394

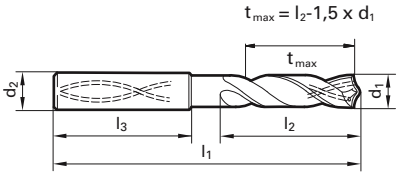
GUHRING Select

Series 5512

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 7xD, self-centering 140° SU point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	70.00	30.00
0.1220			3.100	6.000	70.00	30.00
0.1248	1/8		3.170	6.000	70.00	30.00
0.1260			3.200	6.000	70.00	30.00
0.1280			3.250	6.000	70.00	30.00
0.1299			3.300	6.000	70.00	30.00
0.1339			3.400	6.000	75.00	37.50
0.1378			3.500	6.000	75.00	37.50
0.1406	9/64	28	3.570	6.000	75.00	37.50
0.1417			3.600	6.000	75.00	37.50
0.1457			3.700	6.000	75.00	37.50
0.1496		25	3.800	6.000	75.00	37.50
0.1535			3.900	6.000	75.00	37.50
0.1563	5/32		3.970	6.000	75.00	37.50
0.1575			4.000	6.000	75.00	37.50
0.1591		21	4.040	6.000	75.00	37.50
0.1614			4.100	6.000	75.00	37.50
0.1654			4.200	6.000	75.00	37.50
0.1693			4.300	6.000	85.00	45.00
0.1720	11/64		4.370	6.000	85.00	45.00
0.1732			4.400	6.000	85.00	45.00
0.1772			4.500	6.000	85.00	45.00
0.1811			4.600	6.000	85.00	45.00
0.1830			4.650	6.000	85.00	45.00
0.1850			4.700	6.000	85.00	45.00
0.1874	3/16		4.760	6.000	90.00	50.00
0.1890			4.800	6.000	90.00	50.00
0.1929			4.900	6.000	90.00	50.00
0.1969			5.000	6.000	90.00	50.00
0.2008			5.100	6.000	90.00	50.00
0.2012		7	5.110	6.000	90.00	50.00
0.2031	13/64		5.160	6.000	90.00	50.00
0.2047			5.200	6.000	90.00	50.00
0.2087			5.300	6.000	90.00	50.00
0.2126			5.400	6.000	90.00	50.00
0.2130		3	5.410	6.000	90.00	50.00
0.2165			5.500	6.000	97.00	57.00
0.2189	7/32		5.560	6.000	97.00	57.00
0.2205			5.600	6.000	97.00	57.00
0.2244			5.700	6.000	97.00	57.00
0.2283			5.800	6.000	97.00	57.00
0.2323			5.900	6.000	97.00	57.00
0.2343	15/64		5.950	6.000	97.00	57.00
0.2362			6.000	6.000	97.00	57.00
0.2402			6.100	8.000	106.00	66.00
0.2441			6.200	8.000	106.00	66.00
0.2480			6.300	8.000	106.00	66.00
0.2500	1/4	E	6.350	8.000	106.00	66.00
0.2520			6.400	8.000	106.00	66.00
0.2559			6.500	8.000	106.00	66.00
0.2571		F	6.530	8.000	106.00	66.00
0.2598			6.600	8.000	106.00	66.00
0.2638			6.700	8.000	106.00	66.00
0.2657	17/64	H	6.750	8.000	106.00	66.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2677			6.800	8.000	106.00	66.00
0.2717		I	6.900	8.000	116.00	76.00
0.2756			7.000	8.000	116.00	76.00
0.2795			7.100	8.000	116.00	76.00
0.2811	9/32	K	7.140	8.000	116.00	76.00
0.2835			7.200	8.000	116.00	76.00
0.2874			7.300	8.000	116.00	76.00
0.2913			7.400	8.000	116.00	76.00
0.2953			7.500	8.000	116.00	76.00
0.2969	19/64		7.540	8.000	116.00	76.00
0.2992			7.600	8.000	116.00	76.00
0.3031			7.700	8.000	116.00	76.00
0.3071			7.800	8.000	116.00	76.00
0.3110			7.900	8.000	116.00	76.00
0.3126	5/16		7.940	8.000	116.00	76.00
0.3150			8.000	8.000	116.00	76.00
0.3189			8.100	10.000	131.00	87.00
0.3228		P	8.200	10.000	131.00	87.00
0.3268			8.300	10.000	131.00	87.00
0.3280	21/64		8.330	10.000	131.00	87.00
0.3307			8.400	10.000	131.00	87.00
0.3346			8.500	10.000	131.00	87.00
0.3386			8.600	10.000	131.00	87.00
0.3425			8.700	10.000	131.00	87.00
0.3437	11/32		8.730	10.000	131.00	87.00
0.3465			8.800	10.000	131.00	87.00
0.3504			8.900	10.000	131.00	87.00
0.3543			9.000	10.000	131.00	87.00
0.3583			9.100	10.000	139.00	95.00
0.3594	23/64		9.130	10.000	139.00	95.00
0.3622			9.200	10.000	139.00	95.00
0.3642			9.250	10.000	139.00	95.00
0.3661			9.300	10.000	139.00	95.00
0.3677		U	9.340	10.000	139.00	95.00
0.3701			9.400	10.000	139.00	95.00
0.3740			9.500	10.000	139.00	95.00
0.3748	3/8		9.520	10.000	139.00	95.00
0.3780			9.600	10.000	139.00	95.00
0.3819			9.700	10.000	139.00	95.00
0.3858		W	9.800	10.000	139.00	95.00
0.3898			9.900	10.000	139.00	95.00
0.3906	25/64		9.920	10.000	139.00	95.00
0.3937			10.000	10.000	139.00	95.00
0.3976			10.100	12.000	155.00	106.00
0.3937			10.200	12.000	155.00	106.00
0.4055			10.300	12.000	155.00	106.00
0.4063	13/32		10.320	12.000	155.00	106.00
0.4094			10.400	12.000	155.00	106.00
0.4134			10.500	12.000	155.00	106.00
0.4173			10.600	12.000	155.00	106.00
0.4213			10.700	12.000	155.00	106.00
0.4220	27/64		10.720	12.000	155.00	106.00
0.4252			10.800	12.000	155.00	106.00
0.4291			10.900	12.000	155.00	106.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes!

Series 5512

Speeds & Feeds information pg 394

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4331			11.000	12.000	155.00	106.00
0.4370			11.100	12.000	155.00	106.00
0.4374	7/16		11.110	12.000	163.00	114.00
0.4409			11.200	12.000	163.00	114.00
0.4449			11.300	12.000	155.00	106.00
0.4488			11.400	12.000	155.00	106.00
0.4528			11.500	12.000	163.00	114.00
0.4531	29/64		11.510	12.000	155.00	106.00
0.4567			11.600	12.000	155.00	106.00
0.4606			11.700	12.000	155.00	106.00
0.4646			11.800	12.000	163.00	114.00
0.4685			11.900	12.000	155.00	106.00
0.4689	15/32		11.910	12.000	163.00	114.00
0.4724			12.000	12.000	163.00	114.00
0.4764			12.100	14.000	182.00	133.00
0.4803			12.200	14.000	182.00	133.00
0.4843	31/64		12.300	14.000	182.00	133.00
0.4921			12.500	14.000	182.00	133.00
0.5000	1/2		12.700	14.000	182.00	133.00
0.5118			13.000	14.000	182.00	133.00
0.5157			13.100	14.000	182.00	133.00
0.5311	17/32		13.490	14.000	182.00	133.00
0.5315			13.500	14.000	182.00	133.00
0.5469	35/64		13.890	14.000	182.00	133.00
0.5512			14.000	14.000	182.00	133.00
0.5551			14.100	16.000	204.00	152.00
0.5591			14.200	16.000	204.00	152.00
0.5626	9/16		14.290	16.000	204.00	152.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.5709			14.500	16.000	204.00	152.00
0.5906			15.000	16.000	204.00	152.00
0.5945			15.100	16.000	204.00	152.00
0.6094	39/64		15.480	16.000	204.00	152.00
0.6102			15.500	16.000	204.00	152.00
0.6248	5/8		15.870	16.000	204.00	152.00
0.6299			16.000	16.000	204.00	152.00
0.6496			16.500	18.000	223.00	171.00
0.6563	21/32		16.670	18.000	223.00	171.00
0.6654			16.900	18.000	223.00	171.00
0.6693			17.000	18.000	223.00	171.00
0.6890			17.500	18.000	223.00	171.00
0.7087			18.000	18.000	223.00	171.00
0.7283			18.500	20.000	244.00	190.00
0.7441			18.900	20.000	244.00	190.00
0.7480			19.000	20.000	244.00	190.00
0.7500	3/4		19.050	20.000	244.00	190.00
0.7677			19.500	20.000	244.00	190.00
0.7874			20.000	20.000	244.00	190.00

Alternative Drill Series:

#5612 Carbide, RT100, 7xD, 140 U pt, FIREX
#4044 Carbide, RT100U, 7xD, 140 U pt, nano-FIREX

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

10xD

Series 5513

RT 150 GG

DK 460 UF Carbide, RT 150 GG straight flute high penetration, 10xD, 120° point, reinforced straight shank, RH cut

Application Materials:

Aluminum & Alloys

Cast Iron

Bright finish

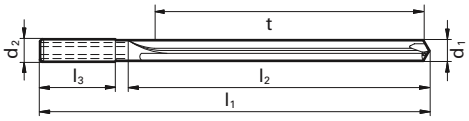
Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 394

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	91.00	42.00
0.1220			3.100	6.000	91.00	42.00
0.1248	1/8		3.170	6.000	91.00	42.00
0.1260			3.200	6.000	91.00	42.00
0.1280			3.250	6.000	91.00	42.00
0.1299			3.300	6.000	91.00	42.00
0.1339			3.400	6.000	91.00	48.00
0.1378			3.500	6.000	91.00	48.00
0.1406	9/64	28	3.570	6.000	91.00	48.00
0.1417			3.600	6.000	91.00	48.00
0.1457		25	3.700	6.000	121.00	77.00
0.1496		25	3.800	6.000	121.00	77.00
0.1535			3.900	6.000	121.00	77.00
0.1563	5/32		3.970	6.000	121.00	77.00
0.1575			4.000	6.000	121.00	77.00
0.1654			4.200	6.000	121.00	77.00
0.1772		16	4.500	6.000	121.00	77.00
0.1969			5.000	6.000	121.00	82.00
0.2165			5.500	6.000	121.00	82.00
0.2362			6.000	6.000	121.00	82.00
0.2500	1/4	E	6.350	8.000	146.00	106.00
0.2559			6.500	8.000	146.00	106.00
0.2677			6.800	8.000	146.00	106.00
0.2756			7.000	8.000	146.00	106.00
0.2953			7.500	8.000	146.00	106.00
0.3071			7.800	8.000	146.00	106.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.3150			8.000	8.000	146.00	106.00
0.3346			8.500	10.000	175.00	130.00
0.3543			9.000	10.000	175.00	130.00
0.3740			9.500	10.000	175.00	130.00
0.3748	3/8		9.520	10.000	175.00	130.00
0.3937			10.000	10.000	175.00	130.00
0.4016			10.200	12.000	209.00	159.00
0.4134			10.500	12.000	209.00	159.00
0.4331			11.000	12.000	209.00	159.00
0.4528			11.500	12.000	209.00	159.00
0.4724			12.000	12.000	209.00	159.00
0.4921			12.500	14.000	233.00	183.00
0.5000	1/2		12.700	14.000	233.00	183.00
0.5118			13.000	14.000	233.00	183.00
0.5315			13.500	14.000	233.00	183.00
0.5512			14.000	14.000	233.00	183.00
0.5709			14.500	16.000	260.00	207.00
0.5906			15.000	16.000	260.00	207.00
0.6102			15.500	16.000	260.00	207.00
0.6299			16.000	16.000	260.00	207.00

Alternative Drill Series:

#770 Carbide, RT150GG, 10xD, 120 pt, Bright
#6070 K20 Carb,RT150GG, 10xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

3xD

FIREX® coated

External Coolant

Reinforced Straight Shank

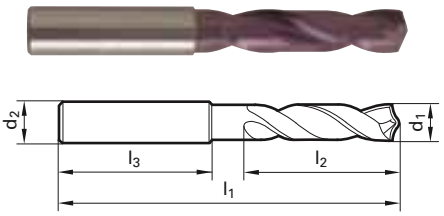
Speeds & Feeds information pg 395

Series 5514

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 3xD, self-centering 140° SU point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	62.00	20.00
0.1220			3.100	6.000	62.00	20.00
0.1248	1/8		3.170	6.000	62.00	20.00
0.1260			3.200	6.000	62.00	20.00
0.1280			3.250	6.000	62.00	20.00
0.1299			3.300	6.000	62.00	20.00
0.1339			3.400	6.000	62.00	20.00
0.1378			3.500	6.000	62.00	20.00
0.1406	9/64	28	3.570	6.000	62.00	20.00
0.1417			3.600	6.000	62.00	20.00
0.1457			3.700	6.000	62.00	20.00
0.1496		25	3.800	6.000	66.00	24.00
0.1535			3.900	6.000	66.00	24.00
0.1563	5/32		3.970	6.000	66.00	24.00
0.1575			4.000	6.000	66.00	24.00
0.1591		21	4.040	6.000	66.00	24.00
0.1614			4.100	6.000	66.00	24.00
0.1654			4.200	6.000	66.00	24.00
0.1693		18	4.300	6.000	66.00	24.00
0.1720	11/64		4.370	6.000	66.00	24.00
0.1732			4.400	6.000	66.00	24.00
0.1772		16	4.500	6.000	66.00	24.00
0.1811			4.600	6.000	66.00	24.00
0.1831			4.650	6.000	66.00	24.00
0.1850		13	4.700	6.000	66.00	24.00
0.1874	3/16		4.760	6.000	66.00	28.00
0.1890		12	4.800	6.000	66.00	28.00
0.1929			4.900	6.000	66.00	28.00
0.1969			5.000	6.000	66.00	28.00
0.2008			5.100	6.000	66.00	28.00
0.2012		7	5.110	6.000	66.00	28.00
0.2031	13/64		5.160	6.000	66.00	28.00
0.2047			5.200	6.000	66.00	28.00
0.2087			5.300	6.000	66.00	28.00
0.2126			5.400	6.000	66.00	28.00
0.2130		3	5.410	6.000	66.00	28.00
0.2165			5.500	6.000	66.00	28.00
0.2185			5.550	6.000	66.00	28.00
0.2189	7/32		5.560	6.000	66.00	28.00
0.2205			5.600	6.000	66.00	28.00
0.2244			5.700	6.000	66.00	28.00
0.2283			5.800	6.000	66.00	28.00
0.2323			5.900	6.000	66.00	28.00
0.2343	15/64		5.950	6.000	66.00	28.00
0.2362			6.000	6.000	66.00	28.00
0.2402			6.100	8.000	79.00	34.00
0.2441			6.200	8.000	79.00	34.00
0.2480			6.300	8.000	79.00	34.00
0.2500	1/4	E	6.350	8.000	79.00	34.00
0.2520			6.400	8.000	79.00	34.00
0.2559			6.500	8.000	79.00	34.00
0.2571		F	6.530	8.000	79.00	34.00
0.2598			6.600	8.000	79.00	34.00
0.2638			6.700	8.000	79.00	34.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2657	17/64	H	6.750	8.000	79.00	34.00
0.2677			6.800	8.000	79.00	34.00
0.2717		I	6.900	8.000	79.00	34.00
0.2756			7.000	8.000	79.00	34.00
0.2795			7.100	8.000	79.00	34.00
0.2811	9/32	K	7.140	8.000	79.00	41.00
0.2835			7.200	8.000	79.00	41.00
0.2874			7.300	8.000	79.00	41.00
0.2913			7.400	8.000	79.00	41.00
0.2953			7.500	8.000	79.00	41.00
0.2969	19/64		7.540	8.000	79.00	41.00
0.2992			7.600	8.000	79.00	41.00
0.3031			7.700	8.000	79.00	41.00
0.3071			7.800	8.000	79.00	41.00
0.3110			7.900	8.000	79.00	41.00
0.3126	5/16		7.940	8.000	79.00	41.00
0.3150			8.000	8.000	79.00	41.00
0.3189			8.100	10.000	89.00	47.00
0.3228		P	8.200	10.000	89.00	47.00
0.3268			8.300	10.000	89.00	47.00
0.3280	21/64		8.330	10.000	89.00	47.00
0.3307			8.400	10.000	89.00	47.00
0.3346			8.500	10.000	89.00	47.00
0.3386			8.600	10.000	89.00	47.00
0.3425			8.700	10.000	89.00	47.00
0.3437	11/32		8.730	10.000	89.00	47.00
0.3465			8.800	10.000	89.00	47.00
0.3504			8.900	10.000	89.00	47.00
0.3543			9.000	10.000	89.00	47.00
0.3583			9.100	10.000	89.00	47.00
0.3594	23/64		9.130	10.000	89.00	47.00
0.3622			9.200	10.000	89.00	47.00
0.3642			9.250	10.000	89.00	47.00
0.3661			9.300	10.000	89.00	47.00
0.3677		U	9.340	10.000	89.00	47.00
0.3701			9.400	10.000	89.00	47.00
0.3740			9.500	10.000	89.00	47.00
0.3748	3/8		9.520	10.000	89.00	47.00
0.3780			9.600	10.000	89.00	47.00
0.3819			9.700	10.000	89.00	47.00
0.3858		W	9.800	10.000	89.00	47.00
0.3898			9.900	10.000	89.00	47.00
0.3906	25/64		9.920	10.000	89.00	47.00
0.3937			10.000	10.000	89.00	47.00
0.3976			10.100	12.000	102.00	55.00
0.4016			10.200	12.000	102.00	55.00
0.4055			10.300	12.000	102.00	55.00
0.4063	13/32		10.320	12.000	102.00	55.00
0.4094			10.400	12.000	102.00	55.00
0.4134			10.500	12.000	102.00	55.00
0.4173			10.600	12.000	102.00	55.00
0.4213			10.700	12.000	102.00	55.00
0.4220	27/64		10.720	12.000	102.00	55.00
0.4252			10.800	12.000	102.00	55.00

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

Series 5514

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Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4291			10.900	12.000	102.00	55.00
0.4331			11.000	12.000	102.00	55.00
0.4370			11.100	12.000	102.00	55.00
0.4374	7/16		11.110	12.000	102.00	55.00
0.4409			11.200	12.000	102.00	55.00
0.4449			11.300	12.000	102.00	55.00
0.4488			11.400	12.000	102.00	55.00
0.4528			11.500	12.000	102.00	55.00
0.4531	29/64		11.510	12.000	102.00	55.00
0.4567			11.600	12.000	102.00	55.00
0.4606			11.700	12.000	102.00	55.00
0.4646			11.800	12.000	102.00	55.00
0.4685			11.900	12.000	102.00	55.00
0.4689	15/32		11.910	12.000	102.00	55.00
0.4724			12.000	12.000	102.00	55.00
0.4764			12.100	14.000	107.00	60.00
0.4803			12.200	14.000	107.00	60.00
0.4843	31/64		12.300	14.000	107.00	60.00
0.4882			12.400	14.000	107.00	60.00
0.4921			12.500	14.000	107.00	60.00
0.4961			12.600	14.000	107.00	60.00
0.5000	1/2		12.700	14.000	107.00	60.00
0.5039			12.800	14.000	107.00	60.00
0.5079			12.900	14.000	107.00	60.00
0.5118			13.000	14.000	107.00	60.00
0.5157	33/64		13.100	14.000	107.00	60.00
0.5197			13.200	14.000	107.00	60.00
0.5236			13.300	14.000	107.00	60.00
0.5276			13.400	14.000	107.00	60.00
0.5311	17/32		13.490	14.000	107.00	60.00
0.5315			13.500	14.000	107.00	60.00
0.5354			13.600	14.000	107.00	60.00
0.5394			13.700	14.000	107.00	60.00
0.5433			13.800	14.000	107.00	60.00
0.5469	35/64		13.890	14.000	107.00	60.00
0.5472			13.900	14.000	107.00	60.00
0.5512			14.000	14.000	107.00	60.00
0.5551			14.100	16.000	115.00	65.00
0.5591			14.200	16.000	115.00	65.00
0.5626	9/16		14.290	16.000	107.00	60.00
0.5630			14.300	16.000	115.00	65.00
0.5669			14.400	16.000	115.00	65.00
0.5709			14.500	16.000	115.00	65.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.5748			14.600	16.000	115.00	65.00
0.5780	37/64		14.680	16.000	115.00	65.00
0.5787			14.700	16.000	115.00	65.00
0.5827			14.800	16.000	115.00	65.00
0.5866			14.900	16.000	115.00	65.00
0.5906			15.000	16.000	115.00	65.00
0.5937	19/32		15.080	16.000	115.00	65.00
0.5945			15.100	16.000	115.00	65.00
0.5984			15.200	16.000	115.00	65.00
0.6024			15.300	16.000	115.00	65.00
0.6063			15.400	16.000	115.00	65.00
0.6094	39/64		15.480	16.000	115.00	65.00
0.6102			15.500	16.000	115.00	65.00
0.6142			15.600	16.000	115.00	65.00
0.6181			15.700	16.000	115.00	65.00
0.6220			15.800	16.000	115.00	65.00
0.6248	5/8		15.870	16.000	115.00	65.00
0.6260			15.900	16.000	115.00	65.00
0.6299			16.000	16.000	115.00	65.00
0.6331			16.080	18.000	123.00	73.00
0.6406	41/64		16.270	18.000	123.00	73.00
0.6496			16.500	18.000	123.00	73.00
0.6563	21/32		16.670	18.000	123.00	73.00
0.6693			17.000	18.000	123.00	73.00
0.6720	43/64		17.070	18.000	123.00	73.00
0.6874	11/16		17.460	18.000	123.00	73.00
0.6890			17.500	18.000	123.00	73.00
0.7031	45/64		17.860	18.000	123.00	73.00
0.7087			18.000	18.000	123.00	73.00
0.7189	23/32		18.260	20.000	131.00	79.00
0.7283			18.500	20.000	131.00	79.00
0.7480			19.000	20.000	131.00	79.00
0.7500	3/4		19.050	20.000	131.00	79.00
0.7579			19.250	20.000	131.00	79.00
0.7656	49/64		19.446	20.000	131.00	79.00
0.7677			19.500	20.000	131.00	79.00
0.7811	25/32		19.840	20.000	131.00	79.00
0.7874			20.000	20.000	131.00	79.00

Alternative Drill Series:

#1242 Carbide, RT100, 3xD, 140 U pt, TiN
#1702 Carbide, RT100, 3xD, 140 F pt, TiN

5xD

FIREX® coated

External Coolant

Reinforced Straight Shank

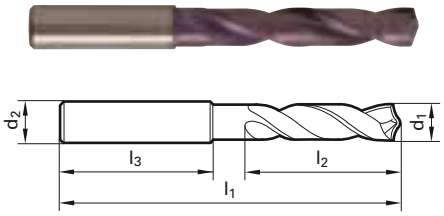
Speeds & Feeds information pg 395

Series 5515

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 5xD, self-centering 140° SU point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	28.00
0.1220			3.100	6.000	66.00	28.00
0.1248	1/8		3.170	6.000	66.00	28.00
0.1260			3.200	6.000	66.00	28.00
0.1280			3.250	6.000	66.00	28.00
0.1299			3.300	6.000	66.00	28.00
0.1339			3.400	6.000	66.00	28.00
0.1378			3.500	6.000	66.00	28.00
0.1406	9/64	28	3.570	6.000	66.00	28.00
0.1417			3.600	6.000	66.00	28.00
0.1457			3.700	6.000	66.00	28.00
0.1496		25	3.800	6.000	74.00	36.00
0.1535			3.900	6.000	74.00	36.00
0.1563	5/32		3.970	6.000	74.00	36.00
0.1575			4.000	6.000	74.00	36.00
0.1614			4.100	6.000	74.00	36.00
0.1654			4.200	6.000	74.00	36.00
0.1693			4.300	6.000	74.00	36.00
0.1720	11/64		4.370	6.000	74.00	36.00
0.1732			4.400	6.000	74.00	36.00
0.1772		16	4.500	6.000	74.00	36.00
0.1811			4.600	6.000	74.00	36.00
0.1831			4.650	6.000	74.01	36.01
0.1850			4.700	6.000	74.00	36.00
0.1874	3/16		4.760	6.000	82.00	44.00
0.1890		12	4.800	6.000	82.00	44.00
0.1929			4.900	6.000	82.00	44.00
0.1969			5.000	6.000	82.00	44.00
0.2008			5.100	6.000	82.00	44.00
0.2031	13/64		5.160	6.000	82.00	44.00
0.2047			5.200	6.000	82.00	44.00
0.2087			5.300	6.000	82.00	44.00
0.2126			5.400	6.000	82.00	44.00
0.2165			5.500	6.000	82.00	44.00
0.2185			5.550	6.000	82.00	44.00
0.2189	7/32		5.560	6.000	82.00	44.00
0.2205			5.600	6.000	82.00	44.00
0.2244			5.700	6.000	82.00	44.00
0.2283			5.800	6.000	82.00	44.00
0.2323			5.900	6.000	82.00	44.00
0.2343	15/64		5.950	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2480			6.300	8.000	91.00	53.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2598			6.600	8.000	91.00	53.00
0.2638			6.700	8.000	91.00	53.00
0.2657	17/64	H	6.750	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717		I	6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2795			7.100	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2835			7.200	8.000	91.00	53.00
0.2874			7.300	8.000	91.00	53.00
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.2969	19/64		7.540	8.000	91.00	53.00
0.2992			7.600	8.000	91.00	53.00
0.3031			7.700	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3110			7.900	8.000	91.00	53.00
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00
0.3268			8.300	10.000	103.00	61.00
0.3280	21/64		8.330	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3465			8.800	10.000	103.00	61.00
0.3504			8.900	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3583			9.100	10.000	103.00	61.00
0.3594	23/64		9.130	10.000	103.00	61.00
0.3622			9.200	10.000	103.00	61.00
0.3642			9.250	10.000	103.00	61.00
0.3661			9.300	10.000	103.00	61.00
0.3701			9.400	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3780			9.600	10.000	103.00	61.00
0.3819			9.700	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3898			9.900	10.000	103.00	61.00
0.3906	25/64		9.920	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.3976			10.100	12.000	118.00	71.00
0.4016			10.200	12.000	118.00	71.00
0.4055			10.300	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4094			10.400	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4173			10.600	12.000	118.00	71.00
0.4213			10.700	12.000	118.00	71.00
0.4220	27/64		10.720	12.000	118.00	71.00
0.4252			10.800	12.000	118.00	71.00
0.4291			10.900	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4370			11.100	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4409			11.200	12.000	118.00	71.00

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

Series 5515

Speeds & Feeds information pg 395

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4449			11.300	12.000	118.00	71.00
0.4488			11.400	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4567			11.600	12.000	118.00	71.00
0.4606			11.700	12.000	118.00	71.00
0.4646			11.800	12.000	118.00	71.00
0.4685			11.900	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4764			12.100	14.000	124.00	77.00
0.4803			12.200	14.000	124.00	77.00
0.4843	31/64		12.300	14.000	124.00	77.00
0.4882			12.400	14.000	124.00	77.00
0.4921			12.500	14.000	124.00	77.00
0.4961			12.600	14.000	124.00	77.00
0.5000	1/2		12.700	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5157	33/64		13.100	14.000	124.00	77.00
0.5197			13.200	14.000	124.00	77.00
0.5236			13.300	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5394			13.700	14.000	124.00	77.00
0.5433			13.800	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5551			14.100	16.000	133.00	83.00
0.5591			14.200	16.000	133.00	83.00
0.5626	9/16		14.290	16.000	133.00	83.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.5630			14.300	16.000	133.00	83.00
0.5669			14.400	16.000	133.00	83.00
0.5709			14.500	16.000	133.00	83.00
0.5787			14.700	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.5945			15.100	16.000	133.00	83.00
0.5984			15.200	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6142			15.600	16.000	133.00	83.00
0.6181			15.700	16.000	133.00	83.00
0.6220			15.800	16.000	133.00	83.00
0.6248	5/8		15.870	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6496			16.500	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7283			18.500	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#1243 Carbide, RT100, 5xD, 140 U pt, TiN
#1662 Carbide, RT100, 5xD, 140 F pt, TiN
#5511 Carbide, RT100, 5xD, 140 U pt, FIREX

5xD

Bright Finish

External Coolant

Straight Shank

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GUHRING Select

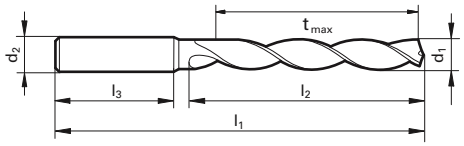
Series 5518

Three-Flute High Precision

DK 460 UF Carbide, GS 200 G three-flute high precision, 5xD, self-centering 130° point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



Application Materials:

- General Steels/Brass
- Cast Iron
- Aluminum & Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	28.00
0.1220			3.100	6.000	66.00	28.00
0.1260			3.200	6.000	66.00	28.00
0.1299			3.300	6.000	66.00	28.00
0.1378			3.500	6.000	66.00	28.00
0.1457			3.700	6.000	66.00	28.00
0.1496		25	3.800	6.000	74.00	36.00
0.1575			4.000	6.000	74.00	36.00
0.1614			4.100	6.000	74.00	36.00
0.1654			4.200	6.000	74.00	36.00
0.1772		16	4.500	6.000	74.00	36.00
0.1890		12	4.800	6.000	74.00	36.00
0.1969			5.000	6.000	82.00	44.00
0.2008			5.100	6.000	82.00	44.00
0.2047			5.200	6.000	82.00	44.00
0.2087			5.300	6.000	82.00	44.00
0.2165			5.500	6.000	82.00	44.00
0.2283			5.800	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2638			6.700	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717			6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00
0.2795			7.100	8.000	91.00	53.00
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.3465			8.800	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3583			9.100	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.3976			10.100	12.000	118.00	71.00
0.4016			10.200	12.000	118.00	71.00
0.4055			10.300	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4409			11.200	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4646			11.800	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4764			12.100	14.000	124.00	77.00
0.4921			12.500	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5709			14.500	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6496			16.500	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7283			18.500	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#609 Carbide, GS200, 5xD, 150 U pt, Bright
#1452 Carbide, GS200, 5xD, 150 U pt, TiN

To order: Series number + mm, ex. 5518 3.000

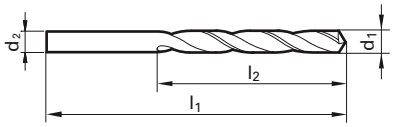
5xD

Series 5519

GU 500 DZ High-performance

Cobalt, GU 500 DZ universal, jobber length, 118° 4-facet split point, standard straight shank, RH helix

Cut/Shank Dia. = h8 tolerance range



$d_1 = d_2$

TiN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 396

Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0433			1.100	36.00	14.00
0.0472			1.200	38.00	16.00
0.0512			1.300	38.00	16.00
0.0551		54	1.400	40.00	18.00
0.0591			1.500	40.00	18.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0709			1.800	46.00	22.00
0.0748			1.900	46.00	22.00
0.0780	5/64		1.980	49.00	24.00
0.0787			2.000	49.00	24.00
0.0827			2.100	49.00	24.00
0.0866			2.200	53.00	27.00
0.0906			2.300	53.00	27.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0984			2.500	57.00	30.00
0.1024			2.600	57.00	30.00
0.1063			2.700	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1142			2.900	61.00	33.00
0.1181			3.000	61.00	33.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1457			3.700	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1929			4.900	86.00	52.00
0.1969			5.000	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64		6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4094			10.400	133.00	87.00
0.4134			10.500	133.00	87.00
0.4220	27/64		10.720	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4528			11.500	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5118			13.000	151.00	101.00
0.5315			13.500	160.00	108.00
0.5512			14.000	160.00	108.00

Alternative Drill Series:

#5523 Cobalt, GU500, 5xD, 118 pt, Bright
#657 Cobalt, Ti, 5xD, 130 pt, TiN
#622 Cobalt, GT100, 5xD, 130 pt, Bright
#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX

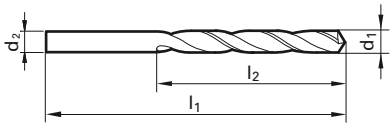
3xD

Series 5520

GU 500 DZ High-performance

Cobalt, GU 500 DZ universal, stub length, 118° 4-facet split point, standard straight shank, RH helix

Cut/Shank Dia. = h8 tolerance range



$d_1 = d_2$

TiN coated

External Coolant

Straight Shank

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Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	26.00	6.00
0.0433			1.100	28.00	7.00
0.0472			1.200	30.00	8.00
0.0512			1.300	30.00	8.00
0.0551		54	1.400	32.00	9.00
0.0591			1.500	32.00	9.00
0.0626	1/16		1.590	32.00	9.00
0.0630			1.600	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0709			1.800	36.00	11.00
0.0748			1.900	36.00	11.00
0.0780	5/64		1.980	36.00	11.00
0.0787			2.000	38.00	12.00
0.0827			2.100	38.00	12.00
0.0866			2.200	40.00	13.00
0.0906			2.300	40.00	13.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0984			2.500	43.00	14.00
0.1024			2.600	43.00	14.00
0.1063			2.700	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1102			2.800	46.00	16.00
0.1142			2.900	46.00	16.00
0.1181			3.000	46.00	16.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1457			3.700	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1535			3.900	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1575			4.000	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1811			4.600	58.00	24.00
0.1850		13	4.700	58.00	24.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1929			4.900	62.00	26.00
0.1969			5.000	62.00	26.00
0.2008			5.100	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2047			5.200	62.00	26.00
0.2087			5.300	62.00	26.00
0.2126			5.400	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2244			5.700	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2402			6.100	70.00	31.00
0.2441			6.200	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2598			6.600	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64		6.750	70.00	31.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2913			7.400	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	74.00	34.00
0.2992			7.600	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3307			8.400	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3425			8.700	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3661			9.300	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	84.00	40.00
0.3780			9.600	89.00	43.00
0.3819			9.700	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.3976			10.100	89.00	43.00
0.4016			10.200	89.00	43.00
0.4055			10.300	89.00	43.00
0.4094			10.400	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4134			10.500	89.00	43.00
0.4220	27/64		10.720	89.00	43.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4689	15/32		11.910	95.00	47.00
0.4724			12.000	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5315			13.500	107.00	54.00
0.5512			14.000	107.00	54.00

Alternative Drill Series:

#659 Cobalt, GV120, 3xD, 130 pt, TiN
#329 Cobalt, GV120, 3xD, 118 pt, Bright
#5524 Cobalt, GU500, 3xD, 118 pt, Bright
#653 HSS, GP, 3xD, 118 pt, TiN

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

3xD

Series 5521

GT 500 DZ High-performance

PM-Cobalt, GT 500 DZ parabolic, stub length,
130° cone-relief point, standard straight shank, RH helix

Cut/Shank Dia. = h8 tolerance range

Application Materials:

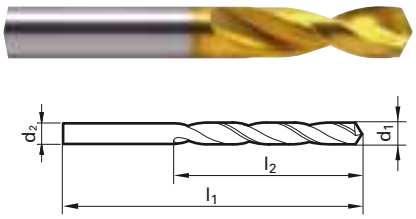
- Universal Steels
- Cast Iron
- General Steels/Brass

(S) TiN coated

External Coolant

Straight Shank

Speeds & Feeds information pg 397



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	26.00	6.00
0.0433			1.100	28.00	7.00
0.0472			1.200	30.00	8.00
0.0512			1.300	30.00	8.00
0.0551		54	1.400	32.00	9.00
0.0591			1.500	32.00	9.00
0.0626	1/16		1.590	32.00	9.00
0.0630			1.600	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0709			1.800	36.00	11.00
0.0748			1.900	36.00	11.00
0.0780	5/64		1.980	36.00	11.00
0.0787			2.000	38.00	12.00
0.0827			2.100	38.00	12.00
0.0866			2.200	40.00	13.00
0.0906			2.300	40.00	13.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0984			2.500	43.00	14.00
0.1024			2.600	43.00	14.00
0.1063			2.700	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1102			2.800	46.00	16.00
0.1142			2.900	46.00	16.00
0.1181			3.000	46.00	16.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1457			3.700	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1535			3.900	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1575			4.000	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1811			4.600	58.00	24.00
0.1850		13	4.700	58.00	24.00
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1929			4.900	62.00	26.00
0.1969			5.000	62.00	26.00
0.2008			5.100	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2047			5.200	62.00	26.00
0.2087			5.300	62.00	26.00
0.2126			5.400	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2244			5.700	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2402			6.100	70.00	31.00
0.2441			6.200	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2598			6.600	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64		6.750	70.00	31.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2913			7.400	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	74.00	34.00
0.2992			7.600	79.00	37.00
0.3031			7.700	79.00	37.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00
0.3307			8.400	79.00	37.00
0.3346			8.500	79.00	37.00
0.3437	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3543			9.000	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3661			9.300	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	84.00	40.00
0.3858		W	9.800	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.4016			10.200	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4134			10.500	89.00	43.00
0.4220	27/64		10.720	89.00	43.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4689	15/32		11.910	95.00	47.00
0.4724			12.000	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5315			13.500	107.00	54.00
0.5512			14.000	107.00	54.00

Alternative Drill Series:

#515 0, 3xD, 130 pt, TiN
#515 PM cobalt, GT500, 3xD, 130 pt, FIREX
#659 Cobalt, GV120, 3xD, 130 pt, TiN
#329 Cobalt, GV120, 3xD, 118 pt, Bright

5xD

Series 5522

GT 500 DZ High-performance

PM-Cobalt, GT 500 DZ parabolic, jobber length,
130° cone relief point, standard straight shank, RH helix

Cut/Shank Dia. = h8 tolerance range

Application Materials:

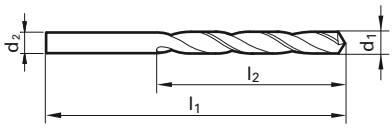
- Universal Steels
- Cast Iron
- General Steels/Brass

TiN coated

External Coolant

Straight Shank

Speeds & Feeds
information pg 398



$d_1 = d_2$

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0433			1.100	36.00	14.00
0.0472			1.200	38.00	16.00
0.0512			1.300	38.00	16.00
0.0551		54	1.400	40.00	18.00
0.0591			1.500	40.00	18.00
0.0626	1/16		1.590	40.00	18.00
0.0630			1.600	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0709			1.800	46.00	22.00
0.0748			1.900	46.00	22.00
0.0780	5/64		1.980	46.00	22.00
0.0787			2.000	49.00	24.00
0.0827			2.100	49.00	24.00
0.0866			2.200	53.00	27.00
0.0906			2.300	53.00	27.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0984			2.500	57.00	30.00
0.1024			2.600	57.00	30.00
0.1063			2.700	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1142			2.900	61.00	33.00
0.1181			3.000	61.00	33.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1457			3.700	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1929			4.900	86.00	52.00
0.1969			5.000	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64		6.750	101.00	63.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	109.00	69.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3543			9.000	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3661			9.300	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	125.00	81.00
0.3858		W	9.800	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.4016			10.200	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4134			10.500	133.00	87.00
0.4220	27/64		10.720	133.00	87.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4528			11.500	142.00	94.00
0.4689	15/32		11.910	142.00	94.00
0.4724			12.000	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5118			13.000	151.00	101.00
0.5315			13.500	160.00	108.00
0.5512			14.000	160.00	108.00

Alternative Drill Series:

#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX
#658 Cobalt, GT100, 5xD, 130 pt, TiN
#657 Cobalt, Ti, 5xD, 130 pt, TiN
#622 Cobalt, GT100, 5xD, 130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

5xD

Bright finish

External Coolant

Straight Shank

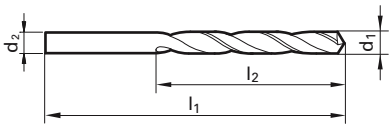
Speeds & Feeds information pg 398

Series 5523

GU 500 DZ High-performance

Cobalt, GU 500 DZ universal, jobber length,
118° 4-facet split point, standard straight shank, RH helix

Cut/Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Cast Iron
- General Steels/Brass

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	34.00	12.00
0.0433			1.100	36.00	14.00
0.0472			1.200	38.00	16.00
0.0512			1.300	38.00	16.00
0.0551		54	1.400	40.00	18.00
0.0591			1.500	40.00	18.00
0.0626	1/16		1.590	43.00	20.00
0.0630			1.600	43.00	20.00
0.0669		51	1.700	43.00	20.00
0.0709			1.800	46.00	22.00
0.0748			1.900	46.00	22.00
0.0780	5/64		1.980	49.00	24.00
0.0787			2.000	49.00	24.00
0.0827			2.100	49.00	24.00
0.0866			2.200	53.00	27.00
0.0906			2.300	53.00	27.00
0.0937	3/32		2.380	57.00	30.00
0.0945			2.400	57.00	30.00
0.0984			2.500	57.00	30.00
0.1024			2.600	57.00	30.00
0.1063			2.700	61.00	33.00
0.1094	7/64		2.780	61.00	33.00
0.1102			2.800	61.00	33.00
0.1142			2.900	61.00	33.00
0.1181			3.000	61.00	33.00
0.1220			3.100	65.00	36.00
0.1248	1/8		3.170	65.00	36.00
0.1260			3.200	65.00	36.00
0.1299			3.300	65.00	36.00
0.1339			3.400	70.00	39.00
0.1378			3.500	70.00	39.00
0.1406	9/64	28	3.570	70.00	39.00
0.1417			3.600	70.00	39.00
0.1457			3.700	70.00	39.00
0.1496		25	3.800	75.00	43.00
0.1535			3.900	75.00	43.00
0.1563	5/32		3.970	75.00	43.00
0.1575			4.000	75.00	43.00
0.1614			4.100	75.00	43.00
0.1654			4.200	75.00	43.00
0.1693		18	4.300	80.00	47.00
0.1720	11/64		4.370	80.00	47.00
0.1732			4.400	80.00	47.00
0.1772		16	4.500	80.00	47.00
0.1811			4.600	80.00	47.00
0.1850		13	4.700	80.00	47.00
0.1874	3/16		4.760	86.00	52.00
0.1890		12	4.800	86.00	52.00
0.1929			4.900	86.00	52.00
0.1969			5.000	86.00	52.00
0.2008			5.100	86.00	52.00
0.2031	13/64		5.160	86.00	52.00
0.2047			5.200	86.00	52.00
0.2087			5.300	86.00	52.00
0.2126			5.400	93.00	57.00
0.2165			5.500	93.00	57.00
0.2189	7/32		5.560	93.00	57.00
0.2205			5.600	93.00	57.00
0.2244			5.700	93.00	57.00
0.2283			5.800	93.00	57.00
0.2323			5.900	93.00	57.00
0.2343	15/64		5.950	93.00	57.00
0.2362			6.000	93.00	57.00
0.2402			6.100	101.00	63.00
0.2441			6.200	101.00	63.00
0.2480			6.300	101.00	63.00
0.2500	1/4	E	6.350	101.00	63.00
0.2520			6.400	101.00	63.00
0.2559			6.500	101.00	63.00
0.2598			6.600	101.00	63.00
0.2638			6.700	101.00	63.00
0.2657	17/64		6.750	109.00	69.00
0.2677			6.800	109.00	69.00
0.2717		I	6.900	109.00	69.00
0.2756			7.000	109.00	69.00
0.2795			7.100	109.00	69.00
0.2811	9/32	K	7.140	109.00	69.00
0.2835			7.200	109.00	69.00
0.2874			7.300	109.00	69.00
0.2913			7.400	109.00	69.00
0.2953			7.500	109.00	69.00
0.2969	19/64		7.540	117.00	75.00
0.2992			7.600	117.00	75.00
0.3031			7.700	117.00	75.00
0.3071			7.800	117.00	75.00
0.3110			7.900	117.00	75.00
0.3126	5/16		7.940	117.00	75.00
0.3150			8.000	117.00	75.00
0.3189			8.100	117.00	75.00
0.3228		P	8.200	117.00	75.00
0.3268			8.300	117.00	75.00
0.3280	21/64		8.330	117.00	75.00
0.3307			8.400	117.00	75.00
0.3346			8.500	117.00	75.00
0.3386			8.600	125.00	81.00
0.3425			8.700	125.00	81.00
0.3437	11/32		8.730	125.00	81.00
0.3465			8.800	125.00	81.00
0.3504			8.900	125.00	81.00
0.3543			9.000	125.00	81.00
0.3583			9.100	125.00	81.00
0.3594	23/64		9.130	125.00	81.00
0.3622			9.200	125.00	81.00
0.3661			9.300	125.00	81.00
0.3701			9.400	125.00	81.00
0.3740			9.500	125.00	81.00
0.3748	3/8		9.520	133.00	87.00
0.3780			9.600	133.00	87.00
0.3819			9.700	133.00	87.00
0.3858		W	9.800	133.00	87.00
0.3898			9.900	133.00	87.00
0.3906	25/64		9.920	133.00	87.00
0.3937			10.000	133.00	87.00
0.3976			10.100	133.00	87.00
0.4016			10.200	133.00	87.00
0.4055			10.300	133.00	87.00
0.4063	13/32		10.320	133.00	87.00
0.4094			10.400	133.00	87.00
0.4134			10.500	133.00	87.00
0.4220	27/64		10.720	142.00	94.00
0.4331			11.000	142.00	94.00
0.4374	7/16		11.110	142.00	94.00
0.4528			11.500	142.00	94.00
0.4689	15/32		11.910	151.00	101.00
0.4724			12.000	151.00	101.00
0.4843	31/64		12.300	151.00	101.00
0.4921			12.500	151.00	101.00
0.5000	1/2		12.700	151.00	101.00
0.5118			13.000	151.00	101.00
0.5315			13.500	160.00	108.00
0.5512			14.000	160.00	108.00

Alternative Drill Series:

#5519 Cobalt, GU500, 5xD, 118 pt, TiN
#657 Cobalt, Ti, 5xD, 130 pt, TiN
#622 Cobalt, GT100, 5xD, 130 pt, Bright
#530 PM Cobalt, GT500, 5xD, 130 pt, FIREX

3xD

Bright finish

External Coolant

Straight Shank

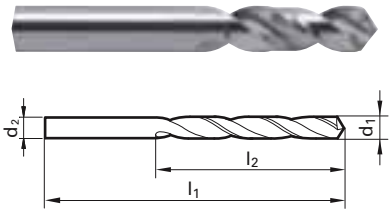
Speeds & Feeds information pg 399

Series 5524

GU 500 DZ High-performance

Cobalt, GU 500 DZ universal, stub length, 118° 4-facet split point, standard straight shank, RH helix

Cut/Shank Dia. = h8 tolerance range



$d_1 = d_2$

Application Materials:

- Universal Steels
- Cast Iron
- General Steels/Brass

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.0394			1.000	26.00	6.00
0.0433			1.100	28.00	7.00
0.0472			1.200	30.00	8.00
0.0512			1.300	30.00	8.00
0.0551		54	1.400	32.00	9.00
0.0591			1.500	32.00	9.00
0.0626	1/16		1.590	32.00	9.00
0.0630			1.600	34.00	10.00
0.0669		51	1.700	34.00	10.00
0.0709			1.800	36.00	11.00
0.0748			1.900	36.00	11.00
0.0780	5/64		1.980	36.00	11.00
0.0787			2.000	38.00	12.00
0.0827			2.100	38.00	12.00
0.0866			2.200	40.00	13.00
0.0906			2.300	40.00	13.00
0.0937	3/32		2.380	43.00	14.00
0.0945			2.400	43.00	14.00
0.0984			2.500	43.00	14.00
0.1024			2.600	43.00	14.00
0.1063			2.700	46.00	16.00
0.1094	7/64		2.780	46.00	16.00
0.1102			2.800	46.00	16.00
0.1142			2.900	46.00	16.00
0.1181			3.000	46.00	16.00
0.1220			3.100	49.00	18.00
0.1248	1/8		3.170	49.00	18.00
0.1260			3.200	49.00	18.00
0.1299			3.300	49.00	18.00
0.1339			3.400	52.00	20.00
0.1378			3.500	52.00	20.00
0.1406	9/64	28	3.570	52.00	20.00
0.1417			3.600	52.00	20.00
0.1457			3.700	52.00	20.00
0.1496		25	3.800	55.00	22.00
0.1535			3.900	55.00	22.00
0.1563	5/32		3.970	55.00	22.00
0.1575			4.000	55.00	22.00
0.1614			4.100	55.00	22.00
0.1654			4.200	55.00	22.00
0.1693		18	4.300	58.00	24.00
0.1720	11/64		4.370	58.00	24.00
0.1732			4.400	58.00	24.00
0.1772		16	4.500	58.00	24.00
0.1811			4.600	58.00	24.00
0.1850		13	4.700	58.00	24.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.1874	3/16		4.760	62.00	26.00
0.1890		12	4.800	62.00	26.00
0.1929			4.900	62.00	26.00
0.1969			5.000	62.00	26.00
0.2008			5.100	62.00	26.00
0.2031	13/64		5.160	62.00	26.00
0.2047			5.200	62.00	26.00
0.2087			5.300	62.00	26.00
0.2126			5.400	66.00	28.00
0.2165			5.500	66.00	28.00
0.2189	7/32		5.560	66.00	28.00
0.2205			5.600	66.00	28.00
0.2244			5.700	66.00	28.00
0.2283			5.800	66.00	28.00
0.2323			5.900	66.00	28.00
0.2343	15/64		5.950	66.00	28.00
0.2362			6.000	66.00	28.00
0.2402			6.100	70.00	31.00
0.2441			6.200	70.00	31.00
0.2480			6.300	70.00	31.00
0.2500	1/4	E	6.350	70.00	31.00
0.2520			6.400	70.00	31.00
0.2559			6.500	70.00	31.00
0.2598			6.600	70.00	31.00
0.2638			6.700	70.00	31.00
0.2657	17/64		6.750	70.00	31.00
0.2677			6.800	74.00	34.00
0.2717		I	6.900	74.00	34.00
0.2756			7.000	74.00	34.00
0.2795			7.100	74.00	34.00
0.2811	9/32	K	7.140	74.00	34.00
0.2835			7.200	74.00	34.00
0.2874			7.300	74.00	34.00
0.2913			7.400	74.00	34.00
0.2953			7.500	74.00	34.00
0.2969	19/64		7.540	74.00	34.00
0.2992			7.600	79.00	37.00
0.3031			7.700	79.00	37.00
0.3071			7.800	79.00	37.00
0.3110			7.900	79.00	37.00
0.3126	5/16		7.940	79.00	37.00
0.3150			8.000	79.00	37.00
0.3189			8.100	79.00	37.00
0.3228		P	8.200	79.00	37.00
0.3268			8.300	79.00	37.00
0.3280	21/64		8.330	79.00	37.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	l1 mm	l2 mm
0.3307			8.400	79.00	37.00
0.3346			8.500	79.00	37.00
0.3386			8.600	84.00	40.00
0.3425			8.700	84.00	40.00
0.3437	11/32		8.730	84.00	40.00
0.3465			8.800	84.00	40.00
0.3504			8.900	84.00	40.00
0.3543			9.000	84.00	40.00
0.3583			9.100	84.00	40.00
0.3594	23/64		9.130	84.00	40.00
0.3622			9.200	84.00	40.00
0.3661			9.300	84.00	40.00
0.3701			9.400	84.00	40.00
0.3740			9.500	84.00	40.00
0.3748	3/8		9.520	84.00	40.00
0.3780			9.600	89.00	43.00
0.3819			9.700	89.00	43.00
0.3858		W	9.800	89.00	43.00
0.3898			9.900	89.00	43.00
0.3906	25/64		9.920	89.00	43.00
0.3937			10.000	89.00	43.00
0.3976			10.100	89.00	43.00
0.4016			10.200	89.00	43.00
0.4055			10.300	89.00	43.00
0.4063	13/32		10.320	89.00	43.00
0.4094			10.400	89.00	43.00
0.4134			10.500	89.00	43.00
0.4220	27/64		10.720	89.00	43.00
0.4331			11.000	95.00	47.00
0.4374	7/16		11.110	95.00	47.00
0.4528			11.500	95.00	47.00
0.4689	15/32		11.910	95.00	47.00
0.4724			12.000	102.00	51.00
0.4843	31/64		12.300	102.00	51.00
0.4921			12.500	102.00	51.00
0.5000	1/2		12.700	102.00	51.00
0.5118			13.000	102.00	51.00
0.5315			13.500	107.00	54.00
0.5512			14.000	107.00	54.00

Alternative Drill Series:

#5520 Cobalt, GU500, 3xD, 118 pt, TiN
#659 Cobalt, GV120, 3xD, 130 pt, TiN
#329 Cobalt, GV120, 3xD, 118 pt, Bright

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

12xD

Ⓕ FIREX® tipped

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 399

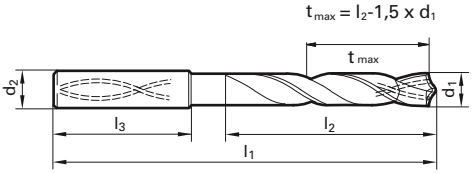
GUHRING Select

Series 5525

RT 100 C High Penetration

DK 460 UF Carbide, RT 100 C high penetration, 12xD, self-centering 140° SC, double margin, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	90.00	50.00
0.1220			3.100	6.000	90.00	50.00
0.1250	1/8		3.170	6.000	90.00	50.00
0.1260			3.200	6.000	90.00	50.00
0.1280			3.250	6.000	90.00	50.00
0.1299			3.300	6.000	90.00	50.00
0.1339			3.400	6.000	90.00	50.00
0.1378			3.500	6.000	90.00	50.00
0.1406	9/64		3.570	6.000	90.00	50.00
0.1417			3.600	6.000	90.00	50.00
0.1457			3.700	6.000	90.00	50.00
0.1496		25	3.800	6.000	90.00	50.00
0.1535			3.900	6.000	90.00	50.00
0.1563	5/32		3.970	6.000	90.00	50.00
0.1575			4.000	6.000	102.00	64.00
0.1614			4.100	6.000	102.00	64.00
0.1654			4.200	6.000	102.00	64.00
0.1693		18	4.300	6.000	102.00	64.00
0.1720	11/64		4.370	6.000	102.00	64.00
0.1732			4.400	6.000	102.00	64.00
0.1772		16	4.500	6.000	102.00	64.00
0.1811			4.600	6.000	102.00	64.00
0.1831			4.650	6.000	102.00	64.00
0.1850			4.700	6.000	102.00	64.00
0.1874	3/16		4.760	6.000	102.00	64.00
0.1890			4.800	6.000	116.00	78.00
0.1929			4.900	6.000	116.00	78.00
0.1969			5.000	6.000	116.00	78.00
0.2008			5.100	6.000	116.00	78.00
0.2031	13/64		5.160	6.000	116.00	78.00
0.2047			5.200	6.000	116.00	78.00
0.2087			5.300	6.000	116.00	78.00
0.2126			5.400	6.000	116.00	78.00
0.2165			5.500	6.000	116.00	78.00
0.2189	7/32		5.560	6.000	116.00	78.00
0.2205			5.600	6.000	116.00	78.00
0.2244			5.700	6.000	116.00	78.00
0.2283			5.800	6.000	116.00	78.00
0.2323			5.900	6.000	116.00	78.00
0.2343	15/64		5.950	6.000	116.00	78.00
0.2362			6.000	6.000	116.00	78.00
0.2402			6.100	8.000	146.00	108.00
0.2441			6.200	8.000	146.00	108.00
0.2480			6.300	8.000	146.00	108.00
0.2500	1/4	E	6.350	8.000	146.00	108.00
0.2520			6.400	8.000	146.00	108.00
0.2559			6.500	8.000	146.00	108.00
0.2598			6.600	8.000	146.00	108.00
0.2638			6.700	8.000	146.00	108.00
0.2657	17/64		6.750	8.000	146.00	108.00
0.2677			6.800	8.000	146.00	108.00
0.2717			6.900	8.000	146.00	108.00
0.2756			7.000	8.000	146.00	108.00
0.2795			7.100	8.000	146.00	108.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2811	9/32		7.140	8.000	146.00	108.00
0.2835			7.200	8.000	146.00	108.00
0.2874			7.300	8.000	146.00	108.00
0.2913			7.400	8.000	146.00	108.00
0.2953			7.500	8.000	146.00	108.00
0.2969	19/64		7.540	8.000	146.00	108.00
0.2992			7.600	8.000	146.00	108.00
0.3031			7.700	8.000	146.00	108.00
0.3071			7.800	8.000	146.00	108.00
0.3110			7.900	8.000	146.00	108.00
0.3126	5/16		7.940	8.000	146.00	108.00
0.3150			8.000	8.000	146.00	108.00
0.3189			8.100	10.000	162.00	120.00
0.3228			8.200	10.000	162.00	120.00
0.3268			8.300	10.000	162.00	120.00
0.3280	21/64		8.330	10.000	162.00	120.00
0.3307			8.400	10.000	162.00	120.00
0.3346			8.500	10.000	162.00	120.00
0.3386			8.600	10.000	162.00	120.00
0.3425			8.700	10.000	162.00	120.00
0.3437	11/32		8.730	10.000	162.00	120.00
0.3465			8.800	10.000	162.00	120.00
0.3504			8.900	10.000	162.00	120.00
0.3543			9.000	10.000	162.00	120.00
0.3583			9.100	10.000	162.00	120.00
0.3594	23/64		9.130	10.000	162.00	120.00
0.3622			9.200	10.000	162.00	120.00
0.3642			9.250	10.000	162.00	120.00
0.3661			9.300	10.000	162.00	120.00
0.3701			9.400	10.000	162.00	120.00
0.3740			9.500	10.000	162.00	120.00
0.3748	3/8		9.520	10.000	162.00	120.00
0.3780			9.600	10.000	162.00	120.00
0.3819			9.700	10.000	162.00	120.00
0.3858			9.800	10.000	162.00	120.00
0.3898			9.900	10.000	162.00	120.00
0.3906	25/64		9.920	10.000	162.00	120.00
0.3937			10.000	10.000	162.00	120.00
0.3976			10.100	12.000	204.00	156.00
0.4016			10.200	12.000	204.00	156.00
0.4055			10.300	12.000	204.00	156.00
0.4063	13/32		10.320	12.000	204.00	156.00
0.4134			10.500	12.000	204.00	156.00
0.4173			10.600	12.000	204.00	156.00
0.4213			10.700	12.000	204.00	156.00
0.4220	27/64		10.720	12.000	204.00	156.00
0.4252			10.800	12.000	204.00	156.00
0.4291			10.900	12.000	204.00	156.00
0.4331			11.000	12.000	204.00	156.00
0.4374	7/16		11.110	12.000	204.00	156.00
0.4528			11.500	12.000	204.00	156.00
0.4531	29/64		11.510	12.000	204.00	156.00
0.4689	15/32		11.910	12.000	204.00	156.00
0.4724			12.000	12.000	204.00	156.00

To order: Series number + mm, ex. 5518 3.000

Red indicates NEW sizes!

Series 5525

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Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.4843	31/64		12.300	14.000	230.00	182.00
0.4921			12.500	14.000	230.00	182.00
0.5000	1/2		12.700	14.000	230.00	182.00
0.5118			13.000	14.000	230.00	182.00
0.5311	17/32		13.490	14.000	230.00	182.00
0.5315			13.500	14.000	230.00	182.00
0.5469	35/64		13.890	14.000	230.00	182.00
0.5512			14.000	14.000	230.00	182.00
0.5709			14.500	16.000	260.00	208.00
0.5906			15.000	16.000	260.00	208.00
0.6094	39/64		15.480	16.000	260.00	208.00
0.6102			15.500	16.000	260.00	208.00
0.6299			16.000	16.000	260.00	208.00
0.6496			16.500	18.000	285.00	234.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.6693			17.000	18.000	285.00	234.00
0.6890			17.500	18.000	285.00	234.00
0.7087			18.000	18.000	285.00	234.00
0.7283			18.500	20.000	285.00	234.00
0.7480			19.000	20.000	310.00	258.00
0.7500	3/4		19.050	20.000	310.00	258.00
0.7677			19.500	20.000	310.00	258.00
0.7874			20.000	20.000	310.00	258.00

Alternative Drill Series:

#5512 Carbide, RT100, 7xD, 140 U pt, FIREX
#6511 Carbide, FT100T, 20xD, 135 pt, TiAlN tipped

3xD

NEW!

Series 5610

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 3xD, self-centering 140° SU point, reinforced shank w/flat, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

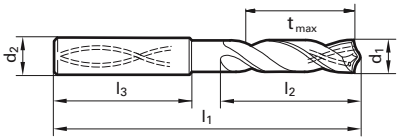
F
FIREX® coated

Coolant Through

Reinforced Straight Shank w/Flat

Speeds & Feeds information pg 400

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



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

* Non-stock item

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.00	6.000	62.00	20.00
0.1220			3.10	6.000	62.00	20.00
0.1248	1/8		3.17	6.000	62.00	20.00
0.1260			3.20	6.000	62.00	20.00
0.1280			3.25	6.000	62.00	20.00
0.1299			3.30	6.000	62.00	20.00
0.1339			3.40	6.000	62.00	20.00
0.1378			3.50	6.000	62.00	20.00
0.1406	9/64		3.57	6.000	62.00	20.00
0.1417			3.60	6.000	62.00	20.00
0.1457			3.70	6.000	62.00	20.00
0.1496		25	3.80	6.000	66.00	24.00
0.1535			3.90	6.000	66.00	24.00
0.1563	5/32		3.97	6.000	66.00	24.00
0.1575			4.00	6.000	66.00	24.00
0.1614			4.10	6.000	66.00	24.00
0.1654			4.20	6.000	66.00	24.00
0.1693		18	4.30	6.000	66.00	24.00
0.1720	11/64		4.37	6.000	66.00	24.00
0.1732			4.40	6.000	66.00	24.00
0.1752			4.45	6.000	66.00	24.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1772		16	4.50	6.000	66.00	24.00
0.1811			4.60	6.000	66.00	24.00
0.1831			4.65	6.000	66.00	24.00
0.1850		13	4.70	6.000	66.00	28.00
0.1874	3/16		4.76	6.000	66.00	28.00
0.1890			4.80	6.000	66.00	28.00
0.1929			4.90	6.000	66.00	28.00
0.1969			5.00	6.000	66.00	28.00
0.2008			5.10	6.000	66.00	28.00
0.2031	13/64		5.16	6.000	66.00	28.00
0.2047			5.20	6.000	66.00	28.00
0.2087			5.30	6.000	66.00	28.00
0.2126			5.40	6.000	66.00	28.00
0.2165			5.50	6.000	66.00	28.00
0.2185			5.55	6.000	66.00	28.00
0.2189	7/32		5.56	6.000	66.00	28.00
0.2205			5.60	6.000	66.00	28.00
0.2224			5.65	6.000	66.00	28.00
0.2244			5.70	6.000	66.00	28.00
0.2264			5.75	6.000	66.00	28.00
0.2283			5.80	6.000	66.00	28.00

To order: Series number + mm, ex. 5518 3.000

Series 5610

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Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.2323			5.90	6.000	66.00	28.00
0.2343	15/64		5.95	6.000	66.00	28.00
0.2362			6.00	6.000	66.00	28.00
0.2402			6.10	8.000	79.00	34.00
0.2441			6.20	8.000	79.00	34.00
0.2480			6.30	8.000	79.00	34.00
0.2500	1/4		6.35	8.000	79.00	34.00
0.2520			6.40	8.000	79.00	34.00
0.2559			6.50	8.000	79.00	34.00
0.2598			6.60	8.000	79.00	34.00
0.2638			6.70	8.000	79.00	34.00
0.2657	17/64		6.75	8.000	79.00	34.00
0.2677			6.80	8.000	79.00	34.00
0.2717		I	6.90	8.000	79.00	34.00
0.2756			7.00	8.000	79.00	34.00
0.2795			7.10	8.000	79.00	41.00
0.2811	9/32		7.14	8.000	79.00	41.00
0.2835			7.20	8.000	79.00	41.00
0.2874			7.30	8.000	79.00	41.00
0.2913			7.40	8.000	79.00	41.00
0.2933			7.45	8.000	79.00	41.00
0.2953			7.50	8.000	79.00	41.00
0.2969	19/64		7.54	8.000	79.00	41.00
0.2992			7.60	8.000	79.00	41.00
0.3012			7.65	8.000	79.00	41.00
0.3031			7.70	8.000	79.00	41.00
0.3071			7.80	8.000	79.00	41.00
0.3110			7.90	8.000	79.00	41.00
0.3126	5/16		7.94	8.000	79.00	41.00
0.3150			8.00	8.000	79.00	41.00
0.3189			8.10	10.000	89.00	47.00
0.3228		P	8.20	10.000	89.00	47.00
0.3268			8.30	10.000	89.00	47.00
0.3280	21/64		8.33	10.000	89.00	47.00
0.3307			8.40	10.000	89.00	47.00
0.3346			8.50	10.000	89.00	47.00
0.3366			8.55	10.000	89.00	47.00
0.3386			8.60	10.000	89.00	47.00
0.3425			8.70	10.000	89.00	47.00
0.3437	11/32		8.73	10.000	89.00	47.00
0.3465			8.80	10.000	89.00	47.00
0.3504			8.90	10.000	89.00	47.00
0.3543			9.00	10.000	89.00	47.00
0.3563			9.05	10.000	89.00	47.00
0.3583			9.10	10.000	89.00	47.00
0.3594	23/64		9.13	10.000	89.00	47.00
0.3622			9.20	10.000	89.00	47.00
0.3642			9.25	10.000	89.00	47.00
0.3661			9.30	10.000	89.00	47.00
0.3701			9.40	10.000	89.00	47.00
0.3740			9.50	10.000	89.00	47.00
0.3748	3/8		9.52	10.000	89.00	47.00
0.3760			9.55	10.000	89.00	47.00
0.3780			9.60	10.000	89.00	47.00
0.3819			9.70	10.000	89.00	47.00
0.3858			9.80	10.000	89.00	47.00
0.3898			9.90	10.000	89.00	47.00
0.3906	25/64		9.92	10.000	89.00	47.00
0.3937			10.00	10.000	89.00	47.00
0.3976			10.10	12.000	102.00	55.00
0.4016			10.20	12.000	102.00	55.00
0.4055			10.30	12.000	102.00	55.00
0.4063	13/32		10.32	12.000	102.00	55.00
0.4094			10.40	12.000	102.00	55.00
0.4134			10.50	12.000	102.00	55.00
0.4173			10.60	12.000	102.00	55.00
0.4213			10.70	12.000	102.00	55.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4252			10.80	12.000	102.00	55.00
0.4291			10.90	12.000	102.00	55.00
0.4331			11.00	12.000	102.00	55.00
0.4370			11.10	12.000	102.00	55.00
0.4374	7/16		11.11	12.000	102.00	55.00
0.4409			11.20	12.000	102.00	55.00
0.4449			11.30	12.000	102.00	55.00
0.4488			11.40	12.000	102.00	55.00
0.4528			11.50	12.000	102.00	55.00
0.4547			11.55	12.000	102.00	55.00
0.4567			11.60	12.000	102.00	55.00
0.4606			11.70	12.000	102.00	55.00
0.4646			11.80	12.000	102.00	55.00
0.4685			11.90	12.000	102.00	55.00
0.4689	15/32		11.91	12.000	102.00	55.00
0.4724			12.00	12.000	102.00	55.00
0.4764			12.10	14.000	107.00	60.00
0.4803			12.20	14.000	107.00	60.00
0.4882			12.40	14.000	107.00	60.00
0.4921			12.50	14.000	107.00	60.00
0.5000	1/2		12.70	14.000	107.00	60.00
0.5118			13.00	14.000	107.00	60.00
0.5157	33/64		13.10	14.000	107.00	60.00
0.5236			13.30	14.000	107.00	60.00
0.5276			13.40	14.000	107.00	60.00
0.5315			13.50	14.000	107.00	60.00
0.5335			13.55	14.000	107.00	60.00
0.5394			13.70	14.000	107.00	60.00
0.5512			14.00	14.000	107.00	60.00
0.5551			14.10	16.000	115.00	65.00
0.5591			14.20	16.000	115.00	65.00
0.5626	9/16		14.29	16.000	115.00	65.00
0.5709			14.50	16.000	115.00	65.00
0.5787			14.70	16.000	115.00	65.00
0.5827			14.80	16.000	115.00	65.00
0.5906			15.00	16.000	115.00	65.00
0.5945			15.10	16.000	115.00	65.00
0.5984			15.20	16.000	115.00	65.00
0.6024			15.30	16.000	115.00	65.00
0.6102			15.50	16.000	115.00	65.00
0.6122			15.55	16.000	115.00	65.00
0.6181			15.70	16.000	115.00	65.00
0.6260			15.90	16.000	115.00	65.00
0.6299			16.00	16.000	115.00	65.00
0.6496			16.50	18.000	123.00	73.00
0.6654			16.90	18.000	123.00	73.00
0.6693			17.00	18.000	123.00	73.00
0.6811			17.30	18.000	123.00	73.00
0.6890			17.50	18.000	123.00	73.00
0.6909			17.55	18.000	123.00	73.00
0.7047			17.90	18.000	123.00	73.00
0.7087			18.00	18.000	123.00	73.00
0.7205			18.30	20.000	131.00	79.00
0.7283			18.50	20.000	131.00	79.00
0.7441			18.90	20.000	131.00	79.00
0.7480			19.00	20.000	131.00	79.00
0.7598			19.30	20.000	131.00	79.00
0.7677			19.50	20.000	131.00	79.00
0.7697			19.55	20.000	131.00	79.00
0.7835			19.90	20.000	131.00	79.00
0.7874			20.00	20.000	131.00	79.00

Alternative Drill Series:

#5510 Carbide, RT100, 3xD, 140 U pt, FIREX
#2477 Carbide, RT100U, 3xD, 140 U pt, nano-FIREX
#8510 Carbide, RT100VA, 3xD, 140 VA pt, nano-A

To order: Series number + mm, ex. 5518 3.000

5xD

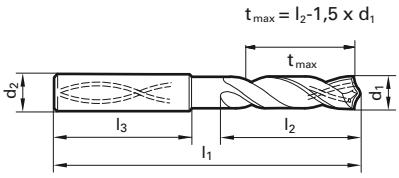
NEW!

Series 5611

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 5xD, self-centering 140° SU point, reinforced shank w/flat, RH helix

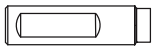
Cut Dia. = m7 tolerance range, Shank Dia. = h6



F

FIREX® coated

Coolant Through



Reinforced Straight Shank w/Flat

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Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

* Non-stock item

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.00	6.000	66.00	28.00
0.1220			3.10	6.000	66.00	28.00
0.1248	1/8		3.17	6.000	66.00	28.00
0.1260			3.20	6.000	66.00	28.00
0.1280			3.25	6.000	66.00	28.00
0.1299			3.30	6.000	66.00	28.00
0.1339			3.40	6.000	66.00	28.00
0.1378			3.50	6.000	66.00	28.00
0.1406	9/64		3.57	6.000	66.00	28.00
0.1417			3.60	6.000	66.00	28.00
0.1457			3.70	6.000	66.00	28.00
0.1496		25	3.80	6.000	74.00	36.00
0.1535			3.90	6.000	74.00	36.00
0.1563	5/32		3.97	6.000	74.00	36.00
0.1575			4.00	6.000	74.00	36.00
0.1614			4.10	6.000	74.00	36.00
0.1654			4.20	6.000	74.00	36.00
0.1693		18	4.30	6.000	74.00	36.00
0.1720	11/64		4.37	6.000	74.00	36.00
0.1732			4.40	6.000	74.00	36.00
0.1772		16	4.50	6.000	74.00	36.00
0.1811			4.60	6.000	74.00	36.00
0.1831			4.65	6.000	74.00	36.00
0.1850		13	4.70	6.000	74.00	36.00
0.1874	3/16		4.76	6.000	82.00	44.00
0.1890			4.80	6.000	82.00	44.00
0.1929			4.90	6.000	82.00	44.00
0.1969			5.00	6.000	82.00	44.00
0.2008			5.10	6.000	82.00	44.00
0.2031	13/64		5.16	6.000	82.00	44.00
0.2047			5.20	6.000	82.00	44.00
0.2087			5.30	6.000	82.00	44.00
0.2126			5.40	6.000	82.00	44.00
0.2165			5.50	6.000	82.00	44.00
0.2185			5.55	6.000	82.00	44.00
0.2189	7/32		5.56	6.000	82.00	44.00
0.2205			5.60	6.000	82.00	44.00
0.2244			5.70	6.000	82.00	44.00
0.2283			5.80	6.000	82.00	44.00
0.2323			5.90	6.000	82.00	44.00
0.2343	15/64		5.95	6.000	82.00	44.00
0.2362			6.00	6.000	82.00	44.00
0.2402			6.10	8.000	91.00	53.00
0.2441			6.20	8.000	91.00	53.00
0.2480			6.30	8.000	91.00	53.00
0.2500	1/4		6.35	8.000	91.00	53.00
0.2520			6.40	8.000	91.00	53.00
0.2559			6.50	8.000	91.00	53.00
0.2598			6.60	8.000	91.00	53.00
0.2638			6.70	8.000	91.00	53.00
0.2657	17/64		6.75	8.000	91.00	53.00
0.2677			6.80	8.000	91.00	53.00
0.2717			6.90	8.000	91.00	53.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2756			7.00	8.000	91.00	53.00
0.2795			7.10	8.000	91.00	53.00
0.2811	9/32		7.14	8.000	91.00	53.00
0.2835			7.20	8.000	91.00	53.00
0.2874			7.30	8.000	91.00	53.00
0.2913			7.40	8.000	91.00	53.00
0.2953			7.50	8.000	91.00	53.00
0.2969	19/64		7.54	8.000	91.00	53.00
0.2992			7.60	8.000	91.00	53.00
0.3031			7.70	8.000	91.00	53.00
0.3071			7.80	8.000	91.00	53.00
0.3110			7.90	8.000	91.00	53.00
0.3126	5/16		7.94	8.000	91.00	53.00
0.3150			8.00	8.000	91.00	53.00
0.3189			8.10	10.000	103.00	61.00
0.3228		P	8.20	10.000	103.00	61.00
0.3268			8.30	10.000	103.00	61.00
0.3280	21/64		8.33	10.000	103.00	61.00
0.3307			8.40	10.000	103.00	61.00
0.3346			8.50	10.000	103.00	61.00
0.3386			8.60	10.000	103.00	61.00
0.3425			8.70	10.000	103.00	61.00
0.3437	11/32		8.73	10.000	103.00	61.00
0.3465			8.80	10.000	103.00	61.00
0.3504			8.90	10.000	103.00	61.00
0.3543			9.00	10.000	103.00	61.00
0.3583			9.10	10.000	103.00	61.00
0.3594	23/64		9.13	10.000	103.00	61.00
0.3622			9.20	10.000	103.00	61.00
0.3642			9.25	10.000	103.00	61.00
0.3661			9.30	10.000	103.00	61.00
0.3701			9.40	10.000	103.00	61.00
0.3740			9.50	10.000	103.00	61.00
0.3748	3/8		9.52	10.000	103.00	61.00
0.3780			9.60	10.000	103.00	61.00
0.3819			9.70	10.000	103.00	61.00
0.3858		W	9.80	10.000	103.00	61.00
0.3898			9.90	10.000	103.00	61.00
0.3906	25/64		9.92	10.000	103.00	61.00
0.3937			10.00	10.000	103.00	61.00
0.3976			10.10	12.000	118.00	71.00
0.4016			10.20	12.000	118.00	71.00
0.4055			10.30	12.000	118.00	71.00
0.4063	13/32		10.32	12.000	118.00	71.00
0.4094			10.40	12.000	118.00	71.00
0.4134			10.50	12.000	118.00	71.00
0.4173			10.60	12.000	118.00	71.00
0.4213			10.70	12.000	118.00	71.00
0.4252			10.80	12.000	118.00	71.00
0.4291			10.90	12.000	118.00	71.00
0.4331			11.00	12.000	118.00	71.00
0.4370			11.10	12.000	118.00	71.00
0.4374	7/16		11.11	12.000	118.00	71.00

To order: Series number + mm, ex. 5518 3.000

Series 5611

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Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4409			11.20	12.000	118.00	71.00
0.4449			11.30	12.000	118.00	71.00
0.4488			11.40	12.000	118.00	71.00
0.4528			11.50	12.000	118.00	71.00
0.4567			11.60	12.000	118.00	71.00
0.4606			11.70	12.000	118.00	71.00
0.4646			11.80	12.000	118.00	71.00
0.4685			11.90	12.000	118.00	71.00
0.4689	15/32		11.91	12.000	118.00	71.00
0.4724			12.00	12.000	118.00	71.00
0.4764			12.10	14.000	124.00	77.00
0.4803			12.20	14.000	124.00	77.00
0.4921			12.50	14.000	124.00	77.00
0.5000	1/2		12.70	14.000	124.00	77.00
0.5118			13.00	14.000	124.00	77.00
0.5315			13.50	14.000	124.00	77.00
0.5394			13.70	14.000	124.00	77.00
0.5512			14.00	14.000	124.00	77.00
0.5551			14.10	16.000	133.00	83.00
0.5591			14.20	16.000	133.00	83.00
0.5626	9/16		14.29	16.000	133.00	83.00
0.5709			14.50	16.000	133.00	83.00
0.5787			14.70	16.000	133.00	83.00
0.5906			15.00	16.000	133.00	83.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.5984			15.20	16.000	133.00	83.00
0.6102			15.50	16.000	133.00	83.00
0.6181			15.70	16.000	133.00	83.00
0.6299			16.00	16.000	133.00	83.00
0.6496			16.50	18.000	143.00	93.00
0.6575			16.70	18.000	143.00	93.00
0.6693			17.00	18.000	143.00	93.00
0.6890			17.50	18.000	143.00	93.00
0.6969			17.70	18.000	143.00	93.00
0.7087			18.00	18.000	143.00	93.00
0.7283			18.50	20.000	153.00	101.00
0.7362			18.70	20.000	153.00	101.00
0.7480			19.00	20.000	153.00	101.00
0.7500	3/4		19.05	20.000	153.00	101.00
0.7677			19.50	20.000	153.00	101.00
0.7756			19.70	20.000	153.00	101.00
0.7874			20.00	20.000	153.00	101.00

Alternative Drill Series:

#5511 Carbide, RT100, 5xD, 140 U pt, FIREX
#2479 Carbide, RT100, 5xD, 140 U pt, nano-FIREX
#8511 Carbide, RT100VA, 5xD, 140 VA pt, nano-A

7xD

NEW!

Series 5612

RT 100 U High Penetration

DK 460 UF Carbide, RT 100 U high penetration, 7xD, self-centering
140° SU point, reinforced shank w/flat, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

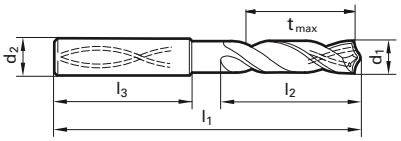
Ⓕ FIREX® coated

Coolant Through

Reinforced Straight Shank w/Flat

Speeds & Feeds information pg 401

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



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Hardened Materials
- Cast Iron
- Ti & Ni Alloys

* Non-stock item

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.00	6.000	70.00	30.00
0.1220			3.10	6.000	70.00	30.00
0.1248	1/8		3.17	6.000	70.00	30.00
0.1260			3.20	6.000	70.00	30.00
0.1280			3.25	6.000	70.00	30.00
0.1299			3.30	6.000	70.00	30.00
0.1339			3.40	6.000	75.00	37.50
0.1378			3.50	6.000	75.00	37.50
0.1406	9/64		3.57	6.000	75.00	37.50
0.1417			3.60	6.000	75.00	37.50
0.1457			3.70	6.000	75.00	37.50
0.1496		25	3.80	6.000	75.00	37.50
0.1535			3.90	6.000	75.00	37.50
0.1563	5/32		3.97	6.000	75.00	37.50
0.1575			4.00	6.000	75.00	37.50
0.1614			4.10	6.000	75.00	37.50
0.1654			4.20	6.000	75.00	37.50
0.1693		18	4.30	6.000	85.00	45.00
0.1720	11/64		4.37	6.000	85.00	45.00
0.1732			4.40	6.000	85.00	45.00
0.1772		16	4.50	6.000	85.00	45.00
0.1811			4.60	6.000	85.00	45.00
0.1831			4.65	6.000	85.00	45.00
0.1850		13	4.70	6.000	85.00	45.00
0.1874	3/16		4.76	6.000	90.00	50.00
0.1890			4.80	6.000	90.00	50.00
0.1929			4.90	6.000	90.00	50.00
0.1969			5.00	6.000	90.00	50.00
0.2008			5.10	6.000	90.00	50.00
0.2031	13/64		5.16	6.000	90.00	50.00
0.2047			5.20	6.000	90.00	50.00
0.2087			5.30	6.000	90.00	50.00
0.2126			5.40	6.000	90.00	50.00
0.2165			5.50	6.000	97.00	57.00
0.2244			5.70	6.000	97.00	57.00
0.2283			5.80	6.000	97.00	57.00
0.2323			5.90	6.000	97.00	57.00
0.2362			6.00	6.000	97.00	57.00
0.2441			6.20	8.000	106.00	66.00
0.2480			6.30	8.000	106.00	66.00
0.2500	1/4		6.35	8.000	106.00	66.00
0.2559			6.50	8.000	106.00	66.00
0.2598			6.60	8.000	106.00	66.00
0.2638			6.70	8.000	106.00	66.00
0.2677			6.80	8.000	106.00	66.00
0.2717			6.90	8.000	116.00	76.00
0.2756			7.00	8.000	116.00	76.00
0.2795			7.10	8.000	116.00	76.00
0.2835			7.20	8.000	116.00	76.00
0.2913			7.40	8.000	116.00	76.00
0.2953			7.50	8.000	116.00	76.00
0.2992			7.60	8.000	116.00	76.00
0.3031			7.70	8.000	116.00	76.00
0.3071			7.80	8.000	116.00	76.00
0.3150			8.00	8.000	116.00	76.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.3189			8.10	10.000	131.00	87.00
0.3228		P	8.20	10.000	131.00	87.00
0.3307			8.40	10.000	131.00	87.00
0.3346	21/64		8.50	10.000	131.00	87.00
0.3386			8.60	10.000	131.00	87.00
0.3425			8.70	10.000	131.00	87.00
0.3465			8.80	10.000	131.00	87.00
0.3543			9.00	10.000	131.00	87.00
0.3583			9.10	10.000	131.00	87.00
0.3622			9.20	10.000	139.00	95.00
0.3661			9.30	10.000	139.00	95.00
0.3701			9.40	10.000	139.00	95.00
0.3740			9.50	10.000	139.00	95.00
0.3748	3/8		9.52	10.000	139.00	95.00
0.3819			9.70	10.000	139.00	95.00
0.3858		w	9.80	10.000	139.00	95.00
0.3898			9.90	10.000	139.00	95.00
0.3937			10.00	10.000	139.00	95.00
0.4016			10.20	12.000	155.00	106.00
0.4055			10.30	12.000	155.00	106.00
0.4134			10.50	12.000	155.00	106.00
0.4252			10.80	12.000	155.00	106.00
0.4331			11.00	12.000	155.00	106.00
0.4409			11.20	12.000	163.00	114.00
0.4528			11.50	12.000	163.00	114.00
0.4646			11.80	12.000	163.00	114.00
0.4724			12.00	12.000	163.00	114.00
0.4764			12.10	14.000	182.00	133.00
0.4803			12.20	14.000	182.00	133.00
0.4921			12.50	14.000	182.00	133.00
0.5000	1/2		12.70	14.000	182.00	133.00
0.5118			13.00	14.000	182.00	133.00
0.5315			13.50	14.000	182.00	133.00
0.5512			14.00	14.000	182.00	133.00
0.5551			14.10	16.000	204.00	152.00
0.5591			14.20	16.000	204.00	152.00
0.5709			14.50	16.000	204.00	152.00
0.5906			15.00	16.000	204.00	152.00
0.6102			15.50	16.000	204.00	152.00
0.6299			16.00	16.000	204.00	152.00
0.6496			16.50	18.000	223.00	171.00
0.6693			17.00	18.000	223.00	171.00
0.6890			17.50	18.000	223.00	171.00
0.7087			18.00	18.000	223.00	171.00
0.7283			18.50	20.000	244.00	190.00
0.7480			19.00	20.000	244.00	190.00
0.7500	3/4		19.05	20.000	244.00	190.00
0.7677			19.50	20.000	244.00	190.00
0.7874			20.00	20.000	244.00	190.00

Alternative Drill Series:

#5512 Carbide, RT100, 7xD, 140 U pt, FIREX
#4044 Carbide, RT100X, 7xD, 140 X pt, nano-FIREX

To order: Series number + mm, ex. 5518 3.000

4xD

Bright finish

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 401

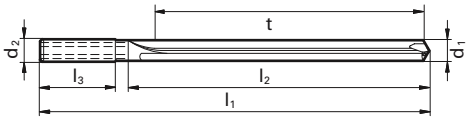
Series 6068

RT 150 GG

DK 255 UF Carbide, RT 150 GG straight flute high penetration, 4xD, 130° point, reinforced straight shank, RH cut

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



Application Materials:

Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	24.00
0.1220			3.100	6.000	66.00	24.00
0.1260			3.200	6.000	66.00	24.00
0.1299			3.300	6.000	66.00	24.00
0.1339			3.400	6.000	66.00	24.00
0.1378			3.500	6.000	66.00	24.00
0.1417			3.600	6.000	66.00	24.00
0.1457			3.700	6.000	66.00	24.00
0.1496		25	3.800	6.000	74.00	30.00
0.1535			3.900	6.000	74.00	30.00
0.1575			4.000	6.000	74.00	30.00
0.1654			4.200	6.000	74.00	30.00
0.1772		16	4.500	6.000	74.00	30.00
0.1811			4.600	6.000	74.00	30.00
0.1890		12	4.800	6.000	74.00	36.00
0.1969			5.000	6.000	74.00	36.00
0.2008			5.100	6.000	74.00	36.00
0.2031	13/64		5.160	6.000	74.00	36.00
0.2047			5.200	6.000	74.00	36.00
0.2087			5.300	6.000	74.00	36.00
0.2126			5.400	6.000	74.00	36.00
0.2165			5.500	6.000	74.00	36.00
0.2189	7/32		5.560	6.000	74.00	36.00
0.2205			5.600	6.000	74.00	36.00
0.2283			5.800	6.000	74.00	36.00
0.2362			6.000	6.000	74.00	36.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2480			6.300	8.000	91.00	53.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2598			6.600	8.000	91.00	53.00
0.2657	17/64	H	6.750	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717		I	6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00
0.2795			7.100	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2835			7.200	8.000	91.00	53.00
0.2874			7.300	8.000	91.00	53.00
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.2969	19/64		7.540	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.3268			8.300	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3594	23/64		9.130	10.000	103.00	61.00
0.3622			9.200	10.000	103.00	61.00
0.3661			9.300	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3780			9.600	10.000	103.00	61.00
0.3819			9.700	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3906	25/64		9.920	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.4016			10.200	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4220	27/64		10.720	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4843	31/64		12.300	14.000	124.00	74.00
0.4921			12.500	14.000	124.00	74.00
0.5000	1/2		12.700	14.000	124.00	74.00
0.5118			13.000	14.000	124.00	74.00
0.5315			13.500	14.000	124.00	74.00
0.5512			14.000	14.000	124.00	74.00
0.5709			14.500	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6496			16.500	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7283			18.500	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#768 Carbide, RT150GG, 4xD, 120 pt, Bright
#6069 K20 Carbide, RT150GG, 7xD,130 pt, Bright

7xD

Bright finish

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 402

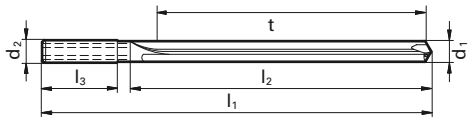
Series 6069

RT 150 GG

DK 255 UF Carbide, RT 150 GG straight flute high penetration, 7xD, 130° point, reinforced straight shank, RH cut

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



Application Materials:

Cast Iron

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	74.00	36.00
0.1220			3.100	6.000	74.00	36.00
0.1260			3.200	6.000	74.00	36.00
0.1299			3.300	6.000	74.00	36.00
0.1339			3.400	6.000	74.00	36.00
0.1378			3.500	6.000	74.00	36.00
0.1417			3.600	6.000	74.00	36.00
0.1457			3.700	6.000	74.00	36.00
0.1496		25	3.800	6.000	97.00	45.00
0.1535			3.900	6.000	97.00	45.00
0.1575			4.000	6.000	97.00	45.00
0.1614			4.100	6.000	97.00	45.00
0.1654			4.200	6.000	97.00	45.00
0.1693		18	4.300	6.000	97.00	45.00
0.1732			4.400	6.000	97.00	45.00
0.1772		16	4.500	6.000	97.00	45.00
0.1850		13	4.700	6.000	97.00	45.00
0.1890		12	4.800	6.000	97.00	57.00
0.1929			4.900	6.000	97.00	57.00
0.1969			5.000	6.000	97.00	57.00
0.2031	13/64		5.160	6.000	97.00	57.00
0.2165			5.500	6.000	97.00	57.00
0.2362			6.000	6.000	97.00	57.00
0.2500	1/4	E	6.350	8.000	116.00	76.00
0.2559			6.500	8.000	116.00	76.00
0.2677			6.800	8.000	116.00	76.00
0.2756			7.000	8.000	116.00	76.00
0.2811	9/32	K	7.140	8.000	116.00	76.00
0.2953			7.500	8.000	116.00	76.00
0.3071			7.800	8.000	116.00	76.00
0.3126	5/16		7.940	8.000	116.00	76.00
0.3150			8.000	8.000	116.00	76.00
0.3280	21/64		8.330	10.000	139.00	95.00
0.3346			8.500	10.000	139.00	95.00
0.3437	11/32		8.730	10.000	139.00	95.00
0.3543			9.000	10.000	139.00	95.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.3594	23/64		9.130	10.000	139.00	95.00
0.3740			9.500	10.000	139.00	95.00
0.3748	3/8		9.520	10.000	139.00	95.00
0.3937			10.000	10.000	139.00	95.00
0.4016			10.200	12.000	163.00	114.00
0.4063	13/32		10.320	12.000	163.00	114.00
0.4134			10.500	12.000	163.00	114.00
0.4220	27/64		10.720	12.000	163.00	114.00
0.4331			11.000	12.000	163.00	114.00
0.4374	7/16		11.110	12.000	163.00	114.00
0.4528			11.500	12.000	163.00	114.00
0.4531	29/64		11.510	12.000	163.00	114.00
0.4724			12.000	12.000	163.00	114.00
0.4843	31/64		12.300	14.000	182.00	133.00
0.4921			12.500	14.000	182.00	133.00
0.5000	1/2		12.700	14.000	182.00	133.00
0.5118			13.000	14.000	182.00	133.00
0.5315			13.500	14.000	182.00	133.00
0.5512			14.000	14.000	182.00	133.00
0.5709			14.500	16.000	204.00	152.00
0.5906			15.000	16.000	204.00	152.00
0.6102			15.500	16.000	204.00	152.00
0.6299			16.000	16.000	204.00	152.00
0.6496			16.500	18.000	223.00	171.00
0.6693			17.000	18.000	223.00	171.00
0.6890			17.500	18.000	223.00	171.00
0.7087			18.000	18.000	223.00	171.00
0.7283			18.500	20.000	244.00	190.00
0.7480			19.000	20.000	244.00	190.00
0.7677			19.500	20.000	244.00	190.00
0.7874			20.000	20.000	244.00	190.00

Alternative Drill Series:

#769 Carbide, RT150GG, 7xD, 120 pt, Bright
#6070 K20 Carb, RT150GG, 10xD,130 pt, Bright

To order: Series number + mm, ex. 5518 3.000

10xD

Series 6070

RT 150 GG

DK 255 UF Carbide, RT 150 GG straight flute high penetration, 10xD, 130° point, reinforced straight shank, RH cut

Application Materials:

Cast Iron

Bright finish

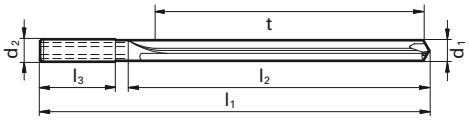
Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 402

Cut Dia. = m7 tolerance range, Shank Dia. = h6

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



Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	91.00	42.00
0.1220			3.100	6.000	91.00	42.00
0.1260			3.200	6.000	91.00	42.00
0.1299			3.300	6.000	91.00	42.00
0.1339			3.400	6.000	91.00	48.00
0.1378			3.500	6.000	91.00	48.00
0.1417			3.600	6.000	91.00	48.00
0.1457			3.700	6.000	91.00	48.00
0.1496		25	3.800	6.000	121.00	77.00
0.1535			3.900	6.000	121.00	77.00
0.1575			4.000	6.000	121.00	77.00
0.1614			4.100	6.000	121.00	77.00
0.1654			4.200	6.000	121.00	77.00
0.1693		18	4.300	6.000	121.00	77.00
0.1732			4.400	6.000	121.00	77.00
0.1772		16	4.500	6.000	121.00	77.00
0.1850		13	4.700	6.000	121.00	77.00
0.1890		12	4.800	6.000	121.00	82.00
0.1929			4.900	6.000	121.00	82.00
0.1969			5.000	6.000	121.00	82.00
0.2031	13/64		5.160	6.000	121.00	82.00
0.2165			5.500	6.000	121.00	82.00
0.2362			6.000	6.000	121.00	82.00
0.2500	1/4	E	6.350	8.000	146.00	106.00
0.2559			6.500	8.000	146.00	106.00
0.2677			6.800	8.000	146.00	106.00
0.2756			7.000	8.000	146.00	106.00
0.2811	9/32	K	7.140	8.000	146.00	106.00
0.2953			7.500	8.000	146.00	106.00
0.3071			7.800	8.000	146.00	106.00
0.3126	5/16		7.940	8.000	146.00	106.00
0.3150			8.000	8.000	146.00	106.00
0.3280	21/64		8.330	10.000	175.00	130.00
0.3346			8.500	10.000	175.00	130.00
0.3437	11/32		8.730	10.000	175.00	130.00
0.3543			9.000	10.000	175.00	130.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.3594	23/64		9.130	10.000	175.00	130.00
0.3740			9.500	10.000	175.00	130.00
0.3748	3/8		9.520	10.000	175.00	130.00
0.3937			10.000	10.000	175.00	130.00
0.4016			10.200	12.000	209.00	159.00
0.4063	13/32		10.320	12.000	209.00	159.00
0.4134			10.500	12.000	209.00	159.00
0.4220	27/64		10.720	12.000	209.00	159.00
0.4331			11.000	12.000	209.00	159.00
0.4374	7/16		11.110	12.000	209.00	159.00
0.4528			11.500	12.000	209.00	159.00
0.4531	29/64		11.510	12.000	209.00	159.00
0.4724			12.000	12.000	209.00	159.00
0.4843	31/64		12.300	14.000	233.00	183.00
0.4921			12.500	14.000	233.00	183.00
0.5000	1/2		12.700	14.000	233.00	183.00
0.5118			13.000	14.000	233.00	183.00
0.5315			13.500	14.000	233.00	183.00
0.5512			14.000	14.000	233.00	183.00
0.5709			14.500	16.000	260.00	207.00
0.5906			15.000	16.000	260.00	207.00
0.6102			15.500	16.000	260.00	207.00
0.6299			16.000	16.000	260.00	207.00
0.6496			16.500	18.000	284.00	231.00
0.6693			17.000	18.000	284.00	231.00
0.6890			17.500	18.000	284.00	231.00
0.7087			18.000	18.000	284.00	231.00
0.7283			18.500	20.000	308.00	255.00
0.7480			19.000	20.000	308.00	255.00
0.7677			19.500	20.000	308.00	255.00
0.7874			20.000	20.000	308.00	255.00

Alternative Drill Series:

#5513 Carbide, RT150GG, 10xD, 120 pt, Bright
#770 Carbide, RT150GG, 10xD,120 pt, Bright

Micro drill

Super-A™ coated

External Coolant

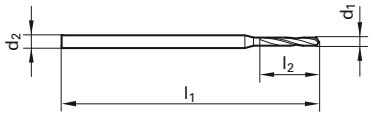
Reinforced Straight Shank

Speeds & Feeds pg 403

Exclusive Line®

DK 460 UF Carbide, micro-precision drill, 140° 4-facet ground hone point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Cast Iron
- Ti & Ni Alloys
- Aluminum & Alloys

Series 6400 (4xD)

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0315			0.800	3.000	47.00	4.80
0.0335			0.850	3.000	47.00	5.10
0.0354			0.900	3.000	47.00	5.40
0.0374			0.950	3.000	47.00	5.70
0.0394			1.000	3.000	47.00	6.00
0.0413			1.050	3.000	47.00	6.30
0.0433			1.100	3.000	47.00	6.60
0.0453			1.150	3.000	47.00	6.90
0.0472			1.200	3.000	47.00	7.20
0.0492			1.250	3.000	47.00	7.50
0.0512			1.300	3.000	47.00	7.80
0.0531			1.350	3.000	47.00	8.10
0.0551		54	1.400	3.000	47.00	8.40
0.0571			1.450	3.000	47.00	8.70
0.0591			1.500	3.000	47.00	9.00
0.0610			1.550	3.000	47.00	9.30
0.0626	1/16		1.590	3.000	47.00	9.60
0.0630			1.600	3.000	47.00	9.60
0.0650			1.650	3.000	47.00	9.90
0.0669		51	1.700	3.000	47.00	10.20
0.0689			1.750	3.000	47.00	10.50
0.0709			1.800	3.000	52.00	10.80
0.0728		49	1.850	3.000	52.00	11.10
0.0748			1.900	3.000	52.00	11.40
0.0768			1.950	3.000	52.00	11.70
0.0780	5/64		1.980	4.000	59.00	12.00
0.0787			2.000	4.000	59.00	12.00
0.0807			2.050	4.000	59.00	12.30
0.0827			2.100	4.000	59.00	12.60
0.0846			2.150	4.000	59.00	12.90
0.0866			2.200	4.000	59.00	13.20
0.0886			2.250	4.000	59.00	13.50
0.0906			2.300	4.000	59.00	13.80
0.0925			2.350	4.000	59.00	14.10
0.0937	3/32		2.380	4.000	59.00	14.40
0.0945			2.400	4.000	59.00	14.40
0.0965			2.450	4.000	59.00	14.70
0.0984			2.500	4.000	59.00	15.00
0.1004			2.550	4.000	59.00	15.30
0.1024			2.600	4.000	59.00	15.60
0.1043			2.650	4.000	59.00	15.90
0.1063			2.700	4.000	59.00	16.20
0.1083			2.750	4.000	59.00	16.50
0.1094	7/64		2.780	4.000	59.00	16.80
0.1102			2.800	4.000	59.00	16.80
0.1122			2.850	4.000	59.00	17.10
0.1142			2.900	4.000	59.00	17.40
0.1161		32	2.950	4.000	59.00	17.70
0.1181			3.000	4.000	59.00	18.00

Alternative Drill Series:

#660 Cobalt, Micro, 118pt, TiN

Series 6401 (7xD)

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	Shank dia.	l1 mm	l2 mm
0.0315			0.800	3.000	47.00	6.40
0.0335			0.850	3.000	47.00	6.80
0.0354			0.900	3.000	47.00	7.20
0.0374			0.950	3.000	47.00	7.60
0.0394			1.000	3.000	47.00	8.00
0.0413			1.050	3.000	47.00	8.40
0.0433			1.100	3.000	47.00	8.80
0.0453			1.150	3.000	47.00	9.20
0.0472			1.200	3.000	52.00	10.80
0.0492			1.250	3.000	52.00	11.30
0.0512			1.300	3.000	52.00	11.70
0.0531			1.350	3.000	52.00	12.20
0.0551		54	1.400	3.000	52.00	12.60
0.0571			1.450	3.000	52.00	13.10
0.0591			1.500	3.000	52.00	13.50
0.0610			1.550	3.000	52.00	14.00
0.0626	1/16		1.590	3.000	52.00	14.40
0.0630			1.600	3.000	52.00	14.40
0.0650			1.650	3.000	52.00	14.90
0.0669		51	1.700	3.000	52.00	15.30
0.0689			1.750	3.000	52.00	15.80
0.0709			1.800	3.000	52.00	16.20
0.0728		49	1.850	3.000	52.00	16.70
0.0748			1.900	3.000	52.00	17.10
0.0768			1.950	3.000	52.00	17.60
0.0780	5/64		1.980	4.000	63.00	18.00
0.0787			2.000	4.000	63.00	18.00
0.0807			2.050	4.000	63.00	18.50
0.0827			2.100	4.000	63.00	18.90
0.0846			2.150	4.000	63.00	19.40
0.0866			2.200	4.000	63.00	19.80
0.0886			2.250	4.000	63.00	20.30
0.0906			2.300	4.000	63.00	20.70
0.0925			2.350	4.000	63.00	21.20
0.0937	3/32		2.380	4.000	63.00	21.60
0.0945			2.400	4.000	63.00	21.60
0.0965			2.450	4.000	63.00	22.10
0.0984			2.500	4.000	63.00	22.50
0.1004			2.550	4.000	63.00	23.00
0.1024			2.600	4.000	67.00	23.40
0.1043			2.650	4.000	67.00	23.90
0.1063			2.700	4.000	67.00	24.30
0.1083			2.750	4.000	67.00	24.80
0.1094	7/64		2.780	4.000	67.00	25.20
0.1102			2.800	4.000	67.00	25.20
0.1122			2.850	4.000	67.00	25.70
0.1142			2.900	4.000	67.00	26.10
0.1161		32	2.950	4.000	67.00	26.60
0.1181			3.000	4.000	67.00	27.00

Alternative Drill Series:

#660 Cobalt, Micro, 118pt, TiN

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

Micro drill

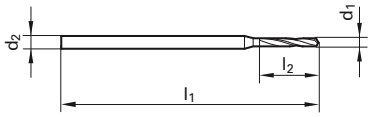
NEW!

Exclusive Line®

Coolant-fed

DK 460 UF Carbide, Exclusive Line Micro Drills, 135° 4-facet ground hone point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6



A
TiAlN coated


Coolant Through


Reinforced Straight Shank

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Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Cast Iron
- Ti & Ni Alloys
- Aluminum & Alloys

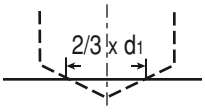
Series 6408 (8xD)

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0551		54	1.400	4.000	52.00	15.00
0.0571			1.450	4.000	52.00	16.00
0.0591			1.500	4.000	52.00	17.00
0.0610			1.550	4.000	52.00	17.00
0.0626	1/16		1.590	4.000	52.00	18.00
0.0630			1.600	4.000	52.00	18.00
0.0650			1.650	4.000	52.00	18.00
0.0669		51	1.700	4.000	56.00	19.00
0.0689			1.750	4.000	56.00	19.00
0.0709			1.800	4.000	56.00	20.00
0.0728		49	1.850	4.000	56.00	20.00
0.0748			1.900	4.000	56.00	21.00
0.0768			1.950	4.000	56.00	21.00
0.0780	5/64		1.980	4.000	56.00	22.00
0.0787			2.000	4.000	56.00	22.00
0.0807			2.050	4.000	56.00	23.00
0.0827			2.100	4.000	62.00	23.00
0.0846			2.150	4.000	62.00	24.00
0.0866			2.200	4.000	62.00	24.00
0.0886			2.250	4.000	62.00	25.00
0.0906			2.300	4.000	62.00	25.00
0.0925			2.350	4.000	62.00	26.00
0.0937	3/32		2.380	4.000	62.00	26.00
0.0945			2.400	4.000	62.00	26.00
0.0965			2.450	4.000	62.00	27.00
0.0984			2.500	4.000	62.00	28.00
0.1004			2.550	4.000	62.00	28.00
0.1024			2.600	4.000	66.00	29.00
0.1043			2.650	4.000	66.00	29.00
0.1063			2.700	4.000	66.00	30.00
0.1083			2.750	4.000	66.00	30.00
0.1094	7/64		2.780	4.000	66.00	31.00
0.1102			2.800	4.000	66.00	31.00
0.1122			2.850	4.000	66.00	31.00
0.1142			2.900	4.000	66.00	32.00
0.1161		32	2.950	4.000	66.00	32.00
0.1181			3.000	4.000	66.00	33.00

Alternative Drill Series:
#6412 Carbide, Micro, 15xD, 135 pt, TiAlN Tipped

Spot Drilling

In order to achieve full performance with Series 6408 carbide micro-precision drills at 8xD drilling depth, we recommend spot drilling.



The ExclusiveLine Series 6400 solid carbide micro-precision drill (up to 4xD) can be applied for this purpose. The spot drill diameter should be approximately $^{2}/_{3}$xD.

Series 6412 (15xD)

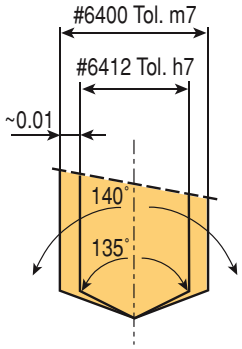
Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.0551			1.400	4.000	62.00	25.00
0.0591			1.500	4.000	62.00	27.00
0.0626	1/16		1.590	4.000	62.00	29.00
0.0630			1.600	4.000	62.00	29.00
0.0669			1.700	4.000	70.00	31.00
0.0709			1.800	4.000	70.00	32.00
0.0748			1.900	4.000	70.00	34.00
0.0780	5/64		1.980	4.000	70.00	36.00
0.0787			2.000	4.000	70.00	36.00
0.0827			2.100	4.000	78.00	38.00
0.0866			2.200	4.000	78.00	40.00
0.0906			2.300	4.000	78.00	42.00
0.0937	3/32		2.380	4.000	78.00	44.00
0.0945			2.400	4.000	78.00	44.00
0.0984			2.500	4.000	78.00	45.00
0.1024			2.600	4.000	87.00	47.00
0.1063			2.700	4.000	87.00	48.00
0.1094	7/64		2.780	4.000	87.00	50.00
0.1102			2.800	4.000	87.00	50.00
0.1142			2.900	4.000	87.00	52.00
0.1181			3.000	4.000	87.00	54.00

Alternative Drill Series:
#6408 Carbide, Micro, 8xD, 135 pt, TiAlN Tipped

Pilot drilling

For applications using Series 6412 carbide micro-precision drills to drilling depths of 15xD we recommend a pilot hole 1xD up to 2xD depth.

For this pilot hole, the Series 6400 solid carbide micro-precision drill (4xD) is optimally suited. Its 140° point angle and its m7 diameter tolerance are perfectly adapted.



To order: Series number + mm, ex. 5518 3.000

5xD

Series 6501

RT 100 R

DK 255 UF Carbide, RT 100 R high penetration, 5xD,
patented radius point*, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

Application Materials:

Cast Iron, CGI, ADI

FIREX® coated

Coolant Through

Reinforced Straight Shank

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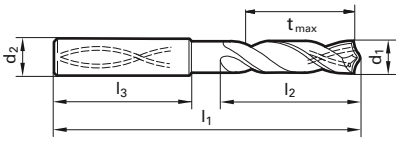
$t_{max} = l_2\text{-}1{,}5 \times d_1$



* US Patent No. 7296954

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	28.00
0.1220			3.100	6.000	66.00	28.00
0.1248	1/8		3.170	6.000	66.00	28.00
0.1260			3.200	6.000	66.00	28.00
0.1280			3.250	6.000	66.00	28.00
0.1299			3.300	6.000	66.00	28.00
0.1339			3.400	6.000	66.00	28.00
0.1378			3.500	6.000	66.00	28.00
0.1406	9/64	28	3.570	6.000	66.00	28.00
0.1417			3.600	6.000	66.00	28.00
0.1457			3.700	6.000	66.00	28.00
0.1496		25	3.800	6.000	74.00	36.00
0.1535			3.900	6.000	74.00	36.00
0.1563	5/32		3.970	6.000	74.00	36.00
0.1575			4.000	6.000	74.00	36.00
0.1614			4.100	6.000	74.00	36.00
0.1654			4.200	6.000	74.00	36.00
0.1693		18	4.300	6.000	74.00	36.00
0.1720	11/64		4.370	6.000	74.00	36.00
0.1732			4.400	6.000	74.00	36.00
0.1772		16	4.500	6.000	74.00	36.00
0.1811			4.600	6.000	74.00	36.00
0.1831			4.650	6.000	74.00	36.00
0.1850		13	4.700	6.000	74.00	36.00
0.1874	3/16		4.760	6.000	82.00	44.00
0.1890		12	4.800	6.000	82.00	44.00
0.1929			4.900	6.000	82.00	44.00
0.1969			5.000	6.000	82.00	44.00
0.2008			5.100	6.000	82.00	44.00
0.2031	13/64		5.160	6.000	82.00	44.00
0.2047			5.200	6.000	82.00	44.00
0.2087			5.300	6.000	82.00	44.00
0.2126			5.400	6.000	82.00	44.00
0.2165			5.500	6.000	82.00	44.00
0.2185			5.550	6.000	82.00	44.00
0.2189	7/32		5.560	6.000	82.00	44.00
0.2205			5.600	6.000	82.00	44.00
0.2244			5.700	6.000	82.00	44.00
0.2283			5.800	6.000	82.00	44.00
0.2323			5.900	6.000	82.00	44.00
0.2343	15/64		5.950	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2480			6.300	8.000	91.00	53.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2598			6.600	8.000	91.00	53.00
0.2638			6.700	8.000	91.00	53.00
0.2657	17/64	H	6.750	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717		I	6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2795			7.100	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2835			7.200	8.000	91.00	53.00
0.2874			7.300	8.000	91.00	53.00
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.2969	19/64		7.540	8.000	91.00	53.00
0.2992			7.600	8.000	91.00	53.00
0.3031			7.700	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3110			7.900	8.000	91.00	53.00
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00
0.3268			8.300	10.000	103.00	61.00
0.3280	21/64		8.330	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3465			8.800	10.000	103.00	61.00
0.3504			8.900	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3583			9.100	10.000	103.00	61.00
0.3594	23/64		9.130	10.000	103.00	61.00
0.3622			9.200	10.000	103.00	61.00
0.3642			9.250	10.000	103.00	61.00
0.3661			9.300	10.000	103.00	61.00
0.3701			9.400	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3780			9.600	10.000	103.00	61.00
0.3819			9.700	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3898			9.900	10.000	103.00	61.00
0.3906	25/64		9.920	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.3976			10.100	12.000	118.00	71.00
0.4016			10.200	12.000	118.00	71.00
0.4055			10.300	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4094			10.400	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4173			10.600	12.000	118.00	71.00
0.4213			10.700	12.000	118.00	71.00
0.4220	27/64		10.720	12.000	118.00	71.00
0.4252			10.800	12.000	118.00	71.00
0.4291			10.900	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4370			11.100	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4409			11.200	12.000	118.00	71.00

To order: Series number + mm, ex. 5518 3.000

Series 6501

Speeds & Feeds information pg 404

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4449			11.300	12.000	118.00	71.00
0.4488			11.400	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4567			11.600	12.000	118.00	71.00
0.4606			11.700	12.000	118.00	71.00
0.4646			11.800	12.000	118.00	71.00
0.4685			11.900	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4764			12.100	14.000	124.00	77.00
0.4803			12.200	14.000	124.00	77.00
0.4843	31/64		12.300	14.000	124.00	77.00
0.4882			12.400	14.000	124.00	77.00
0.4921			12.500	14.000	124.00	77.00
0.4961			12.600	14.000	124.00	77.00
0.5000	1/2		12.700	14.000	124.00	77.00
0.5039			12.800	14.000	124.00	77.00
0.5079			12.900	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5157	33/64		13.100	14.000	124.00	77.00
0.5236			13.300	14.000	124.00	77.00
0.5276			13.400	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5394			13.700	14.000	124.00	77.00
0.5433			13.800	14.000	124.00	77.00
0.5472			13.900	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5551			14.100	16.000	133.00	83.00
0.5591			14.200	16.000	133.00	83.00
0.5626	9/16		14.290	16.000	133.00	83.00
0.5630			14.300	16.000	133.00	83.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.5669			14.400	16.000	133.00	83.00
0.5709			14.500	16.000	133.00	83.00
0.5748			14.600	16.000	133.00	83.00
0.5787			14.700	16.000	133.00	83.00
0.5866			14.900	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.5945			15.100	16.000	133.00	83.00
0.5984			15.200	16.000	133.00	83.00
0.6024			15.300	16.000	133.00	83.00
0.6063			15.400	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6142			15.600	16.000	133.00	83.00
0.6181			15.700	16.000	133.00	83.00
0.6220			15.800	16.000	133.00	83.00
0.6248	5/8		15.870	16.000	133.00	83.00
0.6260			15.900	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6496			16.500	18.000	143.00	93.00
0.6563	21/32		16.670	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7283			18.500	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#5511 Carbide, RT100, 5xD, 140 U pt, FIREX

7xD

Series 6502

RT 100 R

DK 255 UF Carbide, RT 100 R high penetration, 7xD,
patented radius point*, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

Application Materials:

Cast Iron, CGI, ADI

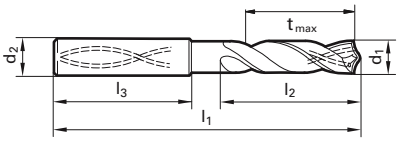
FIREX® coated

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 405

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



* US Patent No. 7296954

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1575			4.000	6.000	75.00	37.50
0.1614			4.100	6.000	75.00	37.50
0.1654			4.200	6.000	75.00	37.50
0.1693		18	4.300	6.000	85.00	45.00
0.1720	11/64		4.370	6.000	85.00	45.00
0.1732			4.400	6.000	85.00	45.00
0.1772		16	4.500	6.000	85.00	45.00
0.1811			4.600	6.000	85.00	45.00
0.1831			4.650	6.000	85.00	45.00
0.1850		13	4.700	6.000	85.00	45.00
0.1874	3/16		4.760	6.000	90.00	50.00
0.1890		12	4.800	6.000	90.00	50.00
0.1929			4.900	6.000	90.00	50.00
0.1969			5.000	6.000	90.00	50.00
0.2008			5.100	6.000	90.00	50.00
0.2031	13/64		5.160	6.000	90.00	50.00
0.2047			5.200	6.000	90.00	50.00
0.2087			5.300	6.000	90.00	50.00
0.2126			5.400	6.000	97.00	57.00
0.2165			5.500	6.000	97.00	57.00
0.2185			5.550	6.000	97.00	57.00
0.2189	7/32		5.560	6.000	97.00	57.00
0.2205			5.600	6.000	97.00	57.00
0.2244			5.700	6.000	97.00	57.00
0.2283			5.800	6.000	97.00	57.00
0.2323			5.900	6.000	97.00	57.00
0.2343	15/64		5.950	6.000	97.00	57.00
0.2362			6.000	6.000	97.00	57.00
0.2402			6.100	8.000	106.00	66.00
0.2441			6.200	8.000	106.00	66.00
0.2480			6.300	8.000	106.00	66.00
0.2500	1/4	E	6.350	8.000	106.00	66.00
0.2520			6.400	8.000	106.00	66.00
0.2559			6.500	8.000	106.00	66.00
0.2598			6.600	8.000	106.00	66.00
0.2638			6.700	8.000	106.00	66.00
0.2657	17/64	H	6.750	8.000	106.00	66.00
0.2677			6.800	8.000	106.00	66.00
0.2717		I	6.900	8.000	116.00	76.00
0.2756			7.000	8.000	116.00	76.00
0.2795			7.100	8.000	116.00	76.00
0.2811	9/32	K	7.140	8.000	116.00	76.00
0.2835			7.200	8.000	116.00	76.00
0.2874			7.300	8.000	116.00	76.00
0.2913			7.400	8.000	116.00	76.00
0.2953			7.500	8.000	116.00	76.00
0.2969	19/64		7.540	8.000	116.00	76.00
0.2992			7.600	8.000	116.00	76.00
0.3031			7.700	8.000	116.00	76.00
0.3071			7.800	8.000	116.00	76.00
0.3110			7.900	8.000	116.00	76.00
0.3126	5/16		7.940	8.000	116.00	76.00
0.3150			8.000	8.000	116.00	76.00
0.3189			8.100	10.000	131.00	87.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.3228		P	8.200	10.000	131.00	87.00
0.3268			8.300	10.000	131.00	87.00
0.3280	21/64		8.330	10.000	131.00	87.00
0.3307			8.400	10.000	131.00	87.00
0.3346			8.500	10.000	131.00	87.00
0.3386			8.600	10.000	131.00	87.00
0.3425			8.700	10.000	131.00	87.00
0.3437	11/32		8.730	10.000	131.00	87.00
0.3465			8.800	10.000	131.00	87.00
0.3504			8.900	10.000	131.00	87.00
0.3543			9.000	10.000	131.00	87.00
0.3583			9.100	10.000	139.00	95.00
0.3594	23/64		9.130	10.000	139.00	95.00
0.3622			9.200	10.000	139.00	95.00
0.3642			9.250	10.000	139.00	95.00
0.3661			9.300	10.000	139.00	95.00
0.3701			9.400	10.000	139.00	95.00
0.3740			9.500	10.000	139.00	95.00
0.3748	3/8		9.520	10.000	139.00	95.00
0.3780			9.600	10.000	139.00	95.00
0.3819			9.700	10.000	139.00	95.00
0.3858		W	9.800	10.000	139.00	95.00
0.3898			9.900	10.000	139.00	95.00
0.3906	25/64		9.920	10.000	139.00	95.00
0.3937			10.000	10.000	139.00	95.00
0.3976			10.100	12.000	155.00	106.00
0.4016			10.200	12.000	155.00	106.00
0.4055			10.300	12.000	155.00	106.00
0.4063	13/32		10.320	12.000	155.00	106.00
0.4094			10.400	12.000	155.00	106.00
0.4134			10.500	12.000	155.00	106.00
0.4173			10.600	12.000	155.00	106.00
0.4213			10.700	12.000	155.00	106.00
0.4220	27/64		10.720	12.000	155.00	106.00
0.4252			10.800	12.000	155.00	106.00
0.4291			10.900	12.000	155.00	106.00
0.4331			11.000	12.000	155.00	106.00
0.4370			11.100	12.000	163.00	114.00
0.4374	7/16		11.110	12.000	163.00	114.00
0.4409			11.200	12.000	163.00	114.00
0.4449			11.300	12.000	163.00	114.00
0.4488			11.400	12.000	163.00	114.00
0.4528			11.500	12.000	163.00	114.00
0.4567			11.600	12.000	163.00	114.00
0.4606			11.700	12.000	163.00	114.00
0.4646			11.800	12.000	163.00	114.00
0.4685			11.900	12.000	163.00	114.00
0.4689	15/32		11.910	12.000	163.00	114.00
0.4724			12.000	12.000	163.00	114.00
0.4764			12.100	14.000	182.00	133.00
0.4803			12.200	14.000	182.00	133.00
0.4843	31/64		12.300	14.000	182.00	133.00
0.4882			12.400	14.000	182.00	133.00
0.4921			12.500	14.000	182.00	133.00

To order: Series number + mm, ex. 5518 3.000

Series 6502

Speeds & Feeds information pg 405

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4961			12.600	14.000	182.00	133.00
0.5000	1/2		12.700	14.000	182.00	133.00
0.5039			12.800	14.000	182.00	133.00
0.5079			12.900	14.000	182.00	133.00
0.5118			13.000	14.000	182.00	133.00
0.5157	33/64		13.100	14.000	182.00	133.00
0.5236			13.300	14.000	182.00	133.00
0.5276			13.400	14.000	182.00	133.00
0.5315			13.500	14.000	182.00	133.00
0.5394			13.700	14.000	182.00	133.00
0.5433			13.800	14.000	182.00	133.00
0.5472			13.900	14.000	182.00	133.00
0.5512			14.000	14.000	182.00	133.00
0.5551			14.100	16.000	204.00	152.00
0.5591			14.200	16.000	204.00	152.00
0.5626	9/16		14.290	16.000	204.00	152.00
0.5630			14.300	16.000	204.00	152.00
0.5669			14.400	16.000	204.00	152.00
0.5709			14.500	16.000	204.00	152.00
0.5748			14.600	16.000	204.00	152.00
0.5787			14.700	16.000	204.00	152.00
0.5866			14.900	16.000	204.00	152.00
0.5906			15.000	16.000	204.00	152.00
0.5945			15.100	16.000	204.00	152.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.5984			15.200	16.000	204.00	152.00
0.6024			15.300	16.000	204.00	152.00
0.6063			15.400	16.000	204.00	152.00
0.6102			15.500	16.000	204.00	152.00
0.6142			15.600	16.000	204.00	152.00
0.6181			15.700	16.000	204.00	152.00
0.6220			15.800	16.000	204.00	152.00
0.6248	5/8		15.870	16.000	204.00	152.00
0.6260			15.900	16.000	204.00	152.00
0.6299			16.000	16.000	204.00	152.00
0.6496			16.500	18.000	223.00	171.00
0.6563	21/32		16.670	18.000	223.00	171.00
0.6693			17.000	18.000	223.00	171.00
0.6890			17.500	18.000	223.00	171.00
0.7087			18.000	18.000	223.00	171.00
0.7283			18.500	20.000	244.00	190.00
0.7480			19.000	20.000	244.00	190.00
0.7677			19.500	20.000	244.00	190.00
0.7874			20.000	20.000	244.00	190.00

Alternative Drill Series:

#5512 Carbide, RT100, 7xD, 140 U pt, FIREX

RT 100T Deep Hole Drill

Extra Length

A

TiAlN tipped

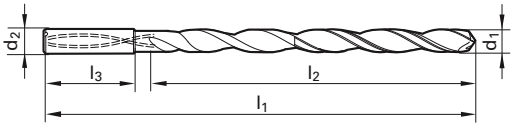
Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 405-406

K30/K40 Carbide, RT 100T high penetration, 135° point, standard straight shank, RH helix

Cut Dia. = h7 tolerance range, Shank Dia. = h6



Application Materials:

- General Steels/Brass
- Universal Steels
- Stainless Steels
- Cast Iron

Series 6511 (20xD)

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	110.00	70.00
0.1250	1/8		3.170	6.000	123.00	83.00
0.1378			3.500	6.000	136.00	96.00
0.1406	9/64		3.570	6.000	136.00	96.00
0.1563	5/32		3.970	6.000	136.00	96.00
0.1575			4.000	6.000	136.00	96.00
0.1719	11/64		4.370	6.000	158.00	118.00
0.1772			4.500	6.000	158.00	118.00
0.1874	3/16		4.760	6.000	158.00	118.00
0.1969			5.000	6.000	158.00	118.00
0.2008			5.100	6.000	158.00	118.00
0.2030	13/64		5.160	6.000	158.00	118.00
0.2130		3	5.410	6.000	180.00	140.00
0.2165			5.500	6.000	180.00	140.00
0.2189	7/32		5.560	6.000	180.00	140.00
0.2344	15/64		5.950	6.000	180.00	140.00
0.2362			6.000	6.000	180.00	140.00
0.2500	1/4		6.350	8.000	202.00	162.00
0.2559			6.500	8.000	202.00	162.00
0.2656	17/64		6.750	8.000	202.00	162.00
0.2756			7.000	8.000	202.00	162.00
0.2811	9/32		7.140	8.000	223.00	183.00
0.2953			7.500	8.000	223.00	183.00
0.2969	19/64		7.540	8.000	223.00	183.00
0.3120	5/16		7.940	8.000	223.00	183.00
0.3150			8.000	8.000	223.00	183.00
0.3281	21/64		8.330	10.000	249.00	205.00
0.3346			8.500	10.000	249.00	205.00
0.3438	11/32		8.730	10.000	249.00	205.00
0.3543			9.000	10.000	249.00	205.00
0.3594	23/64		9.130	10.000	249.00	205.00
0.3750	3/8		9.520	10.000	271.00	227.00
0.3937			10.000	10.000	271.00	227.00
0.4063	13/32		10.320	12.000	302.00	242.00
0.4219	27/64		10.720	12.000	302.00	242.00
0.4370	7/16		11.110	12.000	323.00	274.00
0.4531	29/64		11.510	12.000	323.00	274.00
0.4688	15/32		11.910	12.000	323.00	274.00
0.4724			12.000	12.000	323.00	274.00
0.5000	1/2		12.700	14.000	367.00	318.00
0.5512			14.000	14.000	367.00	318.00

Alternative Drill Series:

#6512 Carbide, RT100T, 25xD, 135 pt, TiAlN tipped

Series 6512 (25xD)

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	125.00	85.00
0.1250	1/8		3.170	6.000	141.00	101.00
0.1378			3.500	6.000	156.00	116.00
0.1406	9/64		3.570	6.000	156.00	116.00
0.1563	5/32		3.970	6.000	156.00	116.00
0.1575			4.000	6.000	156.00	116.00
0.1719	11/64		4.370	6.000	183.00	143.00
0.1772			4.500	6.000	183.00	143.00
0.1874	3/16		4.760	6.000	183.00	143.00
0.1969			5.000	6.000	183.00	143.00
0.2008			5.100	6.000	183.00	143.00
0.2030	13/64		5.160	6.000	183.00	143.00
0.2130		3	5.410	6.000	210.00	170.00
0.2165			5.500	6.000	210.00	170.00
0.2189	7/32		5.560	6.000	210.00	170.00
0.2344	15/64		5.950	6.000	210.00	170.00
0.2362			6.000	6.000	210.00	170.00
0.2500	1/4		6.350	8.000	237.00	197.00
0.2559			6.500	8.000	237.00	197.00
0.2656	17/64		6.750	8.000	237.00	197.00
0.2756			7.000	8.000	237.00	197.00
0.2811	9/32		7.140	8.000	263.00	223.00
0.2953			7.500	8.000	263.00	223.00
0.2969	19/64		7.540	8.000	263.00	223.00
0.3120	5/16		7.940	8.000	263.00	223.00
0.3150			8.000	8.000	263.00	223.00
0.3281	21/64		8.330	10.000	294.00	250.00
0.3346			8.500	10.000	294.00	250.00
0.3438	11/32		8.730	10.000	294.00	250.00
0.3543			9.000	10.000	294.00	250.00
0.3594	23/64		9.130	10.000	294.00	250.00
0.3750	3/8		9.520	10.000	321.00	277.00
0.3937			10.000	10.000	321.00	277.00
0.4219	27/64		10.720	12.000	359.00	310.00
0.4370	7/16		11.110	12.000	386.00	337.00
0.4724			12.000	12.000	386.00	337.00

Alternative Drill Series:

#6513 Carbide, RT100T, 30xD, 135 pt, TiAlN tipped

Red indicates NEW sizes!

To order: Series number + mm, ex. 5518 3.000

RT 100T Deep Hole Drill

Speeds & Feeds information pg 406-407

Series 6513 (30xD)

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	140.00	100.00
0.1250	1/8		3.170	6.000	158.00	118.00
0.1378			3.500	6.000	176.00	136.00
0.1406	9/64		3.570	6.000	176.00	136.00
0.1563	5/32		3.970	6.000	176.00	136.00
0.1575			4.000	6.000	176.00	136.00
0.1719	11/64		4.370	6.000	208.00	168.00
0.1772			4.500	6.000	208.00	168.00
0.1874	3/16		4.760	6.000	208.00	168.00
0.1969			5.000	6.000	208.00	168.00
0.2008			5.100	6.000	208.00	168.00
0.2030	13/64		5.160	6.000	208.00	168.00
0.2130		3	5.410	6.000	240.00	200.00
0.2165			5.500	6.000	240.00	200.00
0.2189	7/32		5.560	6.000	240.00	200.00
0.2344	15/64		5.950	6.000	240.00	200.00
0.2362			6.000	6.000	240.00	200.00
0.2500	1/4		6.350	8.000	272.00	232.00
0.2559			6.500	8.000	272.00	232.00
0.2656	17/64		6.750	8.000	272.00	232.00
0.2756			7.000	8.000	272.00	232.00
0.2811	9/32		7.140	8.000	303.00	263.00
0.2953			7.500	8.000	303.00	263.00
0.2969	19/64		7.540	8.000	303.00	263.00
0.3120	5/16		7.940	8.000	303.00	263.00
0.3150			8.000	8.000	303.00	263.00
0.3281	21/64		8.330	10.000	339.00	295.00
0.3346			8.500	10.000	339.00	295.00
0.3438	11/32		8.730	10.000	339.00	295.00
0.3543			9.000	10.000	339.00	295.00
0.3594	23/64		9.130	10.000	339.00	295.00
0.3750	3/8		9.520	10.000	371.00	327.00
0.3937			10.000	10.000	371.00	327.00

Alternative Drill Series:

#6514 Carbide, RT100T, 40xD, 135 pt, TiAlN tipped

- Minimum of 250 PSI coolant pressure recommended -

NEW!

Series 6514 (40xD)

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	170.00	130.00
0.1248	1/8		3.170	6.000	193.00	153.00
0.1378			3.500	6.000	193.00	153.00
0.1563	5/32		3.970	6.000	216.00	176.00
0.1575			4.000	6.000	216.00	176.00
0.1772			4.500	6.000	238.00	198.00
0.1874	3/16		4.760	6.000	258.00	218.00
0.1969			5.000	6.000	258.00	218.00
0.2165			5.500	6.000	280.00	240.00
0.2189	7/32		5.560	6.000	300.00	260.00
0.2362			6.000	6.000	300.00	260.00
0.2500	1/4		6.350	8.000	322.00	282.00
0.2559			6.500	8.000	322.00	282.00
0.2756			7.000	8.000	342.00	302.00
0.2811	9/32		7.140	8.000	363.00	323.00
0.2953			7.500	8.000	363.00	323.00
0.3150			8.000	8.000	383.00	343.00

Alternative Drill Series:

#6513 Carbide, RT100T, 30xD, 135 pt, TiAlN tipped

All deep hole drills must utilize a pilot hole.

Deep hole drills must never operate at full speed without support in the pilot hole.

Procedure:

- Machine a pilot hole with an m7 toleranced series 5514 RT 100 drill to a minimum pilot depth of 1 to 1.5 x D.
- Enter the pilot hole at a speed of approx. 300 RPM, and with a feed rate of approx. 19 - 20 IPM
- Start high coolant pressure and increase RPM.
- Continuous drilling to complete hole depth without peck cycle.
- For through holes with oblique exit, reduce the feed rate to 40% approx. 1 mm prior to break-through.
- After reaching hole depth reduce machine spindle RPM and withdraw.

3xD

NEW!

Series 8510

RT 100 VA High Penetration

DK 460 UF Carbide, RT 100 VA, 3xD, self-centering
140° VA point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

Application Materials:

- Universal Steels
- Stainless Steels
- Hardened Materials
- Ti & Ni Alloys

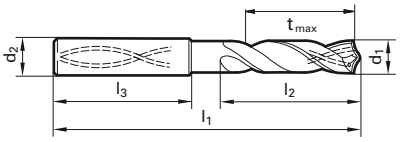
ⓐ nano-A™ coated

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 408

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



Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	62.00	20.00
0.1220			3.100	6.000	62.00	20.00
0.1248	1/8		3.170	6.000	62.00	20.00
0.1260			3.200	6.000	62.00	20.00
0.1280			3.250	6.000	62.00	20.00
0.1299			3.300	6.000	62.00	20.00
0.1339			3.400	6.000	62.00	20.00
0.1378			3.500	6.000	62.00	20.00
0.1406	9/64	28	3.570	6.000	62.00	20.00
0.1417			3.600	6.000	62.00	20.00
0.1457			3.700	6.000	62.00	20.00
0.1496		25	3.800	6.000	66.00	24.00
0.1535			3.900	6.000	66.00	24.00
0.1563	5/32		3.970	6.000	66.00	24.00
0.1575			4.000	6.000	66.00	24.00
0.1614			4.100	6.000	66.00	24.00
0.1654			4.200	6.000	66.00	24.00
0.1693			4.300	6.000	66.00	24.00
0.1720	11/64		4.370	6.000	66.00	24.00
0.1732			4.400	6.000	66.00	24.00
0.1772		16	4.500	6.000	66.00	24.00
0.1811			4.600	6.000	66.00	24.00
0.1831			4.650	6.000	66.00	24.00
0.1850		13	4.700	6.000	66.00	28.00
0.1874	3/16		4.760	6.000	66.00	28.00
0.1890		12	4.800	6.000	66.00	28.00
0.1929			4.900	6.000	66.00	28.00
0.1969			5.000	6.000	66.00	28.00
0.2008			5.100	6.000	66.00	28.00
0.2031	13/64		5.160	6.000	66.00	28.00
0.2047			5.200	6.000	66.00	28.00
0.2087			5.300	6.000	66.00	28.00
0.2126			5.400	6.000	66.00	28.00
0.2165			5.500	6.000	66.00	28.00
0.2185			5.550	6.000	66.00	28.00
0.2189	7/32		5.560	6.000	66.00	28.00
0.2205			5.600	6.000	66.00	28.00
0.2244			5.700	6.000	66.00	28.00
0.2283			5.800	6.000	66.00	28.00
0.2323			5.900	6.000	66.00	28.00
0.2343	15/64		5.950	6.000	66.00	28.00
0.2362			6.000	6.000	66.00	28.00
0.2402			6.100	8.000	79.00	34.00
0.2441			6.200	8.000	79.00	34.00
0.2480			6.300	8.000	79.00	34.00
0.2500	1/4	E	6.350	8.000	79.00	34.00
0.2520			6.400	8.000	79.00	34.00
0.2559			6.500	8.000	79.00	34.00
0.2598			6.600	8.000	79.00	34.00
0.2638			6.700	8.000	79.00	34.00
0.2657	17/64	H	6.750	8.000	79.00	34.00
0.2677			6.800	8.000	79.00	34.00
0.2717		I	6.900	8.000	79.00	34.00
0.2756			7.000	8.000	79.00	34.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2795			7.100	8.000	79.00	41.00
0.2811	9/32	K	7.140	8.000	79.00	41.00
0.2835			7.200	8.000	79.00	41.00
0.2874			7.300	8.000	79.00	41.00
0.2913			7.400	8.000	79.00	41.00
0.2953			7.500	8.000	79.00	41.00
0.2969	19/64		7.540	8.000	79.00	41.00
0.2992			7.600	8.000	79.00	41.00
0.3031			7.700	8.000	79.00	41.00
0.3071			7.800	8.000	79.00	41.00
0.3110			7.900	8.000	79.00	41.00
0.3126	5/16		7.940	8.000	79.00	41.00
0.3150			8.000	8.000	79.00	41.00
0.3189			8.100	10.000	89.00	47.00
0.3228		P	8.200	10.000	89.00	47.00
0.3268			8.300	10.000	89.00	47.00
0.3280	21/64		8.330	10.000	89.00	47.00
0.3307			8.400	10.000	89.00	47.00
0.3346			8.500	10.000	89.00	47.00
0.3386			8.600	10.000	89.00	47.00
0.3425			8.700	10.000	89.00	47.00
0.3437	11/32		8.730	10.000	89.00	47.00
0.3465			8.800	10.000	89.00	47.00
0.3504			8.900	10.000	89.00	47.00
0.3543			9.000	10.000	89.00	47.00
0.3583			9.100	10.000	89.00	47.00
0.3594	23/64		9.130	10.000	89.00	47.00
0.3622			9.200	10.000	89.00	47.00
0.3642			9.250	10.000	89.00	47.00
0.3661			9.300	10.000	89.00	47.00
0.3701			9.400	10.000	89.00	47.00
0.3740			9.500	10.000	89.00	47.00
0.3748	3/8		9.520	10.000	89.00	47.00
0.3780			9.600	10.000	89.00	47.00
0.3819			9.700	10.000	89.00	47.00
0.3858		W	9.800	10.000	89.00	47.00
0.3898			9.900	10.000	89.00	47.00
0.3906	25/64		9.920	10.000	89.00	47.00
0.3937			10.000	10.000	89.00	47.00
0.3976			10.100	12.000	102.00	55.00
0.4016			10.200	12.000	102.00	55.00
0.4055			10.300	12.000	102.00	55.00
0.4063	13/32		10.320	12.000	102.00	55.00
0.4094			10.400	12.000	102.00	55.00
0.4134			10.500	12.000	102.00	55.00
0.4173			10.600	12.000	102.00	55.00
0.4213			10.700	12.000	102.00	55.00
0.4252			10.800	12.000	102.00	55.00
0.4291			10.900	12.000	102.00	55.00
0.4331			11.000	12.000	102.00	55.00
0.4370			11.100	12.000	102.00	55.00
0.4374	7/16		11.110	12.000	102.00	55.00
0.4409			11.200	12.000	102.00	55.00
0.4449			11.300	12.000	102.00	55.00

Available Spring 2010

To order: Series number + mm, ex. 5518 3.000

Series 8510

Speeds & Feeds information pg 408

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4488			11.400	12.000	102.00	55.00
0.4528			11.500	12.000	102.00	55.00
0.4567			11.600	12.000	102.00	55.00
0.4606			11.700	12.000	102.00	55.00
0.4645			11.800	12.000	102.00	55.00
0.4685			11.900	12.000	102.00	55.00
0.4689	15/32		11.910	12.000	102.00	55.00
0.4724			12.000	12.000	102.00	55.00
0.4803			12.200	14.000	107.00	60.00
0.4921			12.500	14.000	107.00	60.00
0.5000	1/2		12.700	14.000	107.00	60.00
0.5039			12.800	14.000	107.00	60.00
0.5118			13.000	14.000	107.00	60.00
0.5236			13.300	14.000	107.00	60.00
0.5315			13.500	14.000	107.00	60.00
0.5394			13.700	14.000	107.00	60.00
0.5512			14.000	14.000	107.00	60.00
0.5591			14.200	16.000	115.00	65.00
0.5626	9/16		14.290	16.000	115.00	65.00
0.5630			14.300	16.000	115.00	65.00
0.5709			14.500	16.000	115.00	65.00
0.5787			14.700	16.000	115.00	65.00
0.5906			15.000	16.000	115.00	65.00
0.5984			15.200	16.000	115.00	65.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.6024			15.300	16.000	115.00	65.00
0.6102			15.500	16.000	115.00	65.00
0.6142			15.600	16.000	115.00	65.00
0.6181			15.700	16.000	115.00	65.00
0.6299			16.000	16.000	115.00	65.00
0.6417			16.300	18.000	123.00	73.00
0.6496			16.500	18.000	123.00	73.00
0.6654			16.900	18.000	123.00	73.00
0.6693			17.000	18.000	123.00	73.00
0.6811			17.300	18.000	123.00	73.00
0.6890			17.500	18.000	123.00	73.00
0.7087			18.000	18.000	123.00	73.00
0.7283			18.500	20.000	131.00	79.00
0.7441			18.900	20.000	131.00	79.00
0.7480			19.000	20.000	131.00	79.00
0.7598			19.300	20.000	131.00	79.00
0.7677			19.500	20.000	131.00	79.00
0.7874			20.000	20.000	131.00	79.00

Alternative Drill Series:

#5510 Carbide, RT100, 3xD, 140 U pt, FIREX
#2477 Carbide, RT100U, 3xD, 140 U pt, nano-FIREX

5xD

NEW!

Series 8511

RT 100 VA High Penetration

DK 460 UF Carbide, RT 100 VA, 5xD, self-centering
140° VA point, reinforced straight shank, RH helix

Cut Dia. = m7 tolerance range, Shank Dia. = h6

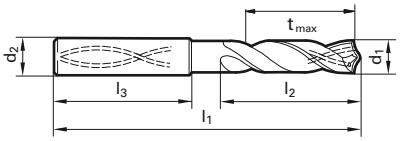
a nano-A™ coated

Coolant Through

Reinforced Straight Shank

Speeds & Feeds information pg 408

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



Application Materials:

- Universal Steels
- Stainless Steels
- Hardened Materials
- Ti & Ni Alloys

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.1181			3.000	6.000	66.00	28.00
0.1220			3.100	6.000	66.00	28.00
0.1248	1/8		3.170	6.000	66.00	28.00
0.1260			3.200	6.000	66.00	28.00
0.1280			3.250	6.000	66.00	28.00
0.1299			3.300	6.000	66.00	28.00
0.1339			3.400	6.000	66.00	28.00
0.1378			3.500	6.000	66.00	28.00
0.1406	9/64	28	3.570	6.000	66.00	28.00
0.1417			3.600	6.000	66.00	28.00
0.1457			3.700	6.000	66.00	28.00
0.1496		25	3.800	6.000	74.00	36.00
0.1535			3.900	6.000	74.00	36.00
0.1563	5/32		3.970	6.000	74.00	36.00
0.1575			4.000	6.000	74.00	36.00
0.1614			4.100	6.000	74.00	36.00
0.1654			4.200	6.000	74.00	36.00
0.1693		18	4.300	6.000	74.00	36.00
0.1720	11/64		4.370	6.000	74.00	36.00
0.1732			4.400	6.000	74.00	36.00
0.1772		16	4.500	6.000	74.00	36.00
0.1811			4.600	6.000	74.00	36.00
0.1831			4.650	6.000	74.00	36.00
0.1850		13	4.700	6.000	74.00	36.00
0.1874	3/16		4.760	6.000	82.00	44.00
0.1890		12	4.800	6.000	82.00	44.00
0.1929			4.900	6.000	82.00	44.00
0.1969			5.000	6.000	82.00	44.00
0.2008			5.100	6.000	82.00	44.00
0.2031	13/64		5.160	6.000	82.00	44.00
0.2047			5.200	6.000	82.00	44.00
0.2087			5.300	6.000	82.00	44.00
0.2126			5.400	6.000	82.00	44.00
0.2165			5.500	6.000	82.00	44.00
0.2185			5.550	6.000	82.00	44.00
0.2189	7/32		5.560	6.000	82.00	44.00
0.2205			5.600	6.000	82.00	44.00
0.2244			5.700	6.000	82.00	44.00
0.2283			5.800	6.000	82.00	44.00
0.2323			5.900	6.000	82.00	44.00
0.2343	15/64		5.950	6.000	82.00	44.00
0.2362			6.000	6.000	82.00	44.00
0.2402			6.100	8.000	91.00	53.00
0.2441			6.200	8.000	91.00	53.00
0.2480			6.300	8.000	91.00	53.00
0.2500	1/4	E	6.350	8.000	91.00	53.00
0.2520			6.400	8.000	91.00	53.00
0.2559			6.500	8.000	91.00	53.00
0.2598			6.600	8.000	91.00	53.00
0.2638			6.700	8.000	91.00	53.00
0.2657	17/64	H	6.750	8.000	91.00	53.00
0.2677			6.800	8.000	91.00	53.00
0.2717		I	6.900	8.000	91.00	53.00
0.2756			7.000	8.000	91.00	53.00

Diameter (d1) Dec. inch	Fract. inch	Wire / letter	mm	d2 mm	l1 mm	l2 mm
0.2795			7.100	8.000	91.00	53.00
0.2811	9/32	K	7.140	8.000	91.00	53.00
0.2835			7.200	8.000	91.00	53.00
0.2874			7.300	8.000	91.00	53.00
0.2913			7.400	8.000	91.00	53.00
0.2953			7.500	8.000	91.00	53.00
0.2969	19/64		7.540	8.000	91.00	53.00
0.2992			7.600	8.000	91.00	53.00
0.3031			7.700	8.000	91.00	53.00
0.3071			7.800	8.000	91.00	53.00
0.3110			7.900	8.000	91.00	53.00
0.3126	5/16		7.940	8.000	91.00	53.00
0.3150			8.000	8.000	91.00	53.00
0.3189			8.100	10.000	103.00	61.00
0.3228		P	8.200	10.000	103.00	61.00
0.3268			8.300	10.000	103.00	61.00
0.3280	21/64		8.330	10.000	103.00	61.00
0.3307			8.400	10.000	103.00	61.00
0.3346			8.500	10.000	103.00	61.00
0.3386			8.600	10.000	103.00	61.00
0.3425			8.700	10.000	103.00	61.00
0.3437	11/32		8.730	10.000	103.00	61.00
0.3465			8.800	10.000	103.00	61.00
0.3504			8.900	10.000	103.00	61.00
0.3543			9.000	10.000	103.00	61.00
0.3583			9.100	10.000	103.00	61.00
0.3594	23/64		9.130	10.000	103.00	61.00
0.3622			9.200	10.000	103.00	61.00
0.3642			9.250	10.000	103.00	61.00
0.3661			9.300	10.000	103.00	61.00
0.3701			9.400	10.000	103.00	61.00
0.3740			9.500	10.000	103.00	61.00
0.3748	3/8		9.520	10.000	103.00	61.00
0.3780			9.600	10.000	103.00	61.00
0.3819			9.700	10.000	103.00	61.00
0.3858		W	9.800	10.000	103.00	61.00
0.3898			9.900	10.000	103.00	61.00
0.3906	25/64		9.920	10.000	103.00	61.00
0.3937			10.000	10.000	103.00	61.00
0.3976			10.100	12.000	118.00	71.00
0.4016			10.200	12.000	118.00	71.00
0.4055			10.300	12.000	118.00	71.00
0.4063	13/32		10.320	12.000	118.00	71.00
0.4094			10.400	12.000	118.00	71.00
0.4134			10.500	12.000	118.00	71.00
0.4173			10.600	12.000	118.00	71.00
0.4213			10.700	12.000	118.00	71.00
0.4252			10.800	12.000	118.00	71.00
0.4291			10.900	12.000	118.00	71.00
0.4331			11.000	12.000	118.00	71.00
0.4370			11.100	12.000	118.00	71.00
0.4374	7/16		11.110	12.000	118.00	71.00
0.4409			11.200	12.000	118.00	71.00
0.4449			11.300	12.000	118.00	71.00

Available Spring 2010

To order: Series number + mm, ex. 5518 3.000

Series 8511

Speeds & Feeds information pg 408

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.4488			11.400	12.000	118.00	71.00
0.4528			11.500	12.000	118.00	71.00
0.4567			11.600	12.000	118.00	71.00
0.4606			11.700	12.000	118.00	71.00
0.4646			11.800	12.000	118.00	71.00
0.4685			11.900	12.000	118.00	71.00
0.4689	15/32		11.910	12.000	118.00	71.00
0.4724			12.000	12.000	118.00	71.00
0.4803			12.200	14.000	124.00	77.00
0.4921			12.500	14.000	124.00	77.00
0.5000	1/2		12.700	14.000	124.00	77.00
0.5039			12.800	14.000	124.00	77.00
0.5118			13.000	14.000	124.00	77.00
0.5236			13.300	14.000	124.00	77.00
0.5315			13.500	14.000	124.00	77.00
0.5394			13.700	14.000	124.00	77.00
0.5512			14.000	14.000	124.00	77.00
0.5591			14.200	16.000	133.00	83.00
0.5626	9/16		14.290	16.000	133.00	83.00
0.5630			14.300	16.000	133.00	83.00
0.5709			14.500	16.000	133.00	83.00
0.5787			14.700	16.000	133.00	83.00
0.5906			15.000	16.000	133.00	83.00
0.5984			15.200	16.000	133.00	83.00

Diameter (d1)				d2	l1	l2
Dec. inch	Fract. inch	Wire / letter	mm	mm	mm	mm
0.6024			15.300	16.000	133.00	83.00
0.6102			15.500	16.000	133.00	83.00
0.6181			15.700	16.000	133.00	83.00
0.6299			16.000	16.000	133.00	83.00
0.6417			16.300	18.000	143.00	93.00
0.6496			16.500	18.000	143.00	93.00
0.6654			16.900	18.000	143.00	93.00
0.6693			17.000	18.000	143.00	93.00
0.6811			17.300	18.000	143.00	93.00
0.6890			17.500	18.000	143.00	93.00
0.7087			18.000	18.000	143.00	93.00
0.7283			18.500	20.000	153.00	101.00
0.7441			18.900	20.000	153.00	101.00
0.7480			19.000	20.000	153.00	101.00
0.7500	3/4		19.050	20.000	153.00	101.00
0.7598			19.300	20.000	153.00	101.00
0.7677			19.500	20.000	153.00	101.00
0.7874			20.000	20.000	153.00	101.00

Alternative Drill Series:

#5511 Carbide, RT100, 5xD, 140 U pt, FIREX
#2479 Carbide, RT100, 5xD, 140 U pt, nano-FIREX
#1662, Carbide, RT100, 5xD, 140 U pt, TiN

Hollfelder-Guhring Cutting Tools

Are you looking for a competent partner for µ-accurate adjustable precision tools? Contact us! Thanks to precision solutions for axial and radial adjustment, Hollfelder-Guhring Cutting Tools supplies standard tools for milling, turning and countersinking as well as complex customer-specific solutions.

NEW!

Drill/Chamfer Units

Hollfelder-Guhring Cutting Tools

The new Drill / Chamfering units are versatile - can be applied in a wide variety of machining tasks and workpiece materials.

Features:

Use in standard hydraulic expansion chucks

Use with standard RT 100 style solid carbide drills or comparable drills (DIN 6537 L/K)

3 different chamfering angles available as standard

Standard inserts in carbide (uncoated and coated); PCD inserts available

Benefits:

High runout accuracy due to use in hydraulic expansion chucks	→	High tool life on drills and inserts
One tool holder for different chamfering angles	→	Reduced amount of tool bodies
Easy handling, assembly and setup	→	Reduced non-productive times
Suitable for all standard hydraulic expansion chucks	→	No additional costs for special chucks

HOLLFELDER GÜHRING CUTTING TOOLS

NEW!

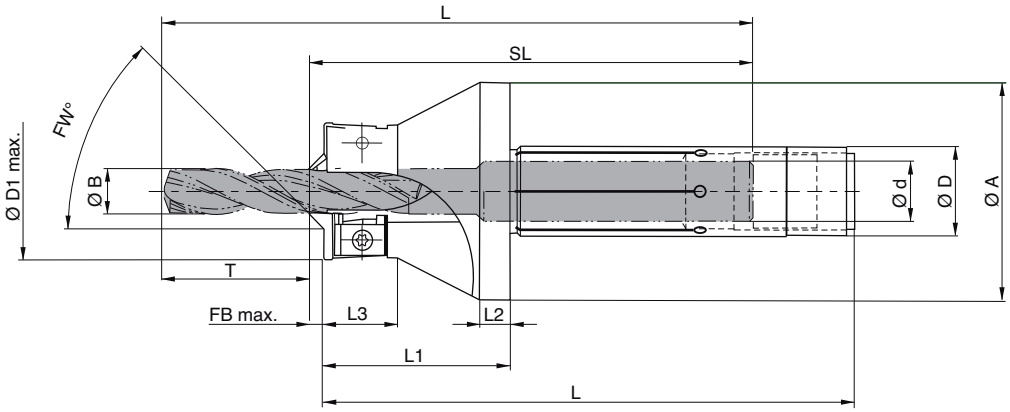
Drill/Chamfer Units

Possible drill-adapter combinations

							Drill 3xD RT 100 style DIN 6537 K			Drill 5xD RT 100 style DIN 6537 L			Drill 7xD RT 100 style		
Part number	chamfer FB	Insert (see page 234)	SL max	SL min	Drill Ø B		Drill Ø from	-	to	Drill Ø from	-	to	Drill Ø from	-	to
H 2006-1206 0000 R	1.8	W 2006-... ... L	59.3	50.3	4.0	- 4.2	6.7	-	15.7	14.7	-	23.7	15.7	-	24.7
					4.3	- 4.7	6.7	-	15.7	14.7	-	23.7	25.7	-	34.7
					4.8	- 5.3	6.7	-	15.7	22.7	-	31.7	30.7	-	39.7
					5.4	- 6.0	6.7	-	15.7	22.7	-	31.7	37.7	-	46.7
H 2006-1208 0000 R	1.8	W 2006-.... L	59.3	50.3	6.1	- 7.0	19.7	-	24.8	31.7	-	40.7	46.7	-	55.7
					7.1	- 8.0	19.7	-	28.7	31.7	-	40.7	56.7	-	65.7
H 2006-2006 0000 R	1.8	W 2006-.... L	62.8	52.8	4.0	- 4.2	3.2	-	13.2	11.2	-	21.2	12.2	-	22.2
					4.3	- 4.7	3.2	-	13.2	11.2	-	21.2	22.2	-	32.2
					4.8	- 5.3	3.2	-	13.2	19.2	-	29.2	27.2	-	37.2
					5.4	- 6.0	3.2	-	13.2	19.2	-	29.2	34.2	-	44.2
H 2006-2008 0000 R	1.8	W 2006-.... L	62.8	52.8	6.1	- 7.0	16.2	-	24.8	28.2	-	38.2	43.2	-	53.2
					7.1	- 8.0	16.2	-	26.2	28.2	-	38.2	53.2	-	63.2
H 2006-2010 0000 R	1.8	W 2006-.... L	67.8	57.8	8.1	- 9.0	21.2	-	31.2	35.2	-	45.2	63.2	-	73.2
					9.1	- 10.0	21.2	-	31.2	35.2	-	45.2	71.2	-	81.2
H 2006-2012 0000 R	1.8	W 2006-.... L	72.8	62.8	10.1	- 11.0	29.2	-	39.2	0.5	-	10.5	82.2	-	92.2
					11.1	- 12.0	29.2	-	39.2	45.2	-	55.2	90.2	-	99.5
H 3006-2014 0000 R	2.5	W 3006-.... L	73.5	63.5	12.1	- 14.0	33.5	-	41.5	50.5	-	58.5	108.5	-	116
H 3006-2016 0000 R	2.5	W 3006-.... L	73.5	63.5	14.1	- 16.0	41.5	-	43.9	59.5	-	61.9	130.5	-	132.6
H 2006-3206 0000 R	1.8	W 2006-.... L	64.8	54.8	4.0	- 4.2	1.2	-	11.2	9.2	-	19.2	10.2	-	20.2
					4.3	- 4.7	1.2	-	11.2	9.2	-	19.2	20.2	-	30.2
					4.8	- 5.3	1.2	-	11.2	17.2	-	27.2	25.2	-	35.2
					5.4	- 6.0	1.2	-	11.2	17.2	-	27.2	32.2	-	42.2
H 2006-3208 0000 R	1.8	W 2006-.... L	64.8	54.8	6.1	- 7.0	14.2	-	24.2	26.2	-	36.2	41.2	-	51.2
					7.1	- 8.0	14.2	-	24.2	26.2	-	36.2	51.2	-	61.2
H 2006-3210 0000 R	1.8	W 2006-.... L	69.8	59.8	8.1	- 9.0	19.2	-	29.2	33.2	-	43.2	61.2	-	71.2
					9.1	- 10.0	19.2	-	29.2	33.2	-	43.2	69.2	-	79.2
H 2006-3212 0000 R	1.8	W 2006-.... L	74.8	64.8	10.1	- 11.0	27.2	-	37.2	43.2	-	53.2	80.2	-	90.2
					11.1	- 12.0	27.2	-	37.2	43.2	-	53.2	88.2	-	98.2
H 3006-3214 0000 R	2.5	W 3006-.... L	75.5	65.5	12.1	- 14.0	31.5	-	41.5	48.5	-	58.5	106.5	-	116
H 3006-3216 0000 R	2.5	W 3006-.... L	80.5	70.5	14.1	- 16.0	34.5	-	43.9	52.5	-	62.5	123.5	-	132.6
H 3006-3218 0000 R	2.5	W 3006-.... L	80.5	70.5	16.1	- 18.0	42.5	-	49.3	62.5	-	69.3	142.5	-	149.2
H 3006-3220 0000 R	2.5	W 3006-.... L	80.5	70.5	18.1	- 20.0	50.5	-	52.6	72.5	-	74.6	163.5	-	165.8

Ordering example:
Drill-Ø = 6.2 mm, Drilling depth = 22 mm, Chamfer = 1x45°, Hydraulic chuck-Ø = 20mm
reading from the table: Drawing number = H 2006-2008 000 R, the drawing number reading from the table of the right side shows the Ordering number = Series No. + Code = 20042 8.020

Drill/Chamfer Units



all dimensions in mm

Series no. 20042		Drill range	Chamfer	Holder shank	Drill shank							
Code	Part number	Ø B	FB max.	Ø D	Ø d	Ø A	L	L1	L2	L3	Ø D_{1max}	Insert (next page)
6.012	H 2006-1206 0000 R	4.0- 6	1.8	12	6	29	70	25	4	10	18.3	W 2006-.... L
8.012	H 2006-1208 0000 R	6.1- 8	1.8	12	8	29	70	25	4	10	20.2	W 2006-.... L
6.020	H 2006-2006 0000 R	4.0- 6	1.8	20	6	35	75	25	4	10	18.5	W 2006-.... L
8.020	H 2006-2008 0000 R	6.1- 8	1.8	20	8	35	75	25	4	10	20.2	W 2006-.... L
10.020	H 2006-2010 0000 R	8.1- 10	1.8	20	10	35	75	25	4	10	22.2	W 2006-.... L
12.020	H 2006-2012 0000 R	10.1- 12	1.8	20	12	35	75	25	4	10	24.4	W 2006-.... L
6.032	H 2006-3206 0000 R	4.0- 6	1.8	32	6	46	90	30	5	10	18.3	W 2006-.... L
8.032	H 2006-3208 0000 R	6.1- 8	1.8	32	8	46	90	30	5	10	20.2	W 2006-.... L
10.032	H 2006-3210 0000 R	8.1- 10	1.8	32	10	46	90	30	5	10	22.4	W 2006-.... L
12.032	H 2006-3212 0000 R	10.1- 12	1.8	32	12	46	90	30	5	10	24.4	W 2006-.... L
14.020	H 3006-2014 0000 R	12.1- 14	2.5	20	14	35	75	25	4	12	31.7	W 3006-.... L
16.020	H 3006-2016 0000 R	14.1- 16	2.5	20	16	35	75	25	4	12	33.6	W 3006-.... L
14.032	H 3006-3214 0000 R	12.1- 14	2.5	32	14	46	90	30	5	12	31.7	W 3006-.... L
16.032	H 3006-3216 0000 R	14.1- 16	2.5	32	16	46	90	30	5	12	33.6	W 3006-.... L
18.032	H 3006-3218 0000 R	16.1- 18	2.5	32	18	46	90	30	5	12	35.5	W 3006-.... L
20.032	H 3006-3220 0000 R	18.1- 20	2.5	32	20	46	90	30	5	12	37.7	W 3006-.... L

Spare parts

Series no. 20067			
Code	Drawing number	Clamping set for	Tx
2.000	E4890	H 2006-...	6
2.500	E4991	H 3006-...	8

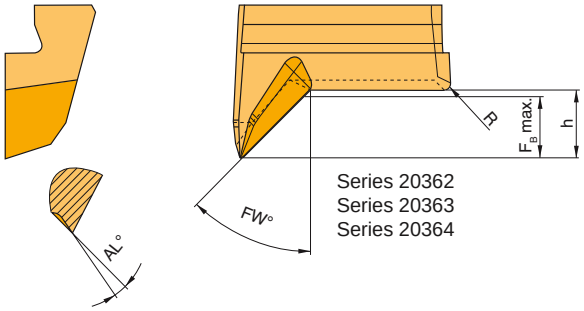
Ordering example:
Series number + Code = Ordering number **e.g. Clamping set for H 2006-... = Ordering number 20067 2.000**

HOLLFELDER GÜHRING CUTTING TOOLS

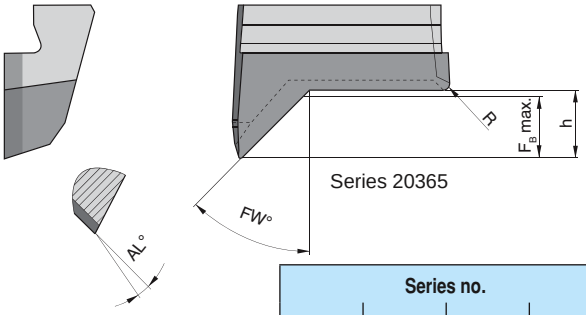
NEW!

Drill/Chamfer Units

Carbide inserts, uncoated / coated



PCD inserts



all dimensions in mm

Code	Part no.	F_B max max. Chamfer width	FW° Chamfer angle	AL° Rake angle	R Radius	h Height	Series no. 20362 Cutting grade K10	Series no. 20363 Cutting grade G12	Series no. 20364 Cutting grade G16	Series no. 20365 Cutting grade PCD
20.060	W 2006-1830 1000 L	1.8	30°	10°	0.2	2	•	•	•	
20.060	W 2006-1830 0000 L	1.8	30°	0°	0.2	2				•
20.061	W 2006-1845 1000 L	1.8	45°	10°	0.2	2	•	•	•	
20.061	W 2006-1845 0000 L	1.8	45°	0°	0.2	2				•
20.062	W 2006-1860 1000 L	1.8	60°	10°	0.2	2	•	•	•	
20.062	W 2006-1860 0000 L	1.8	60°	0°	0.2	2				•
30.063	W 3006-2530 1000 L	2.5	30°	10°	0.2	2.7	•	•	•	
30.063	W 3006-2530 0000 L	2.5	30°	0°	0.2	2.7				•
30.064	W 3006-2545 1000 L	2.5	45°	10°	0.2	2.7	•	•	•	
30.064	W 3006-2545 0000 L	2.5	45°	0°	0.2	2.7				•
30.065	W 3006-2560 1000 L	2.5	60°	10°	0.2	2.7	•	•	•	
30.065	W 3006-2560 0000 L	2.5	60°	0°	0.2	2.7				•

• ex stock

Application recommendations

Cutting material	Grade composition		Workpiece material				
Grade code	Substrate	Coating	Steel	Stainless steel	Cast iron	Non ferrous materials	Heavy machinable materials
K10 With chipbreaker	K10	uncoated			●	▲	●
G12 With chipbreaker	K10	TiAlN Multilayer PVD			▲	●	
G16 With chipbreaker	P20	TiAlN Multilayer PVD	▲	▲			●
PCD Without chipbreaker	Grain size 10 µm					▲	

▲ = well suited ● = applicable Further cutting material, coatings and geometries on request.

Drill/Chamfer Inserts

HOLLFELDER GUHRING CUTTING TOOLS

The cutting data recommendations in the table are guide values and depend to a high degree on the stability of the machine, fixture and workpiece.

Cutting group	Material group	Composition / Structure	Tensile strength RM (MPa)	Hardness HB HRC	Cutting speed v_c m/min	Recommended cutting grade	Feed rate f_z mm/z W 2006-....	Feed rate f_z mm/z W 3006-....
1.1		C = 0,1 -0,25 annealed, long cut	420	125	100-160	G16	0.05-0.15	0.07-0.15
1.2		C = 0,1 -0,25 annealed, short chip	420	125	110-160			
2.1	Unalloyed steel	C = 0,25 -0,55 annealed, long cut	620	190	90-150			
2.2	Cast steel	C = 0,25 -0,55 annealed, short chip	640	190	100-160			
3	Machining steel	C = 0,25 -0,55 tempered	850	250	90-150			
4		C = 0,25 -0,8 annealed	915	270	80-140			
5		C = 0,25 -0,8 tempered	1020	300	75-125			
6		annealed	610	180	90-140			
7	Low-alloy steel Cast steel	tempered	930	275	60-110			
8	Machining steel	tempered	1020	300	60-110			
9		tempered	1190	350	60-100			
10	High-alloy steel Cast steel	annealed	680	250	60-110			
11	High-alloy tool steel	hardened and tempered	1100	325	50-60			
12-13	Stainless steel and cast steel	ferritic/martensitic annealed	680	200	50-90			
		martensitic	810	240	40-80			
14.1	Stainless steel	austenitisch quenched	610	180	40-80	G16		
14.2		austenitic/ferritisch (duplex)	880	260	40-80			
15	Grey cast iron	perlitic/ferritic		180	110-160	K10/G12		
16		perlitic (martensitic)		260	100-150			
17	Cast iron with nodular cast iron	ferritic		160	80-130			
18		perlitic		250	70-120			
19	Malleable	ferritisch		130	90-150			
20		perlitic		230	80-140			
21	Aluminium forging alloys	not heat treatable		60	-1000	K10/PKD		
22		aushärtbar/ausgehärtet		100	-800			
23	Aluminium casting alloys	<12% Si not heat treatable		75	-1000			
24		<12% Si heat treatable/heat treated		90	-800			
25		>12% Si not heat treatable		130	-600			
26	Copper	Machined alloys, Pb >1%		110	70-120	K10/G12		
27	Copper alloys	CuZn, CuSnZn		90	70-120			
28	(bronze, brass)	Cu, lead free Copper/electrolyte copper		100	70-120			
29	Non metallic materials	Duroplastic			-200	K10/PKD		
30		Reinforced materials			-200			
31	Heat treatable alloys	Fe-based annealed		200	30-50	G16		
32		heat treated		230	30-50			
33		Ni- or Co-based annealed		250	20-40			
34		heat treated		350	20-40			
35		cast		320	20-40			
36	Titanium alloys	Pure titanium	400		20-40	K10		
37		Alpha-beta alloys	1050		20-40			

Assembly Instructions

Changing the insert

Disassembly

- Loosen clamp set (1 to 2 turns) and remove worn insert
- Clean pocket seat

Assembly

- Put new insert into pocket seat
- Press insert into the pocket seat while slightly tightening the clamp set
- Push insert against the drill, therefore place 0.03 mm feeler gauge between insert and drill
- Hold insert in position and tight down clamp set with recommended torque

Clamp set (Series 20067)	Clamping set for	Torx Screw Size	Torque (Ncm)
E4890, order code 2.000	H 2006-… …	6	70
E4991, order code 2.500	H 3006-… …	8	140

Torque wrenches

Series 20063	Version	Torx Screw Size	Ncm
E5000, order code 1.200	adjustable	6	20-120
E5001, order code 6.000	adjustable	8	100-600
E54006, order code 0.700	fixed	6	70
E54008, order code 1.400	fixed	8	140

Recommended drills and hydraulic chucks

All drill / chamfering adapters are especially designed for the hydraulic chuck line of the GUHRING GM 300 program and the solid carbide drill line RT 100 (DIN 6537 L/K) .

GUHRING

The Tool Company

HIGH PERFORMANCE TAPS

COBALT ● PM ● CARBIDE ● CUT & FORM TAPS

PCD AND CBN TOOLS

GUHRING

Global know-how
The development and production of PCD and CBN tools has been one of Guhring's high-tech sectors since the mid 80's. At three production locations, Germany, Czech Republic and USA, innovative and complex tools are developed globally for highly specialised machining tasks.

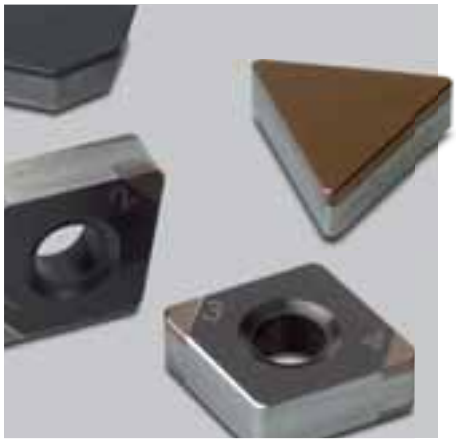
New PCD and CBN production
Centre-piece of our PCD and CBN production is our facility in Albstadt, located in a purpose-built, state-of-the-art building since early 2004. Here, a workforce of approximately 200 develops and produces predominantly customer specific special tools but also standard tools. In addition, design guidelines with world-wide validity are also developed and stipulated here.

Locations all over the world
We have been producing PCD and CBN tools in the USA since 2001. Our specifically trained field service engineers and design team offer our customers in North America optimal support.
In addition, Guhring is establishing independent PCD and CBN production plants in Korea and Poland. Service centres for re-lapping and re-tipping of PCD and CBN tools are currently being developed in China, Great Britain, Italy, Mexico and India. Thus, a world-wide development and production service is available for these tools.
The application of identical machine facilities at all locations ensures a consistent quality standard. Wherever our PCD and CBN tools come from, the customer always receives a consistent high quality. Whatever Guhring PCD and CBN plant the customer approaches, they will receive the required tool from all locations.

Engineering Support
The high demands for process knowledge and tool technology requires a competent workforce. Basic prerequisite for the success of Guhring's PCD and CBN production is therefore our highly qualified technical personnel. Continuous training ensures that all personnel are constantly up-to-date with the latest technologies and know-how.

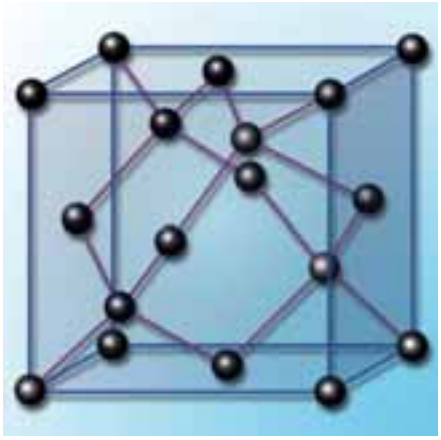
Tools with CBN cutting edges for hard steels and cast materials

Highly complex flexible tools are our speciality



Carbide interchangeable inserts, PCD- and CBN-tipped

Wonder of nature
As the hardest natural mineral the diamond is ideally suited for machining other materials. It also possesses extreme hardness as well as very sharp cutting edges if machined accordingly. For example, a diamond will scratch any other mineral but cannot be scratched by any other stone itself.



Structure
Easily recognisable – the cubic structure

Treasure from the deep
Natural diamond consists of pure carbon and graphite. It was created millions of years ago in the earth's crust through complex geological processes. At a depth of 130 to 700 kilometres below the earth's surface there were large quantities of pure carbon. Under certain optimal conditions the carbon atoms combined and in time crystallised in the form of diamonds. Responsible for this synthesis were the temperatures of in excess of 1000° C and enormous pressures of approx. 40,000 bar existing at this depth.

Valuable raw material
Raw diamonds cleansed from accompanying minerals and dirt

Source volcano cone
Through convection currents in the earth's crust – also the engine for the plate tectonics, the movement of the continental plates – over millions of years the diamonds steadily rose further and further upwards with the magma and were eventually spat into the atmosphere with the eruption of a volcano. This created relatively small volcano cones with so-called "pipes", the current source of natural diamonds.

Equivalent characteristics
Natural diamonds are less suited for industrial application due to limited availability and heterogeneous structure. For this reason, PCD is applied in this instance because it possesses similar characteristics with regard to hardness, wear-resistance and sharpness.

PCD – a super-hard tool material
Because diamonds have always been very valuable, mankind have attempted to artificially recreate diamonds – by means of magic and alchemy of course without success. However, natural science has increasingly unearthed the secret of the diamond and opened the door for a synthetic production.

20 tons per year
The first synthetic diamond was created at General Electric, USA in 1955. More or less simultaneously, ASEA in Sweden developed a similar process. With this special process, at a temperature between 1500° C and 1800° C and a pressure of between 53,000 and 100,000 bar, synthetic diamonds up to 1 mm diameter are produced from graphite, marketed under the name PCD (polycrystalline diamond). Currently, the annual production of PCD is approximately 20 tons, primarily applied for cutting tools, grinding powder and for the production of cutting wheels.
The advantage of PCD is primarily its consistent high quality – a fundamental pre-requisite for the further machining of tools with the same characteristics.

CBN – a tough alternative
Cubic boron nitride (CBN) is a high-performance tool material from a polycrystalline mass, that similar to PCD is produced in a high temperature-pressure process.
CBN, its hardness only surpassed by a diamond, is suitable for the machining of materials that cannot be machined with PCD or monocrystalline diamond. The main application range is ferrous materials possessing a hardness from approx. 45 HRC as well as grey cast iron, Cr-chilled cast iron and wear alloys on a cobalt, nickel or iron basis.

In contrast to PCD and diamond, CBN does not react with the carbide constituents existing in these materials. Also of no consequence are the occurring machining temperatures, because CBN only reacts with oxygen from a temperature of approx. 1200° C and subsequently possesses an unequalled thermal hardness.
Only in so-called super-alloys in the aircraft or reactor industry with a distinctive austenitic phase and simultaneously high toughness do CBN tools generally reach their application limits. Typical representatives are high Ni-alloyed materials such as Inconel 718 or Nimonic. For these materials machining trials are necessary to clarify the application possibility.

Powerful and economical

Tools with PCD and CBN cutting edges are the ideal solution for difficult-to machine, highly abrasive materials. These tools achieve highest quality and economic efficiency. The result: Long tool life, highest surface quality, optimal process reliability and repeatability.

However, in order to take full advantage of their performance potential, the customer's production must fulfil certain minimum requirements. This includes applying the tools on rigid and vibration-free machines as well as highly accurate spindle bearings or slide ways respectively.

CFK, is probably the most suitable future material applied in the aircraft industry thanks to its high rigidity and low weight. A consequence of this development is the difficult characteristics for machining. The abrasive wear leads to a visible rounding of carbide cutting edges within a short time (fig. 2). This results in the fibres no longer being cut but squashed and then being ripped from the laminate (delamination).

The range of application of our PCD tools begins with applications that have highest demands on surface quality. PCD-tools do not display the typical initial wear (fig. 1), but guarantee no delamination tendencies during the machining process thanks to the extremely resilient diamond cutting edge.

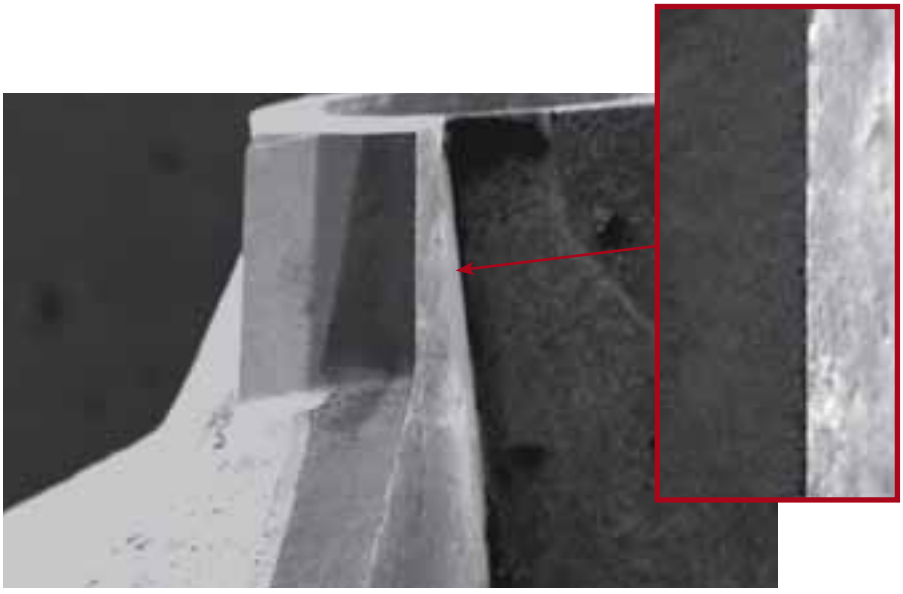


Fig. 1: PCD-tool
Convincing, wear-resistant diamond cutting edge

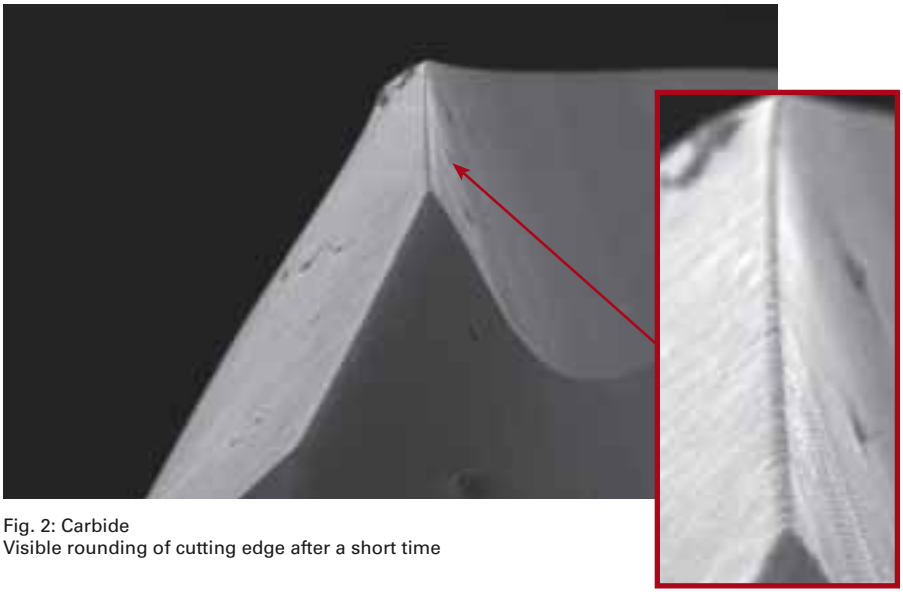


Fig. 2: Carbide
Visible rounding of cutting edge after a short time

Satisfying highest demands

PCD is especially suitable for the drilling, milling and reaming of non-ferrous materials, light and heavy metals, fibre-reinforced plastics, ceramics as well as synthetic glass.
CBN is especially efficient for the machining of hardened steels and pearlitic cast materials.
These materials are currently specifically applied in the automotive and aerospace industry as well as the machine tool industry.

Standard and highly complex PCD special tools

Guhring's PCD tool range on the one hand includes drills, milling cutters and reamers as well as interchangeable inserts. In addition, Guhring develops, designs and produces predominantly customer specific special tools for highly complex machining tasks. This includes. For example, PCD-tipped finishing reamers for the machining of valve seats in the automotive industry or combination tools enabling different machining operations with one single tool.

Standard and highly complex CBN special tools

Guhring's CBN tool range includes, dependent on the range of application, drills, milling cutters, reamers and interchangeable inserts. These tools are applied in the automotive and medical industry as well as other specific applications. For example, CBN tools from Guhring are successfully and economically applied in the production of wheels, pumps and shafts.

High-tech and the dream of flying

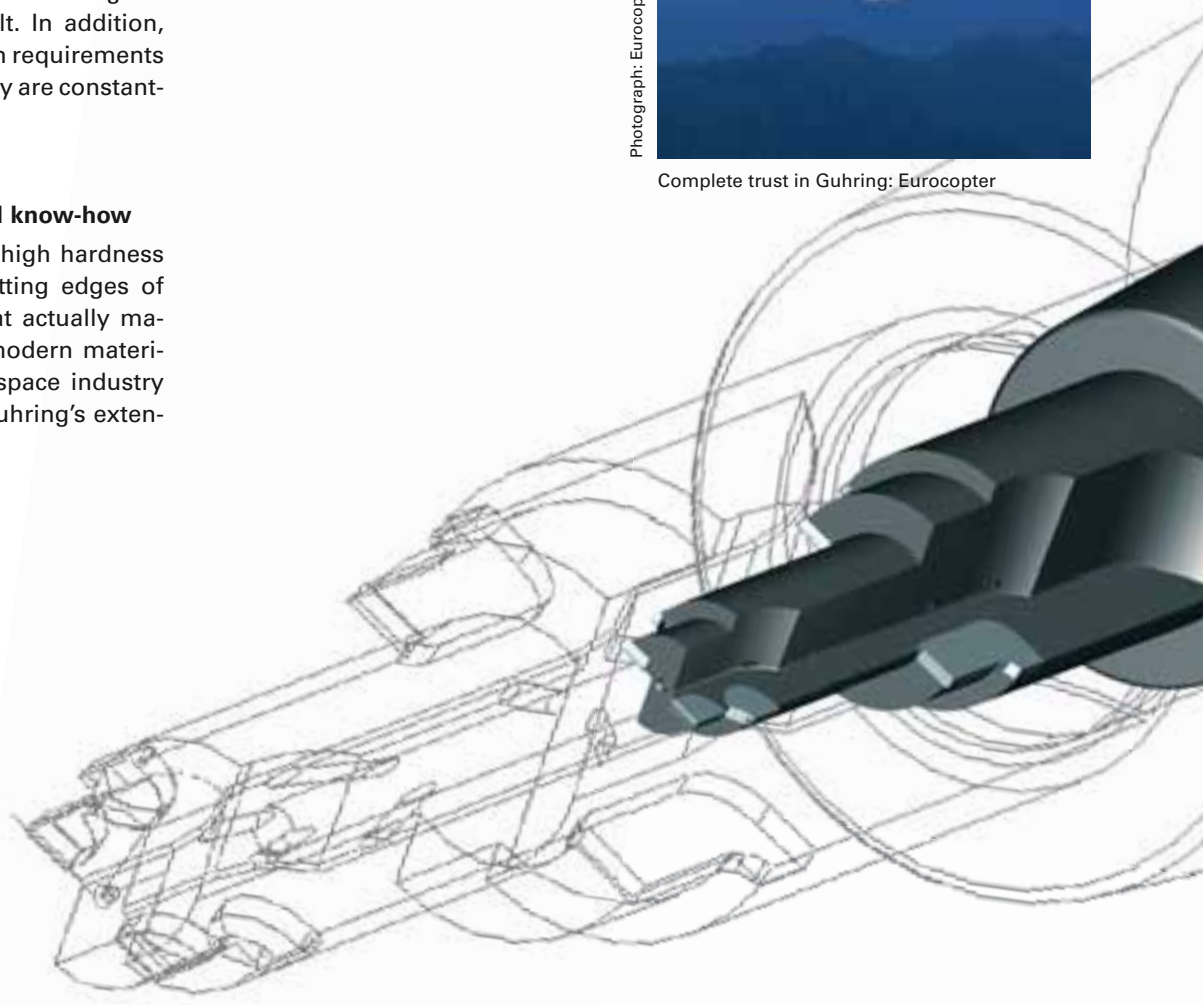
The increasing demands on aeroplanes, helicopters, rockets and satellites drives forward the continuous development of new materials, especially synthetic composite materials or special alloys. The machining of these materials is, however, becoming increasingly more difficult. In addition, the quality and precision requirements of the aerospace industry are constantly increasing.

The solution: Guhring's PCD and CBN know-how

In many cases it is the high hardness and the very sharp cutting edges of PCD and CBN tools that actually makes the machining of modern materials applied in the aerospace industry possible. In addition, Guhring's extensive know-how in PCD and CBN sector regarding the design of tools and machining processes ensures that the tools developed by Guhring achieve the required quality and economical cutting parameters as well as tool life.

Photograph: Eurocopter

Complete trust in Guhring: Eurocopter



Guhring tools with PCD cutting edges

Technology leader –
Composite materials require PCD and CBN tools

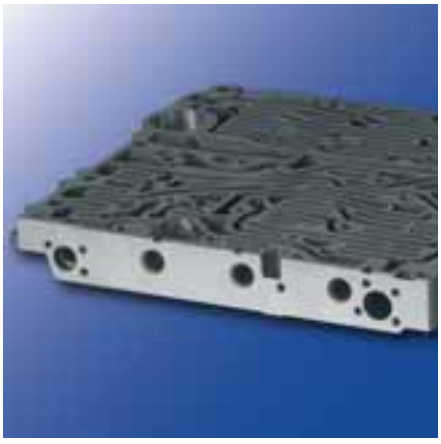
Photograph: Volkswagen AG*

Multi-faceted application:
Milling, drilling and reaming of a transmission housing

Better performance - less fuel consumption

Lightweight construction for better performance and less fuel consumption in the automotive industry is leading increasingly to the application of special materials such as aluminium and magnesium alloys in this field. Typical workpieces are, for exam-ple, engine blocks, cylinder heads, crankshafts and camshafts as well as transmission housings – ideal for the application of PCD and CBN tools.

*Publication with kind permission of Volkswagen AG



Finish machining:
Slide valve holes in a control plate.

Photograph: Volkswagen AG*

Complete machining:
Motor mountings in a revolving machine

Demanding:
Complete machining of a cylinder head

Safety component:
Drilling and reaming of a master brake cylinder

The machining process should be observed in its entirety

To fully take advantage of the efficiency of PCD and CBN tools, the complete machining process should be looked at. This applies to the application of complex special solutions combining several machining steps in one tool.

From process design to the application of the tool in volume production, Guhring's complete know-how is available to the customer. World-wide, Guhring's technical field service engineers for PCD and CBN tools provide advice to customers on-site.

State-of-the-art production process

World-wide, a total workforce of in excess of 200 is engaged in the development and production of PCD and CBN tools.

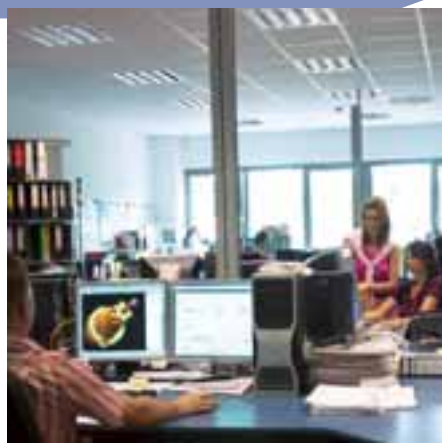
State-of-the-art CAD programmes and computers provide support to personnel in their development work that is carried out in close consulta-tion with the customer. Simultaneous engineering guarantees a continuous interaction between Guhring and its customers – world-wide without complication thanks to three Guhring locations.

Highest demands
Highest production accuracy is demanded for the new high-performance engines in the automotive industry.

1. Tool design and imperfection inspection

2. Design

3. Planning and co-ordination



4. Acquisition and production

5. Assembly and pre-adjustment

6. Packing and despatch

For the benefit of our customers
Naturally, Guhring's service commitment doesn't end when the tools are delivered to our customers. We continue to take care of our products, including PCD and CBN tools, for the duration of their application – world-wide. This includes customer support on-site by our technical field service as well as a comprehensive service program.

Refurbishment
For the PCD and CBN sector our service includes the refurbishment of worn but also the repair of damaged tools.

Prior to the refurbishment we carry out a comprehensive inspection of the incoming tool and determine the overall work required for the refurbishment. In accordance with the result of the incoming tool inspection we choose the most practical and economical way to proceed in close co-operation with the customer: to refurbish the tool or to supply a new tool.

Our refurbishment service also includes the re-tipping of heavily worn PCD and CBN cutting edges, if there is only slight wear we can re-grind the cutting edge. A final inspection and the return of the as new tool follows.

Tool Management
Naturally, Guhring not only provides a re-tipping or re-grinding service for your PCD and CBN cutting tools via our PCD and CBN tool production. Guhring's service division provides a complete tool management – not only for PCD and CBN tools, but for all your tools!

1. Tool arrival,…

2. …incoming tool. inspection,…

3. …re-grinding and/or…

4. …re-tipping of tools, …

5. …final inspection followed by…

6. …the delivery to the customer.

Reaming with maximum Accuracy

Unique technologies for perfect, highly efficient reaming

For reaming operations with PCD- or CBN-tipped tools, Guhring has developed unique solutions opening up completely new possibilities regarding accuracy and economic efficiency. Reaming tools with these technologies offer the user the following clear competitive advantages:

- simple, quick and highly accurate diameter setting for first and second step.
- both tool diameters can be re-adjusted when tool is in clamped condition.
- machining of through and blind holes thanks to the integrated expanding screw in the tool point.
- optimal coolant delivery to the cutting edges thanks to radial coolant exits in the expanding screw.
- highest feed rates thanks to several cutting edges.
- reduction in machining time.
- maximum accuracy and extreme tool life.

Patent applied for coolant delivery directly to the cutting edges via expanding screw

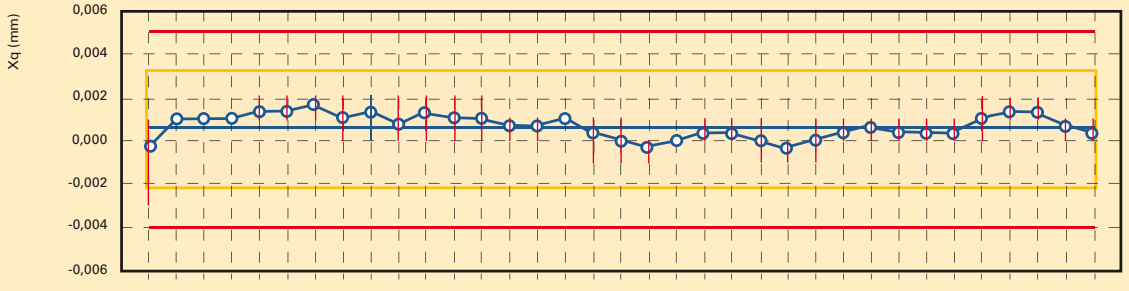
- quick, simple and highly accurate setting of the first tool step diameter.
- radial delivery of the coolant directly at the cutting edges via expanding screw.
- optimal tool lubrication.
- optimal chip evacuation from the hole.

The expanding screw is integrated in the tool head

- the expanding screw is completely integrated in the tool head.
- the reamer operates - in contrast to conventional solutions with a protrusive expansion screw - down to the base of the hole without problem.
- it enables the machining of through holes as well as blind holes.

The patent pending stepped reamer diameter setting

- with two-step reamers the inner tool body acts as an expanding screw.
- inner tool body and outer unit are screwed together.
- the expansion of the step diameter is performed via the integrated taper of the inner tool body.
- the diameter setting of the second step is carried out by simply turning the inner tool body.
- the diameter setting can, therefore, be carried out when the tool is clamped.
- the ground flats on the inner tool body suit an adjusting wrench.

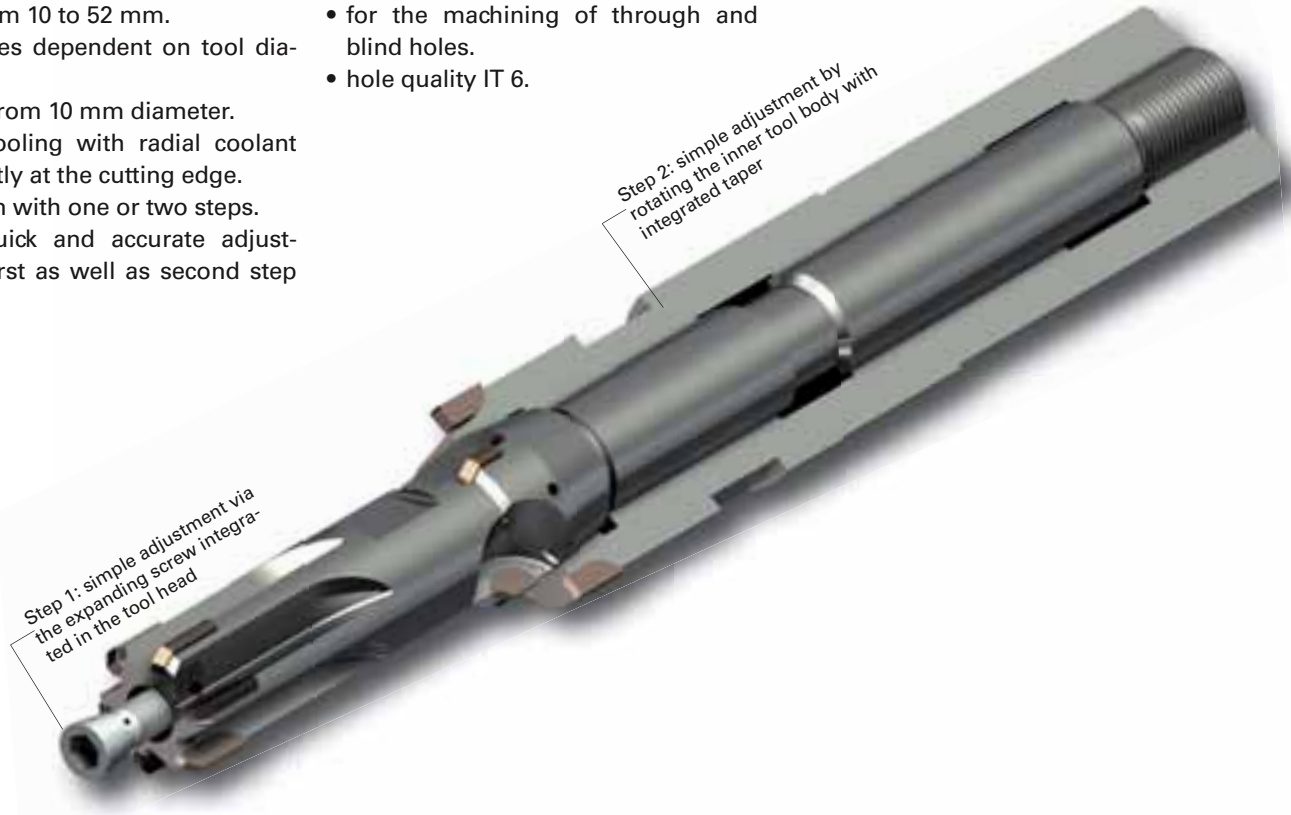


Continued maximum accuracy: For 10,000 holes inspected the max. scattering was 2 µm.

PCD-tool Designs and their application possibilities

Various PCD or CBN reamer designs

- multi-fluted reamer with solid brazed PCD or CBN inserts and nominal diameters from 10 to 52 mm.
- no. of flutes dependent on tool diameter.
- six flutes from 10 mm diameter.
- internal cooling with radial coolant exits directly at the cutting edge.
- tool design with one or two steps.
- simple, quick and accurate adjustment of first as well as second step diameter with expanding screw principle.
- for the machining of through and blind holes.
- hole quality IT 6.



Stepped PCD-reamer
Multi-fluted two-step PCD-reamer with step diameters 17 mm and 27 mm

Performance data:
- hole quality IT 6
- concentrity 2 µm
- feed rate 2800 mm/min.
- cutting speed 680 m/min.
- applied for 120,000 holes

PCD-reamer without step
Multi-fluted PCD-reamer with diameter 28 mm

Performance data:
- hole quality IT 5
- concentrity 2 µm
- feed rate 2900 mm/min.
- cutting speed 710 m/min.
- applied for 160,000 holes

Efficient parent metal machining of valve seat and valve guide bores

The parent metal machining of valve seat and valve guide bores in a cylinder head belongs to the most demanding machining tasks in the automotive industry. Due to the high demands for circularity, form accuracy and concentricity a single-flute, adjustable reamer is the classic tool for this machining task as it guarantees the required precision with a long tool life. The tool, however, has its limits regards satisfying the demand for reducing the cycle time because it has only one flute.

For this reason, Guhring has developed a multi-flute and double adjustable PCD-tipped two step reamer that optimally satisfies the demand for the efficient parent metal machining of valve seat and valve guide bores:

- highest accuracy with an extremely long tool life through the diameter setting at the cutting edges of both steps.
- highest cutting parameters thanks to multiple flutes and optimal cooling.
- simple to operate as the diameter setting of both steps can be carried out while the tool is clamped.

Perfect results thanks to optimal tool design

A multi-flute, PCD-tipped two step reamer is applied for the parent metal machining of the valve seat and the valve guide bores in one setting. Two tools of identical design are applied for the machining of the inlet and exhaust valve.

- exhaust: Machining of the valve seat bore of 28.5 mm diameter and the valve guide bore of 11 mm diameter, each with 6 flutes. Both step diameters can be adjusted independently of each other.
- inlet: Machining of the valve seat bore of 35.5 mm diameter and the valve guide bore of 11 mm diameter, each with 6 flutes. Both step diameters can be adjusted independently of each other.
- the simple, quick and highly accurate diameter setting when the tool is clamped allows the re-adjustment of both diameters at any time. Subsequently, it also results in increased tool life.
- the design of the reamer provides a reliable and compliant process with the demand for circularity, form accuracy and concentricity and an extremely long tool life with high cutting rates.
- the coolant delivery enables an optimal lubrication of the cutting edges and supports the chip evacuation.

Especially for the complete machining of cylinder heads, accuracy as well as the economic efficiency are the centre point of demands on the tool supplier. Due to the multi-valve technology a large proportion of the overall cost of cylinder head machining falls on the pre- and finish machining of valve seats and valve guides.

In order to reduce costs with the application of multi-flute reamers with considerably increased cutting speeds while retaining the same accuracy and long tool life in comparison to conventional single-flute tools, Guhring has developed the diameter setting for both steps.

The patent pending diameter setting of the second step

- the inner tool body acts as expanding screw for the second step.
- inner tool body and outer unit are screwed together.
- the expansion of the step diameter is performed via the integrated taper of the inner tool body.
- simple rotation of the inner tool body leads to the diameter setting of the second step.
- therefore, the diameter setting of the second step can also be carried out when the tool is clamped.
- ground flats on the inner tool body suit an adjusting wrench.

The expanding screw is integrated in the tool head

- the expanding screw is completely integrated in the tool head.
- the reamer operates - in contrast to conventional solutions with a protrusive expansion screw - down to the base of the hole without problem.
- it enables the machining of through holes as well as blind holes.

The PCD-tipped, double adjustable multi-flute two step reamer is successfully applied for the machining of the initial hole in the following workpiece:

- 6-valve cylinder head for a 3-cylinder engine
- material G-AlSi7Cu3
- horizontal machining on machining centre
- tool holder HSK 63
- internal cooling with soluble oil 6 %
- coolant pressure 20 bar

Performance data comparison

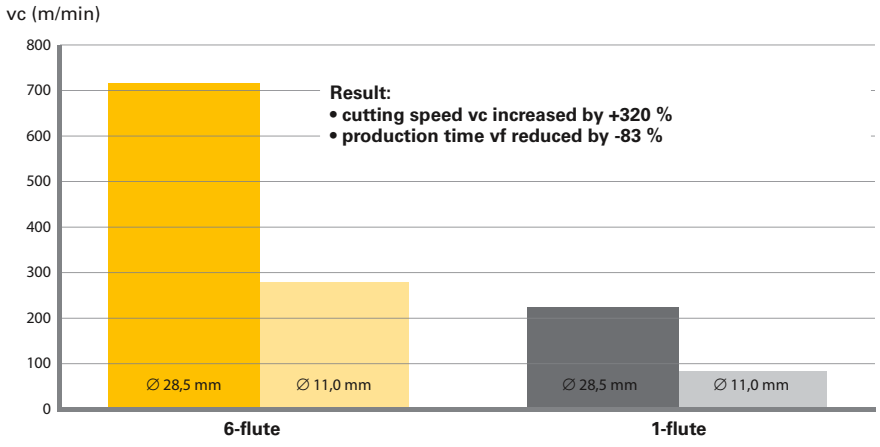
6-flute PCD-tipped, double adjustable two-step reamer

- production time: 7.80 seconds per cylinder head
- cutting speeds for machining the initial exhaust valve hole:
  diameter 11 mm = 276.46 m/min
  diameter 28.5 mm = 716.28 m/min
- feed rate vf:
  both vf = 2400 mm/min

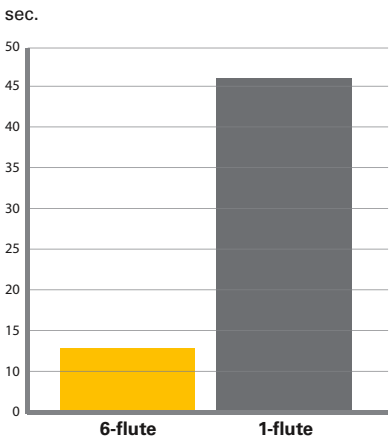
1-flute two step reamer with PCD interchangeable insert

- production time: 46.35 seconds per cylinder head
- cutting speeds for machining the initial exhaust valve hole:
  diameter 11 mm = 86,39 m/min
  diameter 28,5 mm = 223,84 m/min
- feed rate vf:
  both vf = 338 mm/min

Cutting speed



Production time



Intelligent solutions for fine adjustment

Fine adjustment:
- Threaded key adjustment (direct installation)
- ISO indexable inserts, PCD-tipped

Workpiece:
- Intermediate plate

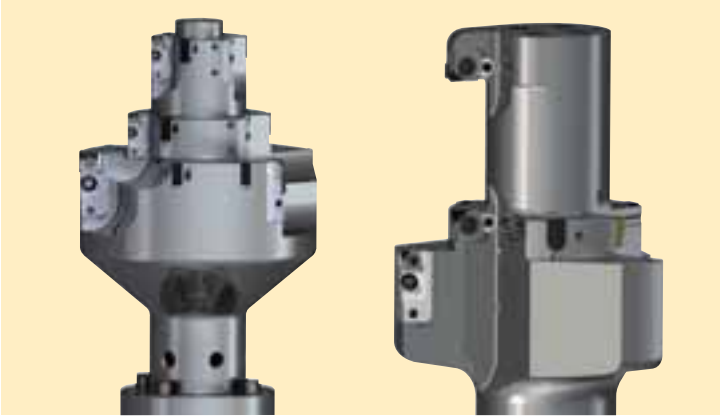
Machining:
- External contour
- Diameter tolerance IT6 (D = 41mm)

Fine adjustment:
- Locating wedge adjustment in cartridge installation Guhring no. 4051) with integrated diameter and length adjustment
- ISO indexable inserts, PCD-tipped
- PCD guide pads

Workpiece:
- Intermediate plate

Machining:
- Precision hole
- Diameter tolerance IT6 (D = 70mm)

Fine adjustment:
- Locating wedge adjustment in cartridge installation (Guhring no. 4051) with integrated diameter and length adjustment
- Threaded key adjustment (direct installation)
- Indexable inserts, PCD-tipped
- PCD guide pad and alignment adaptor



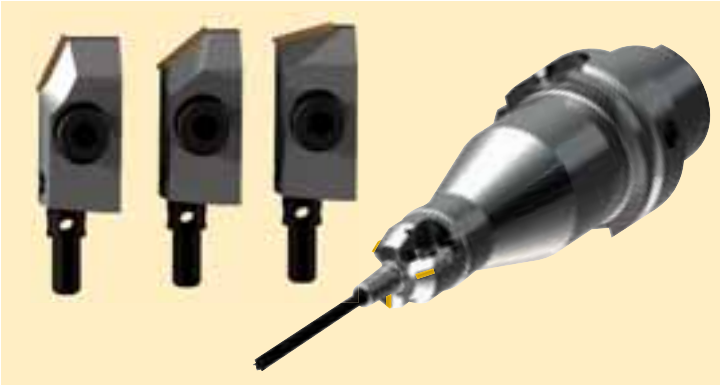
Workpiece:
- Transmission

Machining:
- Bearing seats
- Diameter tolerance IT6

Fine adjustment:
- GP 100

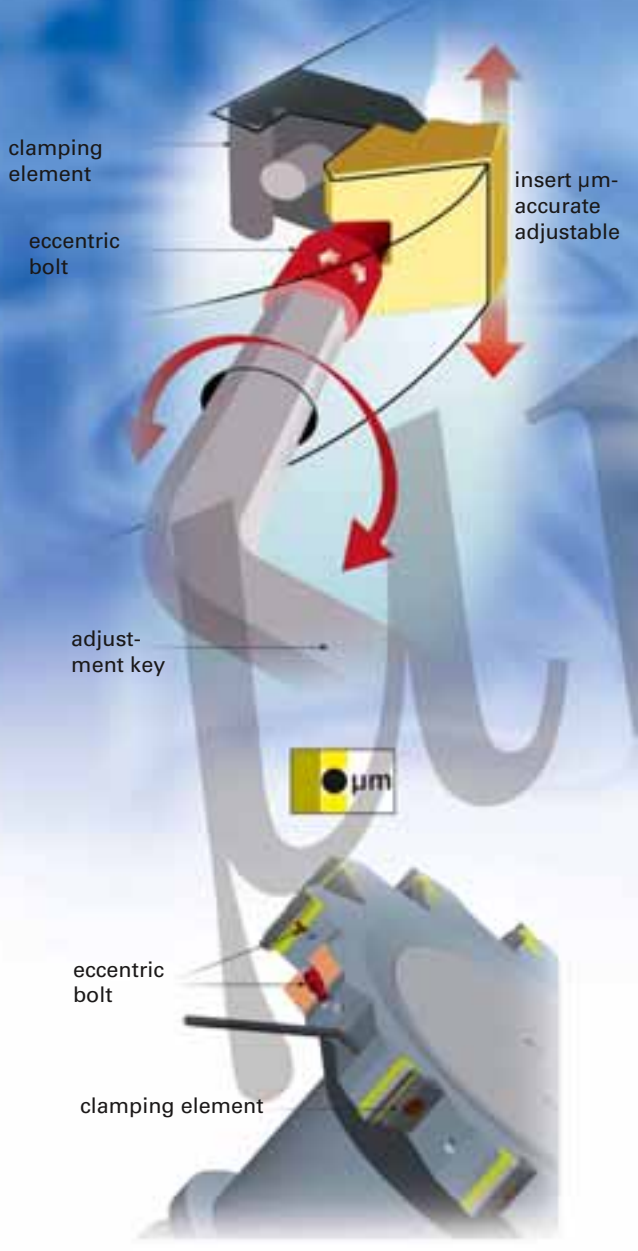
Workpiece:
- Cylinder head

Machining:
- Valve seats
- 60° and 120° adjacent angle
- 90° main seal angle



HOLLFELDER GUHRING CUTTING TOOLS

Eccentric bolt adjustment



Adjustment with tapered screw

ADJUSTMENT SYSTEMS

Hollfelder-Guhring Cutting Tools is your experienced partner for µm-accurate adjustable tooling for standard as well as for specific applications. The adjustment systems are the basis for innovative tooling solutions and guarantee a highly accurate process, an enormous increase in productivity as well as considerable cost savings.

TM VENDING MACHINE

Guhring's modular TM Vending Machine relieves the customer of all tasks regarding tool storage and administration. Drawer and spiral modules enable the individual adaptation to specific customer storage requirements. The intelligent software ensures tool availability around the clock and detailed evaluation of all consumption and movement data.

MODULAR TOOLING SYSTEMS

GUHRING

Technical information and advantages

Fig. 1:
HSK-A 63 interface,
automatic tool change

Our modular tooling system GM 300 has been developed for the application of rotating and stationary tools. 1987 we devloped the GM 300 coupling. Standardization for this interface (DIN 69893) was obtained in1991. Since 12/2001 the HSK interface is also standard to ISO 12164-1/-2. The unique design of the clamping method offers not only an ideal interface for manual clamping within the tooling system, but also an ideal interface for automatic clamping directly to the machine spindle (fig. 1) or tool holder.

Characteristic feature:
Tapered holow shank (HSK) with axial plane clamping mechanism according to DIN 69893. The most important advantages are as follows:

ISO taper DIN 2080 DIN 69871	HSK form A/C/(E) DIN 69893 part 1	HSK form B/D/(F) DIN 69893 part 2
–	HSK 40	HSK 50
SK30	HSK 50	HSK 63
SK40	HSK 63	HSK 80
SK45	HSK 80	HSK 100
SK50	HSK 100	HSK 125

Association between ISO taper - hollow taper shank

• High static and dynamic rigidity

The radial and axial forces generated in the tool shank provide the clamping forse necessary for extreme rigidity (fig. 2). Recommended values for the GM-300 module for manual clamping (see page 21 + 23 + 35).

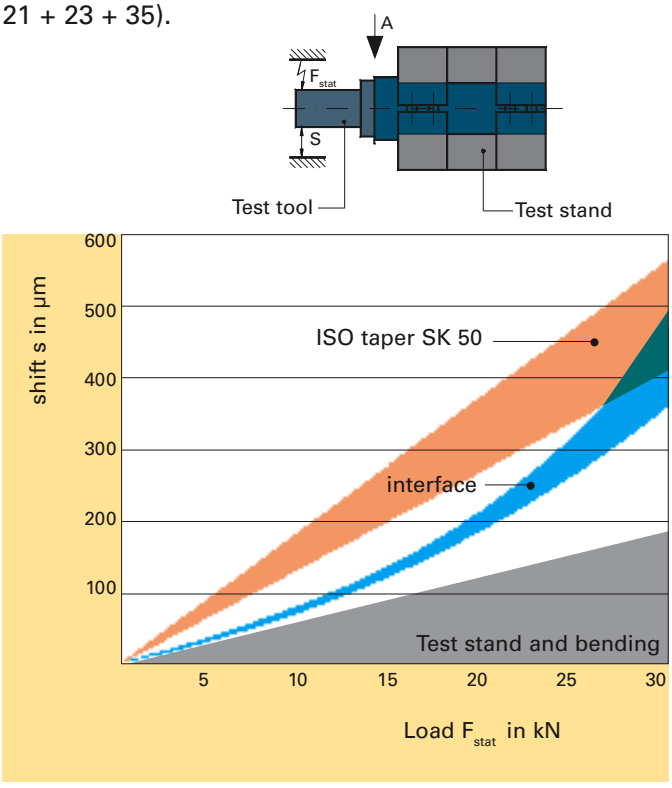


Fig. 2
Static deflection: Comparison between ISO taper 50 and automatic interface HSK-A 100 (A)

Technical information and advantages

• High torque transmission and defined radial positioning

The wedging effect between the hollow taper shank and the holder or spindle causes a friction contact over the full taper surface and the plane supporting face (fig. 3). Two keys engage with the shank end of the tool holder and provide form-closed, radial positioning, thereby excluding any possible setting errors.

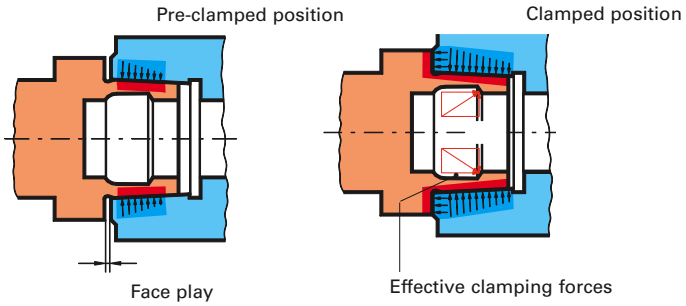
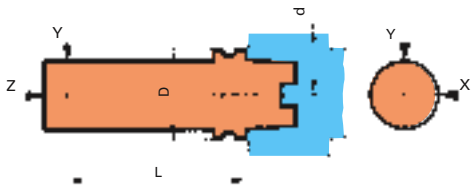


Fig. 3
Prestressing and frictional forces of hollow taper shank at the interface.

• High tool change accuracy and repeatability

The circular form engagement of the clamping claws within the hollow tool shqank provides a totally tight connection between the shank and spindle or holder respectively (fig. 3 and 4).



HSK-size D	d mm	L mm	X mm	Y mm	Z mm
32	24	50	0,002	0,002	0,002
40	30	60	0,002	0,002	0,002
50	38	75	0,002	0,002	0,002
63	48	100	0,002	0,002	0,002
100	75	150	0,002	0,002	0,002

Fig. 4
Radial and axial repeatability of interface for manual and automatic clamping

• High speed machining performance

The higher the number of revolutions the better, as this increases both the power and effectiveness of the locking of the clamping mechanism. The direct initial stress between the hollow taper shank and the spindle holder compensates for the spindle expansion generated by the centrifugal force so that there is absolutely no radial play (fig. 3). The plane clamping position prevents any slipping in the axial direction.

• Short tool changing time

Efficient tool change due to a short shank length (approx. $^1/_3$ of the conventional ISO taper) and light weight (approx. 50% of the ISO taper).

• Simple, cost-efficient shank design

No moving components at the tool shank means no wearing parts.

• Insensitive to foreign matter

The uninterrupted design of the ring-shaped axial plane clamping simplifies the cleaning of the coupling. During automatc tool change compressed air provides ideal cleaning in the interface.

• Coding and identification

To allow for the attachment of common identification systems, a hole of 10 mm dia. and 4.5 mm depth is provided for the data media (coding chips) in the vicinity of the collar.

• Standardising of interface

GM 300 corresponds to ISO 12164-1/DIN 69893 (fig. 5).

• Coolant feed

The tools for automatic clamping, HSK-A and E, are designed for a central coolant feed by means of a duct. Tools with manual change behind the GM 300 interface also operate with a central coolant feed. The clamping elements are entirely sealed against the entry of coolant so that fouling is prevented.

• Installation of the coolant supply set

Coolant supply sets are to be ordered separately for all GM 300 modules. The installation of the coolant duct must be carried out by the user as shown on page 141.

MQL 4-Point Clamping

Guhring no.	Description
4930	MQL 4-point clamping sets
4931	Clamping device for MQL 4--point clamping sets
4932	Ejector for MQL 4-point clamping sets
4933	Retention spindles for MQL 4-point clamping sets
4934	Adaptor for MQL 4-point clamping sets
4935	Retention screw for MQL 4-point clamping sets

4-Point Clamping

Guhring no.	Description
4351	HSK-C extensions
4355	HSK-A/HSK-C reducing adaptors
4385	Short HSK spindle adaptor
4386	HSK spindle adaptor (in front)
4387	ISO taper/HSK-C basic adaptor on spindles to DIN 2079
4953	Brass sealing collars
4957	Components for 4-point clamping sets
4958	4-point clamping sets for conventional cooling
4959	Components for 4-point clamping sets
4961	Ball pressure screws
4963	Torque sockets

PowerClamp

Guhring no.	Description
4509	ISO taper basic adaptors DIN 2080 form A/HSK-C
4510	VDI basic adaptors DIN 69880-1/HSK-C
4512	ISO taper basic adaptors DIN 69871 form AD/HSK-C
4514	MAS 403 BT/HSK-C basic adaptors
4549	HSK-A/HSK-C extensions
4551	Spring and threaded pin for PowerClamp set
4553	Aluminium locking rings
4554	PowerClamp sets
4555	Threaded spindle for PowerClamp set
4557	Tensioning nut set for PowerClamp set
4581	HSK adaptors (in front)
4582	HSK adaptors (in front) for turning centers
4584	HSK-C spindle adapters (integrated)
4586	HSK adaptors (in front)
4953	Brass sealing collars
4961	Ball pressure screws

MQL Program

Guhring no.	Description
4209	HSK-A MQL-Hydraulic-chucks
4210	HSK-A MQL-Hydraulic-chucks
4310	Collets for MQL
4330	MQL synchro tapping chuck
4350	HSK-A extensions with minimal lubrication
4735	MQL HSK-A shrink fit chucks
4741	MQL HSK-A shrink fit chucks
4919	MQL length pre-setting screws
4924	MQL coolant delivery sets
4939	MQL coolant delivery set HSK-A
4940	MQL filler HSK-A
4941	Length adjustment screw
4948	Mounting adapter
4972	Mounting adapter

Hydraulic Chucks

Guhring no.	Description
4038	Clamping force measuring instrument Senso 3000
4099	Extraction key for reduction bushes
4213	ISO taper hydraulic chucks DIN 69871 with increased clamping force
4221	MAS/BT hydraulic chucks with increased clamping force
4267	HSK-C hydraulic chucks with increased clamping force
4295	HSK-C hydraulic chucks
4296	HSK-A hydraulic chucks with radial length pre-setting
4299	HSK-A hydraulic chucks with increased clamping force
4313	ISO taper hydraulic chucks DIN 69871
4315	Length pre-setting ISO taper adaptors
4316	Universal length pre-setting HSK adaptors
4319	Universal length pre-setting ISO taper adaptors
4321	MAS/BT hydraulic chucks
4367	HSK-C hydraulic chucks
4368	Reduction bushes for hydraulic chucks w/o peripheral cooling
4369	Reduction bushes für hydraulic chucks with peripheral cooling
4395	HSK-C hydraulic chucks with radial length pre-setting
4396	HSK-A hydraulic chucks with radial length pre-setting
4399	HSK-A hydraulic chucks
4900	Adjustment screws
4919	MQL length pre-setting screws
4992	Taper inserts
4993	Plug inserts

Shrink Fit Technology

Guhring no.	Description
4718	Length pre-setting adaptor
4719	Shrink fit extensions
4720	Centering ring
4721	HSV 2000 hot air shrink fit system
4729	GUhroJet ISO taper shrink fit chucks DIN 69871 Form AD/B
4736	HSK-A shrink fit chucks
4737	HSK-E shrink fit chucks
4738	ISO taper shrink fit chucks DIN 69871 form AD/B
4739	MAS-BT shrink fit chucks
4742	GISS 2000 induction shrink fit system comfort version
4743	Induction spindle
4744	ISO taper holders
4745	HSK holders
4747	SpeedCooler
4748	Trolley
4749	Tongs
4750	Protective gloves
4751	GISS 2000 ECO
4752	GISS 2000 ECO Plus
4753	GISS 3000 induction shrink fit system
4755	Guhrojet HSK-A shrink fit system with peripheral cooling
4758	HSK-C shrink fit chucks
4759	SpeedCooler Manager
4769	Limit stop washers
4773	Cooling adaptor
4774	HSK-A/E accessory sets
4775	HSK-C accessory sets
4776	ISO taper accessory sets
4777	MAS BT accessory sets
4919	MQL length pre-setting screws
4977	Shrink fit chuck length setting screw

Tool Holders

Guhring no.	Description
4206	Inserts for quick-change tapping chucks
4300	HSK-A precision clamping chucks
4301	SK-A precision clamping chucks
4302	Clamping sleeves for precision clamping chucks
4303	HSK-C collet holders
4304	HSK-A collet holders
4306	Retaining nuts, system DIN ISO 15488
4307	Collets to DIN ISO 15488
4308	Tapping collets
4317	ISO taper side lock holders
4318	ISO taper collet holders DIN 69871 form AD/B
4320	HSK-A Morse taper holders
4322	ISO taper side lock holders
4323	HSK-C collet holders, sealed version
4324	HSK-A collet holders, sealed version
4326	Synchro tapping chucks, straight shank
4327	Synchro tapping chucks, HSK-A
4328	Quick-change tapping chucks, HSK-A with IC
4329	HSK-A side lock holders
4333	HSK-C side lock holders
4334	HSK-A side lock holders
4335	Sealing washers
4340	Quick-change tapping chucks w/o IC
4342	Quick-change tapping chucks with IC
4343	HSK-A adaptors for tapping chucks
4346	HSK-A NC drilling chucks with IC
4361	HSK-A shell milling arbors
4362	Milling arbor HSK-A
4397	HSK-E collet holders
4901	Adjustment screws for HSK-C collet holders
4902	Adjustment screws for HSK-A/HSK-E collet holders
4906	Adjustment screws for tapping collets
4907	Screws DIN EN ISO 4762
4913	Chuck spanners
4982/4983	HSK-A/HSK-C blanks

Measuring and Inspection Instruments General Accessories

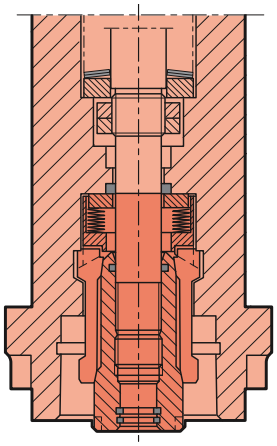
Guhring no.	Description
4038	Senso 3000 clamping force measuring instrument
4068	Flow rate measuring instrument PQ 3000
4076	Coolant supply measuring instrument CC 3000
4077	High-grade steel filters
4910/4911	Socket spanners
4912	Hexagon chuck keys
4914	HSK cleaning mandrels
4915	Torque wrenches
4916	Sockets
4918	Cylindrical cleaning mandrels
4921	Hexagon-socket offset screw key
4925	Pull studs DIN 69872, form A
4926	Pull studs DIN 69872, form B
4927/4928	Pull studs
4946	Tool setting fixture
4947	HSK cleaning cap
4949	Coolant delivery sets for conventional cooling
4968	Gauges for HSK tool shanks
4969	Gauges for HSK spindles
4970	ISO taper proofing bars
4971	HSK proofing bars
4973	ISO taper clamping force measuring instrument
4974	HSK clamping force measuring instrument
4975	Balancing masters for HSK spindles
4976	Centrifugal rings for short spindles to DIN 69002-3
4978	Gauges for HSK cams
4985	HSK-C sealing plugs
4990	Tool setting fixtures
4991	Interchangeable discs

Automatic tool clamping

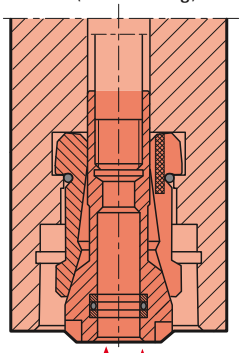
Spindle clamping systems with draw bar

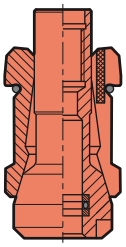
Application in machining centers, milling and turning machines

Suppliers:
Ott
Röhm (Lic. Gühring)
Berg (Lic. Gühring)

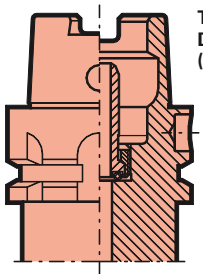


Supplier:
Ortlieb (Lic. Gühring)





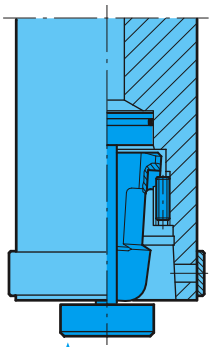
Segmental collet with drawing bar



Tool shanks DIN 69893 part 1 form A (with coolant supply set)

Direct installation in the spindle

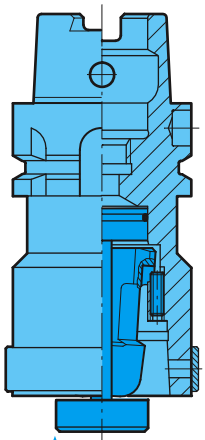
Application in transfer lines, fixtures, setting equipment (e.g. in drilling spindles), in multi spindle drilling heads



Installation in tool holders (examples)

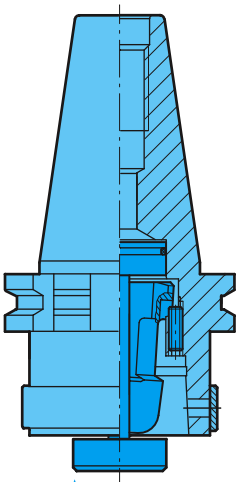
Application in machining centers, milling and turning machines

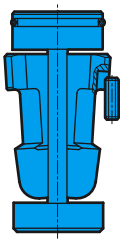
Extensions



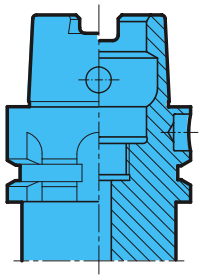
Application in existing machines using ISO taper spindles

ISO taper basic adaptors





POWER-CLAMP SYSTEM



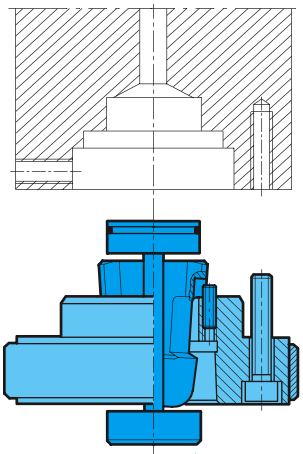
Toolholders

Manual tool clamping

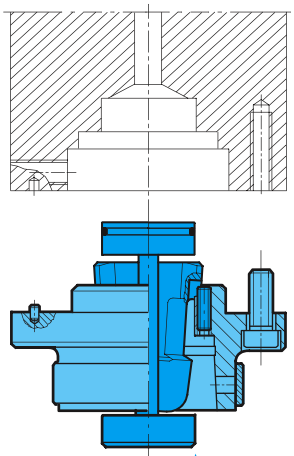
Installation with adaptors

Application in transfer lines, fixtures, setting equipment, for universal use, e.g. milling

adaptor (integrated)

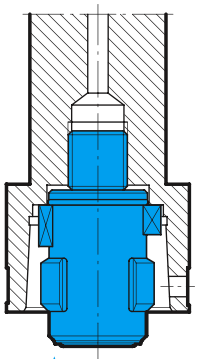


adaptor (in front)



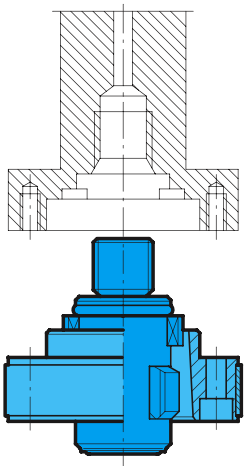
Direct installation in the spindle

Application in transfer lines, fixtures, setting equipment (e.g. in drilling spindles), in multi spindle drilling heads



Installation with adaptors

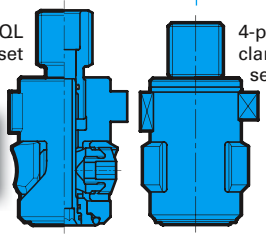
Installation via adaptors



PowerClamp

MQL clamping set

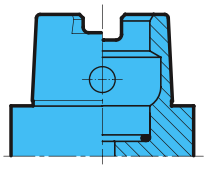
4-point clamping set



MQL by GÜHRING

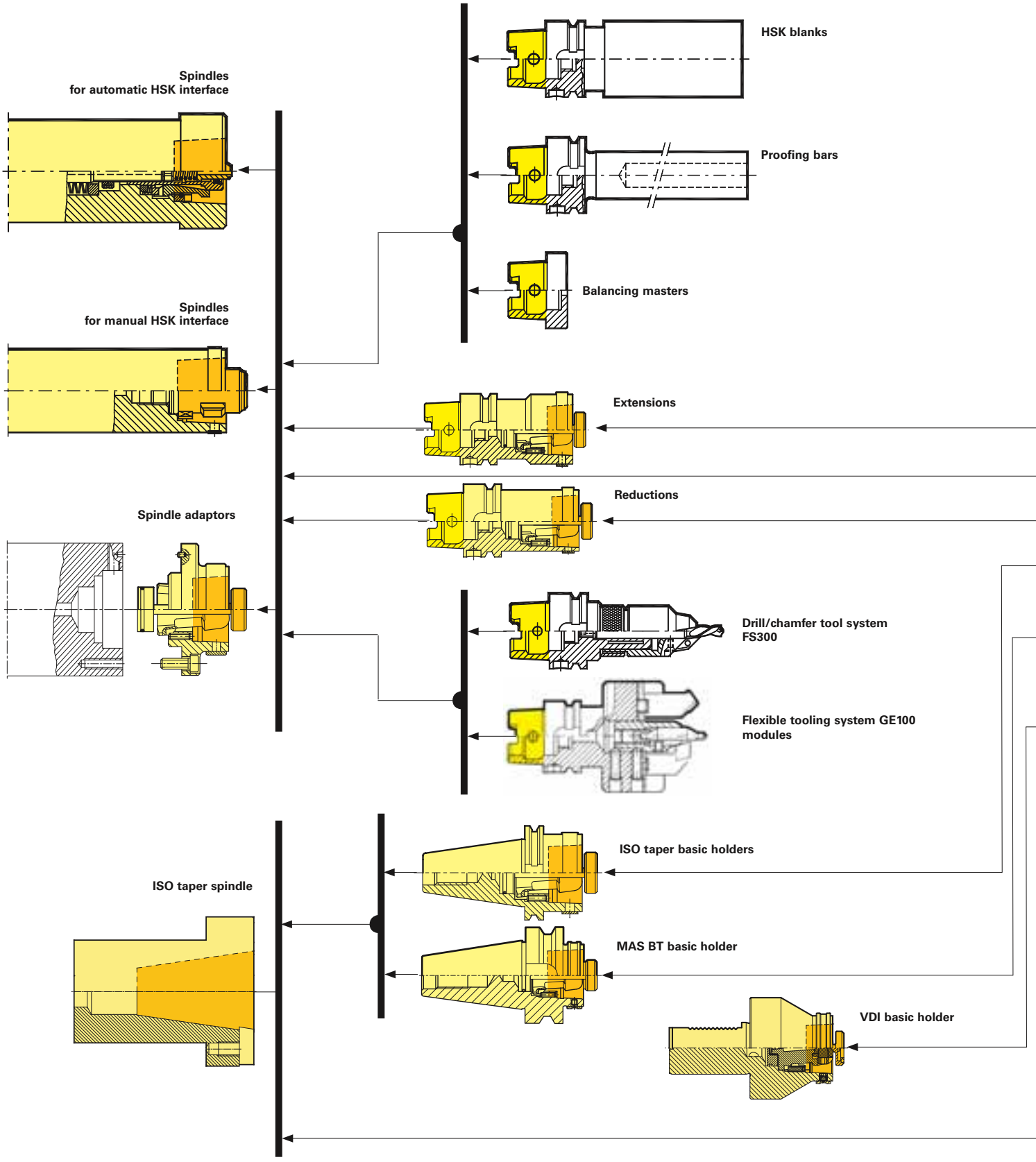
4-POINT CLAMPING SYSTEM

Tool shanks
DIN 69893 part 1 form A
(without coolant supply set)



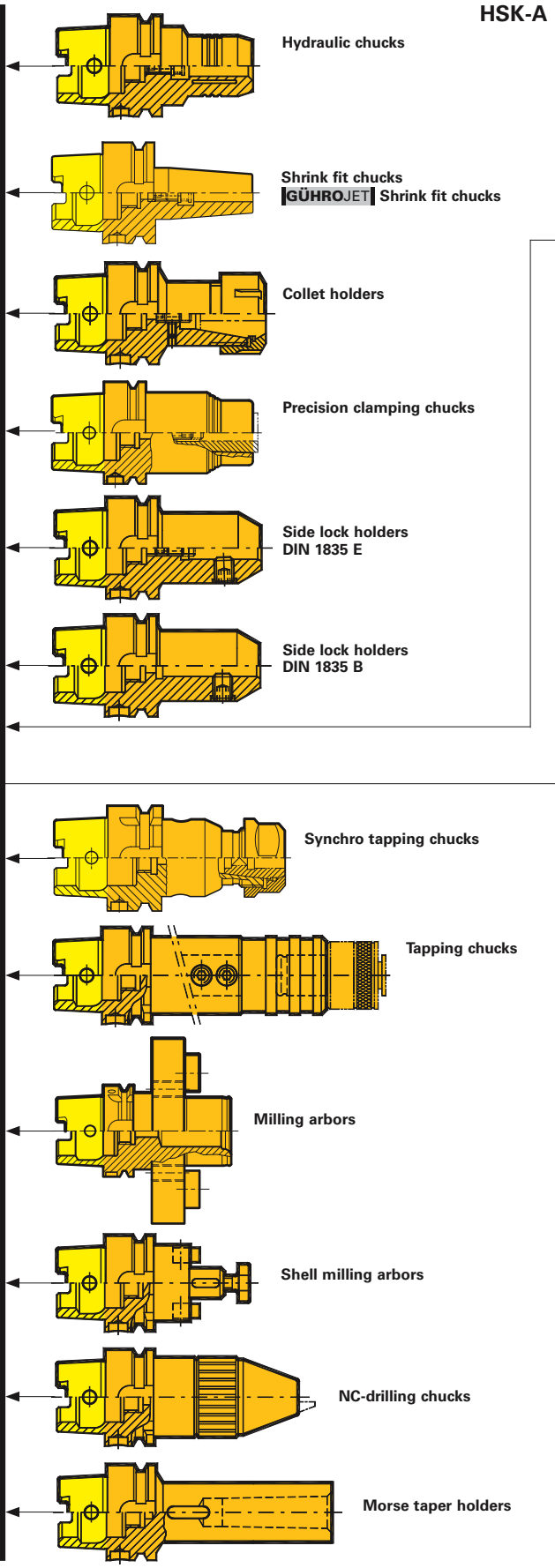
Tool shanks
DIN 69893 part 1 form C
with manual tool change

Toolholders


Spindles
for automatic HSK interface
Spindles
for manual HSK interface
Spindle adaptors
ISO taper spindle
HSK blanks
Proofing bars
Balancing masters
Extensions
Reductions
Drill/chamfer tool system
FS300
Flexible tooling system GE100
modules
ISO taper basic holders
MAS BT basic holder
VDI basic holder

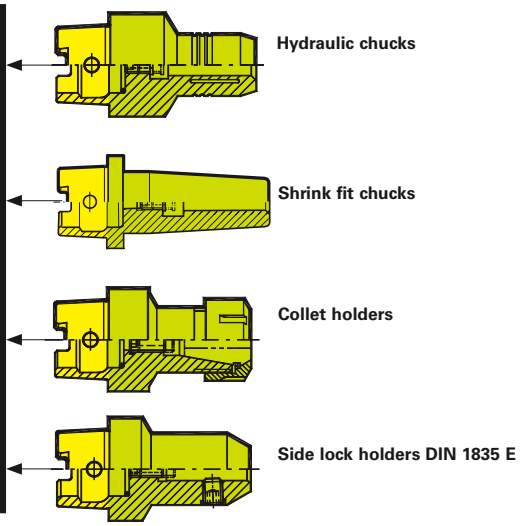
Tool holders
ISO 12164-1/DIN 69893-1

HSK-A

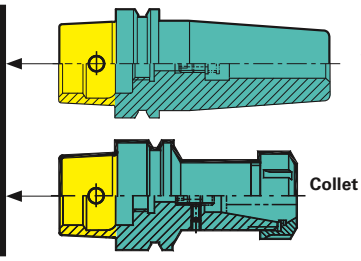


Tool holders
ISO 12164-1/DIN 69893-1

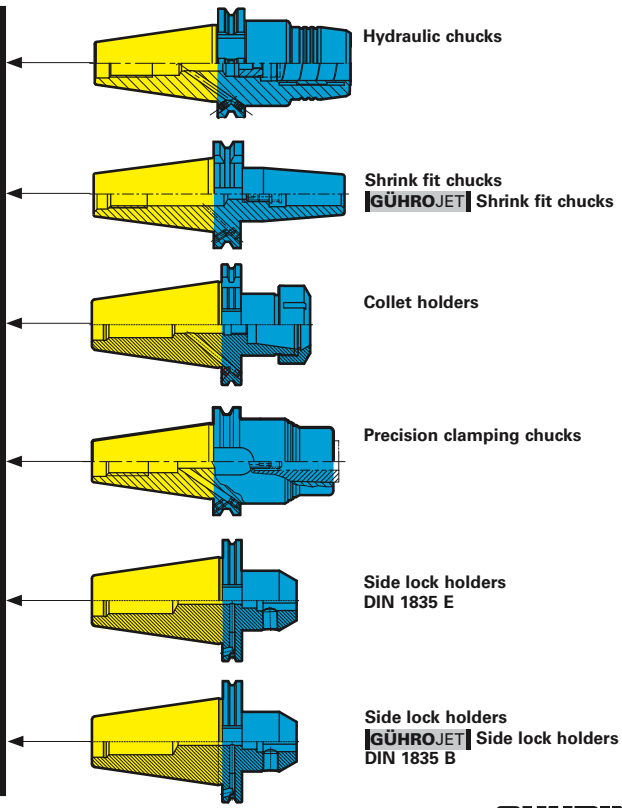
HSK-C



Tool holders
DIN 69893-5 — HSK-E



Tool holders
DIN 69871/JIS B 6339 — SK/MAS BT

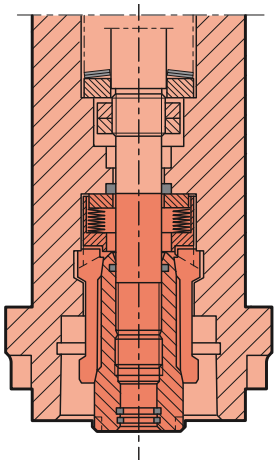


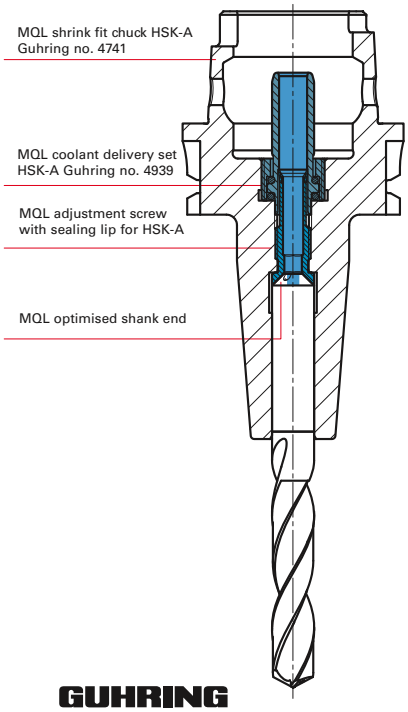
Automatic tool clamping with MQL

Spindle clamping systems with draw bar

Application in machining centres, milling and turning machines

Suppliers:
Ott
Röhm (Lic. Guhring)
Berg (Lic. Guhring)



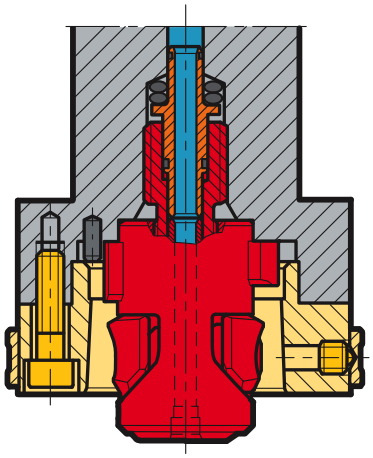


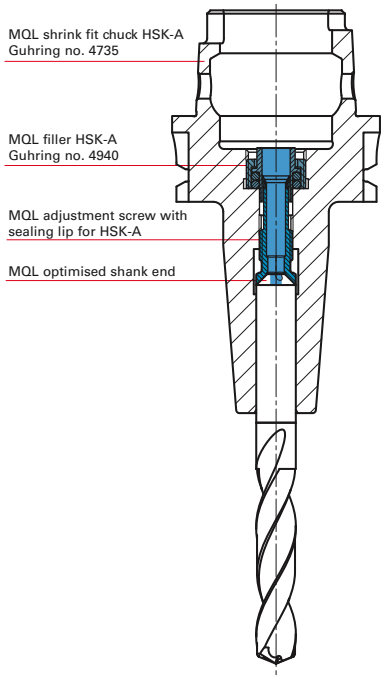
Manual tool clamping with MQL

Installation with adaptors

Application in transfer lines, fixtures, setting equipment (e.g. in drilling spindles), in multiple drilling heads

adaptor (integrated)



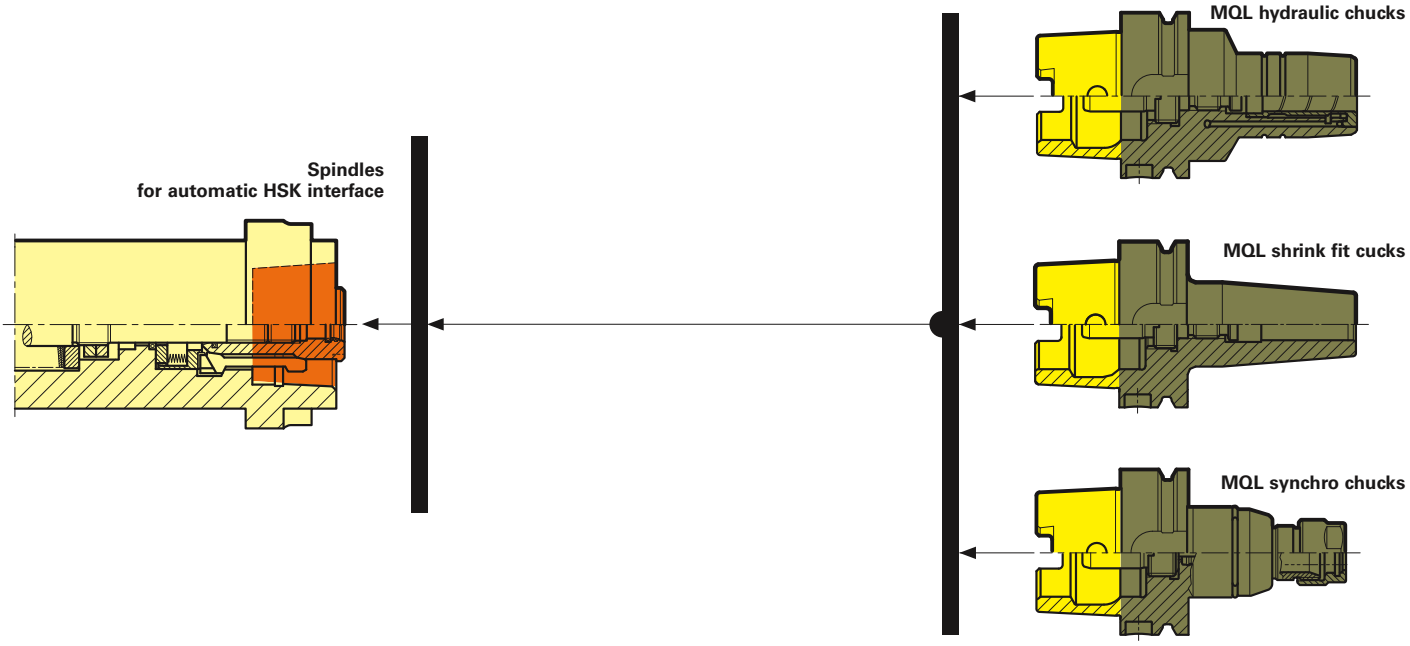


MQL by GÜHRING

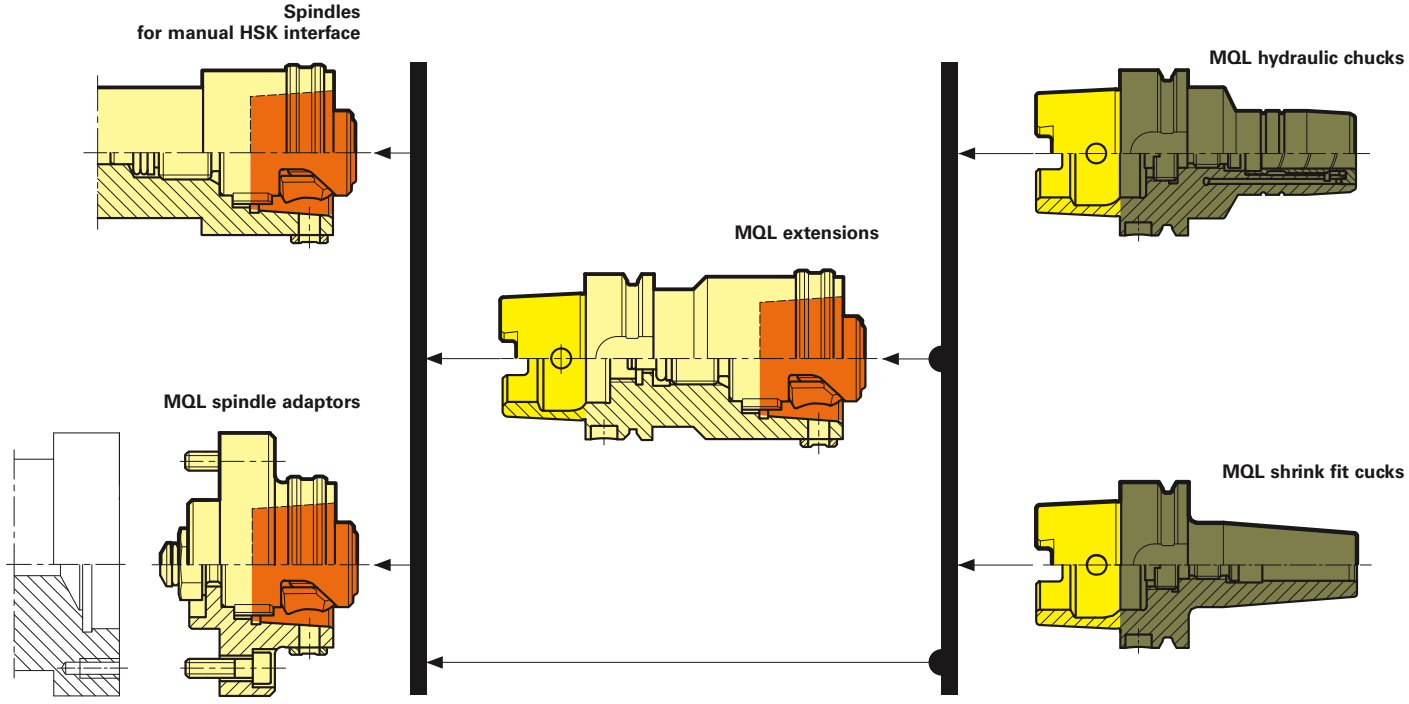
Spindle clamping systems

Tool holders
ISO 12164-1/DIN 69893-1 HSK-A

Automatic tool clamping



Manual tool clamping



Technology and advantages

Guhring is heavily engaged in the subject of minimal quantity lubrication and occupies one of the top positions in this technology. In addition to the suitable MQL geometry, our priority lies especially in the optimal delivery of the coolant in the vicinity of the tool holder. Therefore, we have developed a suitable MQL shank end for our cutting tools and a suitable MQL coolant delivery system for the application with our tool holders.

Shank end suitable for MQL

Because an extremely low volume of lubricant is applied with minimal quantity lubrication, the delivery of these low coolant quantities to the effective area is of utmost importance. Hereby, the geometric design of the shank end is of main significance for a secure delivery of the lubricant.

In a comprehensive series of tests we have thoroughly investigated different geometric designs of the shank end and subsequently determined the optimal design. The Guhring developed conical shank end optimally satisfies the relevant MQL conditions:

- no lubricant pockets
- minimal dead area
- simple operation
- cost-efficient production

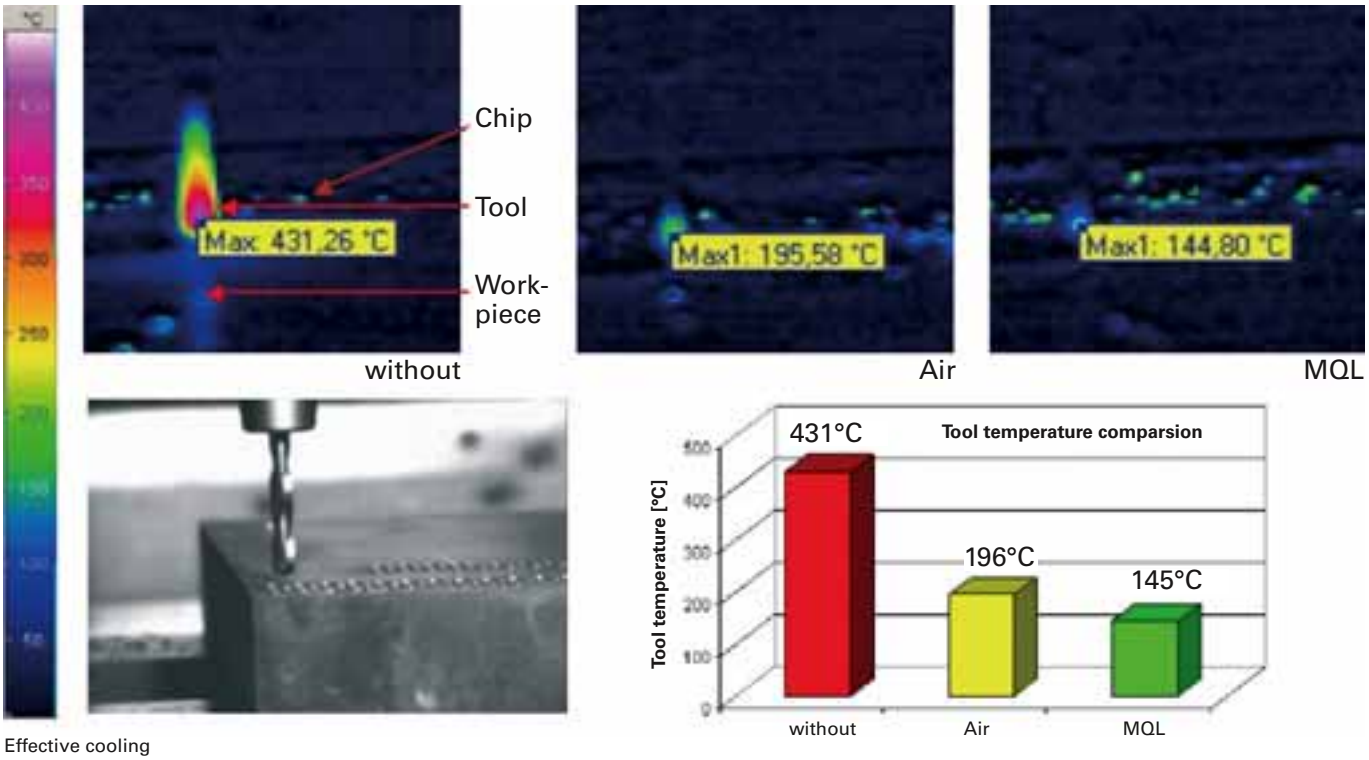
MQL suitable coolant delivey

The coolant delivery has also been subject to an indepth analysis. The result is the recently developed MQL delivery system consisting of a one-piece delivery pipe, with a thin-walled stainless steel pipe glued-inside and a MQL adjustment screw. The advantages of this solution are:

- simple installation
- optimal flow conditions
- the compliancy of the delivery pipe
- cost-efficiency

MQL considerably reduces the operating temperature

In comparison to entirely dry machining, MQL can considerably reduce machining temperatures. The result is longer tool life and increased process reliability. Thermographic experiments at Guhring showed that cooling with dry air reduces the temperature at the tool point by more than 200 degrees. The addition of a few millilitres of neat oil per hour, hence MQL, resulted in an even lower temperature thanks to the reduced friction.



Effective cooling
Guhring has determined the heat development at the drill point when applied without cooling or with internal cooling with air or MQL respectively. With MQL, the temperature of the tool and subsequently the transfer of heat to the workpiece is considarably reduced.

Technology and advantages

Installation and application of Guhring's MQL system
For the successful application of MQL, a consistent synchronisation of tool, tool holder, coolant delivery, clamping, coolant system and machine peripherals is paramount. MQL suitable equipment is available on the market, numerous machine tool manufacturers offer machining centers that are optimised for the production under MQL conditions.

Within the scope of Guhring's tool, tool holder and clamping expertise, there are also MQL solutions available that are indicated in this catalog with a special symbol. The following diagram shows an example of a suitable MQL installation:

Guhring's MQL system
A for MQL machining optimised drill with a MQL shank end sits in a shrink fit chuck. The delivery of the MQL mixture is performed by a one-piece delivery pipe with a glued-in stainless steel pipe.

Optimal flow
An examination of the flow characteristics at the shank end shows an optimal flow for the Guhring solution without lubricant pockets or interfering turbulence. This ensures a fast and secure delivery of the oil/air mixture to the tool point.

Technology and advantages

Our 4-point-clamping sets for minimum quantity lubrication MQL or conventional cooling are compatible. They are suitable for radial manual clamping. Primarily designed for installation in spindles (short drilling spindles, multiple-spindle drilling heads). Most prominent features:

- simple and hence more economic spindle manufacture
- short, small diameter spindles with constricted spindle bearing spacing.

Two clamping segments displaced by 180° with 2 clamping planes each are uniformly moved outwards with a differential threaded spindle, thereby generating the necessary clamping force.

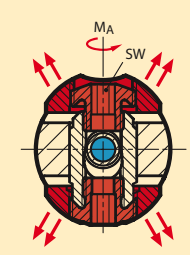
Thanks to their identical fitting contour, the 4-point clamping sets for MQL - especially developped for the application with minimum quantity lubrication (MQL) and with MQL-optimised tools - offer the following special features and advantages:

- A central, coaxial minimal quantity lubrication duct with a consistent internal diameter ensures a MQL coolant delivery to the tool without coolant pockets and offers quick operating times.

① We recommend M_A max. for rough machining and milling operations. For drilling and reaming operations a lower deviation of M_A max. up to 30% is permissible. Please check the torque with a torque wrench.
② Depending on temperature and lubricating conditions these values can be up to 15% lower.
③ Due to the screwed connection, M_T max. can be lower with adaptors.

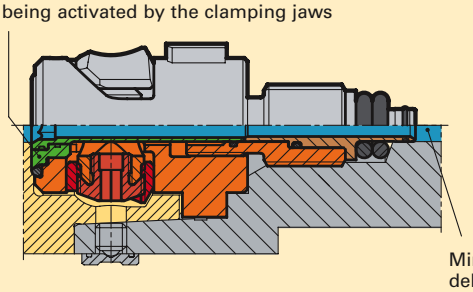
HSK-C	**max.** torque M_A [Nm] ①	Key size	**max.** drawing force [kN] ②	**max.** linear bending moment M_B [Nm] ②	**max.** transferable torsional moment M_T [Nm] ② ③
32	3	2.5	8.5	72	105
40	6	3	12.5	135	180
50	14	4	24	330	390
63	24	5	32	570	680
80	40	6	45	1000	1570
100	54	8	60	1620	4200

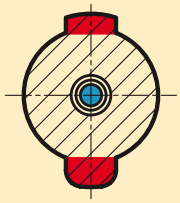
Installation and principle of operation



Direction of dynamic effect

The tool is ejected automatically by the ejector being activated by the clamping jaws

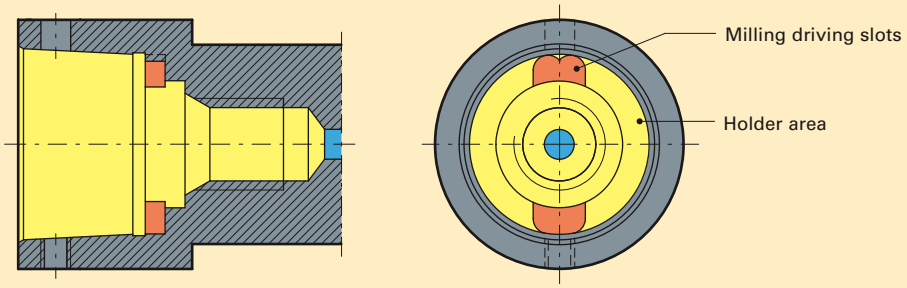




Minimum lubrication delivery

Technology and advantages

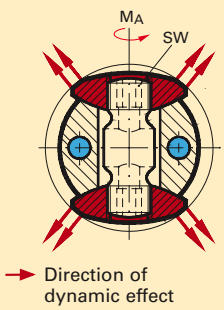
Internal contour of spindle



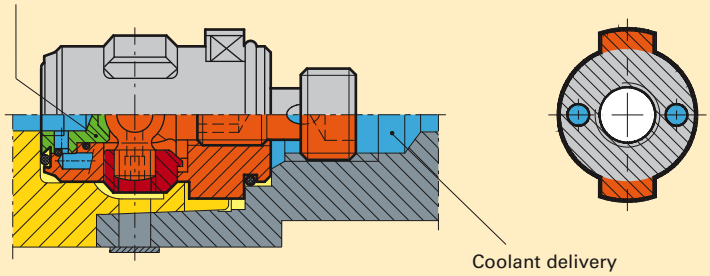
① We recommend M_A max. for rough machining and milling operations. For drilling and reaming operations a lower deviation of M_A max. up to 30% is permissible. Please check the torque with a torque wrench.
② Depending on temperature and lubricating conditions these values can be up to 15% lower.
③ Due to the screwed connection, M_T max. can be lower with adaptors.

HSK-C	**max.** torque M_A [Nm] ①	Key size	**max.** drawing force [kN] ②	**max.** linear bending moment M_B [Nm] ②	**max.** transferable torsional moment M_T [Nm] ② ③
25	1.5	2.5	4.5	30	30
32	3.0	2.5	7.0	60	100
40	6.0	3.0	12.0	130	170
50	14.0	4.0	20.0	280	350
63	27.0	5.0	28.0	500	640
80	54.0	6.0	40.0	900	1330

Installation and principle of operation



The tool is ejected automatically by the ejector being activated by the clamping jaws

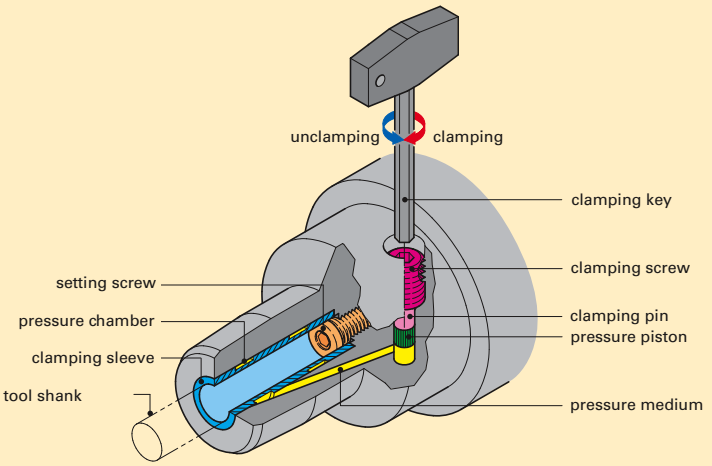


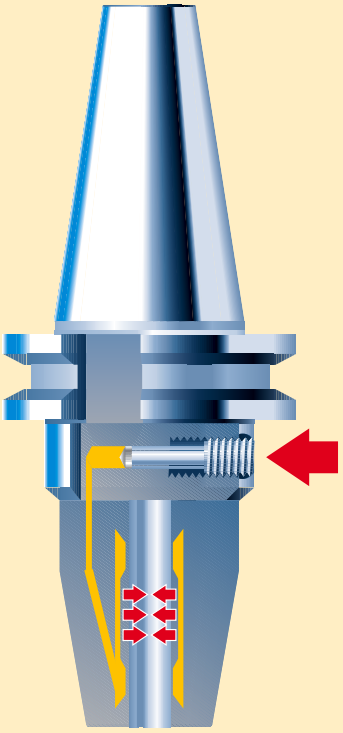
Technology and advantages

Modern machining processes place heavy demands on tool holding. Hydraulic chucks provides excellent clamping characteristics combined with precise concentricity.
Furthermore, they enable a simple and fast tool change, with the assistance of a special extraction key.
Turning the pressure screw generates sufficient pressure in the pressure chamber resulting in an elastic deformation of the clamping bush, providing powerful tool clamping and precise concentricity. A safe and powerful fit is guaranteed. If reduction bushes are applied that are able to hold varying tool diameters, the tool application may be extended without problem. If such bushes are not applied, it is essential to observe the minimum clamping length!

A summary of the advantages:

- precise tool clamping with a maximum 3 µm deviation from concentricity
- transmission of high torque through (excellent clamping) optimised bush clamping system
- high speed compatibility (no centrifugal forces from clamping segments)
- precise concentricity, therefore excellent surface qualities and dimensional accuracy of the workpiece
- rapid tool change thanks to simple operation of the clamping screw
- optimal tool life
- hydraulic cushioning has vibration absorbing effect





Convincing operation: the pressure medium is compressed via a screw and ensures safe positioning of the tool.

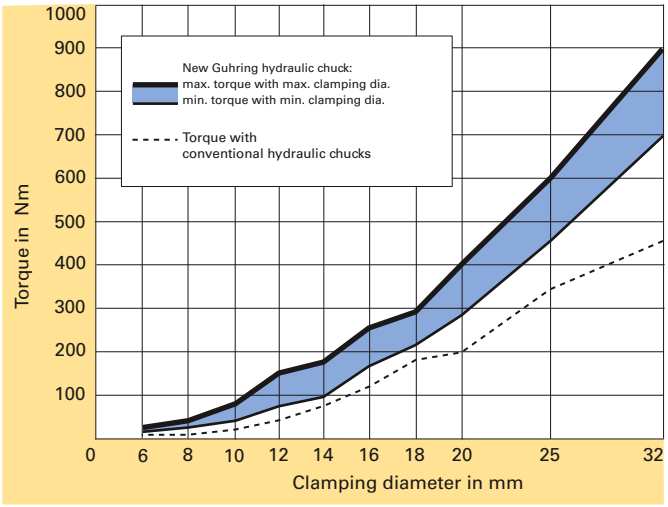
Technology and advantages

Guhring Hydraulic chucks with increased clamping force

Hydraulic chucks are suitable for clamping rotary symmetrical tools or workpieces. Straight shank tools without drive flats may be clamped up to Ø 32 mm, but also shanks according to DIN 6535 form HA and HB up to Ø 20 mm without reduction bushes. The given values in the table below are not to be exceeded. If the inserted length is less than the given minimum insertion depth or other tool shanks than specified above are applied, lower accuracy and breakage may occur!

Above all it is the high revolutions with High-Speed-Cutting operations that puts special demands on the tool holder. The clamping of the tool in a hydraulic chuck is, therefore, especially significant. Guhring has developed a hydraulic chuck that offers reliable and powerful clamping with higher torque figures, guaranteeing excellent tool clamping in the tool holder.

Combined with precise concentricity (max. 3 µm deviation from concentricity), a very fast and simple tool change as well as the vibration cushioning effect of the pressure chamber, the new hydraulic chuck can tackle the most demanding of machining tasks. The result is optimal tool life and excellent surface qualities or dimensional accuracy of the workpiece respectively.



Considerably higher:
The clamping force of Guhring's new HSK-A hydraulic chuck in comparison to conventional chucks.

Technology and advantages

Guhring's shrink fit chucks ensure an optimal connection between shrink fit chuck and shank tool.
While some manufacturers use conventional case hardened steel, Guhring applies a special, application orientated tool steel. The result is an increased expansion rate as well as improved temperature adaptability. There is no limit to the number of shrink fit insertion or withdrawal operations.

Advantages:

- short shrink fit times
- maximum clamping force
- shrink fit chucks available for tool shank diameters from 3 mm to 32 mm
- longevity

These advantages are of particular interest in the field of HSC milling, difficult and rough cutting operations, drilling, reaming and internal grinding operations as well as for woodworking.

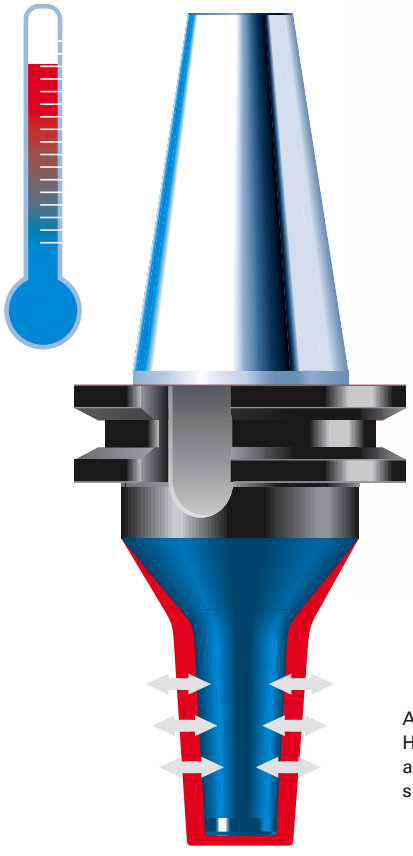
Convincing characteristics:

- excellent concentricity
- extreme clamping force and rigidity
- improved tool life
- insignificant imbalance through rotation symmetry
- economic efficiency

Perfect team: Guhring shrink fit chucks and shrink fit systems

For the shrink fitting for withdrawal and insertion of tools in our shrink fit chucks we offer various shrink fit systems to satisfy individual customer requirements: From high-tech solutions with integrated, highly accurate length pre-setting and special shrink fit systems for extra long tools to the cost-efficient HSV 2000 hot-air shrink fit system:

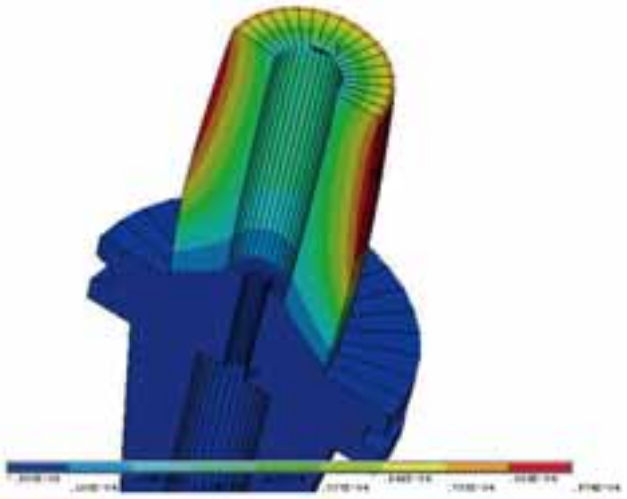
- GISS 5000
- GISS 4000
- GISS 3000
- GISS 2500
- GISS 2000
- HSV 2000



A gripping principle:
Heating and cooling ensures an optimal connection between shrink fit chuck and shank tool.

A gripping principle

When shrink fitting tools in shrink fit chucks, the decisive factors for ensuring the safe clamping of the tool in the tool holder are solely the heating and cooling of the tool holder. The heating process expands the shrink fit chuck enabling a tool to be inserted or withdrawn respectively. During the cooling process it contracts again and clamps the inserted tool with maximum clamping force.
Because the shrink fit chucks can become extremely hot in localised areas during the heating process and the tools shrink fitted for insertion or withdrawal respectively possess very sharp cutting edges, it is paramount that the operator wears Kevlar gloves during the shrink fit operation to prevent burns and cuts to the hands.



Shrink fit extensions: Increase performance

Shrink fit extensions increase the scope of a tool's performance and reduce tool surface imperfections. As with shrink fit chucks, the tool is clamped in the shrink fit extension and ideally in an hydraulic chuck. Naturally, shrink fit extensions can also be clamped in shrink fit chucks.

Technology and advantages

Pre-requisite for optimal machining is perfect tool clamping and a reliable coolant delivery. Tests with customers show that clamping and lubrication is often insufficient for the machining operation. Therefore, Guhring has developed a comprehensive range of measuring and inspection instruments enabling a quick, simple and accurate measurement or inspection on the premises of the customer. Defects can be recognised early and eliminated in order to prevent a reduction in cutting parameters and tool life or even damage to machine, clamping systems as well as tools.

Clamping force measuring instrument Senso 3000 for hydraulic chucks

The hydraulic clamping technology offers, thanks to its completely closed design, the system is impervious, requires low maintenance and guarantees longevity. Following many years of general use, however, thermal and mechanical influences can lead to a reduction in clamping force.

The new Guhring SENSO 3000 measuring instrument offers an accurate, quick and simple as well as consistent method of measuring the clamping force. An added advantage is the mobility of the system, i.e. for measuring within machines and fixtures.

SENSO 3000 determines the clamping force of the hydraulic chuck via a pressure sensitive plug gauge. The entire length of the plug gauge is clamped in the hydraulic chuck so that when tightening the clamping screw the clamping presure of the chuck is optimally applied.

The clamping force measuring instrument displays the clamping force as an absolute measurement value on the one hand and as a percentage clamping force in relation to a reference value that can be set individually on the other.

Clamping force measuring instrument SENSO-SHRINK 3000 for shrink fit chucks

SENSO-SHRINK 3000 simply, quickly and accurately determines the clamping force of the shrink fit chuck by measuring the bore volume. The measuring result displayed by SENSO SHRINK 3000 is the deviation percentage from the nominal value of a reference chuck.

SENSO-SHRINK 3000 offers the user the following benefits:

- simple, quick and accurate measuring of the shrink fit chuck clamping force directly on the customer's premises,
- early recognition of wear and incorrect handling of shrink fit chucks,
- considerable increase of process reliability during use,
- quality assurance of overall system: tool, chuck and tool holder,
- wireless system, providing reproducible measuring data at any time.

Flow rate measuring instrument PQ 3000 for checking the pressure and the volume of the coolant flow

Guhring has developed the PQ 3000 instrument for quick, simple and direct checking of the existing coolant pressure and rate of flow for tools with internal cooling. The check is carried out when the actual tool is clamped directly in

Technology and advantages

the stationary tool spindle, making it possible to establish the real conditions of the relevant machine and tool configuration.

PQ 3000 provides the following information:
- pressure and volume flow of the coolant pump, the so-called P/Q characteristic curve,
- possible pump or seal wear as well rotary transmission losses,
- possible narrowed cross sections in the line through machine, spindle and tool holder,
- possible blocked filters,
- possible narrowed cross sections resulting from deposits on the surface of the coolant ducts in the tool,
- the coolant duct layout in the tool.

Coolant inspection instrument CC 3000 for checking the filtering efficiency of the coolant system

With Guhring's CC 3000 you can quickly and simply check the filtering efficiency of the coolant system. In order to analyse and rectify possible weak points of the filter system, the following information is provided:
- perfect operation of the coolant filtering system,
- defective filters,
- insufficient filtering for the applied tool.

In addition, it is possible to determine the oil concentration of the applied soluble oil with the included refractometer. Thus, it is possible to optimise the tool life of the applied tool, to prevent tool breakage and subsequent production stoppage!

MQL coolant inspection instrument MQL-CHECK 3000 for measuring the coolant volume and reaction time with minimal quantity lubrication

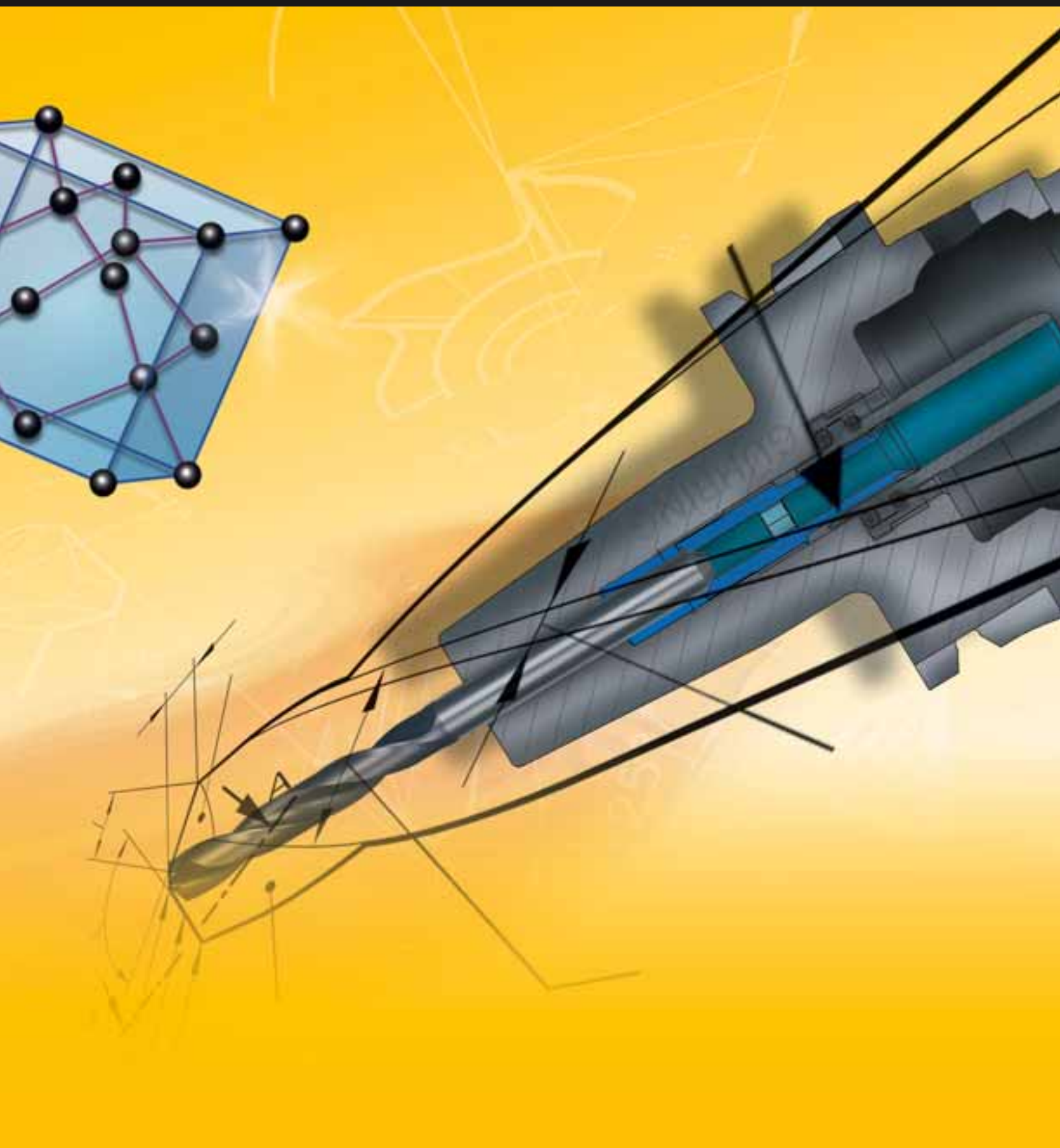
The development of Guhring's new MQL-CHECK 3000 allows simple and quick measuring of the coolant volume and the reaction time with minimal quantity lubrication MQL directly at the tool point. For the user, the result is a considerable increase in process reliability with MQL machining.

MQL-CHECK 3000 is simply installed in the machine, the tool point is passed into the measuring opening of the measuring unit and the coolant delivery is switched on. The measuring unit of the MQL-CHECK 3000 sends the recorded data wireless to the associated display equipment, a data interface allows the transfer of data to a PC as an option, making further evaluations and above all the documentation of the measurements possible.

Subsequently, the user benefits from:
- simple, quick measuring of the coolant volume at the tool point,
- ascertaining the actual response time, i.e. the time from starting the system to the coolant exiting at the tool point,
- reproducible and at any time comparable measuring data,
- a workshop suitable system, wireless operation - in terms of power supply as well as data transfer,
- comparitive measuring regarding function of MQL equipment, machine, spindle, tool holder and tool.

TECHNICAL SECTION

GUHRING



Contents

Decimal Equivalents - drill sizes and popular tap drill sizes (approx. 75% of thread)

Drill Size	mm	Decimal Equiv.	Tap Size	Drill Size	mm	Decimal Equiv.	Tap Size	Drill Size	mm	Decimal Equiv.	Tap Size
-	0.10	0.0039		3/32	2.38	0.0938		Q	8.43	0.3320	3/8-24
97	0.15	0.0059		41	2.44	0.0960			8.50	0.3346	M10 x 1.5
96	0.16	0.0063		40	2.50	0.0980	M3 x 0.5	R	8.61	0.3390	1/8-27 NPT
95	0.17	0.0067		39	2.53	0.0995		11/32	8.73	0.3438	
94	0.18	0.0071		38	2.58	0.1015	#5-40		8.75	0.3445	M10 x 1.25
93	0.19	0.0075		37	2.64	0.1040	#5-44	S	8.84	0.3480	1/8-27 NPS
92	0.20	0.0079		36	2.71	0.1065	#6-32	-	9.00	0.3543	M10 x 1.0
91	0.21	0.0083		7/64	2.78	0.1094		T	9.09	0.3580	
90	0.22	0.0087		35	2.79	0.1100		23/64	9.13	0.3594	
89	0.23	0.0091		34	2.82	0.1110		U	9.35	0.3680	7/16-14
88	0.24	0.0095		33	2.87	0.1130	#6-40		9.50	0.3740	M11 x 1.5
-	0.25	0.0098			2.90	0.1142	M3.5 x 0.6	3/8	9.53	0.3750	
87	0.25	0.0100		32	2.95	0.1160		V	9.56	0.3770	
	0.26	0.0102		-	3.00	0.1181		W	9.80	0.3860	
86	0.27	0.0105		31	3.05	0.1200		25/64	9.92	0.3906	7/16-20
	0.27	0.0106		1/8	3.18	0.1250		-	10.00	0.3937	M12 x 1.75
85	0.28	0.0110		30	3.26	0.1285		X	10.08	0.3970	
	0.29	0.0114			3.30	0.1299	M4 x 0.7	Y	10.26	0.4040	
84	0.29	0.0115		29	3.45	0.1360	#8-32	13/32	10.32	0.4062	
-	0.30	0.0118			3.50	0.1378		Z	10.49	0.4130	
83	0.30	0.0120		28	3.57	0.1405			10.50	0.4134	M12 x 1.25
82	0.32	0.0125		9/64	3.57	0.1406		27/64	10.72	0.4219	1/2-13
	0.32	0.0126		27	3.66	0.1440		-	11.00	0.4331	
81	0.33	0.0130		26	3.73	0.1470		7/16	11.11	0.4375	1/4-18 NPT
80	0.34	0.0135			3.75	0.1476	M4.5 x 0.75		11.50	0.4528	
79	0.37	0.0145		25	3.80	0.1495	#10-24	29/64	11.51	0.4531	1/2-20
1/64	0.40	0.0156		24	3.86	0.1520		15/32	11.91	0.4688	
78	0.41	0.0160		23	3.91	0.1540		-	12.00	0.4724	M14 x 2.0
77	0.46	0.0180		5/32	3.97	0.1562		31/64	12.30	0.4844	9/16-12
-	0.50	0.0197		22	3.99	0.1570			12.50	0.4921	M14 x 1.5
76	0.51	0.0200		-	4.00	0.1575		1/2	12.70	0.5000	
75	0.53	0.0210		21	4.04	0.1590	#10-32	-	13.00	0.5118	M14 x 1.25
74	0.57	0.0225		20	4.09	0.1610		33/64	13.10	0.5156	9/16-18
-	0.60	0.0236			4.20	0.1654	M5 x 0.8	17/32	13.49	0.5312	5/8-11
73	0.61	0.0240		19	4.22	0.1660			13.50	0.5315	
72	0.64	0.0250		18	4.31	0.1695		35/64	13.89	0.5469	
71	0.66	0.0260		11/64	4.37	0.1719		-	14.00	0.5512	M16-2
-	0.70	0.0276		17	4.39	0.1730		9/16	14.29	0.5625	
70	0.71	0.0280		16	4.50	0.1770	#12-24		14.50	0.5709	M16 x 1.5
69	0.74	0.0292		15	4.57	0.1800		37/64	14.68	0.5781	5/16-18
-	0.75	0.0295		14	4.62	0.1820	#12-28	-	15.00	0.5906	
68	0.79	0.0310		13	4.70	0.1850		19/32	15.08	0.5938	3/8-18 NPS
1/32	0.79	0.0313		3/16	4.76	0.1875		39/64	15.48	0.6094	
-	0.80	0.0315		12	4.80	0.1890			15.50	0.6102	M18 x 2.5
67	0.81	0.0320		11	4.85	0.1910		5/8	15.88	0.6250	
66	0.84	0.0330		10	4.91	0.1935		-	16.00	0.6299	M18 x 2.0
65	0.89	0.0350		9	4.98	0.1960		41/64	16.27	0.6406	
-	0.90	0.0354		-	5.00	0.1968	M6 x 1.0		16.50	0.6496	
64	0.91	0.0360		8	5.05	0.1990		21/32	16.67	0.6562	3/4-10
63	0.94	0.0370		7	5.11	0.2010	1/4-20	-	17.00	0.6693	
62	0.97	0.0380		13/64	5.16	0.2031		43/64	17.07	0.6719	
61	0.99	0.0390		6	5.18	0.2040		11/16	17.46	0.6875	3/4-16
-	1.00	0.0394		5	5.22	0.2055			17.50	0.6890	M20 x 2.5
60	1.02	0.0400			5.25	0.2067	M6 x 0.75	45/64	17.86	0.7031	
59	1.04	0.0410		4	5.31	0.2090	1/4-24	-	18.00	0.7087	M20 x 2.0
58	1.07	0.0420		3	5.41	0.2130	1/4-28	23/32	18.26	0.7188	1/2-14 NPT
57	1.09	0.0430			5.50	0.2165			18.50	0.7283	M20 x 1.5
56	1.18	0.0465		7/32	5.56	0.2188		47/64	18.65	0.7344	1/2-14 NPS
3/64	1.19	0.0469	#0-80	2	5.61	0.2210		-	19.00	0.7480	
	1.20	0.0472		1	5.79	0.2280		3/4	19.05	0.7500	
	1.25	0.0492	M1.6 x 0.35	A	5.94	0.2340		49/64	19.45	0.7656	7/8-9
	1.30	0.0512		15/64	5.95	0.2344			19.50	0.7677	M22 x 2.5
55	1.32	0.0520		-	6.00	0.2362	M7 x 1	25/32	19.84	0.7812	
54	1.40	0.0550		B	6.05	0.2380		-	20.00	0.7874	M22 x 2.0
	1.45	0.0571	M1.8 x 0.35	C	6.15	0.2420		51/64	20.24	0.7969	
	1.50	0.0591		D	6.25	0.2460	1/16-27 NPT		20.50	0.8071	M22 x 1.5
53	1.51	0.0595	#1-64	1/4	6.35	0.2500	1/16-27 NPS	13/16	20.64	0.8125	7/8-14
	1.55	0.0610		E	6.35	0.2500		-	21.00	0.8268	M24 x 3.0
1/16	1.59	0.0625			6.50	0.2559		53/64	21.03	0.8281	
	1.60	0.0630	M2 x 0.4	F	6.53	0.2570	5/16-18	27/32	21.43	0.8438	
52	1.61	0.0635		G	6.63	0.2610			21.50	0.8465	
	1.65	0.0650		17/64	6.75	0.2656		55/64	21.84	0.8594	
51	1.70	0.0670	#2-56		6.75	0.2657	M8 x 1.25	-	22.00	0.8661	M24 x 2.0
	1.75	0.0689	M2.2 x 0.45	H	6.76	0.2660		7/8	22.23	0.8750	1-8
50	1.78	0.0700	#2-64	I	6.91	0.2720	5/16-24		22.50	0.8858	M24 x 1.5
	1.80	0.0709		-	7.00	0.2756	M8 x 1.0	57/64	22.62	0.8906	
49	1.85	0.0730		J	7.04	0.2772		-	23.00	0.9055	
	1.90	0.0748	M2.3 x 0.4	K	7.14	0.2810		29/32	23.02	0.9062	
48	1.93	0.0760		9/32	7.14	0.2812		59/64	23.42	0.9219	3/4-14 NPT
	1.95	0.0768		L	7.37	0.2900			23.50	0.9252	
5/64	1.98	0.0781		M	7.49	0.2949		15/16	23.81	0.9375	1-14
47	1.99	0.0785	#3-48		7.50	0.2953		-	24.00	0.9449	M27 x 3.0
-	2.00	0.0787		19/64	7.54	0.2969		61/64	24.21	0.9531	
	2.05	0.0807	M2.5 x 0.45	N	7.67	0.3020			24.50	0.9646	
46	2.06	0.0810			7.75	0.3051	M9 x 1.25	31/32	24.61	0.9688	
45	2.08	0.0820	#3-56	5/16	7.94	0.3125	3/8-16	-	25.00	0.9843	M27 x 2.0
	2.15	0.0846	M2.6 x 0.45	-	8.00	0.3150		63/64	25.00	0.9844	1-1/8 -7
44	2.18	0.0860	#4-36	O	8.03	0.3160		1	25.40	1.0000	
43	2.26	0.0890	#4-40	P	8.20	0.3230					
42	2.37	0.0935	#4-48	21/64	8.33	0.3281					

Outside Diameter (O.D.) Manufacturing Tolerances

Twist drills

h5 Tolerance Range	
Ø-range mm	tolerance range mm
≤ 3.000	+0.000 / -0.004
> 3.000 - 6.000	+0.000 / -0.005

h6 Tolerance Range	
Ø-range mm	tolerance range mm
> 0.600 - 0.950	+0.000 / -0.005
> 0.950 - 3.000	+0.000 / -0.006
> 3.000 - 6.000	+0.000 / -0.008
> 6.000 - 10.000	+0.000 / -0.009
> 10.000 - 18.000	+0.000 / -0.011
> 18.000 - 30.000	+0.000 / -0.013
> 30.000 - 50.000	+0.000 / -0.016

h8 Tolerance Range	
Ø-range mm	tolerance range mm
0.380 - 0.600	+0.000 / -0.010
> 0.600 - 0.950	+0.000 / -0.012
> 0.950 - 3.000	+0.000 / -0.014
> 3.000 - 6.000	+0.000 / -0.018
> 6.000 - 10.000	+0.000 / -0.022
> 10.000 - 18.000	+0.000 / -0.027
> 18.000 - 30.000	+0.000 / -0.033
> 30.000 - 50.000	+0.000 / -0.039

h7 Tolerance Range	
Ø-range mm	tolerance range mm
0.380 - 0.600	+0.000 / -0.007
> 0.600 - 0.950	+0.000 / -0.008
> 0.950 - 3.000	+0.000 / -0.010
> 3.000 - 6.000	+0.000 / -0.012
> 6.000 - 10.000	+0.000 / -0.015
> 10.000 -18.000	+0.000 / -0.018
> 18.000 - 30.000	+0.000 / -0.021
> 30.000 - 50.000	+0.000 / -0.025

m7 Tolerance Range	
Ø-range mm	tolerance range mm
0.800 - 3.000	+0.002 / +0.012
3.000 - 6.000	+0.004 / +0.016
> 6.000 - 10.000	+0.006 / +0.021
> 10.000 - 18.000	+0.007 / +0.025
> 18.000 - 30.000	+0.008 / +0.029

Center drills

DIN 333	
Ø-range mm	tolerance range mm
0.50 – 2.50	0 +0.14
3.15 – 5.00	0 +0.18
6.30 – 10.00	0 +0.22
12.50	0 +0.27

to B.S. 328	
Ø-range mm	tolerance range mm
1.19 – 1.59	0 ±0.05
2.38 – 3.17	0 ±0.07
4.76	0 ±0.07
6.35 – 7.94	0 ±0.12

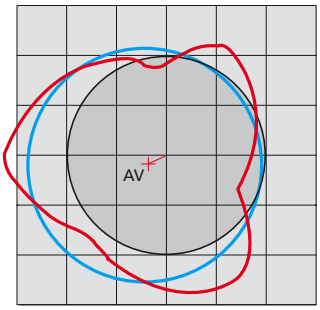
to ASA	
Ø-range mm	tolerance range mm
all	0 + 0.07 mm

Typical hole quality characteristics

1. in 42CrMo4V, Ø 14.5 mm

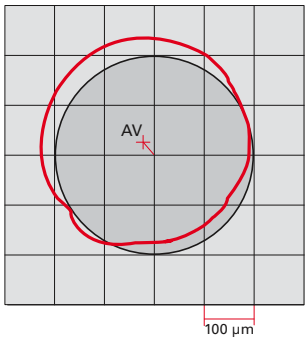
HSS drills, type N
Guhring no. 651 (S)

vc = 25 m/min
f = 0.25 mm/rev.
+Rmax = 131.8 µm
-Rmax = -49.1 µm
actual D = 14.566 mm
dRmax = 103.5 µm
AV = 49.2 µm
Ra = 2.6 µm, Rz = 6.8 µm **IT12**



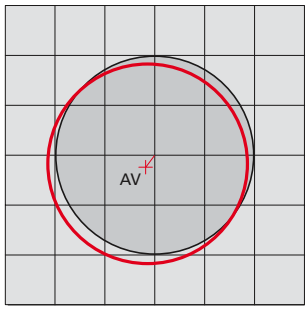
Ratio drills, type RT 80
Guhring no. 1171 (S)

vc = 70 m/min
f = 0.25 mm/rev.
+Rmax = 42.7 µm
-Rmax = -29.6 µm
actual D = 14.515 mm
dRmax = 12.9 µm
AV = 35.3 µm
Ra = 1.4 µm, Rz = 4.31 µm **IT9**



Ratio drills, type RT 100
Guhring no. 1181 (S)

vc = 70 m/min
f = 0.25 mm/rev.
+Rmax = 26.7 µm
-Rmax = -17.2 µm
actual D = 14.509 mm
dRmax = 5.2 µm
AV = 22.8 µm
Ra = 1.04 µm, Rz = 3.2 µm **IT8**



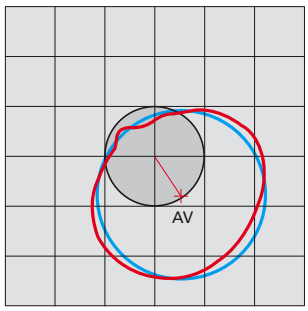
The overall total of the maximum positive and negative deviations is the sum of the total run-out in relation to the black circle as measured on standard instruments (dRmax). The red lines at the hole centres indicate the direction and amplitude of the displacements AV (Axis Shifting) of the produced hole from the true centre point. The parameter showing the largest deviation is decisive for the IT quality class of the hole in relation to the tool diameter.

The black circle in the diagram represents the nominal hole diameter which the tool should ideally produce. The red circle indicates the form actually produced.
The mean value of the radius of the red circle, i.e. the average diameter, is shown by the blue circle. (with our Ratio drills the average diameter is practically identical to the actual diameter produced).

2. in GGG40, Ø 10.0 mm

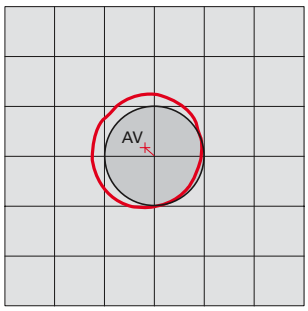
HSS drills, type N
Guhring no. 651 (S)

vc = 30 m/min
f = 0.2 mm/rev.
actual D = 10.077 mm
+Rmax = 106 µm
-Rmax = -28 µm
dRmax = 42 µm
AV = 68.5 µm
Ra = 3.7 µm, Rz = 17.2 µm **IT12**



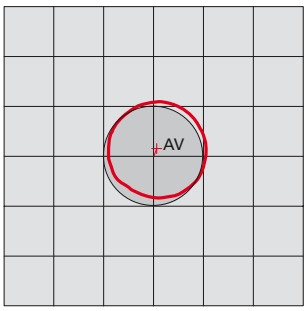
Ratio drills, type RT 100
Guhring no. 1181 (S)

vc = 90 m/min
f = 0.3 mm/rev.
actual D = 10.027 mm
+Rmax = 34 µm
-Rmax = -9.2 µm
dRmax = 6.5 µm
AV = 22.5 µm
Ra = 2.2 µm, Rz = 11.5 µm **IT9**



Ratio drills, type RT 150 GG
Guhring no. 768 ◯

vc = 130 m/min
f = 0.2 mm/rev.
actual D = 9.994 mm
+Rmax = 11.5 µm
-Rmax = -18 µm
dRmax = 5 µm
AV = 14 µm
Ra = 1.99 µm, Rz = 11.2 µm **IT8**



Troubleshooting

Cutting edge build-up

Cause:

Low cutting speed

Excessive honing of cutting lip

Bright finish cutting lip

Remedy:

Increase cutting speed

Reduce cutting lip honing

Have tool coated

Crumbling of outer corners

Cause:

Non-rigid conditions, insufficient workpiece clamping

Excessive deviation from concentricity

Interrupted cut

Remedy:

Rigid clamping of workpiece

Check and correct concentricity if possible

Reduce feed

Heavy wear and tear at flank

Cause:

Cutting speed too high

Feed too low

Clearance angle too small

Remedy:

Decrease cutting speed

Increase feed

Increase clearance angle

Crumbling on cutting lips

Cause:

Non-rigid conditions, insufficient workpiece clamping

Interrupted cut

Maximum wear and tear values have been exceeded

Wrong tool type

Remedy:

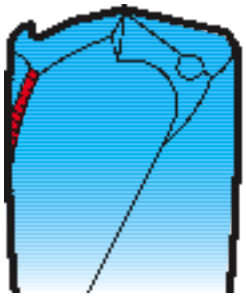
Rigid clamping of workpiece

Reduce feed

Reduce tool change intervals

Apply suitable tool (see application recomendations)

Land wear



Cause:

Non-rigid conditions, insufficient workpiece clamping

Large deviation from concentricity

Back taper too small

Wrong coolant/lubrication (oil), soluble oil too thin

Remedy:

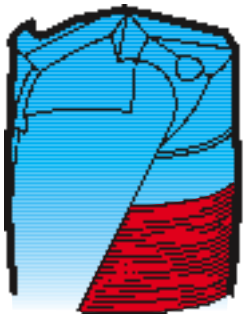
Rigid clamping of workpiece

Check and correct concentricity if possible

Increase back taper

Thicken soluble iol or use neat oil

Scoring on tool body



Cause:

Non-rigid conditions, insufficient workpiece clamping

Large deviation from concentricity

Interrupted cut

Abrasive workpiece material

Remedy:

Rigid clamping of workpiece

Check and correct concentricity if possible

Reduce feed

Thicken soluble oil or use neat oil

Troubleshooting

Heavy chisel edge wear and tear

Cause:

Cutting speed too low

Feed too high

Excessive honing of cutting lip

Remedy:

Increase cutting speed

Decrease feed

Reduce cutting lip honing

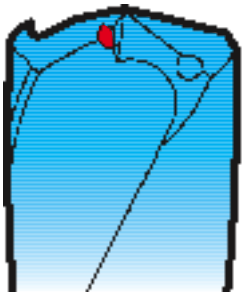
Crumbling at intersection of web thinning and cutting lip

Cause:

Clearance angle too small

Excessive honing of cutting lip

Wrong tool type



Remedy:

Increase clearance angle

Reduce cutting lip honing

Apply suitable tool

Plastic deformation of outer corner

Cause:

Cutting speed too high

Incorrect or no honing at corner

Incorrect or no corner chamfer

Remedy:

Decrease cutting speed

Correct honing

Apply correct corner chamfer

Misalignment, axis shifting

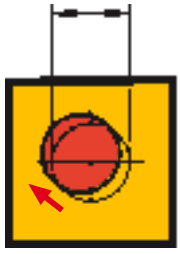
Cause:

Non-rigid conditions, insufficient workpiece clamping

Excessive deviation from concentricity

Spotting area transverse

Chisel edge too large



Remedy:

Rigid clamping of workpiece

Check and correct concentricity, if possible

Use twin-fluted milling cutter for spotting

Reduce chisel edge

Heavy burring on breakthrough

Cause:

Feed too high

Maximum wear and tear values have been exceeded

Excessive honing of cutting lip

Remedy:

Decrease feed

Reduce tool change intervals

Reduce cutting lip honing

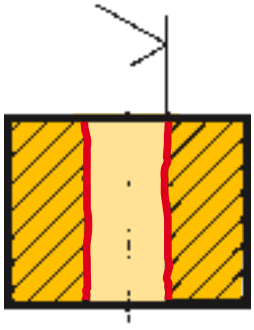
Unsatisfactory surface quality

Cause:

Non-rigid conditions, insufficient workpiece clamping

Excessive deviation from concentricity

Insufficient coolant



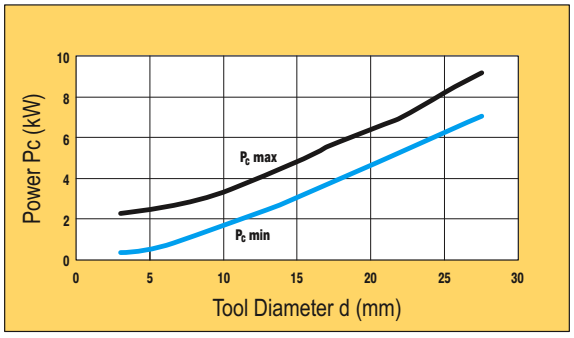
Remedy:

Rigid clamping of workpiece

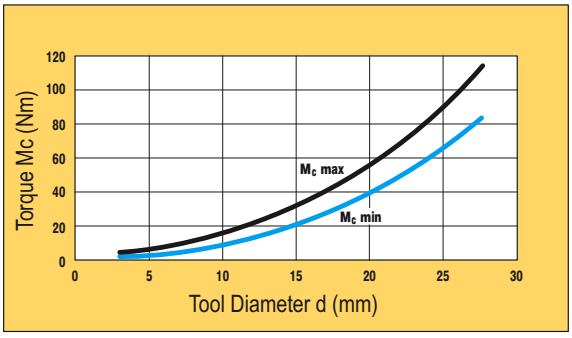
Check and correct concentricity, if possible

Increase coolant (volume, pressure)

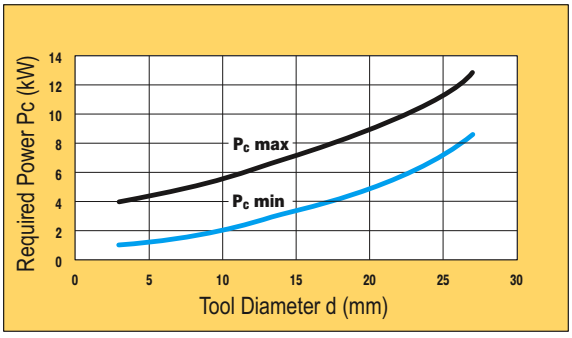
Feed Force and Torque Requirements - Carbide Drills



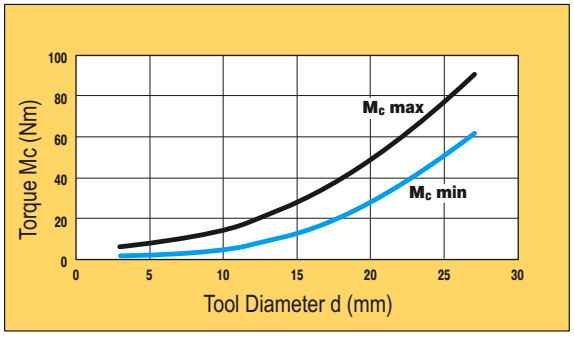
Required power when drilling steel with RT drills (1,000 N/mm2)



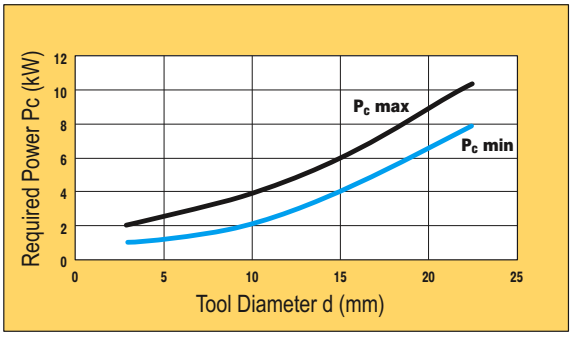
Required machine torque for drilling steel with RT 100 drills (1,000 N/mm²)



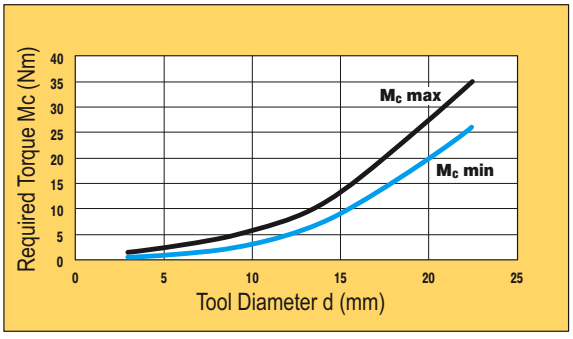
Required power when drilling cast iron with RT 100 drills



Required machine torque when drilling cast iron with RT 100 drills

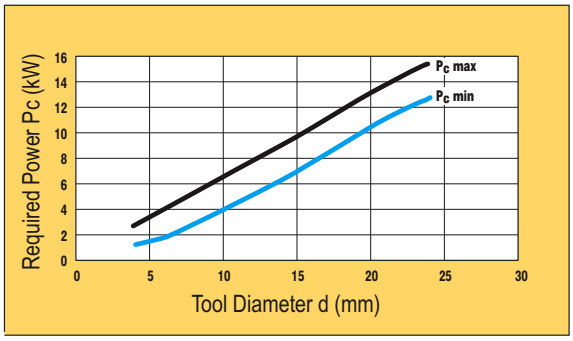


Required power when drilling AlSi7 with RT 100 drills

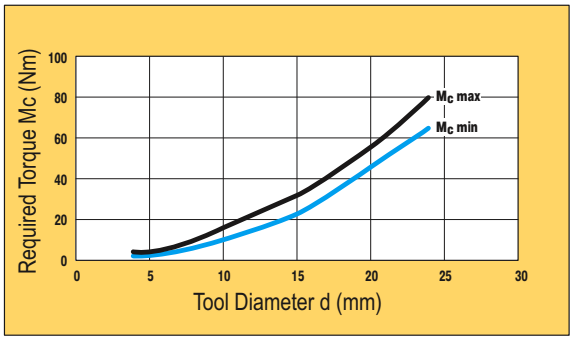


Required machine torque when drilling AlSi7 with RT 100 drills

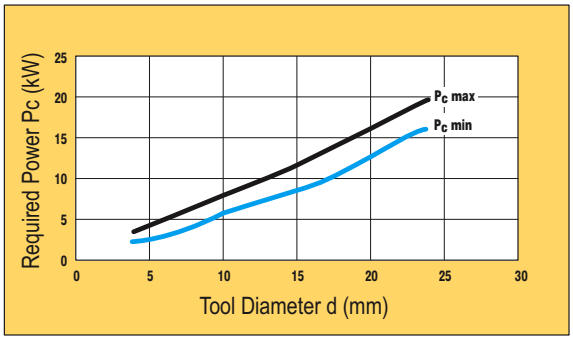
Feed Force and Torque Requirements - Carbide Drills



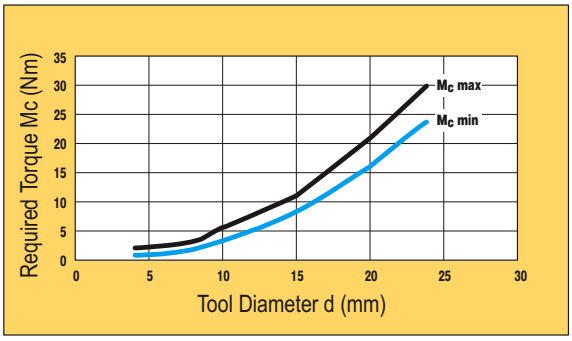
Required power when drilling cast iron with RT 150 GG drills. Vc = 140 m/min.



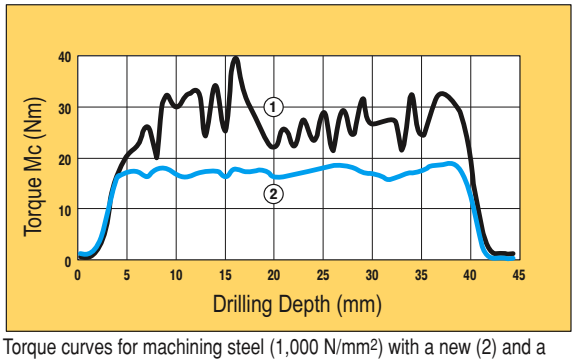
Required machine torque for drilling cast iron with RT 150 GG drills. Vc = 140 m/min.



Required power when drilling AlSi7 with RT 150 GG drills. Vc = 400 m/min.



Required machine torque for drilling AlSi7 with RT 150 GG drills. Vc = 400 m/min.

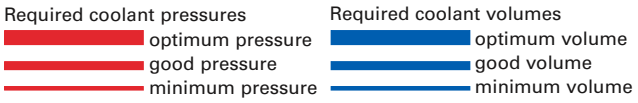


Torque curves for machining steel (1,000 N/mm²) with a new (2) and a worn (1) RT100 drill. v_c = 70 m/min, f = .25 mm/U, p = 40 bar.

Coolant pressure and volumes

The illustrated optimum, good and minimum required coolant volume apply only to spiral-fluted Ratio drills type RT 100. In contrast to the pressure, which is a feature of the machine tool; the cooling system fitted to it and also the possibility of leakage, volume does not depend on the machine (fig. 1). The pressure figures given are therefore recommendations which serve only as guidelines.
Ratio drills type RT 80 with central coolant duct are subject to different standards (fig. 2). The diagrams shown are for Ratio drills in their most important application, machining of steel.
But they are also guidelines for the machining of other materials, primarily because the highest coolant pressures are constantly required for the machining of steel. The effects of cooling using straight-fluted Ratio drills type RT 150 is particularly sensitive and is clearly demonstrated in the examples for particular workpiece materials. For example, the loss in tool life through low pressures when machining grey cast iron is considerably higher than when machining AlSi alloys. But this is only the case when the AlSi alloy is short-chipping! The absolute necessary minimum pressure or good pressure should, when machining cast iron, be generally a little higher than for AlSi machining (figures 3 and 4).

The recommended values are to be used only for drilling depths of up to approx. 5 x D. Deeper holes should be produced with tools having internal coolant ducts, as for example RT 150 GN, otherwise the production of deeper holes (depending on the material) becomes uneconomical.



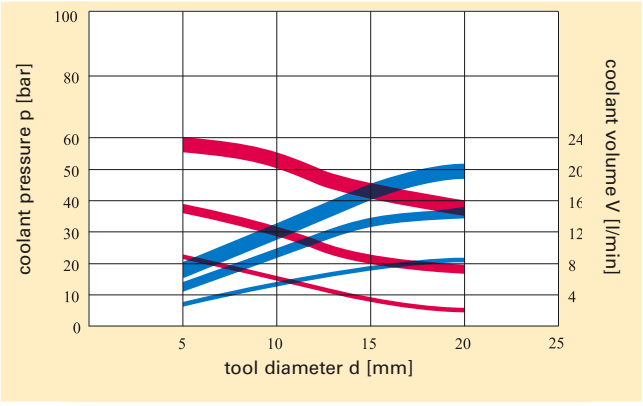


fig. 1:
Required coolant pressures and volumes for RT 100 Ratio drills with internal spiral coolant ducts.

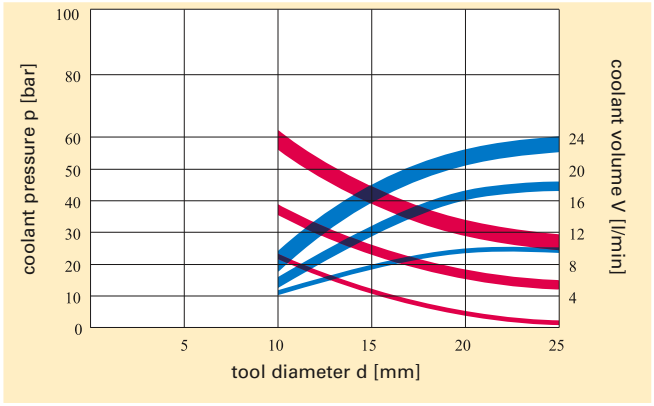


fig. 2:
Required coolant pressures and volumes for RT 80 Ratio drills with central internal coolant duct.

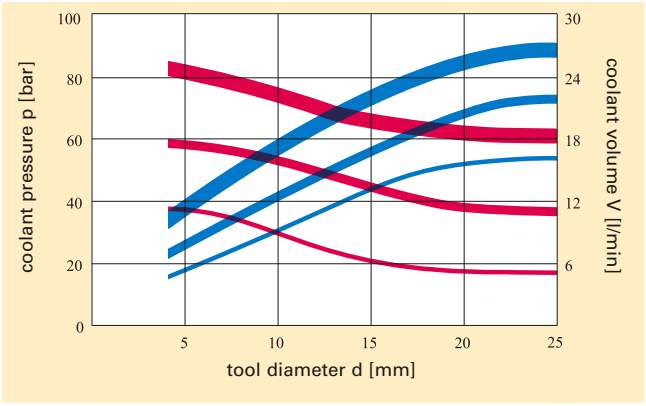


fig. 3:
Required coolant pressures and volumes for straight-fluted Ratio drill type 150 GG when machining cast iron.

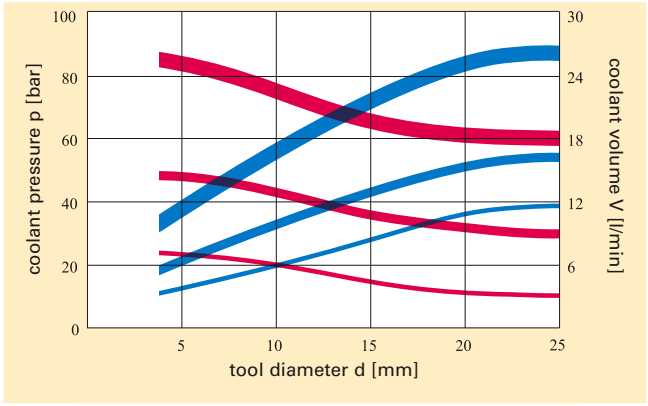
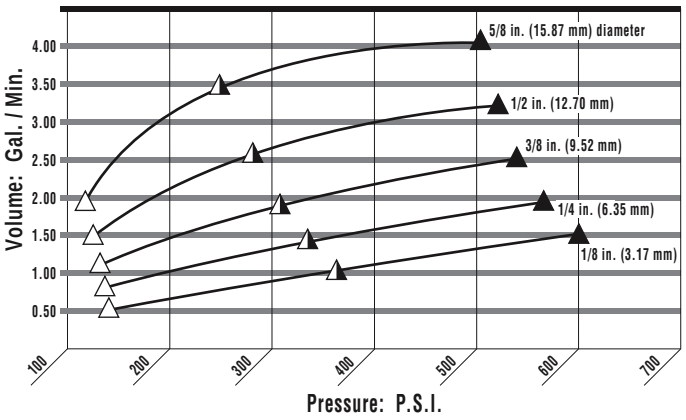


fig. 4:
Required coolant pressures and volumes for straight-fluted Ratio drill type 150 GG when machining AlSi7.

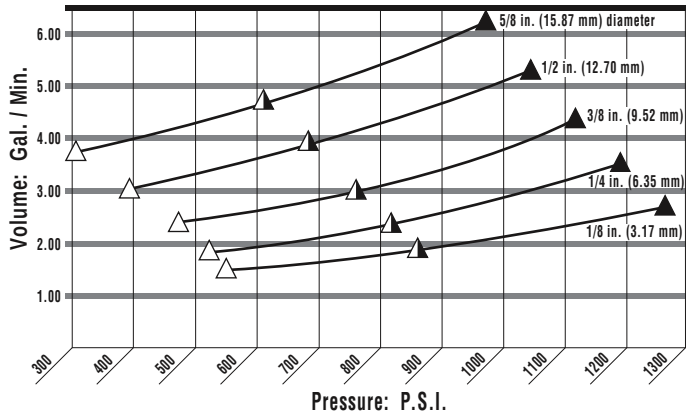
Coolant pressure and volumes

RT 100 U, F & C

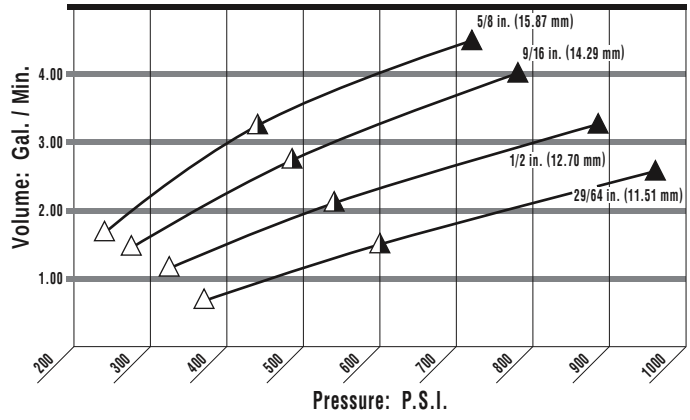


△= Minimum ◭= Good ▲= Optimum

RT 150 GG

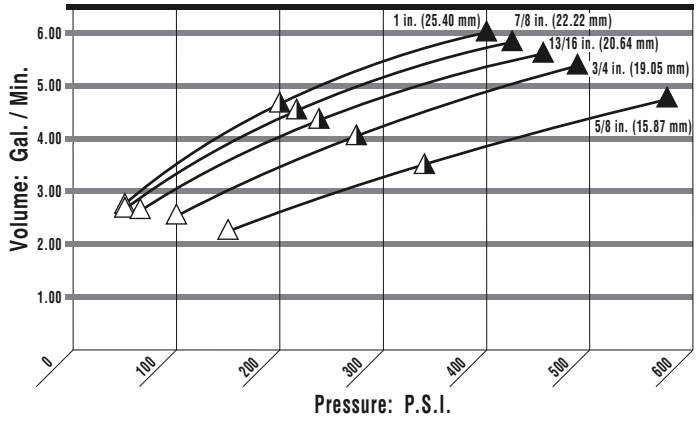


HT 800 WP



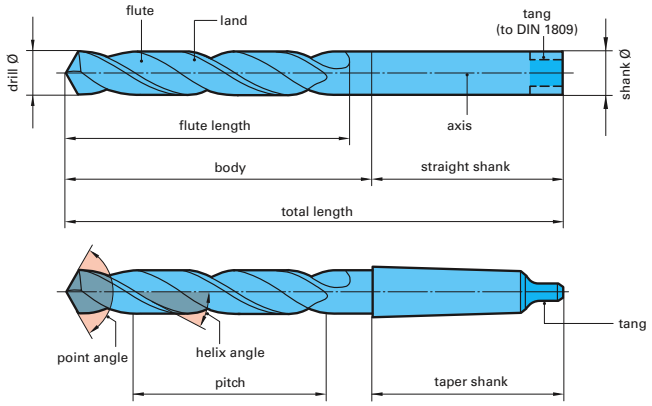
△= Minimum ◭= Good ▲= Optimum

RT 800 WP

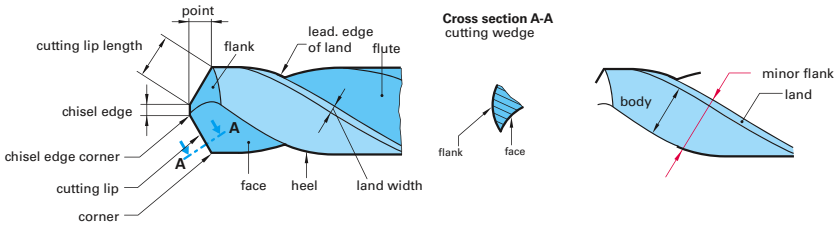


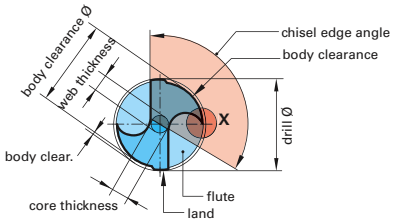
Definitions, dimensions and angles DIN ISO 5419 (extract; edition 06/98)

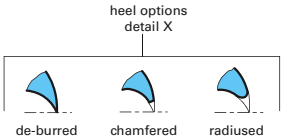
Twist drills with straight/Morse taper shank

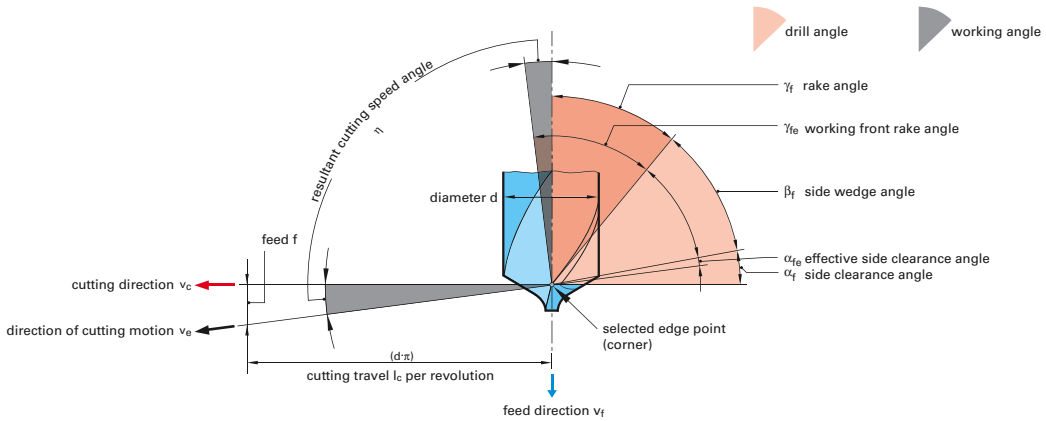


Cutting portion









Straight shank twist drills

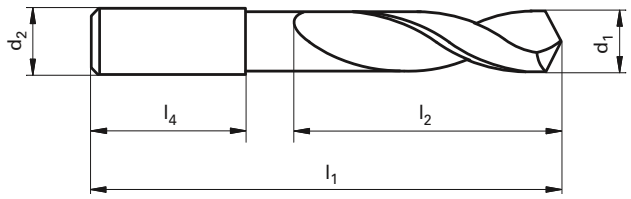
dia. to (incl.) mm	DIN 338		DIN 339		DIN 340		DIN 1897		DIN 1869 Extra length twist drills series 1		series 2		series 3	
	total length mm	flute length mm	total length mm	flute length mm	total length mm	flute length mm	total length mm	flute length mm	total length mm	flute length mm	total length mm	flute length mm	total length mm	flute length mm
≤ 0.24	19	2.5					19	1.5						
0.30	19	3					19	1.5						
0.38	19	4					19	2						
0.48	20	5			30*	10*	19	2.5						
0.53	22	6			32*	12*	20	3						
0.60	24	7	32*	15*	35*	15*	21	3.5						
0.67	26	8	36*	18*	38*	18*	22	4						
0.75	28	9	39*	20*	42*	21*	23	4.5						
0.85	30	10	42*	22*	46*	25*	24	5						
0.95	32	11	45*	24*	51*	29*	25	5.5						
1.06	34	12	48	26	56	33	26	6						
1.18	36	14	50	28	60	37	28	7						
1.32	38	16	52	30	65	41	30	8						
1.50	40	18	55	33	70	45	32	9						
1.70	43	20	58	35	76	50	34	10	115*	75*				
1.90	46	22	62	38	80	53	36	11	120*	80*				
2.12	49	24	66	41	85	56	38	12	125	85	160*	110*	205*	135*
2.36	53	27	70	44	90	59	40	13	135	90	170*	115*	215*	145*
2.65	57	30	74	47	95	62	43	14	140	95	180*	120*	225*	150*
3.00	61	33	79	51	100	66	46	16	150	100	190	130	240*	160*
3.35	65	36	84	55	106	69	49	18	155	105	200	135	250*	170*
3.75	70	39	91	60	112	73	52	20	165	115	210	145	265	180
4.25	75	43	96	64	119	78	55	22	175	120	220	150	280	190
4.75	80	47	102	69	126	82	58	24	185	125	235	160	295	200
5.30	86	52	108	74	132	87	62	26	195	135	245	170	315	210
6.00	93	57	116	80	139	91	66	28	205	140	260	180	330	225
6.70	101	63	124	86	148	97	70	31	215	150	275	190	350	235
7.50	109	69	133	93	156	102	74	34	225	155	290	200	370	250
8.50	117	75	142	100	165	109	79	37	240	165	305	210	390	265
9.50	125	81	151	107	175	115	84	40	250	175	320	220	410	280
10.60	133	87	162	116	184	121	89	43	265	185	340	235	430	295
11.80	142	94	173	125	195	128	95	47	280*	195*	365*	250*	455*	310*
13.20	151	101	184	134	205	134	102	51	295*	205*	375*	260*	480*	330*
14.00	160	108	194	142	214	140	107	54						
15.00	169	114	202	147	220	144	111	56						
16.00	178	120	211	153	227	149	115	58						
17.00	184	125	218	159	235	154	119	60						
18.00	191	130	226	165	241	158	123	62						
19.00	198	135	234	171	247	162	127	64						
20.00	205	140	242	177	254	166	131	66						
21.20					261	171	136	68						
22.40					268	176	141	70						
23.60					275	180	146	72						
25.00					282	185	151	75						
26.50					290	190	156	78						
28.00					298	195	162	81						
30.00					307	201	168	84						
31.50					316	207	174	87						
33.50							180	90						
35.50							186	93						
37.50							193	96						
40.00							200	100						
42.50							207	104						
45.00							214	108						
47.50							221	112						
50.00							228	116						

* Guhring std.

Carbide twist drills (Ratio drills)

Carbide twist drills (Ratio drills) DIN 6537

Applies to solid carbide twist drills with 2 or 3 cutting edges and straight shank to DIN 6535

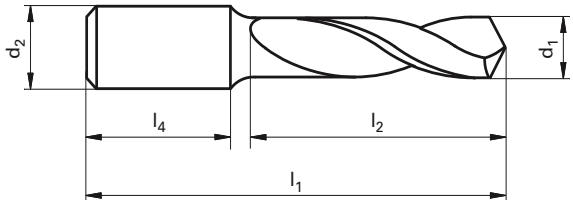


Dimensions in mm

nom. Ø-range up to d1m7	shank Ø d2h6	Ratio drills for 3 x D		Ratio drills for 5 x D		shank length l4
		overall length l1	max. flute length l2	overall length l1	max. flute length l2	
2.9...3.75	6	62	20	66	28	36
4.75	6	66	24	74	36	36
6.00	6	66	28	82	44	36
7.00	8	79	34	91	53	36
8.00	8	79	41	91	53	36
10.00	10	89	47	103	61	40
12.00	12	102	55	118	71	45
14.00	14	107	60	124	77	45
16.00	16	115	65	133	83	48
18.00	18	123	73	143	93	48
20.00	20	131	79	153	101	50

Carbide twist drills (Ratio drills) DIN 6538

Applies to twist drills with brazed carbide tip or head with reinforced straight shank (steel) to DIN 6535. The brazed head can be a part or the complete cutting portion.



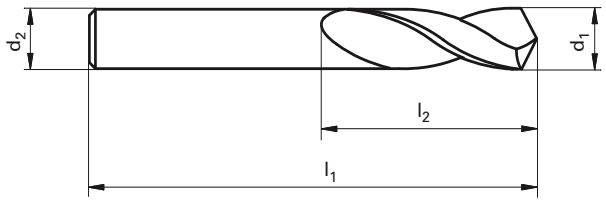
Dimensions in mm

nom. Ø-range up to d1h7	shank Ø d2h6	Ratio drills for 3 x D		Ratio drills for 5 x D		Ratio drills for 7 x D		shank length l4
		overall length l1	max. flute length l2	overall length l1	max. flute length l2	overall length l1	max. flute length l2	
9.5...12.0	16	103	51	127	75	151	99	48
14.0	16	111	59	139	87	167	115	48
16.0	20	122	68	154	100	186	132	50
18.0	20	130	76	166	112	202	148	50
20.0	25	144	84	184	124	224	164	56
22.0	25	153	93	197	137	241	181	56
24.0	25	161	101	209	149	257	197	56
26.0	32	174	110	226	162	278	214	60
28.0	32	182	118	238	174	294	230	60
30.0	32	190	126	250	186	310	246	60

Carbide twist drills (Ratio drills)

Carbide twist drills (Ratio drills) DIN 6539

Applies to solid carbide twist drills with parallel shank, i.e. equal nom. drill and shank diameter.



Dimensions in mm

nom. Ø-range up to (= shank Ø d2) d1	overall length l1	flute length l2
1.90...2.12	38	12
2.36	40	13
2.65	43	14
3.00	46	16
3.35	49	18
3.75	52	20
4.25	55	22
4.75	58	24
5.30	62	26
6.00	66	28
6.70	70	31
7.50	74	34
8.00	79	37
8.50	79	37
9.50	84	40

nom. Ø-range up to (= shank Ø d2) d1	overall length l1	flute length l2
10.00	89	43
10.60	89	43
11.80	95	47
12.00	102	51
13.20	102	51
14.00	107	54
15.00	111	56
16.00	115	58
17.00	119	60
18.00	123	62
19.00	127	64
20.00	131	66

Morse taper twist drills

dia. to (incl.) mm	DIN 345			DIN 346			DIN 341			Bushing drills with oversize taper*			GV/VA-drills* for drilling difficult materials			DIN 1870 Extra length twist drills series 1			DIN 1870 Extra length twist drills series 2		
	total length	flute length	Morse taper	total length	flute length	Morse taper	total length	flute length	Morse taper	total length	flute length	Morse taper	total length	flute length	Morse taper	total length	flute length	Morse taper	total length	flute length	Morse taper
	mm			mm			mm			mm			mm			mm			mm		
2.65	111*	30*	1*																		
3.00	114	33	1																		
3.35	117	36	1																		
3.75	120	39	1																		
4.25	124	43	1				145*	64*	1*												
4.75	128	47	1				150*	69*	1*												
5.30	133	52	1				155	74	1												
6.00	138	57	1				161	80	1												
6.70	144	63	1				167	86	1												
7.50	150	69	1				174	93	1												
8.50	156	75	1				181	100	1				130	49	1	265	165	1	330	210	1
9.50	162	81	1				188	107	1				134	53	1	275	175	1	345	220	1
10.60	168	87	1	185*	87*	2*	197	116	1	214	116	2	138	57	1	285	185	1	360	235	1
11.80	175	94	1	192*	94*	2*	206	125	1	223	125	2	142	61	1	300	195	1	375	250	1
13.20	182	101	1	199	101	2	215	134	1	232	134	2	147	66	1	310	205	1	395	260	1
14.00	189	108	1	206	108	2	223	142	1	240	142	2	168	70	2	325	220	1	410	275	1
15.00	212	114	2	235*	114*	3*	245	147	2	268	147	3	172	74	2	340	220	2	425	275	2
16.00	218	120	2	241*	120*	3*	251	153	2	274	153	3	176	78	2	355	230	2	445	295	2
17.00	223	125	2	246*	125*	3*	257	159	2	280	159	3	179	81	2	355	230	2	445	295	2
18.00	228	130	2	251*	130*	3*	263	165	2	286	165	3	183	85	2	370	245	2	465	310	2
19.00	233	135	2	256	135	3	269	171	2	292	171	3	186	88	2	370	245	2	465	310	2
20.00	238	140	2	261	140	3	275	177	2	298	177	3	212	91	3	385	260	2	490	325	2
21.20	243	145	2	266	145	3	282	184	2	305	184	3	216	95	3	385	260	3	490	325	3
22.40	248	150	2	271	150	3	289	191	2	312	191	3	219	98	3	405	270	3	515	345	3
23.02	253	155	2	276	155	3	296	198	2	319	198	3	222	101	3	405	270	3	515	345	3
23.60	276	155	3	304*	155*	4*	319	198	3	347	198	4	222	101	3	425	270	3	535	345	3
25.00	281	160	3	309*	160*	4*	327	206	3	355	206	4	225	104	3	440	290	3	555	365	3
26.50	286	165	3	314*	165*	4*	335	214	3	363	214	4	256	107	4	440	290	3	555	365	3
28.00	291	170	3	319	170	4	343	222	3	371	222	4	259	110	4	460	305	3	580	385	3
30.00	296	175	3	324	175	4	351	230	3	379	230	4	263	114	4	460	305	3	580	385	3
31.50	301	180	3	329	180	4	360	239	3	388	239	4	266	117	4	480	320	3	610	410	3
31.75	306	185	3	334	185	4	369	248	3	397	248	4	269	120	4	480	320	3	610	410	3
33.50	334	185	4	372*	185*	5*	397	248	4	435	248	5	269	120	4	505	320	4	635	410	4
35.50	339	190	4	377*	190*	5*	406	257	4				272	123	4	530	340	4	665	430	4
37.50	344	195	4	382*	195*	5*	416	267	4				276	127	4	530	340	4	665	430	4
40.00	349	200	4	387*	200*	5*	426	277	4				317	130	5	555	360	4	695	460	4
42.50	354	205	4	392	205	5	436	287	4				320	133	5	555	360	4	695	460	4
45.00	359	210	4	397	210	5	447	298	4				323	136	5	585	385	4	735	490	4
47.50	364	215	4	402	215	5	459	310	4							585	385	4	735	490	4
50.00	369	220	4	407	220	5	470	321	4							605	405	4	765	510	4
50.80	374	225	4	412	225	5	475*	326*	4*												
53.00	412	225	5	479*	225*	6*	513*	326*	5*												
56.00	417	230	5	484*	230*	6*	518*	331*	5*												
60.00	422	235	5	489*	235*	6*	523*	336*	5*												
63.00	427	240	5	494*	240*	6*															
67.00	432	245	5	499	245	6															
71.00	437	250	5	504	250	6															
75.00	442	255	5	509	255	6															
76.50	447	260	5	514	206	6															
80.00	514	260	6																		
85.00	519	265	6																		
90.00	524	270	6																		
95.00	529	275	6																		
100.00	534	280	6																		
106.00	539*	285*	6*																		

* Guhring std.

Dimensions

Straight shank core drills

diameter up to incl. mm	DIN 344				
	overall length mm	flute length mm	diameter up to incl. mm	overall length mm	flute length mm
4.25	96*	64*	11.70	173	125
4.75	102*	69*	13.20	184	134
5.30	108	74	14.00	194	142
6.00	116	80	15.00	202	147
6.70	124	86	16.00	211	153
7.50	133	93	17.00	218	159
8.50	142	100	18.00	226	165
9.50	151	107	19.00	234	171
10.60	162	116	20.00	242	177

Shell-core drills

DIN 222		
nom. Ø up to incl. mm	overall length mm	nom. Ø of hole mm
35.5	45	13
45.0	50	16
53.0	56	19
63.0	63	22
75.0	71	27
90.0	80	32
101.6	90	40

Taper shank core drills

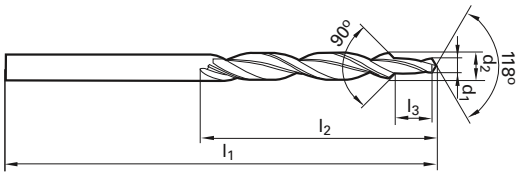
diameter up to incl. mm	DIN 343			DIN 1864		
	overall length mm	flute length mm	Morse taper	overall length mm	flute length mm	Morse taper
7.50	150*	69*	1*	174*	93*	1*
8.50	156*	75*	1*	181*	100*	1*
9.50	162	81	1	188	107	1
10.60	168	87	1	197	116	1
11.70	175	94	1	206	125	1
13.20	182	101	1	215	134	1
14.00	189	108	1	223	142	1
15.00	212	114	2	245	147	2
16.00	218	120	2	251	153	2
17.00	223	125	2	257	159	2
18.00	228	130	2	263	165	2
19.00	233	135	2	269	171	2
20.00	238	140	2	275	177	2
21.20	243	145	2	282	184	2
22.40	248	150	2	289	191	2
23.60	253	155	2	296	198	2
25.00	281	160	3	327	206	3
26.50	286	165	3	335	214	3
28.00	291	170	3	343	222	3
30.00	296	175	3	351	230	3
31.50	301	180	3	360	239	3
33.50	334	185	4			
35.50	339	190	4			
37.50	344	195	4			
40.00	349	200	4			
42.50	354	205	4			
45.00	359	210	4			
47.50	364	215	4			
50.00	369	220	4			

*Guhring std.

Micro-precision drills (total length 25 mm)

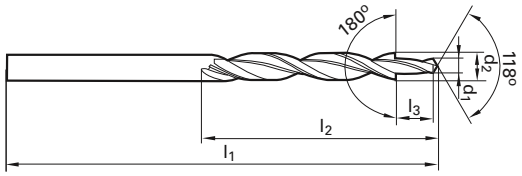
DIN 1899					
diameter up to incl. mm	shank Ø mm	flute length mm	diameter up to incl. mm	shank Ø mm	flute length mm
from 0.1 . . . 0.12	1.0	0.5	0.67	1.0	4.2
0.15	1.0	0.8	0.75	1.0	4.8
0.19	1.0	1.1	0.79	1.0	5.3
0.24	1.0	1.5	0.85	1.5	5.3
0.30	1.0	1.9	0.95	1.5	6.0
0.38	1.0	2.4	1.06	1.5	6.8
0.48	1.0	3.0	1.18	1.5	7.6
0.53	1.0	3.4	1.32	1.5	8.5
0.60	1.0	3.9	1.45	1.5	9.5

Straight shank subland drills, 90° step angle



body Ø d2 h8 mm	step Ø d1 h9 mm	overall length l1 mm	flute length l2 mm	step length l3 mm	for thread	range of application
HSS DIN 8378/ Carbide Guhring std.						
3.4	2.5	70	39	8.8	M 3	For tapping size holes to DIN 336 and countersinks in accordance with clearance holes to DIN-ISO 273 (old) and DIN EN 20273 »medial tolerance«.
4.5	3.3	80	47	11.4	M 4	
5.5	4.2	93	57	13.6	M 5	
6.6	5.0	101	63	16.5	M 6	
9.0	6.8	125	81	21.0	M 8	
11.0	8.5	142	94	25.5	M10	
13.5	10.2	160	108	30.0	M12	
DIN 8374 for countersinks, fine tolerance						
6.0	3.2	93	57	9.0	M 3	For clearance holes to DIN-ISO 273 (old), DIN EN 20273 »fine tolerance« and screwhead countersinks form A and B to DIN 74 part 1 (old) »fine tolerance« and screwhead countersinks to DIN 74 form F. For screws to DIN 963 (old) and DIN 964 (old).
8.0	4.3	117	75	11.0	M 4	
10.0	5.3	133	87	13.0	M 5	
11.5	6.4	142	94	15.0	M 6	
15.0	8.4	169	114	19.0	M 8	
19.0	10.5	198	135	23.0	M10	
Guhring std. for countersinks, medial tolerance						
6.6	3.4	101	63	9.0	M 3	For clearance holes to DIN-ISO 273 (old) and screwhead countersinks form A and B to DIN 74 part 1 (old) »medial tolerance«. For screws to DIN 963 (old) and DIN 964 (old).
9.0	4.5	125	81	11.0	M 4	
11.0	5.5	142	94	13.0	M 5	
13.0	6.6	151	101	15.0	M 6	
17.2	9.0	191	130	19.0	M 8	
DIN 8374 for countersinks, medial tolerance						
7.5	3.4	109	69	9.0	M 3	For clearance holes to DIN-ISO 273 (old) and screwhead countersinks form A and B to DIN 74 part 1 (old) »medial tolerance«. For screws to DIN 963 (old) and DIN 964 (old).
9.7	4.5	133	87	11.0	M 4	
12.0	5.5	151	101	13.0	M 5	
14.5	6.6	169	114	15.0	M 6	
19.9	9.0	198	135	19.0	M 8	

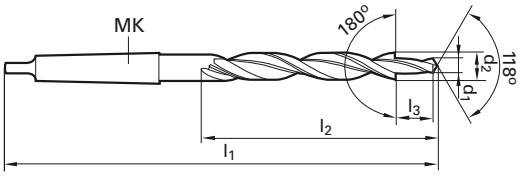
Straight shank subland drills, 180° step angle



body Ø d2 h8 mm	step Ø d1 h9 mm	overall length l1 mm	flute length l2 mm	step length l3 mm	for thread	range of application
HSS DIN 8376/ Carbide Guhring std.						
6.0**	3.4	93**	57**	9.0	M 3	For clearance holes to DIN-ISO 273 (old), DIN EN 20273 »medial tolerance«, screwhead countersinks to DIN 974-1 and screwhead countersinks form H, J and K to DIN 74 part 2 (old): »medial tolerance«. For screws to DIN 84 (old), 912 (old), 6912, 7513 and DIN 7984.
6.5	3.4	101	63	9.0	M 3	
8.0	4.5	117	75	11.0	M 4	
10.0	5.5	133	87	13.0	M 5	
11.0	6.6	142	94	15.0	M 6	
15.0	9.0	169	114	19.0	M 8	
18.0	11.0	191	130	23.0	M10	
Guhring std.						
6.0	3.2	93	57	9.0	M 3	For clearance holes to DIN-ISO 273 (old) and screwhead countersinks form H, J and K to DIN 74 part 2 (old): »fine tolerance«. For screws to DIN 84 (old), 912 (old), 6912, 7513 and DIN 7984.
8.0	4.3	117	75	11.0	M 4	
Guhring std. for countersinks, fine tolerance (old*)						
5.9	3.2	93	57	11.0	M 3	For screws to DIN 84 (old), DIN 912 (old) and DIN 6912. For old type screwhead countersinks form H, J and K to DIN 75 part 2: »fine tolerance«.
7.4	4.3	109	69	13.0	M 4	
9.4	5.3	125	81	16.0	M 5	
10.4	6.4	133	87	19.0	M 6	
13.5	8.4	160	108	22.0	M 8	
16.5	10.5	184	125	25.0	M10	
Guhring std. for countersinks, medial tolerance (old*)						
8.0	4.8	117	75	13.0	M 3	For screws to DIN 84 (old), DIN 912 (old) and DIN 6912. For old type screwhead countersinks form H, J and K to DIN 75 part 2: »medial tolerance«.
10.0	5.8	133	87	16.0	M 4	
11.0	7.0	142	94	19.0	M 5	
14.5	9.5	169	114	22.0	M 6	
17.5	11.5	191	130	25.0	M 8	

* DIN 75, part 2; ** Guhring std

Morse taper subland drills, 180° step angle

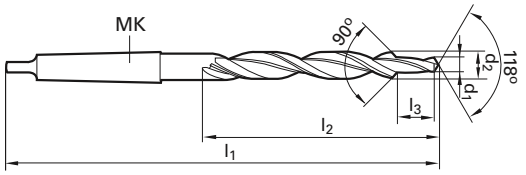


body Ø d2 h8 mm	step Ø d1 h9 mm	overall length l1 mm	flute length l2 mm	Morse taper MK	step length l3 mm	for thread	range of application
HSS DIN 8377/ Carbide Guhring std.							
10.0	5.5	168	87	1	13.0	M 5	For clearance holes to DIN-ISO 273 (old), DIN EN 20273 »medial tolerance«, screwhead countersinks to DIN 974-1 and screwhead countersinks form H, J and K to DIN 74 part 2 (old): »medial tolerance«. For screws to DIN 84 (old), 912 (old), 6912, 7513 and DIN 7984.
11.0	6.6	175	94	1	15.0	M 6	
15.0	9.0	212	114	2	19.0	M 8	
18.0	11.0	228	130	2	23.0	M10	
20.0	13.5	238	140	2	27.0	M12	
24.0	15.5	281	160	3	31.0	M14	
26.0	17.5	286	165	3	35.0	M16	
30.0	20.0	296	175	3	39.0	M18	
33.0	22.0	334	185	4	43.0	M20	
Guhring std.							
10.0	5.3	168	87	1	13.0	M 5	For clearance holes to DIN-ISO 273 (old) and screwhead countersinks form H, J and K to DIN 74 part 2 (old): »fine tolerance«. For screws to DIN 84 (old), 912 (old), 6912, 7513 and DIN 7984.
11.0	6.4	175	94	1	15.0	M 6	
15.0	8.4	212	114	2	19.0	M 8	
18.0	10.5	228	130	2	23.0	M10	
20.0	13.0	238	140	2	27.0	M12	
24.0	15.0	281	160	3	31.0	M14	
26.0	17.0	286	165	3	35.0	M16	
Guhring std. for countersinks, fine tolerance (old*)							
9.4	5.3	162	81	1	16.0	M 5	For screws DIN 84 (old), DIN 912 (old) and DIN 6912. For old countersinks form H, J and K to DIN 75 part 2: »fine tolerance«.
10.4	6.4	168	87	1	19.0	M 6	
13.5	8.4	189	108	1	22.0	M 8	
16.5	10.5	223	125	2	25.0	M10	
19.0	13.0	233	135	2	28.0	M12	
23.0	15.0	253	155	2	30.0	M14	
25.0	17.0	281	160	3	33.0	M16	
28.0	19.0	291	170	3	36.0	M18	
31.0	21.0	301	180	3	39.0	M 20	
Guhring std. for countersinks, medial tolerance (old*)							
10.0	5.8	168	87	1	16.0	M 5	For screws DIN 84 (old), DIN 6912. For old countersinks form H, J and K to DIN 75 part 2: »medial tolerance«.
11.0	7.0	175	94	1	19.0	M 6	
14.5	9.5	212	114	2	22.0	M 8	
17.5	11.5	228	130	2	25.0	M10	
20.0	14.0	238	140	2	28.0	M12	
24.0	16.0	281	160	3	30.0	M14	
26.0	18.0	286	165	3	33.0	M16	
29.0	20.0	296	175	3	36.0	M18	
33.0	23.0	334	185	4	39.0	M20	

inch	mm	inch	mm	inches	mm	inches	mm	MK	inches	mm	for thread	range of application
British Standard												
19/32	15.08	25/64	9.92	8 5/8	219	4 3/4	121	2	3/4	19.05	3/8 inch	For British Standard caphead screws.
21/32	16.67	29/64	11.51	8 3/4	222	4 7/8	124	2	7/8	22.22	7/16 inch	
25/32	19.84	33/64	13.10	9 3/8	238	5 1/2	140	2	1	25.40	1/2 inch	

* DIN 75, part 2

Morse taper subland drills, 90° step angle

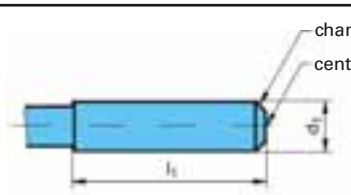


body Ø d2 h8 mm	step Ø d1 h9 mm	overall length l1 mm	flute length l2 mm	Morse taper MK	step length l3 mm	for thread	range of application
Guhring std.							
11.0	5.5	175	94	1	13.0	M 5	For clearance holes to DIN-ISO 273 (old), DIN EN 20273 »medial tolerance«, screwhead countersinks to DIN 74 form F and screwhead countersinks form A and B to DIN 74 part 1 (old) »medial tolerance«. For screws to DIN 963 (old) and DIN 964 (old).
13.0	6.6	182	101	1	15.0	M 6	
17.2	9.0	228	130	2	19.0	M 8	
21.5	11.0	248	150	2	23.0	M10	
26.0	14.0	286	165	3	27.0	M12	
29.0	16.0	296	175	3	31.0	M14	
DIN 8375							
12.0	5.5	182	101	1	13.0	M 5	For clearance holes to DIN-ISO 273 (old), DIN EN 20273 »medial tolerance«, screwhead countersinks to DIN 74 form F and screwhead countersinks form A and B to DIN 74 part 1 (old) »medial tolerance«. For screws to DIN 963 (old) and DIN 964 (old).
14.5	6.6	---	108	1	15.0	M 6	
19.0	9.0	253	135	2	19.0	M 8	
23.0	11.0	248	155	2	23.0	M10	
Guhring std.							
11.5	6.4	175	94	1	15.0	M 6	For clearance holes to DIN-ISO 273 (old) and screwhead countersinks form A and B to DIN 74 part 1 (old) »fine tolerance«. For screws to DIN 963 (old) and DIN 964 (old).
15.0	8.4	212	114	2	19.0	M 8	
19.0	10.5	233	135	2	23.0	M10	
23.0	13.0	253	155	2	27.0	M12	
26.0	15.0	286	165	3	31.0	M14	
30.0	17.0	296	175	3	35.0	M16	
DIN 8379							
9.0	6.8	162	81	1	21.0	M 8	For tapping size holes to DIN 336, DIN EN 20273 »medial tolerance« and countersinks in accordance with clearance holes to DIN-ISO 273 (old).
11.0	8.5	175	94	1	25.5	M10	
13.5	10.2	189	108	1	30.0	M12	
15.5	12.0	218	120	2	34.5	M14	
17.5	14.0	228	130	2	38.5	M16	
20.0	15.5	238	140	2	43.5	M18	
22.0	17.5	248	150	2	47.5	M20	

High speed steel straight shanks, DIN 1835-1 (extract)

Form A, plain

Dimensions in mm

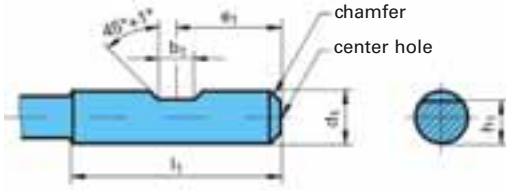


d_1 h8	l_1 +2 0	d_1 h8	l_1 +2 0	d_1 h8	l_1 +2 0
3	28	12	45	50	80
4	28	16	48	63	90
5	28	20	50		
6	36	25	56		
8	36	32	60		
10	40	40	70		

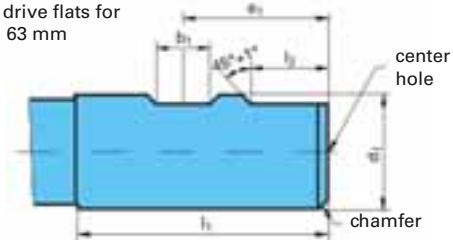
Form B, with drive flat

Dimensions in mm

with **one** drive flat for d_1 = 6 ... 20 mm



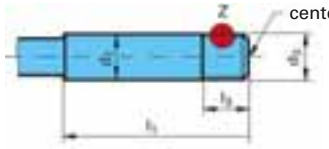
with **two** drive flats for d_1 = 25 ... 63 mm



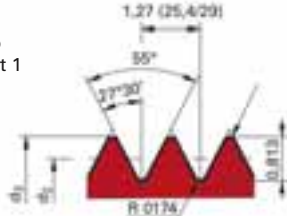
d_1 h6	b_1 +0.05 0	e_1 0 -1	h_1 h13	l_1 +2 0	l_2 +1 0	center hole form R DIN 332 sect. 1
6	4.2	18	4.8	36	-	1.6x2.5
8	5.5	18	6.6	36	-	1.6x3.35
10	7	20	8.4	40	-	1.6x3.35
12	8	22.5	10.4	45	-	1.6x3.35
16	10	24	14.2	48	-	2.0x4.25
20	11	25	18.2	50	-	2.5x5.3
25	12	32	23	56	17	2.5x5.3
32	14	36	30	60	19	3.15x6.7
40	14	40	38	70	19	3.15x6.7
50	18	45	47.8	80	23	3.15x6.7
63	18	50	60.8	90	23	3.15x6.7

Form D, threaded shank

Dimensions in mm



detail Z
(cross section)
thread profile to
DIN ISO 228 part 1

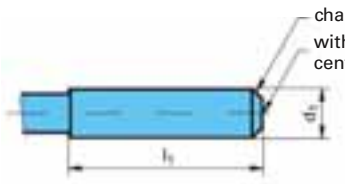


d_1 h8	d_3	tol. zone	d_2	tol. zone	l_1 +2 0	l_3 +2 0	center hole form R DIN 332 sect. 1
6	5.9	0 -0.1	5.087	0 -0.1	36	10	1.6 x 2.5
10	9.9	0 -0.1	9.087	0 -0.1	40	10	1.6 x 3.35
12	11.9	0 -0.1	11.087	0 -0.1	45	10	1.6 x 3.35
16	15.9	0 -0.1	15.087	0 -0.1	48	10	2.0 x 4.25
20	19.9	0 -0.15	19.087	0 -0.15	50	15	2.5 x 5.3
25	24.9	0 -0.15	24.087	0 -0.15	56	15	2.5 x 5.3
32	31.9	0 -0.15	31.087	0 -0.15	60	15	3.15 x 6.7

Carbide straight shanks for twist drills and end mills

Form HA, plain

Dimensions in mm

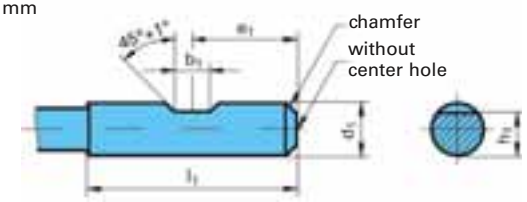


d_1 h6	l_1 +2 0	d_1 h6	l_1 +2 0
2	28	14	45
3	28	16	48
4	28	18	48
5	28	20	50
6	36	25	56
8	36	32	60
10	40		
12	45		

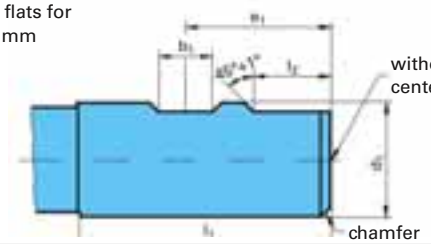
Form HB, with drive flat

Dimensions in mm

with **one** drive flat for d_1 = 6 and 20 mm



with **two** drive flats for d_1 = 25 and 32 mm

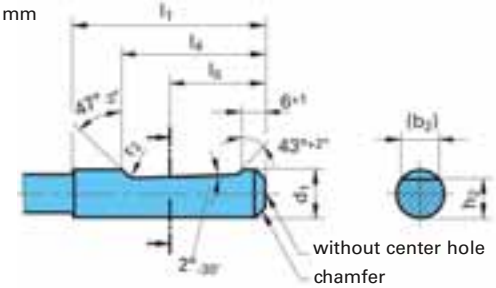


d_1 h6	b_1 +0.05 0	e_1 0 -1	h_1 h11	l_1 +2 0	l_2 +1 0
6	4.2	18	5.1	36	–
8	5.5	18	6.9	36	–
10	7	20	8.5	40	–
12	8	22.5	10.4	45	–
14	8	22.5	12.7	45	–
16	10	24	14.2	48	–
18	10	24	16.2	48	–
20	11	25	18.2	50	–
25	12	32	23	56	17
32	14	36	30	60	19

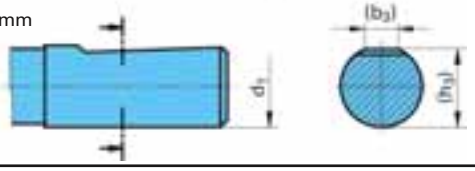
Form HE, with whistle notch flat without coolant ducts*

* Design: Straight shanks to DIN 6335 are available with or without oil feed holes. Applications for various tools, dimensions and position of oil feed holes are fully described within the standard range sections.

for d_1 = 6 to 20 mm



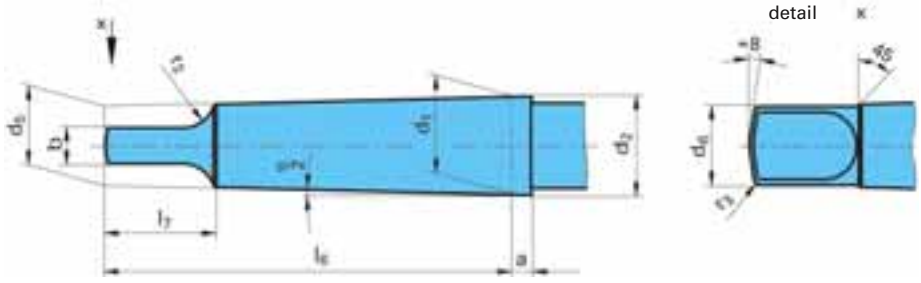
for d_1 = 25 and 32 mm



d_1 h6	(b_2) ≈	(b_3)	h_2 h11	(h_3)	l_1 +2 0	l_4 0 -1	l_5 nom. size	r_2 min.
6	4.3	–	5.1	–	36	25	18	1.2
8	5.5	–	6.9	–	36	25	18	1.2
10	7.1	–	8.5	–	40	28	20	1.2
12	8.2	–	10.4	–	45	33	22.5	1.2
14	8.1	–	12.7	–	45	33	22.5	1.2
16	10.1	–	14.2	–	48	36	24	1.6
18	10.8	–	16.2	–	48	36	24	1.6
20	11.4	–	18.2	–	50	38	25	1.6
25	13.6	9.3	23.0	24.1	56	44	32	1.6
32	15.5	9.9	30.0	31.2	60	48	35	1.6

Morse taper shanks DIN 228 part 1 (extract)

Form B, Morse taper with tang

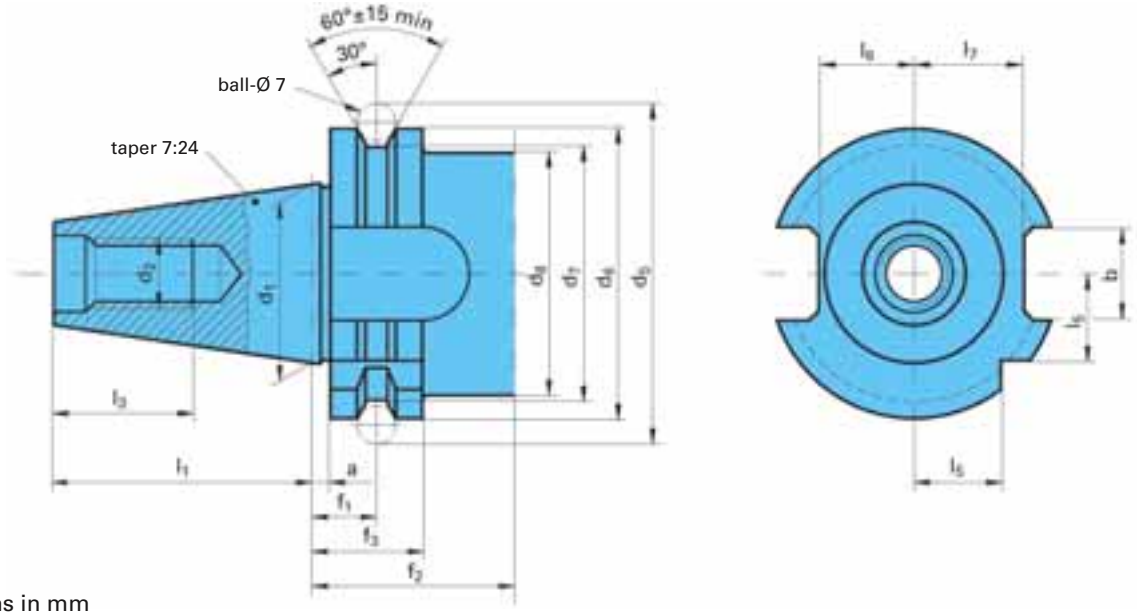


Dimensions in mm

shank to DIN 228 form B size	a limiting dim.	b	d_1	d_2 ≈	d_5 ≈	d_6 max.	l_6 0 -1	l_7 max.	r_2 max.	r_3 ≈	$\frac{\alpha}{2}$
MT 1	3.5 +1.4 0	5.2	12.065	12.2	9.0	8.7	62	13.5	5	1.2	1°25´43´´
MT 2	5.0 +1.4 0	6.3	17.780	18.0	14.0	13.5	75	16	6	1.6	1°25´50´´
MT 3	5.0 +1.7 0	7.9	23.825	24.1	19.1	18.5	94	20	7	2	1°26´16´´
MT 4	6.5 +1.9 0	11.9	31.267	31.6	25.2	24.5	117.5	24	8	2.5	1°29´15´´
MT 5	6.5 +1.9 0	15.9	44.399	44.7	36.5	35.7	149.5	29	10	3	1°30´26´´

ISO tapers for automatic tool change, DIN 69871 (extract)

Form A, with gripper groove, without through hole



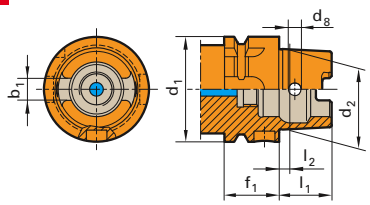
Dimensions in mm

ISO taper no.	a ±0.1	b H12	d_1	d_2	d_5 ±0.05	d_6 0 -0.1	d_7 0 -0.5	d_8 max.	f_1 ±0.1	f_2 min.	f_3 0 -0.1	l_1 0 -0.3	l_3 min.	l_5 0 -0.3	l_6 0 -0.4	l_7 0 -0.4
30	3.2	16.1	31.75	M12	59.3	50.00	44.30	45	11.1	35	19.1	47.8	24	15	16.4	19
40	3.2	16.1	44.45	M16	72.3	63.55	63.55	50	11.1	35	19.1	68.4	32	18.5	22.8	25
45	3.2	19.3	57.15	M20	91.35	82.55	82.55	63	11.1	35	19.1	82.7	40	24	29.1	31.3
50	3.2	25.7	69.85	M24	107.25	97.50	97.50	80	11.1	35	19.1	101.75	47	30	35.5	37.7

General overview of HSK shanks ISO 12164-1/DIN 69893

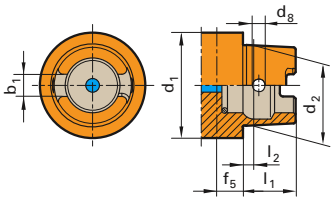
Form A DIN 69893 part 1

HSK-sizes 32...160



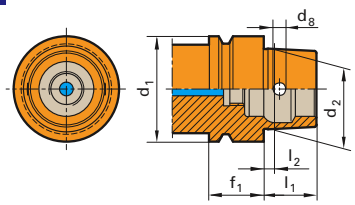
Form C DIN 69893 part 1

HSK-sizes 32...160



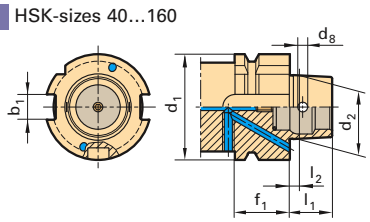
Form E DIN 69893 part 5

HSK-sizes 25...63



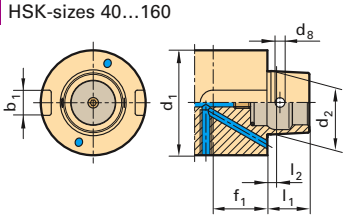
Form B DIN 69893 part 2

HSK-sizes 40...160



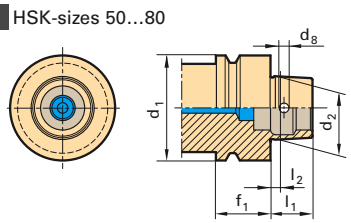
Form D DIN 69893 part 2

HSK-sizes 40...160



Form F DIN 69893 part 6

HSK-sizes 50...80



HSK for automatic tool change with gripper groove and index notch. Manual operation is via access hole in taper. Form B relies on driving dogs on the joint face as shank isn't slotted. Torque is transmitted through highly accurate connnection.

HSK for manual tool change. Operation is via access hole in taper. Form D relies on driving dogs on the joint face as shank isn't slotted. Torque is transmitted through highly accurate connnection.

HSK for automatic tool change. Torque is transmitted through highly accurate connnection. Version with access hole acc. to DIN 69893-1 by arrangement.

HSK form A C E								
Nominal Ø d_1 mm	d_2 mm	l_1 mm	l_2 mm	f_1 mm	f_5 mm	d_8 mm	b_1 mm
25	19.000	13	2.5	10	-	-	-
32	24.007	16	3.2	20	10.0	4.0	7.05
40	30.007	20	4.0	20	10.0	4.6	8.05
50	38.009	25	5.0	26	12.5	6.0	10.54
63	48.010	32	6.3	26	12.5	7.5	12.54
80	60.012	40	8.0	26	16.0	8.5	16.04
100	75.013	50	10.0	29	16.0	12.0	20.02
125	95.016	63	12.5	29	-	-	25.02
160	120.016	90	16.0	31	-	-	30.02

HSK form B D F							
Nominal Ø d_1 mm	d_2 mm	l_1 mm	l_2 mm	f_1 mm	d_8 mm	b_1 mm
25	-	-	-	-	-	-
32	-	-	-	-	-	-
40	24.007	16	3.2	20	4.0	10
50	30.007	20	4.0	26	4.6	12
63	38.009	25	5.0	26	6.0	16
80	48.010	32	6.3	26	7.5	18
100	60.012	40	8.0	29	8.5	20
125	75.013	50	10.0	29	12.0	25
160	95.016	63	12.5	31	12.0	32

Because the rotational speed is the largest influencing factor together with the limits regarding the spindle or spindle bearing interface, the following r.p.m. limits for HSK interfaces have been recommended as guidelines within the HSK standards:

HSK-A/C 32	to 50.000 rev./min
HSK-A/C 40	to 42.000 rev./min
HSK-A/C 50	to 30.000 rev./min
HSK-A/C 63	to 25.000 rev./min
HSK-A/C 80	to 20.000 rev./min
HSK-A/C 100	to 16.000 rev./min

Dry machining and minimal quantity lubrication (MQL)

Dry machining and minimal quantity lubrication (MQL) are important current technologies with the aim of reducing production costs. Guhring has invested heavily in these technologies and developed tools as well as tool holders with optimal geometries for this type of machining. An observation of the thermal conditions at the tool and the workpiece was therefore extremely important.

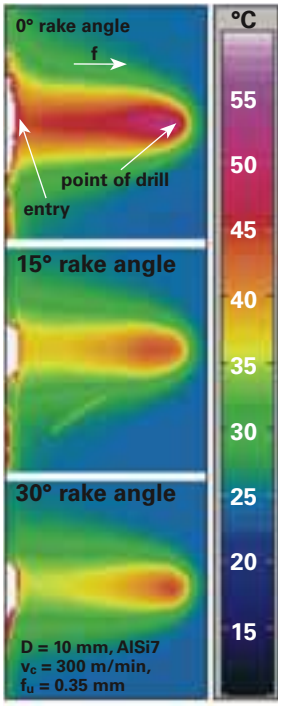
Basic observations

Because with dry and MQL machining, any generated heat is not dissipated via coolant like with conventional wet machining, the design of the optimised tool must ensure that

- heat generation is minimised during the machining process (i.e. through sharp cutting edges and a positive rake angle whilst increasing the cutting parameters),
- friction is minimised (i.e. through a width reduction of the leading margins in comparison to the wet tool and increasing the back taper of the tool),
- heat transfer between chip and tool is reduced (i.e. through heat insulating hard coatings and polished tool surfaces to reduce the friction between chip and face),
- heat transfer between chip and workpiece is reduced (i.e. through improved chip evacuation from the hole or from the workpiece surface respectively).

Influence of rake angle on temperature

To examine this parameter, Guhring produced three drilling test tools in 10 mm diameter for a drilling depth of 100 mm. The tools were geometrically the same, however, the tools had different spirals and subsequently different rake angles. The test tools had 0° (i.e. straight-fluted), 15° and 30° rake angles. The internal coolant duct diameter of the tools was identical.



Using a thermal imaging camera, the heat generated during the machining of a hole in Al-alloy AlSi7 was taken in real time and documented. The sheets applied for the test had a thickness of 14.00 mm and were drilled on the face so that the remaining residual wall between the hole and thermo-graphic examination of the sheet surface was 2.00 mm. Using the above test layout it was possible to make a qualitative analysis of the heat generated by the individual tools.

The thermal imaging of the tool point show a clear connection between the rake angle and the heat generated. A positive rake angle resulted in a clearly lower temperature being generated in the shear zone of the chip, because with a tool with a 30° helix the chip only requires deflecting by 60° (reduced shearing action), whilst the chip deflection for a straight-fluted tool is 90° (increased shearing action).

The heat generated in the shear zone directly enters the process as cutting heat. A shorter chip transfers less frictional heat to the tool due to a smaller contact area on the flute surface resulting in improved temperature conditions

In addition, the chipflow was recorded using a high-speed camera. With the cutting parameters v_c = 300 m/min and f = 0.35 mm/rev., distinct differences were apparent regarding the chip evacuation and the process heat. Chip evacuation, i.e. the continuous transportation of chips from the hole, improved when the helix angle of the tool was increased.

This is primarily due to a positive geometry and the resulting improved chip fracture, providing a shorter shearing chip that, due to its improved surface-volume-relationship, can be evacuated from the hole with greater ease and is less prone to jamming in the flute.

Thanks to considerably improved chip evacuation and comparatively lower process temperatures, spiral-fluted tools play an important role in the increased process reliability in dry machining and MQL applications.

However, the application of straight-fluted drills can be of advantage for the machining of aluminium and cast iron materials, where the demand for hole quality (improved roundness and reduced run-out) is high. This is because straight-fluted tools generally possess four leading margins. In addition, the temperature profile of straight-fluted drilling tools can be reduced by an optimised, geometric design of the coolant ducts to an extent that the thermal disadvantage in comparison to spiral drilling tools is compensated to a large degree.

Dry machining and minimal quantity lubrication (MQL)

Influence of friction on the process temperature

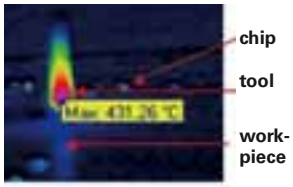
In an additional, three-part test, holes were produced in spheroidal graphite iron GGG40. An identical test tool was applied for completely dry machining, MQL machining and machining with air cooling.

The test tool was a diameter 8.5 mm drill, optimised for MQL. The drilling depth was 42.00 mm. The cutting rates were v_c = 130 m/min and f = 0.26 mm/rev.

A thermo-graphic camera recorded the temperature at the point during the return stroke from the hole. A machining sequence of seven consecutive drilling operations was recorded for this purpose. From the first to the fifth hole a temperature increase at the point was recorded, however, following the fifth hole the maximum temperature at the point during the withdrawal process did not change (quasi stationary condition). For this reason the temperature of the drill was always recorded following the seventh hole.

Consequently, this temperature is lower than that occurring at the point of the drill during the cutting process. Measuring with thermal elements below the face and just behind the cutting lip have shown that temperatures up to 900° C can occur in this area. However, the temperature comparison carried out in this test is admissible because the measurement was always taken at the same point in time.

WITHOUT



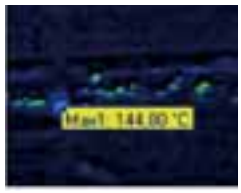
During a completely dry application, the temperature at the point of the drill reached a maximum 431° C. This temperature does not pose a particular problem for modern tool materials and hard coatings, even a completely dry application offers process reliability.

However, the diffusion and adhesion wear mechanisms both accelerate at higher temperature levels, which in turn reduces tool life. Furthermore, an increased level of heat can lead to a thermal expansion of the workpiece, that in turn can jeopardise the close tolerance dimensions if the suitability of the machining strategy is not observed. In addition, with steel machining it can come to fringe zone hardening of the hole wall, making follow-up operations such as tapping or reaming more difficult.

AIR

In the second test, the heat measured at the point of the drill with internal air cooling was 196° C, evidence that the flow of air dissipates a considerable amount of the generated heat. In addition, chip evacuation was considerably improved, confirming that in contrast to completely dry machining the spiral flute of a drilling tool alone is not sufficient for an optimal chip evacuation.

MQL



Under similar test conditions, the heat measured at the point of the drill applied with MQL, i.e. air mixed with small quantities of oil, was only 145° C. An oil volume of only 30 ml/h could not be regarded a major contributing factor in the cooling process, therefore, it must be presumed that the small quantities of oil mixed with air caused a considerable reduction in friction. It also confirms, in contrast to pure air cooling, a further increase in speed of chip evacuation. The lower chip temperature, in comparison to pure air cooling, is further clear evidence of oil reaching the effective area and improving chip evacuation from the face thanks to improved friction characteristics.

Dry machining

Dry machining dispenses with the use of coolant entirely resulting in savings in various areas. For example, less expensive tools without internal coolant ducts can be applied. Furthermore, machines and tool holders suffice without elaborate coolant delivery techniques and obviously there are no longer the costs of coolant and their disposal. Coolant does not have to be removed from components and the surrounding machine area.

Without lubrication, the heat generated during the machining process must be kept to a minimum and dissipated solely via the chip. Otherwise, tool and workpiece are exposed to excessive heat, resulting in increased wear to the tool and hardening of the hole surface in the workpiece. Suitable coatings can prevent overheating of the tool. However, excessive heat to the workpiece can only be achieved by a

good chip evacuation, whereby the tool geometry also plays an important role. Short chips, large flutes with polished surfaces – possibly MolyGlide-coated – can provide the solution.

In a few dry machining applications, air is used for cooling. Obviously, tools with coolant ducts are applied, through which air is delivered to the hole. Air not only cools tool and workpiece, but under the correct pressure also improves chip evacuation.

Interestingly, dry and HSC machining do not exclude one another, as one would expect. On the contrary, modern carbide drills and coatings allow so-called dry HSC – dry high speed machining, combining the advantages of the two machining trends, as for example, a reduction in production costs in certain applications.

Minimal quantity lubrication MQL

MQL or minimal quantity lubrication works with an air-lubricant-mixture, that only contains a small part of lubricant.

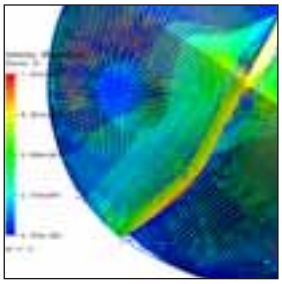
In the past, the technology of minimal quantity lubrication was generally applied on the own initiative of the user, in order to reduce costs. Often, tools for wet machining were simply applied under MQL conditions. With this approach, the limits of the tools' efficiency were reached very quickly and it became clear that a mere substitution of the lubricant was not a targeted approach.

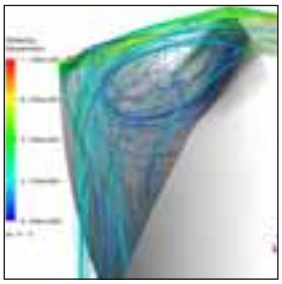
A professional approach during the design of MQL suitable tools nowadays allows considerable performance increases whilst maintaining process reliability. Hereby, all the drill's relevant attributes for providing efficiency and process reliability, from the cutting edge to the flute as well as the shank end, are adapted to satisfy the special demands of MQL. As well as the choice of carbide, this also includes the special tool geometry, the tool coating and the design of the shank end for MQL drills.

To optimise drills for the MQL technology, Guhring is increasingly applying the Finite-Element-Method (FEM). FEM allows the dimensioning and optimisation of the tools during the design phase. The flute in the area directly behind the cutting edge has the task to mould the chip in order to break it as small as possible. In the rear area its task is to evacuate the chip as quickly as possible. These tasks apply to wet machining, minimal quantity lubrication as well as dry machining. With minimal quantity lubrication and dry machining, however, it is extremely important to provide the chip with minimal frictional resistance in the rear area, in order to ensure a problem-free chip evacuation. This is aided by an optimised flute form as well as a specially polished fute surface.

Flute design to suit MQL

With the assistance of the aforementioned FEM-analysis, it is possible to simulate the flow resistance of a flute with chip, subsequently providing optimised flute forms for different material classes. The following image shows a flow optimised flute form and point design, providing optimal chip flow and also minimising the thermal load of the cutting edge thanks to an optimised throughflow of the point area and the flute by the MQL aerosol.





In addition, improved chip evacuation and therefore increased process reliability is provided by a MQL-suitable coating. Guhring has developed a double coating, consisting of a hard coating with an additional soft coating, MolyGlide. Tests confirm a considerably higher chip evacuation speed for the MQL tool with the above coating in comparison with conventional tools.

Coolant delivery to suit MQL

Because an extremely low volume of lubricant is applied with minimal quantity lubrication, the delivery of these low coolant quantities to the effective area is of utmost importance. Hereby, the geometric design of the shank end is of main significance for a safe delivery of the lubricant.

Dry machining and minimal quantity lubrication (MQL)

In order to satisfy the demand for more efficiency and process reliability with MQL drilling operations, Guhring has examined the design of the shank end and subsequently the coolant delivery in great detail.

Due to the low volumes of coolant involved, it is important that four basic demands are met in the design stage.

- minimal dead areas that could lead to consolidation of coolant
- sealed coolant transfer surface between shank end and delivery screw preventing the escape of coolant in the clamping area of the chuck or in the internal areas of HSK (preventing swarf deposits that could lead to concentricity errors following the next tool change).
- simple handling
- cost-effective production

The technologies applied in the design solution of a MQL suitable shank end are based on spray tests as well as computer based simulation programs. CAD-CFD combination has proved to be an especially effective technology. CFD (Computational Fluid Dynamics) assists in determining flow fields. The final choice of suitable shank end is confirmed by spray tests.

Via CAD-CFD and spray tests Guhring has examined four different shank ends and the corresponding adjustment screws regarding their efficiency:

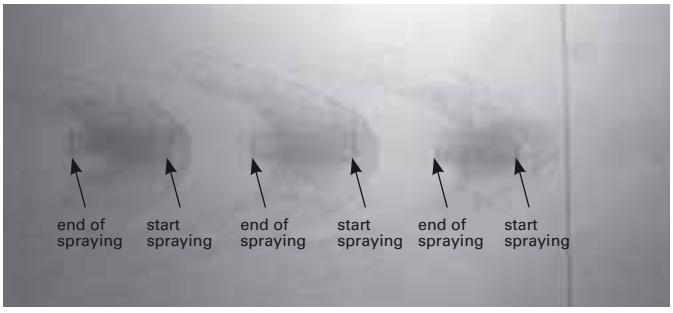
1. Plain shank end without groove with plain screw (left)
2. Plain shank end with sickle-shaped groove to connect the two coolant ducts with plain screw (second from left).
3. Conical shank end with circular groove and taper screw (second from right)
4. Recessed shank end (labyrinth seal) without connection groove with corresponding screw (including indexing facility for orientation of coolant ducts, right)

In intermittent spray tests the different shank ends were examined regarding coolant consolidation in the clamping area of the tool shank and inside the HSK. A test period of one hour with intervals of 5 seconds spraying with a spindle speed of 10,000 rev./min and 2 seconds dry running with a stationary spindle provided the following results for the four examined shank ends:

re.: 1. and 2.: Heavy oil contamination in clamping area and inside HSK.
re.: 3. and 4.: No oil contamination in clamping area and inside HSK

The conical shank end and the shank end with labyrinth seal proved to possess optimal sealing characteristics.

In a second test, the various shank ends were examined regarding response time and the conveyed volume accuracy of the transferred cooling agent. A slotted pipe was fitted at an angle into the working area of the machine tool. The tool was inserted into the slot. During a Z/Y travel sequence the MQL delivery was switched on and off. The internal area of the pipe was fitted with blotting paper to collect the flow of coolant. The blotting paper was then removed to examine the spray pattern.



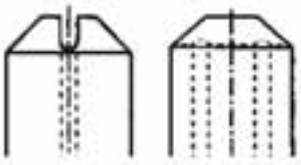
Layed flat, the blotting paper shows a geometry dependent parabolic spray pattern. By analysing the spray pattern at the beginning and at the end of the test whilst simultaneously observing the axis stabilisation signal for the machine tool axes it is possible to calculate the reaction time of the various shank end design solutions.

There are clear differences dependent on the shank end design. Furthermore, through the spray volume shown in a broader spray pattern, it is possible to deduce the conveyed volume during the spray period.

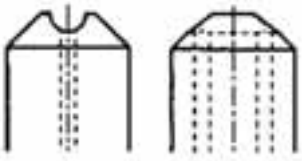
By the way, with Guhring's new measuring instrument MQL-Check 3000 it is possible to evaluate the MQL aerosol flow characteristics of tools quantitatively and time-resolved. The measuring instrument provides the user with reliable data to adapt the air pressure and the lubricant content of the MQL aerosol to the process.

Both findings (spray pattern and reaction time) show the conical shank end and the shank end with labyrinth seal to be superior to those with plain shank end. Subsequently, only the conical shank end and the shank end with labyrinth seal were deemed suitable for further examination and optimisation.

With the assistance of a CFD analysis, the form and size of the connection slot at the shank end were examined. The picture on the left shows the flow profile within the connection shank end – adjustment screw for a conical shank end. Various slot forms were analysed.

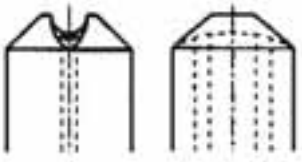


A: Narrow slot with rounded base



B: Wide slot with rounded base

C: Wide slot with round-convex base



D: Wide slot with convex base

Spray patterns were also produced for the above slot forms, showing a tendency to solution B. However, the variations were marginal but the CFD analysis showed a clearer picture.

Because a vector analysis is carried out for the flow, it is possible to analyse the flow pattern according to the direction of flow. Hereby, the speed vectors are examined for forward and reverse flow. Any turbulence formation has a forward and reverse flow. Often, turbulence occurs in dead areas. At this point totally opposing statements can be made for single and two coolant duct systems.

Whilst dead areas in single coolant duct systems lead the medium to be deposited on the wall and separating thanks to the flow speed within the turbulence, dead areas in two coolant duct systems are areas requiring to be filled before the medium can continue. Based on the produced flow patterns, conical shank end B with wide connection slot and rounded base proved to be the optimal solution.

An analysis of the two requirements “simple handling” and “cost-effective production” painted a similar picture. The following table shows the respective evaluation, whereby the data refers to the shank end and the corresponding screw. Relevant features for process reliability, such as “minimal dead areas” and being “leakproof” provide criteria for excluding the two versions with plain shank ends. Subsequently, the most favoured shank end is the one with a conical end and a wide slot with rounded base.

Shank end	Handling	Cost-effective production	Minimal dead areas geom. analysis	Leak-proof
Plain w/o slot	++	++	-	-
Plain w. sickle-shaped slot	++	+	-	-
Conical with slot	++	+	+	++
Recessed end with labyrinth seal	-	-	++	++

++ = very good properties, + = good properties, - = poor properties

The Guhring MQL system

A further decisive criteria for the process reliability of MQL tools is a problem-free system assembly. Guhring's solution is a recently developed MQL delivery system consisting of a one-piece delivery pipe with a thin-walled stainless steel pipe glued inside and a MQL adjustment screw.

The MQL pipe installed in conventional MQL systems is not optimally suited for a process reliable installation due to its high flexibility and its low thermal resistance. Therefore, Guhring uses a stainless steel pipe, eliminating the disadvantages mentioned above. Its large internal diameter also ensures improved flow conditions. The necessary radial flexibility of the coolant delivery pipe installed in the chuck is ensured because it is not glued along its entire length, only a few millimetres of its axial length at the base. Following the glued area, the bore is enlarged so that the coolant delivery pipe has radial flexibility. In addition, Guhring's MQL system provides access and also its axial adjustment at the shank end via hexagon screw.

Guhring has perfected every proposed design feature for an optimum MQL delivery including the design of MQL specific tools for its entire program ensuring the possibility of process reliable MQL operations with solid carbide tools. In addition, our GM300 program includes tool holders, clamping systems and accessories that are specifically designed to satisfy the requirements of MQL machining.

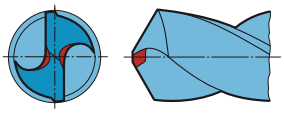
GUHRING

SPECIAL DRILLS

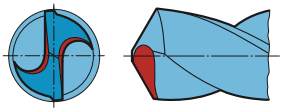
Although we probably offer the most comprehensive standard tool range, there are still applications that require special solutions. Customer specific special solutions are therefore also part of the Guhring program. Put us to the test with your special requirements – thanks to our know-how regarding geometries, tool materials and coatings we will surely convince you!

Special point geometry and manufacturing tolerances

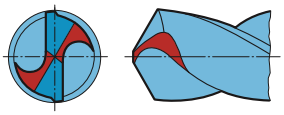
Special point geometry to DIN 1412 (extract; edition 03/01)



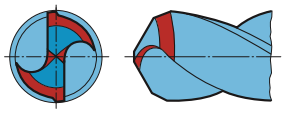
Form A
Thinned chisel edge



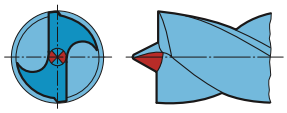
Form B
Thinned chisel edge with corrected cutting lips



Form C
Split point



Form D
Point ground for cast iron



Form E
Brad point (center point)

Twist drill manufacturing tolerances to DIN ISO 286, part 2

diameter (nominal size) up to and incl. mm	tolerance range mm h8	h7
0.38 ... 0.60	10	7
0.95	12	8
3.00	14	10
6.00	18	12
10.00	22	15
18.00	27	18
30.00	33	21
50.00	39	25
80.00	46	30
120.00	54	35

* If you need tolerances other than ISO h8 please let us know. Additional charges for closer diameter tolerance see additional charges at the end of chapter Drilling Tools.

Reference to other relevant standards

DIN 228	Part 1 machine tapers; Morse tapers and metric tapers, taper shank
DIN 1414-1	Directions for design and use for high speed steel twist drills
DIN 6580	Definitions of the metal-cutting industry; motions and geometry of the cutting process
DIN 6581	Definitions of the metal-cutting industry; Cutting portion reference systems and angles

The standard descriptions above are given with the permission from the German Standards Institute (Deutsches Institut für Normung). The most recent editions of the standard sheets apply and are available in DIN A 4 format from Beuth-Verlag GmbH, D-10787 Berlin.

HSS & HSCO specials production range options

Substrate HSS and HSCO (M2, M35, M42) *and Other Materials on request*
Solid and Coolant-Through
Flute Style Normal, High Helix, Low Helix, GT 100, GT 80, GT 50, Chipbreaker and Other Special Forms
Margin Single, Double, Triple, Full Cylindrical
Helix Angle 0° to 52°
Cutting Direction Right Hand or Left Hand
Reamers available in Left Hand Flute, Right Hand Cut, Equal or Unequal Flute Space

No.	Tool Description	Diameter		Overall length		Flute length	
		Inches	mm	Inches	mm	Inches	mm
01	Drills	3/64 - 3/4	1,00 - 19,05	37 1/2	950	31 1/2	800
		> 3/4 - 1 1/2	> 19,05 - 40,00	37 1/2	950	31 1/2	800
02	Three- & Four-Flute Drills	3/64 - 3/4	1,00 - 19,05	37 1/2	950	31 1/2	800
		> 3/4 - 1 1/2	> 19,05 - 40,00	37 1/2	950	31 1/2	800
03	Step Drills	3/32 - 1 9/16	2,38 - 40,00	27 3/4	710	24 1/2	620
04	Step Drill Reamers						
05	Step Core Drills						
06	Step Core Drill Reamers						
07	Reamers						
08	Step Reamers						
10	Subland Drills	1/8 - 1 1/2	3,175 - 40,00	27 3/4	710	19 3/4	500
11	Subland Drill Reamers						
12	Subland Core Drills						

Table for General Guidance only. Contact a GUHRING Territory Manager to confirm specifications and availability.

Carbide specials production range options

Substrate Carbide (P40, K10/K20, K40) *and Other Materials on request*
Solid, Coolant-Through and 2-Piece Construction
Flute Style Normal, High Helix, Low Helix, GT 100, GT 80, GT 50, RT 100, RT 150 (Straight), RT 80, GS 200 (Three) and Other Special Forms
Margin Single, Double, Full Cylindrical
Helix Angle 0° to 45°
Cutting Direction Right Hand or Left Hand
Reamers available in Left Hand Flute, Right Hand Cut, Equal or Unequal Flute Space

No.	Tool Description	Diameter		Overall length		Flute length	
		Inches	mm	Inches	mm	Inches	mm
01	Drills	5/64 - 51/64	2,00 - 20,00	17 11/16	450	15 23/32	400
		> 51/64 - 1	>20,00 - 25,40	15 23/32	400	13 49/64	350
02	Three- & Four-Flute Drills	1/8 - 51/64	3,175 - 20,00	37 1/2	450	31 1/2	400
		> 51/64 - 1	>20,00 - 25,40	15 23/32	400	13 49/64	350
03	Step Drills	3/32 - 51/64	2,38 - 20,00	17 11/16	450	15 23/32	400
04	Step Drill Reamers	> 51/64 - 1	>20,00 - 25,40	15 23/32	400	13 49/64	350
05	Step Core Drills						
06	Step Core Drill Reamers						
07	Reamers						
08	Step Reamers						
10	Subland Drills	1/8 - 51/64	3,175 - 20,00	37 1/2	450	31 1/2	400
11	Subland Drill Reamers	> 51/64 - 1	>20,00 - 25,40	15 23/32	400	13 49/64	350
12	Subland Core Drills						
	Gun Drills, Routers, End Mills, Diamond Inserts/Tooling	On request		On request		On request	

Table for General Guidance only. Contact a GUHRING Territory Manager to confirm specifications and availability.

Quote Request Form

GUHRING®

Date Received: _____ Quote #: _____ Date Due #: _____

Distributor: _____ Enduser: _____

_____ _____

Attn: _____ _____

RFQ #: _____ Attn: _____

Tool #: _____ Quantity: _____

Tool Description: _____

_____

_____ MT #: _____ Tang: ❒ Yes ❒ No

Nominal Diam.	Overall Length	Flute Length	Shank Diam.	Point
_____	_____	_____	_____	_____

Step _____ Length _____ Angle _____ Meas _____
Step _____ Length _____ Angle _____ Meas _____
Step _____ Length _____ Angle _____ Meas _____
Step _____ Length _____ Angle _____ Meas _____

Material to Cut: _____
Hardness (Rc or Bhn): _____
Condition: _____

Hole Diameter: _____
Hole Tolerance: _____
Depth of Cut: _____
Location Tolerance: _____
Straightness: _____
Hole Finish: _____

Hole Type:
❒ Drill ❒ Core ❒ Ream
❒ Drill-Countersink ❒ Drill-Bore ❒ Drill-Drill
❒ Drill-Ream ❒ Other _____

Bushing: ❒ Yes ❒ No
Hole description: ❒ Blind ❒ Through ❒ Pre-drilled
❒ Interrupted ❒ Cast hole
Approach: ❒ Horizontal ❒ Vertical
Other: _____

Rigid Setup: ❒ Yes ❒ No ❒ Somewhat
Turning: ❒ Tool ❒ Part ❒ Both
Coolant: ❒ Flood ❒ Through-the-spindle ❒ None
Flexible S & F: ❒ Yes ❒ No
Limits: _____

Comments: _____

_____

_____

_____

_____

_____

A brief introduction to the subject of deep hole gun drilling

In the machining world, drilling depths of 10 x D and deeper are regarded as deep hole drilling operations, whereby smaller drilling depths can naturally also be produced with gun drills. Advantage is taken of the positive side effects, as for example good surface quality, low deviation from concentricity and optimised alignment accuracy.

High pressure cooling -
has become a matter of course.

In recent years, internal cooling has established itself for all drilling tools. Coolants are now living up to their name and being supplied via coolant ducts to where they are urgently required. Considerable improvements in tool life and less breakages have been achieved by this measure for twist drills, taps etc.

Every conventional machine tool currently on the market can be supplied with high pressure internal cooling and is therefore also suitable for deep hole drilling.

The share of gun drills on machining centres, lathes etc. is forever gaining more importance. The process is therefore increasing in popularity in the machining world.

STOP

All gun drills must have support for the pilot hole.

Gun drills must never operate at full speed without support in the machine shop.

Deep hole drilling is not a closed book, but can be mastered by anybody as long as certain conditions are adhered to.

Recommended cutting rates for the application of Guhring gun drills can be found on the pages for the individual types!

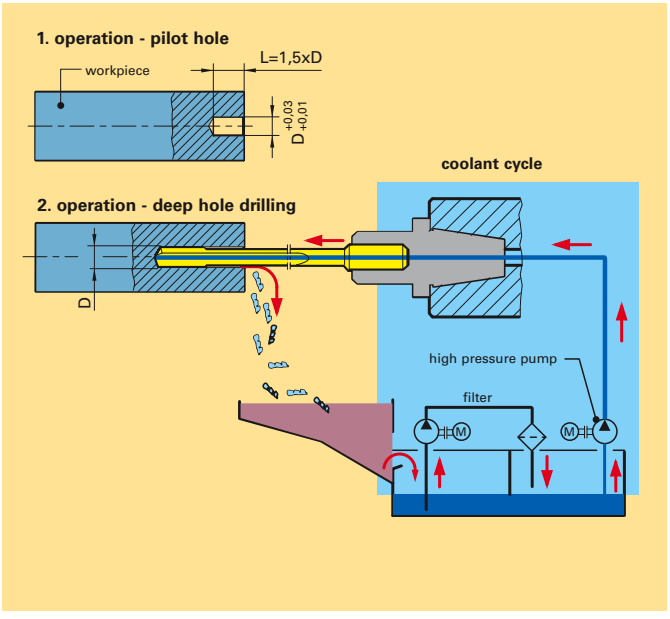
Typical procedure with all gun drills on conventional machine tools:

- production of pilot hole (tol. H8). Enter at low revolutions, approx. 200 rev./min, feed rate approx. 500 mm/min.
- setting coolant pressure and speed.
- continuous drilling to complete hole depth without wood pecking.
- switch off coolant supply after reaching hole depth.
- rapid withdrawal with stationary spindle.

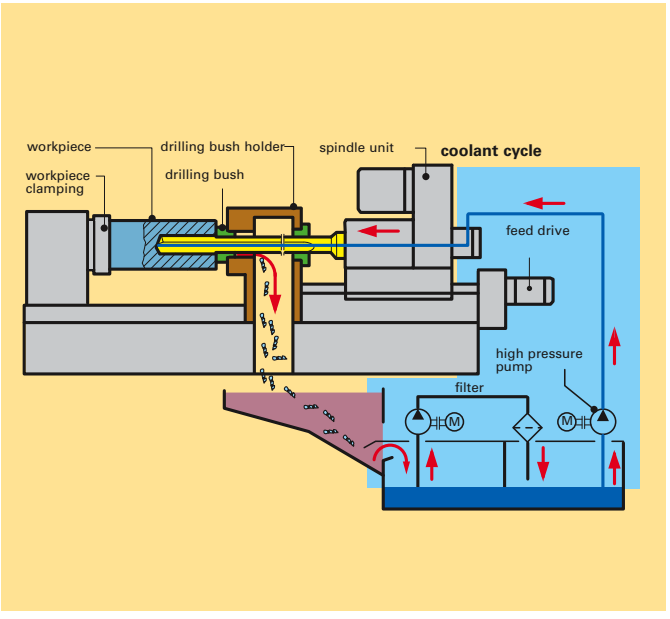
Application advice

- 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.
- For machining of long-chipping materials we recommend the use of gun drills with polished flutes.
- Single-fluted gun drills for long-chipping aluminium should be supplied with point grind 180° and coolant chamber.
- Generally we recommend the use of soluble oil with a minimum oil content of 10 %.

Deep hole drilling on conventional machine tools

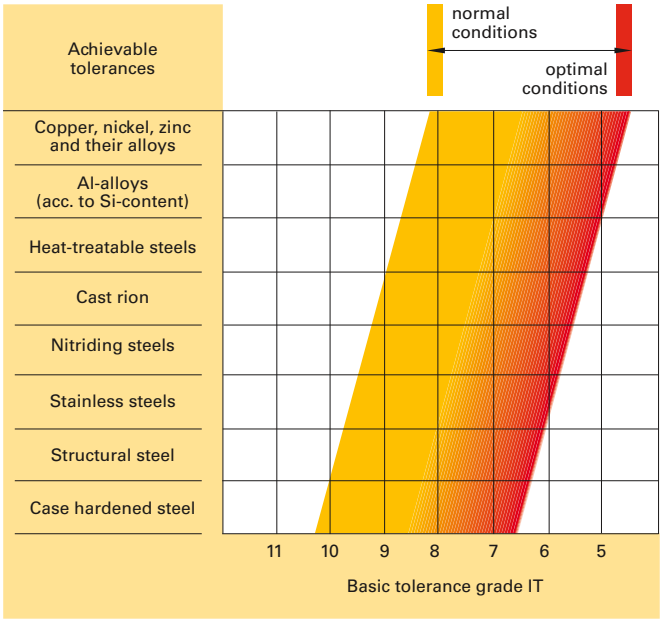


Deep hole drilling machines



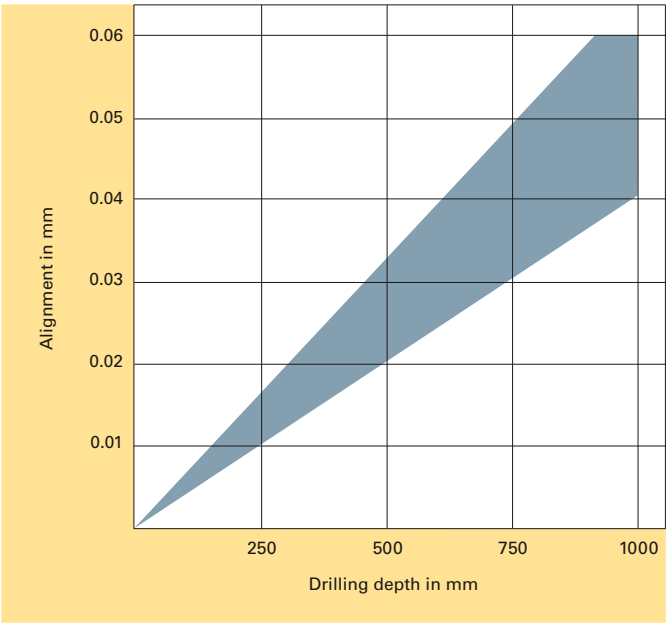
Basic tolerances

The application of single-fluted gun drills can achieve a lower basic tolerance, as the cutting forces at the cutting edge are absorbed by the supporting strips, unlike twist drills where the slightest deviation of the two cutting edges causes a larger hole.



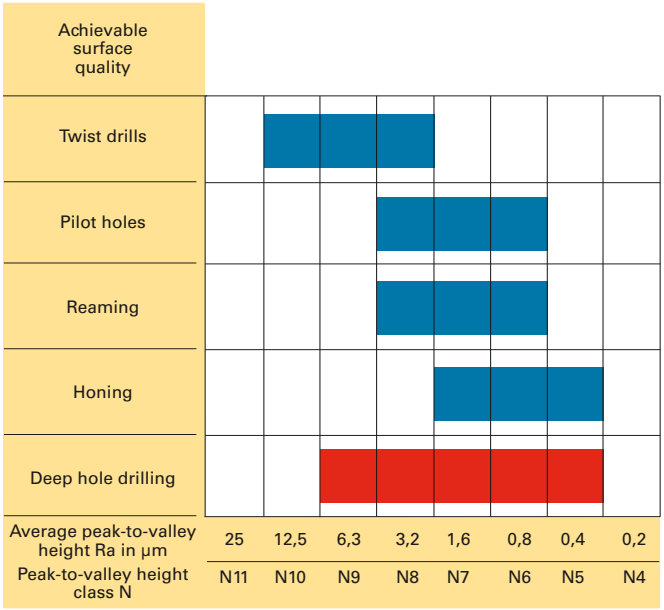
Alignment accuracy

Because brazed single-fluted gun drills always have the precision carbide head brazed on to a flexible tube, the tool achieves very accurate aligned holes remaining unaffected by possible concentricity errors.
However, extreme material fluctuations and other influencing factors can impair the alignment accuracy.



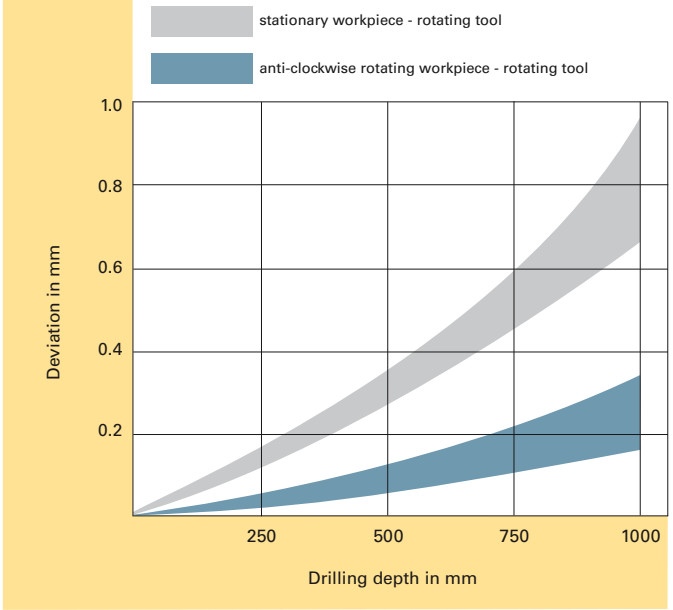
Surface quality

The forces at the cutting edge are absorbed by the support bushes, which in return burnishes the surface.
Lubrication between the supporting strips and hole surface is therefore very important.
The better the lubricant, the better the surface quality.



Deviation from concentricity

When a hole is produced with, for example, a commercial twist drill, the quality of the point grind affects the concentricity of the hole. An imbalance of forces is created at the cutting edges. With gun drills, these cutting forces are absorbed by the supporting strips, resulting in excellent concentricity.

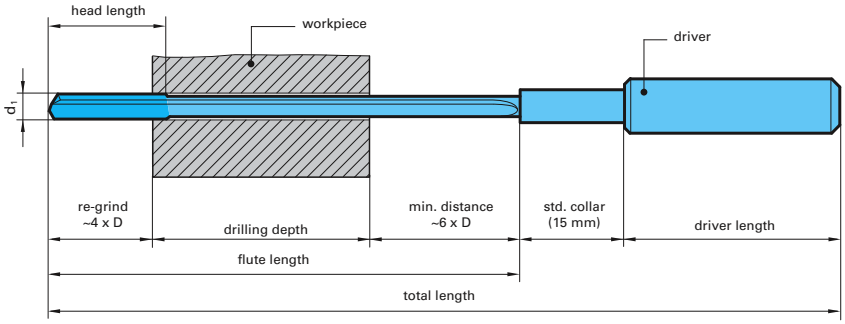


suitable for almost every material, from Ø 1.0 - 8.0 mm, max. flute length 300 mm

For certain materials a coating is required, as the successful application of gun drills with a bright surface finish cannot be guaranteed.
For coating definitions see GuhringNavigator.

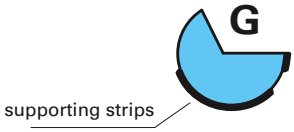
S TiN-coat F FIRE M MolyGlide A SuperA

The dimensions required to calculate the length for conventional machine tools



EB 100 Head forms

(Position of supporting strips. Special head forms on request.)



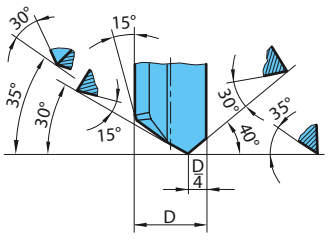
suitable for all materials, but for smaller hole tolerances

suitable for difficult-to-machine materials, i. e. high-alloyed steel

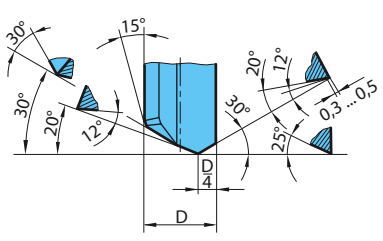
EB 100 Standard point grinds

(special point grinds on request)

Ø 2...4.00 mm



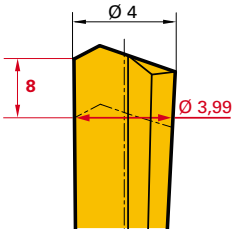
Ø > 4.01...20 mm



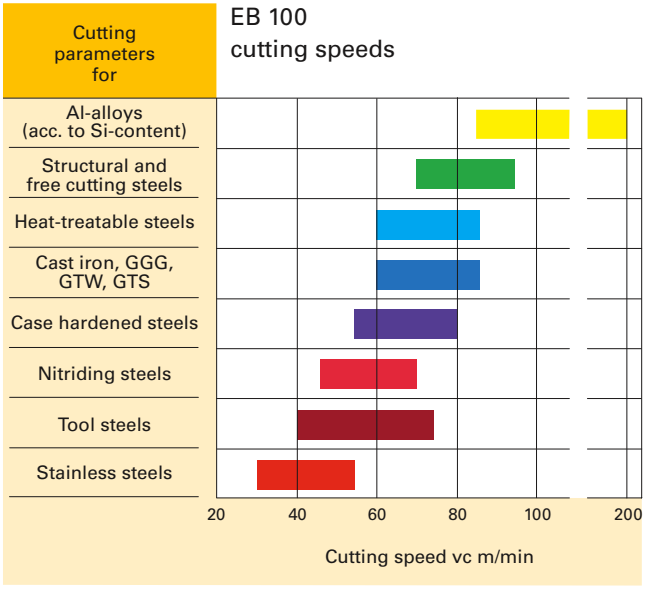
EB 100 Back taper ratio

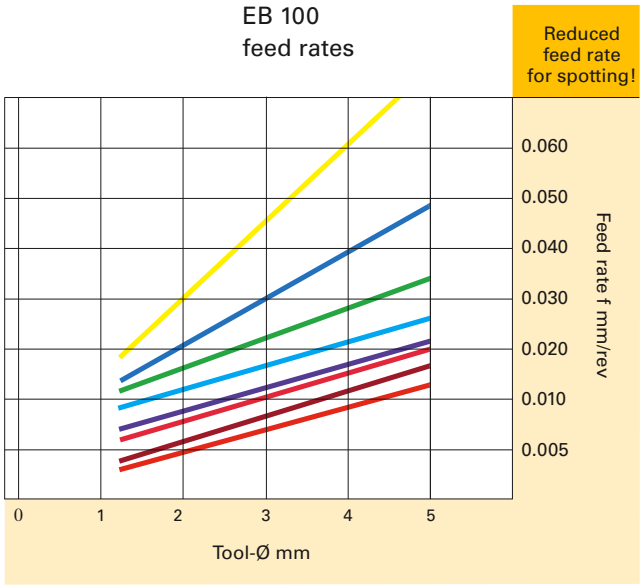
1:800 (standard)

(dimensions in mm)

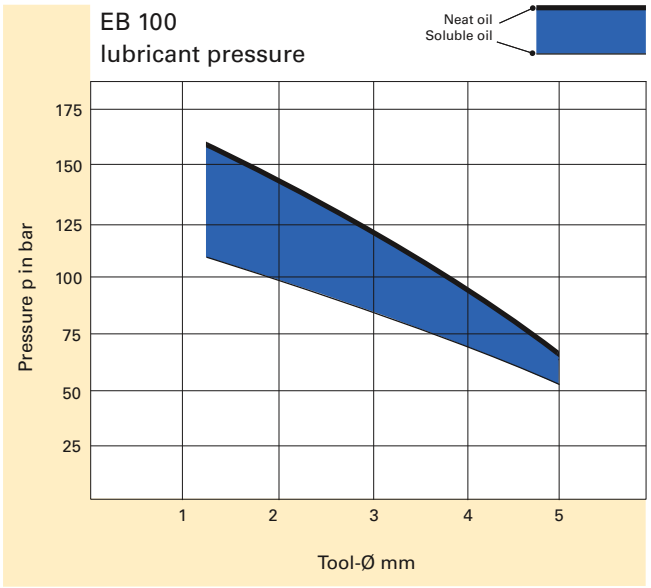


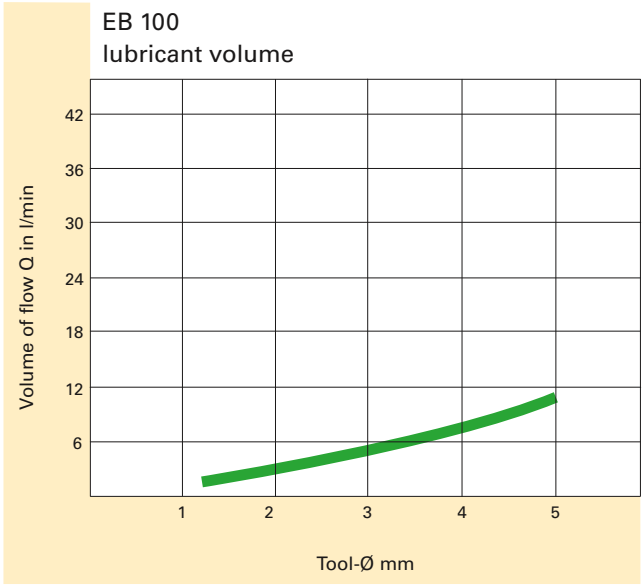
To ensure EB 100 is designed and produced specifically for your application, please complete the questionaire and use for your inquiry/order.





(Detailed cutting parameters see GuhringNavigator)





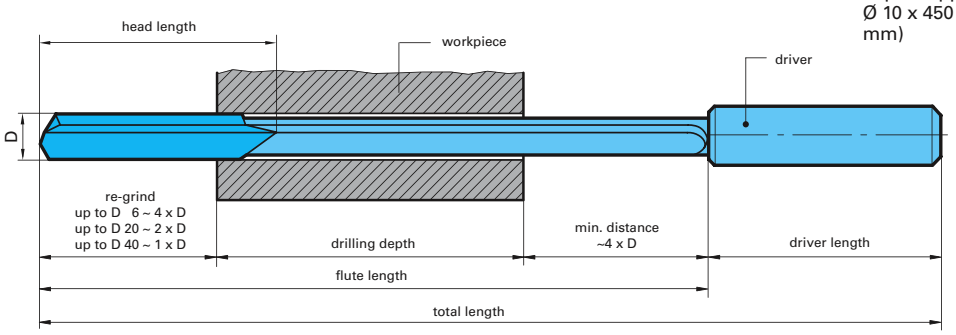
suitable for almost every material, from Ø 2 - 40.0 mm, max. total length 3000 mm

For certain materials a coating is required, as the successful application of gun drills with a bright surface finish cannot be guaranteed.
For coating definitions see GuhringNavigator.

S TiN-coat F FIRE M MolyGlide C TiCN

The dimensions required to calculate the length for conventional machine tools

* max. flute length per tool 40 x D, for larger drilling depths apply two tools. (i.e. Ø 10 x 450 and Ø 9.95 x 850 mm)



EB 80
Head forms
(position of supporting strips)

Standard designs

G Suitable for all materials, but for smaller hole tolerances

C Suitable for difficult-to-machine materials, i.e. high-alloyed steels

Supporting strip

Special designs

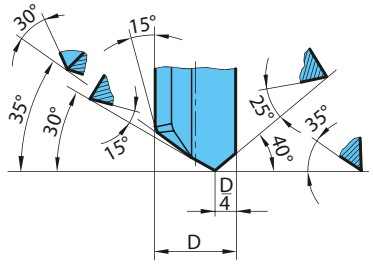
E Suitable for all materials, but for larger hole tolerances

A Suitable for all materials, but only when spotting conditions are unfavourable

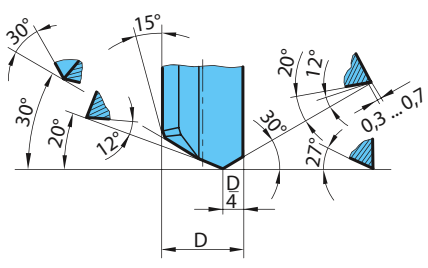
D This design is predominantly suitable for grey cast iron

EB 80
Standard point grinds
special point grinds available)

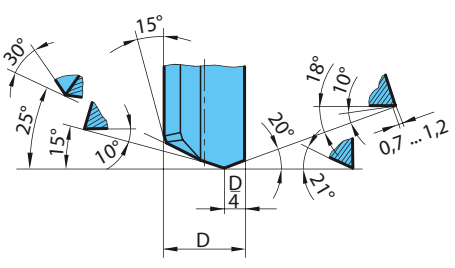
Ø 2...4.00 mm



Ø 4.01...20.00 mm



Ø 20.01...40 mm



To ensure EB 80 is designed and produced specifically for your application, please complete the questionaire and use for your inquiry/order. From Ø 6.0…20.0 mm we can fit PCD or CBN cutting edges on request. With AlSi-alloys for example, tool life subsequently increases multi-fold.

Fast service for brazed single-fluted gun drills

In addition to the ex-stock range Guhring offers a fast service for gun drills with standard point grind and standard driver in the following dimensions. Delivery time is max. 3 weeks.

nom.-Ø-mm	in increments of mm	head form	total length	
2.00...13.90	0.1	G	≤ 7.5 mm Ø 650 max	Prices on request
4.00...13.90	0.1	C	> 7.5 mm Ø 1000 max	
14.00...22.00	0.5	G	1000 max	
14.00...22.00	0.5	C		

Tool material: solid carbide/K15

Surface finish: ◯

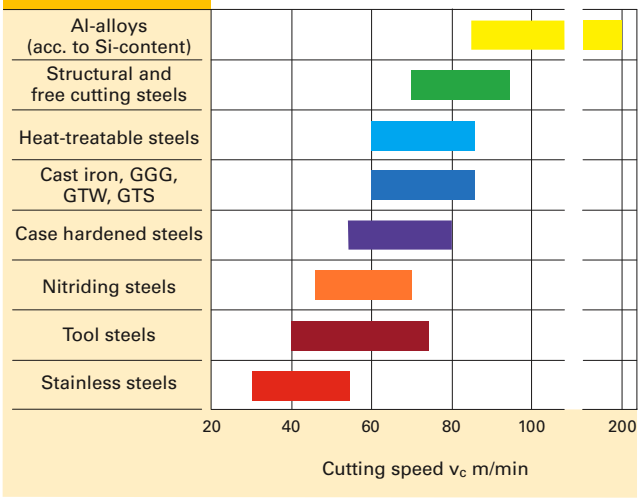
Standard head lengths (mm)

Ø-range	length	Ø-range	length
2.00...2.49	15	10.00...10.99	35
2.50...2.99	18	11.00...17.00	40
3.00...3.99	20	17.01...20.00	45
4.00...5.19	25	20.01...23.00	50
5.20...6.99	30	23.01...26.00	55
7.00...9.99	35	26.01...40.00	65

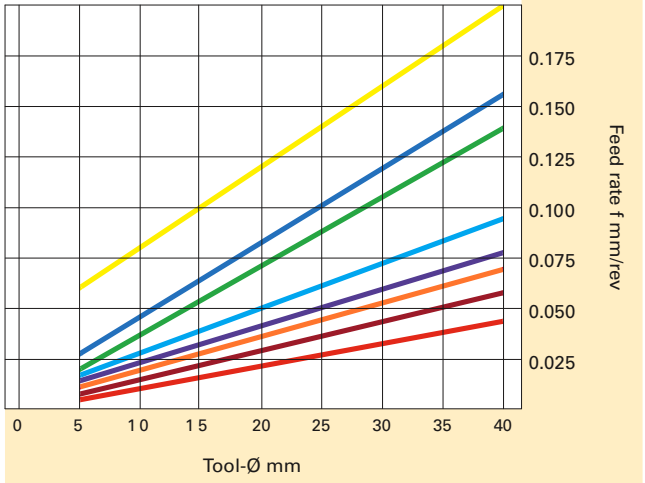
Flute length: min. 20 x D

Cutting parameters for

EB 80 cutting speeds

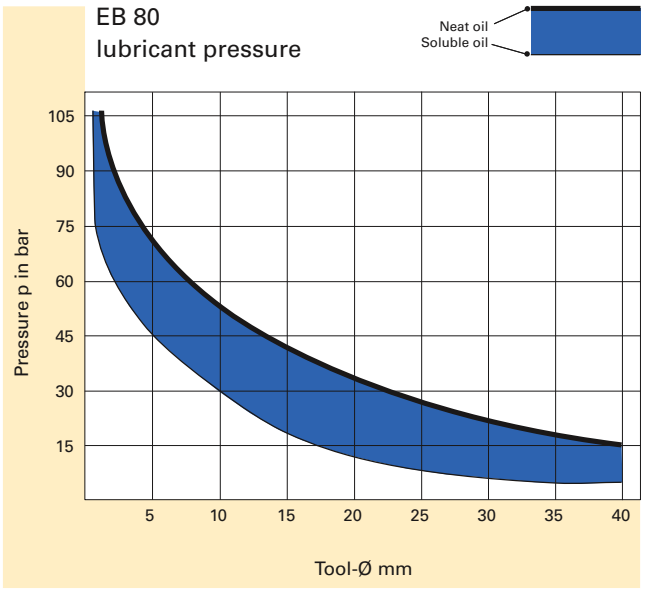


EB 80 feed rates

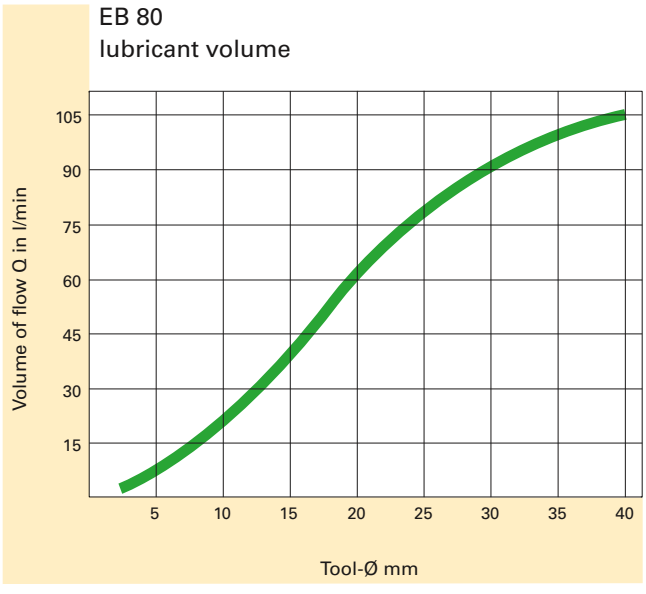


(Detailed cutting parameters see GuhringNavigator)

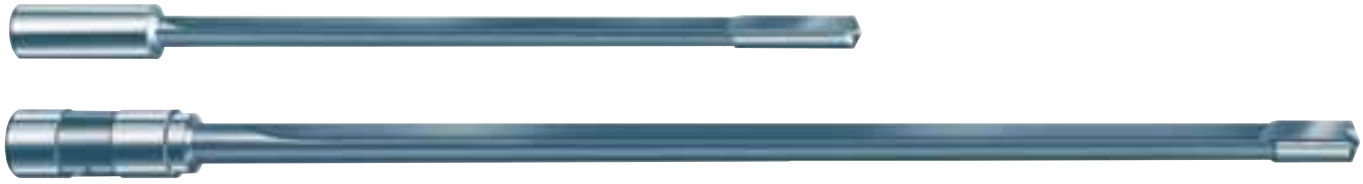
EB 80 lubricant pressure



EB 80 lubricant volume



suitable for cast iron, aluminium and short-chipping non-ferrous metals, from Ø 6.0 - 27.0 mm, max. total length 1000 mm

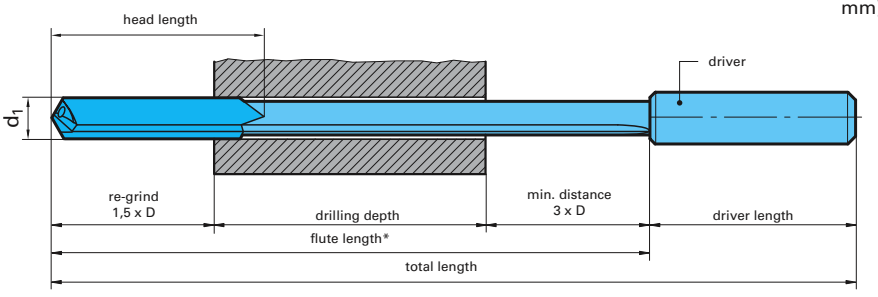


MolyGlide

For certain materials a coating is required, as the successful application of gun drills with a bright surface finish cannot be guaranteed. For chilled cast iron and Al cast alloys with a Si-content above 10% we recommend our MolyGlide-coating. However, two-fluted gun drills type ZB80 can only be coated with MolyGlide up to an overall length of maximum 500 mm due to the technical production process. See also the GuhringNavigator.

The main advantage of two-fluted gun drills compared to single-fluted gun drills is the substantially higher feed rate that can be applied during the production of the hole. This is due to the design of the two-fluted gun drill, it has two cutting edges and two flutes. Holes can therefore be produced considerably faster. However, this increase in machining speed is combined with a reduction in hole accuracy. This is also a direct consequence of a drill design with two cutting edges. As the cutting edges are positioned opposite each other, there is less of a smoothing effect and less support in comparison to a single-fluted gun drill. For drilling depths ≤ 10 x D we recommend our Ratio drill RT 150 GG, available ex stock and more cost-effective for these drilling depths than brazed gun drills. In addition, RT 150 GG does not require a pilot hole in most applications.

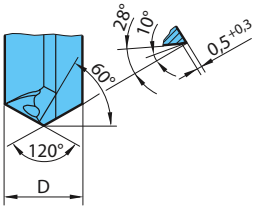
The dimensions required to calculate the length for conventional machine tools



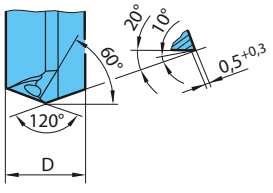
* max. flute length per tool 40 x D, for larger drilling depths apply two tools. (i.e. Ø 10 x 450 and Ø 9.95 x 850 mm)

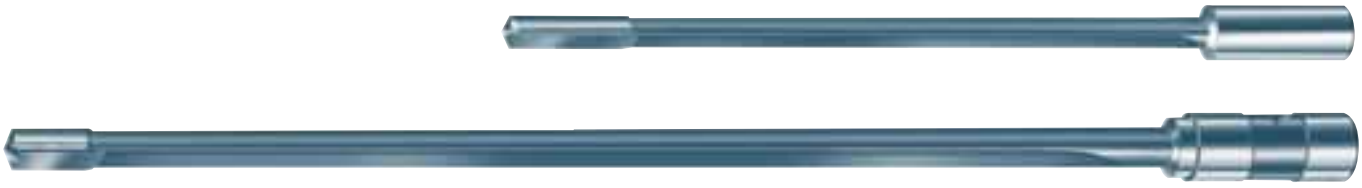
ZB 80
Standard point grinds
(special point grinds available)

Point grind G
for machining
cast iron



Point grind A
for machining
aluminium

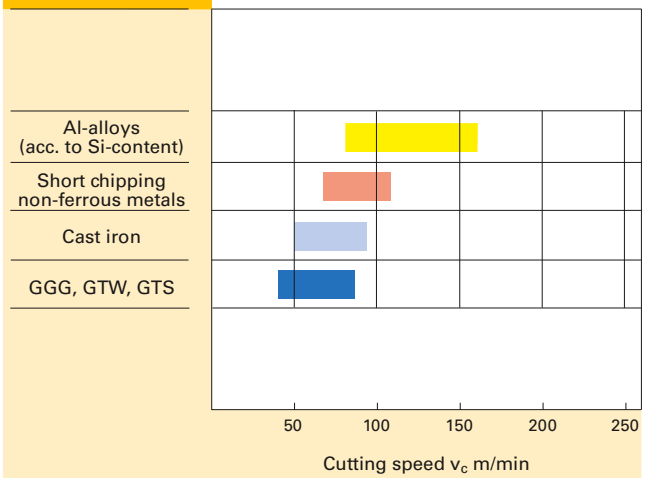




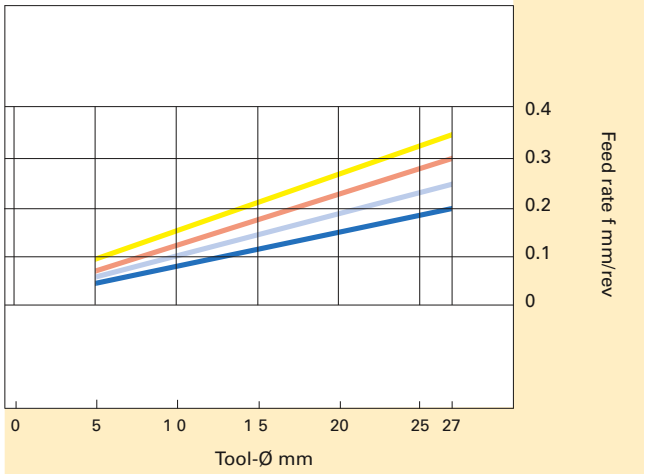
To ensure ZB 80 is designed and produced specifically for your application, please complete the questionaire and use for your inquiry/order.

Cutting parameters for

ZB 80
cutting speeds

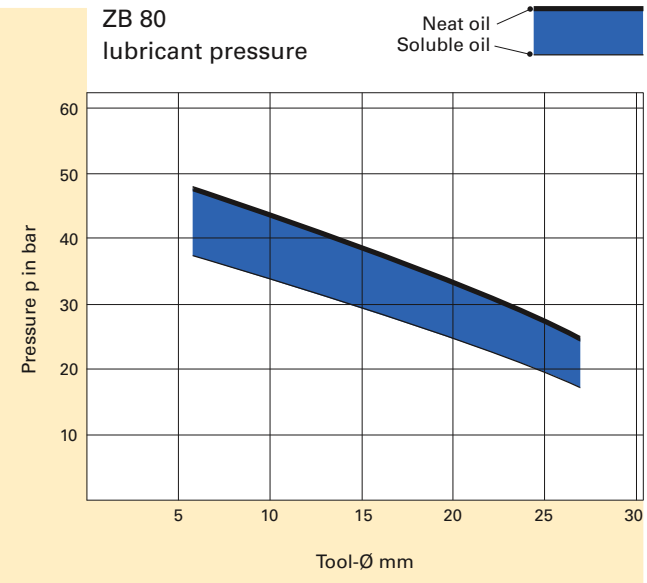


ZB 80
feed rates

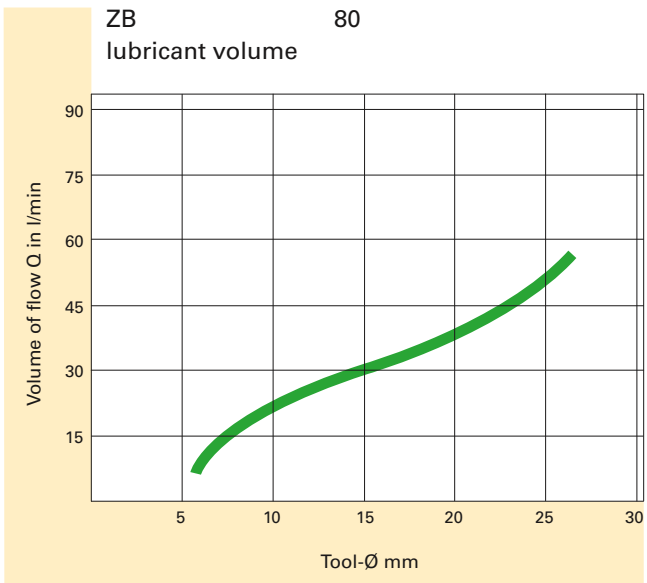


(Detailed cutting parameters see GuhringNavigator)

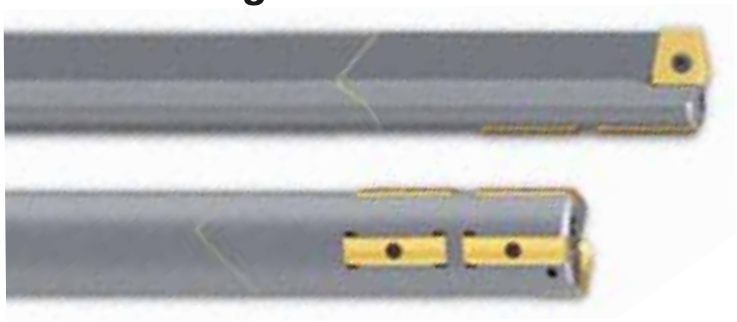
ZB 80
lubricant pressure



ZB 80
lubricant volume



with interchangeable inserts and supporting strips, suitable for most materials, from Ø 16.0 - 40.0 mm, max. total length 3000 mm



Guhring single-fluted gun drills with interchangeable inserts and supporting strips are also produced as special tools according to customer requirements. They are suitable for nearly every material and available from diameter 16.0 to 40.0 mm up to a maximum total length of 3000 mm.

Your special advantages are:

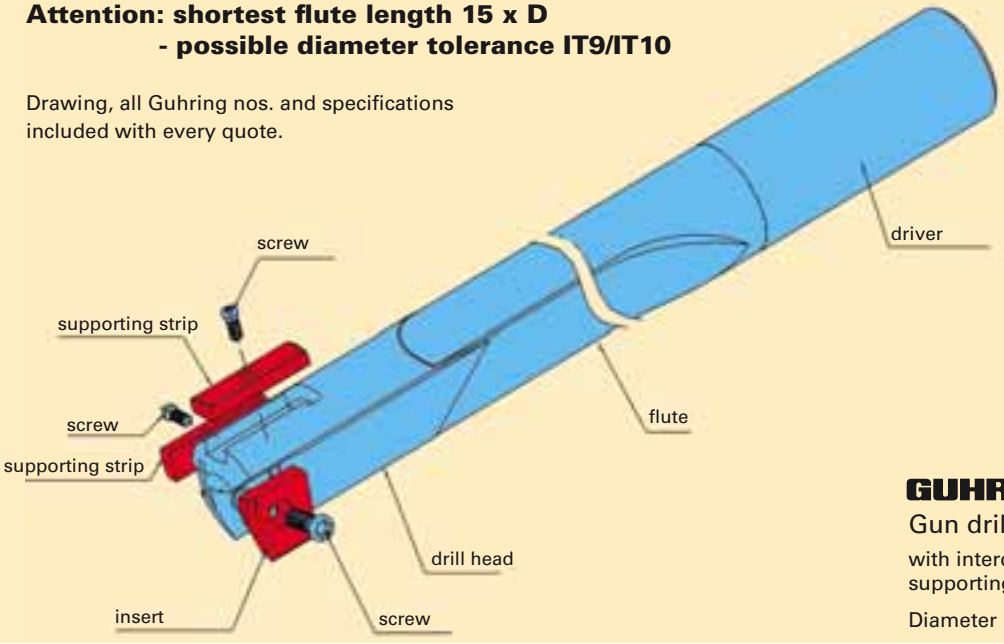
- The interchangeable component technology for inserts and supporting strips makes any combination of carbide grade and coating possible.
- The precision interchangeable inserts and supporting strips eliminate complicated adjustments.
- The precision supporting strips are produced in a special carbide for your individual deep drilling task. They can be reverse-fitted, providing double tool life. In addition, they can be provided with any of the Guhring coatings.
- Thanks to the precision insert seatings and the interchangeable inserts there is only a small number of interchangeable components. The tool is therefore extremely rigid.
- Expensive stoppages are eliminated because the worn components can be replaced without removing the tool from the machine.
- The expensive re-grinding process is eliminated thanks to the interchangeable insert technology.
- The application orientated selection of the most suitable interchangeable insert always ensures optimal chip breaking – even in problematic materials.
- Specifically optimised to your individual deep drilling task, the precision inter-changeable inserts are also produced in a special carbide. In addition, all Gühring coatings are available.
- Within the diameter range it is possible to modify the nominal diameter at any time by simply interchanging the individual components.
- The driver is produced in heat-treatable steel acc. to:
  - DIN 6535 HA
  - DIN 6535 HB
  - DIN 6535 HE
  - DIN 1835 E

  Also, all the forms generally required for deep drilling machines are possible to be manufactured.

GUHRING EB 800 for your application

Attention: shortest flute length 15 x D
- possible diameter tolerance IT9/IT10

Drawing, all Guhring nos. and specifications included with every quote.



GUHRING
Gun drills
with interchangeable insert and supporting strip, internal cooling
Diameter range: 16.00 mm - 40.00 mm

Ranges of nominal diameters

Size	Ø range (mm)
1.00	16.00 - 16.49
1.01	16.50 - 16.99
1.02	17.00 - 17.49
1.03	17.50 - 17.99
1.04	18.00 - 18.49
1.05	18.50 - 18.99
1.06	19.00 - 19.49
1.07	19.50 - 19.99
2.00	20.00 - 20.49
2.01	20.50 - 20.99
2.02	21.00 - 21.49
2.03	21.50 - 21.99
2.04	22.00 - 22.49
2.05	22.50 - 22.99
2.06	23.00 - 23.49
2.07	23.50 - 23.99
2.08	24.00 - 24.49
2.09	24.50 - 24.99
2.10	25.00 - 25.49
2.11	25.50 - 25.99
3.00	26.00 - 26.49
3.01	26.50 - 26.99
3.02	27.00 - 27.49
3.03	27.50 - 27.99

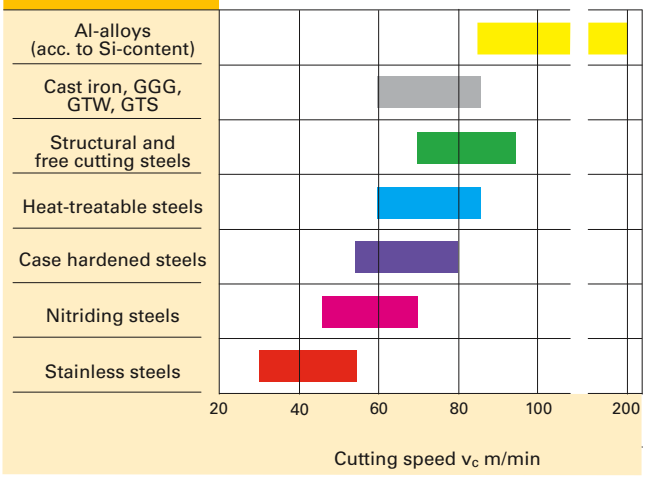
Every tool can be modified within the diameter range

Size	Ø range (mm)
3.04	28.00 - 28.49
3.05	28.50 - 28.99
3.06	29.00 - 29.49
3.07	29.50 - 29.99
4.00	30.00 - 30.49
4.01	30.50 - 30.99
4.02	31.00 - 31.49
4.03	31.50 - 31.99
4.04	32.00 - 32.49
4.05	32.50 - 32.99
4.06	33.00 - 33.49
4.07	33.50 - 33.99
5.00	34.00 - 34.49
5.01	34.50 - 34.99
5.02	35.00 - 35.49
5.03	35.50 - 35.99
5.04	36.00 - 36.49
5.05	36.50 - 36.99
5.06	37.00 - 37.49
5.07	37.50 - 37.99
6.00	38.00 - 38.49
6.01	38.50 - 38.99
6.02	39.00 - 39.49
6.03	39.50 - 40.00

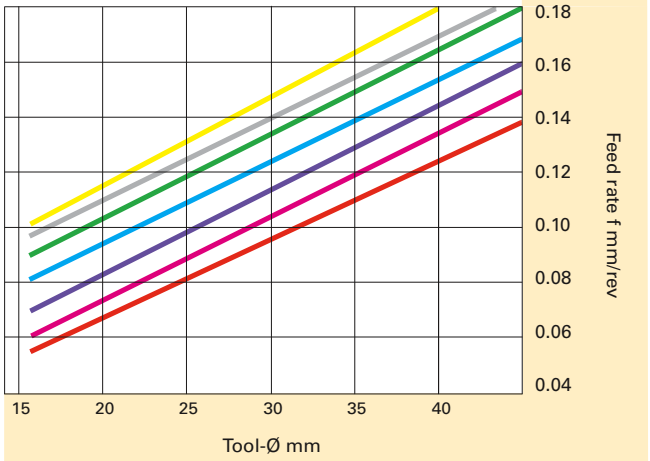
Every tool can be modified within the diameter range

To ensure EB 800 is designed and produced specifically for your application, please complete the questionaire and use for your inquiry/order.

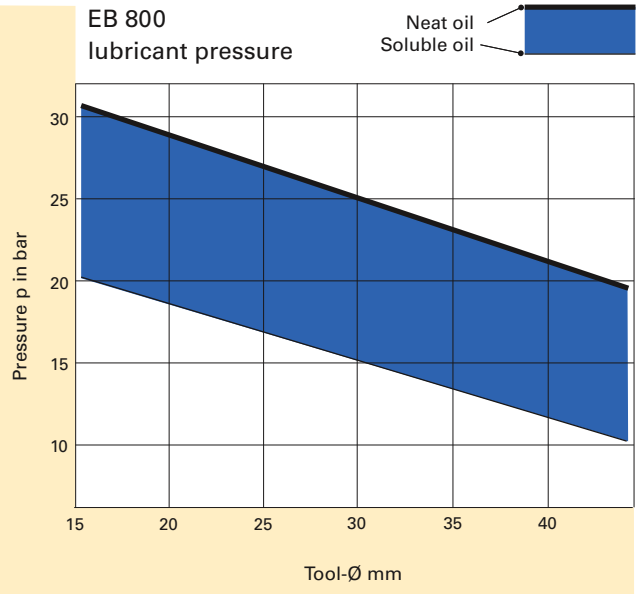
EB 800
cutting speeds



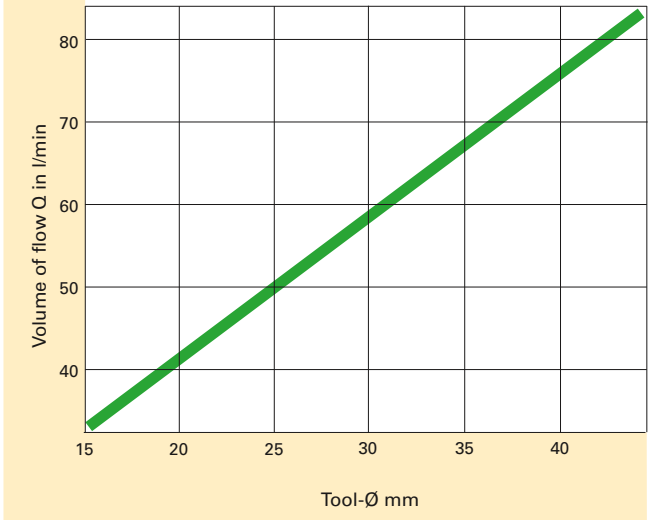
EB 800
feed rates



EB 800
lubricant pressure



EB 800
lubricant volume



Technical

TBM 116

TBM 116 is a manually operated, universal grinding machine. Its compact design combined with Guhring's single-fluted gun drill grinding system and Guhring's double grinding wheel makes this a perfect unit to re-grind single-fluted gun drills. It is especially suitable for the re-grinding of a small to medium number of items of varying diameters and lengths. Furthermore, it also allows the fairly simple addition of transverse chip breakers to single-fluted gun drills as well as other modifications.

Supplied items:

Grinding machine with two high-powered light units as well as two 220 V sockets (grinding system and grinding wheel not included)

Machine data:

Input power requirements 380 V/50 Hz, Grinding wheel 2850 rev./min, Max. diameter of grinding wheel 150 mm

TBV 116

The fixture is designed for the re-grinding of single-fluted gun drills in the diameter range from 3 mm to 30 mm. It is ideally suitable for standard and special point grinds. A minimum flute length is of no importance thanks to a short center sleeve. In addition, the fixture is supplied with a supporting bar for long tools. TBV 116 is therefore truely universal and can be applied on any commercial, manual tool grinding machine.

With TBV 116 we recommend our double grinding wheel DSS 125.

Attention:

Single-fluted gun drills have a flute spacing angle of 120° and can therefore not be clamped in a collet in a separate unit. You could possibly destroy the tool.

TBV 216

The new TBV 216 universal grinding fixture for small diameter single-fluted gun drills from 1.0 to 6.0 mm and a maximum length of 350 mm is simple to handle and enables the re-grinding or modifying of single-fluted gun drills in only four operations. Grinding is achieved with a 3-axis swivel mechansim, enabling the grinding of various point angles. It is possible to adjust and if necessary correct any angle individually.

We recommend the application of our single grinding wheel ESS 125.

To include:

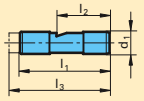
- A set of guide bushes with the diameters 1.0 / 1.5 / 2.0 / 2.5 / 3.0 / 3.5 mm
- Various adaptors
- Centering microscope
- Spotlight and magnifier

Additional technical parameters

The range of drivers introduced below is available ex stock. However, it only represents a small selection of drivers from our complete range. We naturally also produce individual drivers of the highest precision to customer drawings. Attention! EB 100 requires drivers with positioning lugs. Further information on request.

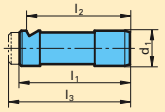
Drivers for deep drilling machines

1



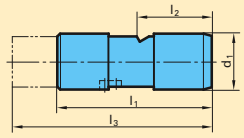
code no.	d_1	l_1	l_2	l_3
1.1	10	40	24	-
1.2	10	40	24	45
1.3	10	40	24	55
1.4	16	45	31,2	-
1.5	25	70	34	-
1.6	25	70	34	78

2



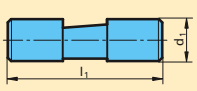
code no.	d_1	l_1	l_2	l_3
2.1	16	50	47	-
2.2	16	50	47	55
2.3	16	50	47	70

3



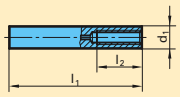
code no.	d_1	l_1	l_2	l_3
3.1	25	70	34	100

4



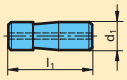
code no.	d_1	l_1
4.1	19,05	70

5



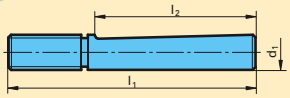
code no.	d_1	l_1	l_2
5.1	10	60	20
5.2	16	80	28
5.3	25	100	50

6



code no.	d_1 (inch)	l_1
6.1	1/2	38
6.2	3/4	70

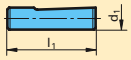
7



code no.	d_1	l_1	l_2
7.1	16	112	73
7.2	20	126	82

Drivers to DIN 1835

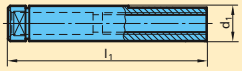
9 form E



code no.	d_1	l_1
9.1	8	36
9.2	10	40
9.3	12	45
9.4	16	48
9.5	20	50
9.6	25	56
9.7	32	60

Drivers to VDI draft

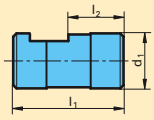
12



code no.	d_1	l_1
12.1	10	68
12.2	16	90
12.3	25	112

Drivers to Speed-Bit-System

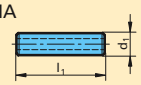
13



code no.	d_1	l_1	l_2
13.1	16	40	16
13.2	25	50	25

Drivers to DIN 6535

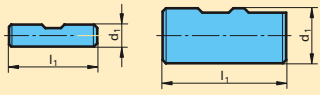
10 form HA



code no.	d_1	l_1
10.1	8	36
10.2	10	40
10.3	12	45
10.4	16	48
10.5	20	50
10.6	25	56
10.7	32	60

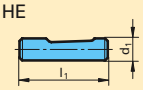
8 form HB

with code no. 8.6, 8.7, 8.8



code no.	d_1	l_1
8.1	8	36
8.2	10	40
8.3	12	45
8.4	16	48
8.5	20	50
8.6	25	56
8.7	32	60
8.8	40	70

11 form HE

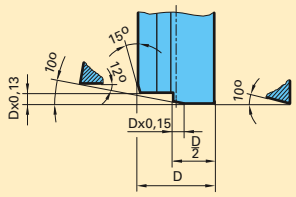


code no.	d_1	l_1
11.1	8	36
11.2	10	40
11.3	12	45
11.4	16	48
11.5	20	50

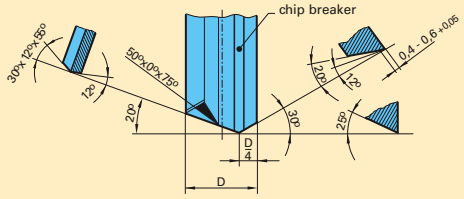
Examples for special point geometries for single-fluted gun drills

(further geometries on request)

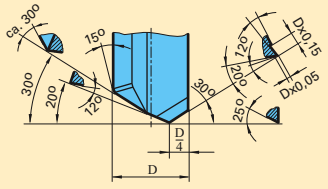
with recessed coolant chamber



with chip breaker



with chip guiding step

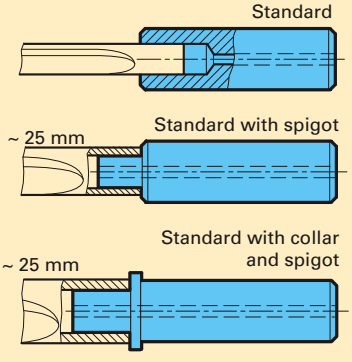


Driver variations to suit gun drill tubes

Solution for nom.-Ø < driver-Ø (difference must be appr. 6 mm):
tube shank installed in driver

Solution for nom.-Ø ≠ driver-Ø (close to parallel):
tube shank installed over spigot

Solution for nom.-Ø > driver-Ø:
tube shank installed over spigot, inside-Ø of tube shank >driver-Ø,
tube shank fits against collar shoulder.



Technical

High speed steels

Only high quality materials are used to produce Guhring HSS tools. Systematic selection of alloying elements ensure the tool possesses the optimal characteristics for the individual application.

Tungsten, Molybdenum: increase tempering- and wear-resistance
Vanadium: increases wear-resistance of finishing tools
Cobalt: enables increased hardening temperatures and improves heat-resistance.

Guhring description	German steel descript.	Material no. (steel code)	Range of application	comparable steels			
				USA	France	Italy	Great Britain
HSS	HS 6-5-2 (DMo5)	1.3343	standard tool material for most common applications	M 2	Z 90 WDCV 06-05-04-02	HS 6-5-2	BM 2
HSCO HSS-E	HS 6-5-2-5 (EMo5Co5)	1.3243	high heat-resistance, especially suited for roughing or when coolant insufficient	M 35	Z 90 WDKCV 06-05-05-04-02	HS 6-5-2-5	BM 35
HSS-E	S 6-5-3 (EMo5V3)	1.3344	high friction resistance and cutting edge stability, especially important for reaming operations	M 3	Z 120 WDCV 06-05-04-03	HS 6-5-3	–
M42 HSS-E	HS 2-9-1-8	1.3247	increased heat resistance and hardness, suitable for difficult-to-machine materials	M 42	Z 110 DKCWV 09-08-04-02-01	HS 2-9-1-8	BM 42
HSS-E-PM	10-2-5-8 PM52 HS 6-5-3-8 PM30	1.3253 1.3294	high hardness, heat-resistance and cutting edge stability, very dense structure	–			

Superhard tool materials

It is not only the extreme hardness of superhard tool materials but also their high heat-resistance which enables highest cutting rates and increased productivity. One disadvantage is however their low toughness.
Economical application is only possible on extremely rigid machines and for a specific range of application. Further information regarding PCD and CBN can be found in the DiamondTool section of this catalogue, our Cermet reamers are covered in the Technical Section under Reaming Tools.

Guhring description	Classification	Range of application	Average grain size	Diamond content
PCD	Fine grain	Aluminium and AlSi-alloys <10%Si, magnesium alloys, brass, copper, bronze, wood composite materials excellent cutting edge quality high abrasion resistance excellent surface qualities	2-4µm	approx. 90%
	Medium grain	Universal grade (general finishing applications) AlSi-alloys <14%Si, copper alloys, graphite and graphite composite materials, wood composite materials, unsintered ceramic and carbide (<15% binding metal content) excellent resistance good surface qualities	5-10µm	approx. 92%
	Coarse grain	Roughing and finishing applications AlSi-alloys >14%Si and other abrasive machining applications, MMC, sintered ceramic and carbide (<15% binding metal content extreme abrasion resistance, high shock resistance long tool life with acceptable to good surface quality	25µm	approx. 94%
	Mixed grain	Abrasive machining applications (i.e.: >14% AlSi-alloys, MMC, composite materials) highest wear resistance, excellent shock resistance extreme abrasion resistance with good edge roughness long tool life with good surface quality	2-4µm+ 25µm	approx. 95%
CBN 10..	Low CBN-content	CBN tool material with carbide base for finishing machining of, for example, case hardened steels, heat-treatable steels, tool steels, grey cast iron, suitable for continuous and interrupted cut applications (especially hard turning) with a chip removal <0.5mm, high pressure resistance, low thermal conductivity, excellent abrasion resistance, chemical stability, good shock toughness for high removal rates, excellent surface finish and long tool life	2µm	50-65% CBN content
CBN 20..	High CBN-content with carbide base	CBN tool material with carbide base for the machining of, for example, pearlitic grey cast iron (> 45 HRC), hardened steel, tool and structural profile steels, powder metallurgic Fe-sinter materials, alloys on Ni/Cr basis (nickel base alloys - „superalloys“) thermal sprayed alloy & hard coatings on Co-, Ni- and Fe-basis suitable for continuous and interrupted cut applications with a medium chip removal (typical 0.5 - 1.5mm) high thermal conductivity, high break toughness, high surface qualities	2µm	80-95% CBN content
CBN 30..	High CBN-content without carbide base	Solid CBN tool material without carbide base for rough machining of pearlitic grey cast iron, chilled cast iron (> 45 HRC), hardened steels with high break toughness, excellent wear resistance, very good chemical stability, high specific removal rates For the application in tool holders, drilling and boring tools, recessing tools as well as cutter heads with clamping element and negative rake angle geometry	15µm	80-95% CBN content
Cermet	TCN 54 P15/P20	high cutting edge stability, for finishing tools such as reamers	< 2.5µm	

Main material group P
This group includes long-chipping ferrous metals except stainless and austenitic steels and is, according to the cutting load, divided into the application groups 01-50.

Main material group M
Group M includes austenitic stainless steels, austenitic/ferritic steels and cast steels. The group is subdivided into the application groups 01-40, dependent on the cutting load. At Guhring, P and M applications are achieved with coated K carbide.

Main material group K
Group K incorporates all forms of grey cast iron and malleable cast iron. Dependent on cutting load it is subdivided into the application groups 01-40.

Main material group S
Heat-resistant "super alloys" based on iron, nickel or cobalt as well as titanium alloys are included in group S. It is divided into the application groups 01-30, dependent on the cutting load.

Main material group N
This group includes non-ferrous metals, especially aluminium-alloys and non-metal materials. It is, depending on the cutting load, divided into the application groups 01-30.

Main material group H
This group includes hard machining of hardened steels. The application groups are from 01-30, depending on the cutting load.

Many carbide grades cover the broad spectrum of the main material groups, especially when coated tools are applied. For example, most of the FIRE-coated carbide drills in the Guhring range are assigned to the main material groups K and P.

Individual Guhring grades
The following table lists the most important carbides that are available from Guhring ex-stock for general applications. Further carbide grades are available on request and detailed information can be found at www.guehring-carbide.de

In more than 80% of applications known to Guhring, the results of DK460UF carbide grade tools together with a specially adapted coating could not be surpassed by any other carbide grades, including coated tools. This and the availability of the material ex-stock simplify tool selection immensely. For further information regarding the application of other carbide grades please contact our technical engineers.

Guhring description	Co-content [M-%]	Tungsten carbide grain size [µm]	Hardness [HV]	ISO classification [ISO 513]	Characteristics
DK460UF	10	0.5	1620	K20-K40 coated: P, M20-M40, H, S, N25	A carbide grade with wide range of application possibilities. It is applied, mostly coated, for the machining of steel, soft Al alloys, cast iron as well as "super alloys" such as Inconel 718. This grade is the backbone of our carbide production.
DK500UF	12	0.5	1680	K25 coated: P, M, H, S, N25	The grade has been especially developed for hard machining. It possesses a higher hardness and deformation tolerance in comparison to DK460UF. Due to the high Co-content, a coated application is strongly recommended.
DK255F	8	0.7	1720	K20 coated: P, M, H, S, N20	The grade is recommended for hard machining, the machining of high tensile grey cast iron and hard AlSi-alloys. Dry machining is possible. A coated application is preferable.
DK120	6	1.3	1620	K15 coated: N15	The grade is especially suitable for the application with diamond coating.
DK120UF	7	0.5	1850	K05	Ultra fine grain type offering extreme wear resistance, suitable for absolutely rigid machines, preferred for reamers.
K55SF	9	0.2 -0.5	1920	K10-K30	For application with high wear resistant materials, stainless steels, composite materials such as Kevlar and GRP, high speed machining and dry machining.
DK400N	10	0.7	1580	K35M coated: P, M, S, N35M	An extremely tough grade for the machining of high heat resistant metals.

Basic characteristics of carbide for drilling applications

Carbide
Carbide, similar to steel, is a less than precise and indeed a very general term for an entire material group. Carbide can be produced in an infinite number of variations with different characteristics through the combination of at least two basic constituents.

Carbide production
Carbide consists of a hardness carrier – tungsten carbide plus maybe one or more carbides – and an extremely tough component: Cobalt (Co). Cobalt basically serves as a cementing or binding agent in which the carbide particles are distributed.

In order to satisfy the diverse demands that, dependent on the individual application task, are placed on carbide, Guhring offers a choice of more than 20 different standard carbide types. Some are especially hard, others possess a very high toughness, some are ultra fine grain and others are coarse. Furthermore, on the request of the customer, any conceivable carbide grade can be developed and produced as a special carbide, so-to-speak.

Our carbide division has a state-of-the-art laboratory at its disposal to ensure our carbide always corresponds with customer requirements. From the raw material to the finished product, samples are continuously examined in order to guarantee and document the highest quality and process reliability in accordance with the certification.

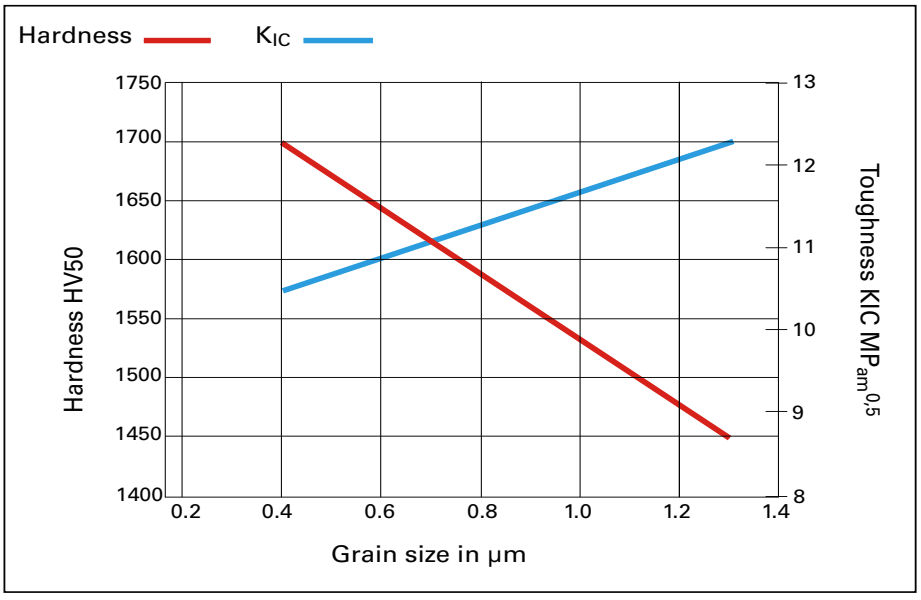
For drilling applications the following characteristics are of importance:

Rigidity
Rigidity is a measure of the energy that is required to force a material to deform. With carbide it is determined by the cobalt content. The higher the cobalt content, the lower the rigidity of the material.

The rigidity of conventional carbide is more than double compared to that of steel. Subsequently, holes of considerably greater straightness can be produced with carbide drills than with steel drills. However, this positive effect of the rigidity is limited because of deformation forced upon the drill – for example through offset or imbalance – result in a heavy increase in load on the material. Therefore, more rigid materials are also more prone to breakage.

Hardness
Hardness is described as the resistance of a material against penetration of another. It is clear, that the tool material must be considerably harder than that of the workpiece, in order to not be exposed to excessive wear.

There are several possibilities to adjust the hardness of carbide: on the one hand by modifying the cobalt content and on the other hand by varying the carbide grain size. If the cobalt content is increased whilst retaining the same grain size, the hardness of the carbide is reduced. However, if the grain size is reduced whilst retaining the same cobalt content, the hardness is increased.



Basic characteristics of carbide for drilling applications

Toughness
Toughness is defined as the resistance the material offers against the growth of a fissure. A high fissure resistance is an indication of "good-natured" carbide, possessing high impact resistance. Unfortunately, hardness and toughness are opposing attributes.

High cobalt content and/or coarse hard material grains are an indication of tough carbide. High toughness is required when a sudden or high cutting load occurs during the machining process. A high cutting load arises when there is a high friction coefficient between tool and workpiece. The coefficient of friction is determined by the surface roughness of the tool and by the chemical relationship between the tool surface and the workpiece.

Please note, toughness is not synonymous with high bending strength. An important and specific characteristic for determining the bending strength is the cutting edge stability.

Cutting edge stability
Cutting edge stability is defined as the resistance of the cutting edge against the breakaway of individual hard material grains or larger grain formations. The bending strength provides a rough measure of the cutting edge stability. In addition to toughness, the size of the longest grain boundary within the structure of the material is also of importance for the bending strength. Subsequently, high toughness increases the bending strength, however, longer grain boundaries (= coarser grains) lowers it.

Reaction
Although today most carbide tools are coated, the reaction tendency between carbide and workpiece must be taken into consideration. Because of rapid wear of the coating at the cutting edge, a reaction between tool and workpiece is indeed a possibility.

Similar to pitting in the corrosion process, a localised attack can have a considerably longer lasting effect than any damage over a large area. Due to the high temperature development at the cutting edge, cobalt in particular reacts very quickly with ferrous metals. Other metals, such as titanium or silicon are prone to react with tungsten carbide. For these reasons, the cobalt content is of interest regarding the reaction of the tool.

Material selection
Dependent on the specific application task, the various attributes must, therefore, be carefully balanced. Subsequently, there are various carbides available. In order to find the correct carbide for a specific application task, several classification systems were experimented with and introduced as standard to simplify the selection. Widely accepted is the DIN ISO classification system to DIN ISO 513, revised in 2005..

Here, the application range of the carbide/coating combination is indicated by an identification letter, the hardness/toughness ratio by an index number. A low index number indicates a high hardness requirement for the application, a high number a high toughness requirement.

Surface finishes

○ bright

Due to their basically good properties, high speed steel and carbide tools are supplied without being surface treated, i.e. in a bright finish.

Surface refining processes
For special applications it is desirable to increase the durability and to reduce the sliding resistance and tendency of cold welding by special surface refining processes. The following refining processes continue to be of less importance. Generally, much better results are achieved with hard or soft coated tools.

● steam nitrided
◐ nitrided lands

Nitriding is a further means of increasing the durability of tools. This finish is recommended for the machining of grey cast iron, aluminium with a high silicon content, plastics, steels with a high perlite content etc. Our tools are nitrided using different application orientated processes.

● steam oxide

Steam oxide tools also offer a reduction in sliding resistance. Thus cold welding which occurs for example during the machining of steels that have a low carbon content, can be avoided most economically. Steam oxide tools are only suitable for ferrous materials.

Guhring coatings

A-coat or TiAlN-coat (Titanium aluminium nitride)

Physical appearance: black-violet color
A special coat for machining abrasive materials (cast iron, AlSi) and/or for working at high temperatures, i.e. in applications without coolant or with limited coolant facilities, such as deep or small diameter holes. Of importance is that the A-coat only achieves performance increases at higher machining rates.

Super A-coat or AlTiN-coat
(Aluminium titanium nitride)

Physical appearance: black-violet color
Guhring's well-proven A-coat on TiAlN basis has undergone continuous development. Optimising the structural, chemical and mechanical properties of the Super A-coating have resulted in an extremely high temperature (red) hardness, very good oxidization resistance as well as excellent coating adhesion. This coating is suitable for the machining of difficult-to-machine materials such as titanium-alloys, Inconel and hardened steels as well as for hard machining (>52HRC) and HSC.

C-coat or TiCN-coat (Titanium carbon nitride)

Physical appearance: grey-violet colour
Brings considerable advantages in steel machining operations, interrupted cutting in difficult-to-machine materials or whenever demands as to hardness and toughness are above average.

F-coat or FIREX®-coat

Physical appearance: black-violet colour
Multilayer TiAlN-coat of gradational structure. All-round coating achieving at least twice the performance of TiN. Combines the advantages of TiN, TiAlN and TiCN. Excellent, near "fire resistant" heat resistance. High toughness. FIREX® plus MolyGlide® - the ideal combination for dry and high speed machining.

P-coat (AlCrN-coat)

Physical appearance: metallic grey
The coating is specially adapted to satisfy the demands of fluteless tapping. Our P-coat based on aluminium chromium nitride (AlCrN) possesses an extremely high oxidation resistance and temperature (red) hardness. The result is a high wear resistance and productivity, as P-coated fluteless taps can be operated with increased cutting parameters and optimally utilize the potential of modern machines.

S-coat or TiN-coat (Titanium nitride)

Physical appearance: golden color
Well proven, cost efficient all-round coating. Generally achieving performance increases. Surpassed in certain cases only by A-, C- and F-coatings.

M-coat or MolyGlide®-coat based on MoS_2

Physical appearance: grey color
Patented soft coating, glide coating, especially developed to improve chip transportation and eliminate built-up edge when machining Al-alloys. Combined with the hard coating FIREX®, dry machining or quasi dry machining (minimal quantity lubrication) can be achieved.

The new material abbreviations (selection)

mat. nos.	ASTM / SAE / AISI	DIN abbreviation
0.6010	A48-20 B	EN-GJL-100
0.6020	A48-30 B	EN-GJL-200
0.6025	A48-40 B	EN-GJL-250
0.6035	A48-50B	EN-GJL-350
0.7050	65-45-12	EN-GJS-500-7
0.7070	100-70-03	EN-GJS-700-2
0.8035		EN-GJMW-350-4
0.8155		EN-GJMB-550-4
0.8170		EN-GJMB-700-2
1.0022		–
1.0035	A283 Gr A	S185
1.0039		S235JRH
1.0044	1020, AG570 Gr40	S275JR
1.0050	A570/572 Gr50	E295
1.0060	A572 Gr 65	E335
1.0070		E360
1.0114		S235J0
1.0226		DX51D
1.0242		S250GD
1.0244		S280GD
1.0250		S320GD
1.0301	1010	–
1.0302	10L10	–
1.0306		DX54D
1.0312	1005, G10050	DC05 [Fe P05]
1.0319	1013, G10030	L210GA
1.0322	1008, G10080	DX56D
1.0330	A366 (1012), 1008	DC01 [Fe P01]
1.0333	A619 (1008)	–
1.0338	A620 (1008)	DC04 [Fe P04]
1.0345	A516, A515 Gr	P235GH
1.0347	A619	DC03 [Fe P03]
1.0348		P195GH
1.0350		DX52D
1.0355		DX53D
1.0356	1013	P215NL
1.0358		–
1.0401	M1015/16/17	–
1.0402	(M) 1020, M1023	C22
1.0403	10L15	–
1.0406	(M) 1025	C25
1.0419	1016	L355
1.0424	1513	P265
1.0424		P265
1.0425		P265GH
1.0429		L290MB
1.0457	1013	L245NB
1.0459		L245GA
1.0461		S255N
1.0473	A537 Cl1, A414GrG	P355GH
1.0481	A515 Gr70	P295GH
1.0484		L290NB
1.0486		P275N
1.0501	1035	C35
1.0503	1045	C45
1.0505		P315N
1.0511	1040	C40
1.0528	1030	C30
1.0529	1522	S350GD
1.0535	1055	C55
1.0539		S355NH
1.0540	1050	C50
1.0547		S355J0H
1.0582	1518	L360NB
1.0601	1060	C60
1.0710		–
1.0715	1213	11SMn30
1.0718	12 L 13	11SMnPb30
1.0721	1108, 1109	10S20
1.0722	11 L 08	10SPb20
1.0726	1140	35S20
1.0727	1146	46S20
1.0728	1151	–
1.0736	1215	11SMn37
1.0737	12 L 14	11SMnPb37
1.0756	11L39	35SPb20
1.0757		46SPb20
1.0760		38SMn26
1.0761		38SMnPb26
1.0762		44SMn28
1.0763		44SMnPb28
1.0873		DC06 [Fe P06]
1.1103		S255NL1
1.1105		S315NL1
1.1121	1010	C10E
1.1141	1015	C15E
1.1151	1020, 1023	C22E
1.1158	1025	C25E
1.1170	1330	28Mn6
1.1178	1030	C30E
1.1181	1035, 1038	C35E
1.1186	1040	C40E
1.1191	1045	C45E
1.1203	1055	C55E
1.1206	1049, 1050	C50E
1.1221	1060, 1064	C60E
1.1241	1050	C50R
1.1750	W1	C75W
1.2067	L 1, L 3	102Cr6
1.2080	D 3	X210Cr12
1.2083		X42Cr13
1.2419	07,T31507	105WCr6
1.2767		X45NiCrMo4
1.3243	M5, M41	S 6-5-2-5
1.3343	M 2	S 6-5-2
1.3344	M3 Class 2	S 6-5-3
1.4000	403, 410S, 429	X6Cr13
1.4002	405	X6CrAl13
1.4003		X2CrNi12
1.4005	416	X12CrS13
1.4006	410, CA-15	X12Cr13
1.4016	430	X6Cr17
1.4021	420	X20Cr13
1.4028	420 F	X30Cr13
1.4031	420	X38Cr13
1.4034	4105	X46Cr13
1.4037		X65Cr13
1.4057	431	X17CrNi16-2
1.4104	430 F	X14CrMoS17
1.4105		X6CrMoS17
1.4109	440A	X70CrMo15
1.4110		X55CrMo14
1.4112	440B	X90CrMoV18
1.4113	434	X6CrMo17-1
1.4116		X50CrMoV15
1.4120		X20CrMo13
1.4122		X39CrMo17-1
1.4125	440 C	X105CrMo17
1.4301	304, 304H	X5CrNi18-10
1.4303	305, 308	X4CrNi18-12
1.4305	303	X8CrNiS18-9
1.4306	304 L	X2CrNi19-11
1.4310	301	X10CrNi18-8
1.4311	304 LN	X2CrNiN18-10
1.4313	CA 6-NM	X3CrNiMo13-4
1.4318		X2CrNiN18-7
1.4335	3105	X1CrNi25-21
1.4361		X1CrNiSi18-15-4
1.4362	2304	X2CrNiN23-4
1.4401	316	X5CrNiMo17-12-2
1.4404	316 L	X2CrNiMo17-12-2
1.4410	2507	X2CrNiMoN25-7-4
1.4418		X4CrNiMo16-5-1
1.4435	316 L	X2CrNiMo18-14-3
1.4436	316	X3CrNiMo17-13-3
1.4438	317 L	X2CrNiMo18-15-4
1.4460	329	X3CrNiMoN27-5-2
1.4462	2205	X2CrNiMoN22-5-3
1.4509		X2CrTiNb18
1.4510	XM 8, 430Ti	X3CrTi17
1.4511		X3CrNb17
1.4512	409	X2CrTi12
1.4520		X2CrTi17
1.4521	443, 444	X2CrMoTi18-2
1.4522		X2CrMoNb18-2
1.4532	AL 15-7	X8CrNiMoAl15-7-2
1.4541	321	X6CrNiTi18-10
1.4542	630	X5CrNiCuNb16-4
1.4550	347, 348	X6CrNiNb18-10
1.4558	B407-409	X2NiCrAlTi32-20
1.4567	18-9-LW	X3CrNiCu18-9-4
1.4568	17-7	X7CrNiAl17-7
1.4571	316Ti	X6CrNiMoTi17-12-2
1.4577		X3CrNiMoTi25-25
1.4592		X2CrMoTi29-4
1.4713		X10CrAlSi7
1.4724		X10CrAlSi13
1.4742		X10CrAlSi18
1.4762	(446)	X10CrAlSi25
1.4821		X20CrNiSi25-4
1.4828	309	X15CrNiSi20-12
1.4833	309 S	X7CrNi23-12
1.4841	314, 310	X15CrNiSi25-21
1.4845	310 S	X12CrNi25-21
1.4864	330	X12NiCrSi35-16
1.4878	321	X10CrNiTi18-10
1.4903		X10CrMoVNb9-1
1.5026	9255	55Si7
1.5131		50MnSi4
1.5415	A204 GrA, 4017	16Mo3
1.5530		20MnB5
1.5531		30MnB5
1.5532		38MnB5
1.5637	A350-LF3	12Ni14
1.5662	A353	X11CrMo5+I
1.5680	2515, 2517	X12Ni5
1.5710	3135	36NiCr6
1.5715		16NiCrS4
1.5752	3310, 3415, 9314	15NiCr13
1.6210		15MnNi6-3
1.6211		16MnNi6-3
1.6310		20MnMoNi5-5
1.6311		20MnMoNi4-5
1.6341		11NiMoV5-3
1.6368		15NiCuMoNb5
1.6511	4340, 9840	36CrNiMo4
1.6523	8620	21NiCrMo2-2
1.6526	8620	21NiCrMoS2-2
1.6580		30CrNiMo8
1.6582	4337, 4340	34CrNiMo6
1.6587	4317	18CrNiMo7-6
1.7003	50B40	38Cr2
1.7006	5045, 5046	46Cr2
1.7016	5117	17Cr3
1.7023	50B40	38CrS2
1.7025	5045	46CrS2
1.7030	5130	28Cr4
1.7033	5132	34Cr4
1.7034	5135	37Cr4
1.7035	5140	41Cr4
1.7036		28CrS4
1.7037	5132	34CrS4
1.7038	5135	37CrS4
1.7039	5140	41CrS4
1.7131	5115	16MnCr5
1.7139	5117	16MnCrS5
1.7043	5135	38Cr4
1.7147	5120	20MnCr5
1.7149	5120	20MnCrS5
1.7176	5155, 5160	55Cr3
1.7182		27MnCrB5-2
1.7185		33MnCrB5-2
1.7189		39MnCrB6-2
1.7213		25CrMoS4
1.7218	4130	25CrMo4
1.7219	4125	26CrMo4-2
1.7220	4135, 4137	34CrMo4
1.7225	4140, 4142	42CrMo4
1.7226	4135	34CrMoS4
1.7227	4140	42CrMoS4
1.7228	4147	50CrMo4
1.7264	4118	20CrMo5
1.7321		20MoCr4
1.7323		20MoCrS4
1.7333		22CrMoS3-5
1.7335	A182-F11, F12	13CrMo4-5
1.7362	501	12CrMo19-5
1.7380	A182 F22, A387	10CrMo9-10
1.7383		11CrMo9-10
1.7779		20CrMoV13-5-5
1.8159	6145, 6150	51CrV4
1.8504		34CrAl6
1.8519		31CrMoV9
1.8550		34CrAlNi7
1.8807		13MnNiMoV5-4
1.8812		18MnMoV5-2
1.8815	4012	18MnMoV6-3
1.8821		P355M
1.8824		P420M
1.8826		P460M
1.8828		P420ML2
1.8831		P460ML2
1.8832		P355ML1
1.8835		P420ML1
1.8837		P460ML1
1.8879		P690Q
1.8880		P690QH
1.8881		P690QL1
1.8882		10MnTi3
1.8888		P690QL2
1.8900		S380N
1.8901		S460N
1.8902	A633 Gr E	S420N
1.8903		S460NL
1.8905	A633 Gr E	P460N
1.8907		S500N
1.8910		S380NL
1.8911		S380NL1
1.8912		S420NL
1.8913		S420NL1
1.8915		P460NL1
1.8917		S500NL
1.8918		P460NL2
1.8919		S500NL1
1.8930		P380NH
1.8932		P420NH
1.8935		P460NH
1.8937		P500NH
1.8972	1522	L415NB
1.8973		L415MB
1.8975		L450MB
1.8977		L485MB
1.8978	1522	L555MB

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 205

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>100-260 Bhn	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Free-cutting steels	≤24 Rc	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>24-30 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	16-24 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.01250	0.01250	0.0140	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Spheroidal graphite iron and	≤240 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
malleable cast iron	<300 Bhn	65	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	205	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
> 10 % Si	≤200 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Magnesium alloys	≤150 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Copper, low-alloyed	≤120 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Brass, short-chipping	≤200 Bhn	205	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
long-chipping	≤200 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Bronze, short-chipping	≤200 Bhn	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>200-260 Bhn	90	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Bronze, long-chipping	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Thermoplastics	–	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 206

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	260	0.0020	0.0065	0.010	0.0125	0.0160	0.0160	0.0180	•	•	•
Al wrought alloys	≤150 Bhn	260	0.0020	0.0065	0.010	0.0125	0.0160	0.0160	0.0180	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	205	0.0020	0.0065	0.010	0.0125	0.0160	0.0160	0.0180	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	205	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Thermoplastics	–	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 207

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	260	0.002	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Al wrought alloys	≤150 Bhn	260	0.002	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	205	0.002	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 208

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	100	0.0017	0.005	0.0080	0.0100	0.0125	•	•	•	•	•
	>100-260 Bhn	80	0.0015	0.004	0.0065	0.0080	0.0100	•	•	•	•	•
Free-cutting steels	≤24 Rc	100	0.0017	0.005	0.0080	0.0100	0.0125	•	•	•	•	•
	>24-30 Rc	80	0.0015	0.004	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	100	0.0015	0.004	0.0065	0.0080	0.0100	•	•	•	•	•
	16-24 Rc	80	0.0015	0.004	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•		
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	100	0.0017	0.005	0.008	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	80	0.0017	0.005	0.008	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	90	0.0017	0.005	0.008	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	65	0.0017	0.005	0.008	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	205	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	160	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Magnesium alloys	≤150 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	205	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
long-chipping	≤200 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	100	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>200-260 Bhn	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	80	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 217

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>100-260 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Free-cutting steels	≤24 Rc	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Unalloyed heat-treatable steels	≤16 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	16-24 Rc	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.008	0.0090	0.0100	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	<300 Bhn	70	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Spheroidal graphite iron and	≤240 Bhn	70	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
malleable cast iron	<300 Bhn	55	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	180	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
> 10 % Si	≤200 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Magnesium alloys	≤150 Bhn	225	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Copper, low-alloyed	≤120 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	110	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Bronze, short-chipping	≤200 Bhn	90	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>200-260 Bhn	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Bronze, long-chipping	≤24 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Thermoplastics	–	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 219

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Al wrought alloys	≤150 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	180	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 223

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	0.0200	•	•
	>100-260 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	0.0160	•	•
Free-cutting steels	≤24 Rc	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	0.0200	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	0.0160	•	•
Unalloyed heat-treatable steels	≤16 Rc	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	0.0160	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	0.0160	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	0.0200	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	0.0125	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	0.0200	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	0.0200	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	0.0200	•	•
	<300 Bhn	75	0.0017	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	0.0200	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	0.0245	•	•
> 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	0.0200	•	•
Magnesium alloys	≤150 Bhn	295	0.0017	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	0.0200	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	0.0160	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	0.0160	•	•
Bronze, short-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	0.0125	•	•
	>200-260 Bhn	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	0.0125	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	0.0125	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	0.0125	•	•
Thermoplastics	–	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	0.0160	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 224

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	260	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0180	•	•
Al wrought alloys	≤150 Bhn	260	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0180	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	205	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0180	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	295	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	225	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Thermoplastics	–	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 225

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Al wrought alloys	≤150 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 226

Material group	Hardness	SFM	Feed Rate - IPR									
			0.0039 in. 1.590 mm	0.0063 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>100-260 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Free-cutting steels	≤24 Rc	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
malleable cast iron	<300 Bhn	75	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Magnesium alloys	≤150 Bhn	295	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>200-260 Bhn	100	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 235

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>100-260 Bhn	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Free-cutting steels	≤24 Rc	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	16-24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	15	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
High speed steels	≥14-30 Rc	15	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	55	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	65	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	45	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
> 10 % Si	≤200 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Magnesium alloys	≤150 Bhn	180	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	145	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
long-chipping	≤200 Bhn	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	70	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>200-260 Bhn	65	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	55	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Duroplastics	–	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Thermoplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 245

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	100	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
	>100-260 Bhn	80	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Free-cutting steels	≤24 Rc	100	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
	>24-30 Rc	80	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Unalloyed heat-treatable steels	≤16 Rc	100	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
	16-24 Rc	80	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	100	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	50	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	100	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
	<300 Bhn	80	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	90	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
	<300 Bhn	65	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	205	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	0.0245	0.0290
> 10 % Si	≤200 Bhn	160	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Magnesium alloys	≤150 Bhn	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Copper, low-alloyed	≤120 Bhn	100	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	130	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Bronze, short-chipping	≤200 Bhn	100	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
	>200-260 Bhn	90	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
Bronze, long-chipping	≤24 Rc	80	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	50	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
Thermoplastics	–	80	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 | IPM = IPR x RPM | $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time | mm = in. x 25.40 | m/min. = SFM ÷ 3.28 | mm/rev. = IPR x 25.40 | Bar = PSI ÷ 14.50 | Liter = Gal. ÷ 3.79

Series # 257

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	90	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
	>100-260 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Free-cutting steels	≤24 Rc	90	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
	>24-30 Rc	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Unalloyed heat-treatable steels	≤16 Rc	90	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
	16-24 Rc	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	90	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	45	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	90	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
	<300 Bhn	70	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Spheroidal graphite iron and	≤240 Bhn	70	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
malleable cast iron	<300 Bhn	55	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	180	•	•	•	0.0125	0.0160	0.0160	0.0180	0.0200	0.0245	0.0290
> 10 % Si	≤200 Bhn	145	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Magnesium alloys	≤150 Bhn	225	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	0.0245
Copper, low-alloyed	≤120 Bhn	90	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	110	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Bronze, short-chipping	≤200 Bhn	90	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
	>200-260 Bhn	70	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
Bronze, long-chipping	≤24 Rc	70	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	45	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	0.0160
Thermoplastics	–	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	0.0200
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 266

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
	>100-260 Bhn	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Free-cutting steels	≤24 Rc	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
	>24-30 Rc	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Unalloyed heat-treatable steels	≤16 Rc	70	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	16-24 Rc	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	35	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Alloyed case hardened steels	24-30 Rc	30	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	25	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	35	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
	>24-30 Rc	15	•	•	•	0.0040	0.0050	0.0050	0.0055	0.0065	0.0080	•
High speed steels	≥14-30 Rc	15	•	•	•	0.0040	0.0050	0.0050	0.0055	0.0065	0.0080	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	25	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
	<300 Bhn	55	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Spheroidal graphite iron and	≤240 Bhn	65	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
malleable cast iron	<300 Bhn	45	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	145	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
> 10 % Si	≤200 Bhn	115	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Magnesium alloys	≤150 Bhn	180	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Copper, low-alloyed	≤120 Bhn	70	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Brass, short-chipping	≤200 Bhn	145	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
long-chipping	≤200 Bhn	90	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Bronze, short-chipping	≤200 Bhn	70	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
	>200-260 Bhn	65	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
Bronze, long-chipping	≤24 Rc	55	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
	>24-30 Rc	45	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
Duroplastics	–	35	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	0.0100	•
Thermoplastics	–	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 301

Material group	Hardness	SFM	Feed Rate - IPR									
			0.0039 in. 0.100 mm	0.0063 in. 0.160 mm	0.0098 in. 0.250 mm	0.0118 in. 0.300 mm	0.0197 in. 0.500 mm	0.0248 in. 0.630 mm	0.0315 in. 0.800 mm	0.0394 in. 1.000 mm	0.0591 in. 1.500 mm	0.0787 in. 2.000 mm
Common structural steels	≤100 Bhn	65	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	>100-260 Bhn	55	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Free-cutting steels	≤24 Rc	55	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	>24-30 Rc	50	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Unalloyed heat-treatable steels	≤16 Rc	65	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
	16-24 Rc	55	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
	24-30 Rc	45	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Alloyed heat-treatable steels	24-30 Rc	45	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>30-38 Rc	35	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Unalloyed case hardened steels	≤230 Bhn	55	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Alloyed case hardened steels	24-30 Rc	45	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>30-38 Rc	35	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Nitriding steels	≥24-30 Rc	45	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>30-38 Rc	35	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Tool steels	≤24 Rc	50	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>24-30 Rc	45	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
High speed steels	≥14-30 Rc	45	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Spring steels	≤330 Bhn	25	0.0002	0.0002	0.0002	0.0002	0.0003	0.0004	0.0006	0.0001	0.0014	0.0019
Stainless steels, sulphured	≤24 Rc	15	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
austenitic	≤24 Rc	15	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
martensitic	≤24 Rc	15	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	85	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	<300 Bhn	70	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	55	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	<300 Bhn	70	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	85	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0024	0.0028	0.0037
> 10 % Si	≤200 Bhn	55	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Magnesium alloys	≤150 Bhn	245	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Copper, low-alloyed	≤120 Bhn	135	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	70	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Bronze, short-chipping	≤200 Bhn	70	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>200-260 Bhn	55	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Bronze, long-chipping	≤24 Rc	40	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	50	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Thermoplastics	–	55	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 303

Material group	Hardness	SFM	Feed Rate - IPR									
			0.0039 in. 0.100 mm	0.0063 in. 0.160 mm	0.0098 in. 0.250 mm	0.0118 in. 0.300 mm	0.0197 in. 0.500 mm	0.0248 in. 0.630 mm	0.0315 in. 0.800 mm	0.0394 in. 1.000 mm	0.0591 in. 1.500 mm	0.0787 in. 2.000 mm
Common structural steels	≤100 Bhn	65	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	>100-260 Bhn	55	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Free-cutting steels	≤24 Rc	55	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	>24-30 Rc	50	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Unalloyed heat-treatable steels	≤16 Rc	65	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
	16-24 Rc	55	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
	24-30 Rc	45	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Alloyed heat-treatable steels	24-30 Rc	45	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>30-38 Rc	35	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Unalloyed case hardened steels	≤230 Bhn	55	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Alloyed case hardened steels	24-30 Rc	45	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>30-38 Rc	35	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Nitriding steels	≥24-30 Rc	45	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>30-38 Rc	35	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Tool steels	≤24 Rc	50	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>24-30 Rc	45	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
High speed steels	≥14-30 Rc	45	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Spring steels	≤330 Bhn	25	0.0002	0.0002	0.0002	0.0002	0.0003	0.0004	0.0006	0.0001	0.0014	0.0019
Stainless steels, sulphured	≤24 Rc	15	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
austenitic	≤24 Rc	15	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
martensitic	≤24 Rc	15	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	85	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	<300 Bhn	70	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	55	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	<300 Bhn	70	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	85	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0024	0.0028	0.0037
> 10 % Si	≤200 Bhn	55	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Magnesium alloys	≤150 Bhn	245	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Copper, low-alloyed	≤120 Bhn	135	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	70	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Bronze, short-chipping	≤200 Bhn	70	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>200-260 Bhn	55	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Bronze, long-chipping	≤24 Rc	40	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	50	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Thermoplastics	–	55	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 305

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
High speed steels	≥14-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Spring steels	≤330 Bhn	25	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
austenitic	≤24 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
martensitic	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	95	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
malleable cast iron	<300 Bhn	70	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>200-260 Bhn	95	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 308

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Alloyed heat-treatable steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>30-38 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
High speed steels	≥14-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Spring steels	≤330 Bhn	25	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	•	•	•
Stainless steels, sulphured	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
austenitic	≤24 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
martensitic	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Spheroidal graphite iron and	≤240 Bhn	95	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
malleable cast iron	<300 Bhn	70	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Chilled cast iron	≤350 Bhn	25	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Bronze, short-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>200-260 Bhn	95	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 317

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	75	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	75	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Alloyed heat-treatable steels	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>30-38 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Nitriding steels	≥24-30 Rc	35	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>30-38 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Tool steels	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
High speed steels	≥14-30 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Spring steels	≤330 Bhn	15	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	•	•	•
Stainless steels, sulphured	≤24 Rc	35	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
austenitic	≤24 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
martensitic	≤24 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	15	0.0005	0.0015	0.0025	0.0030	0.0040	0.0040	0.0045	•	•	•
Cast iron	≤240 Bhn	95	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	<300 Bhn	75	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Spheroidal graphite iron and	≤240 Bhn	75	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
malleable cast iron	<300 Bhn	65	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Chilled cast iron	≤350 Bhn	15	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	95	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	120	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Bronze, short-chipping	≤200 Bhn	95	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>200-260 Bhn	75	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Bronze, long-chipping	≤24 Rc	75	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Duroplastics	–	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 329

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	95	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	95	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Alloyed heat-treatable steels	24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>30-38 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Nitriding steels	≥24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Tool steels	≤24 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-30 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
High speed steels	≥14-30 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Spring steels	≤330 Bhn	30	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Stainless steels, sulphured	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
austenitic	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
martensitic	≤24 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	25	0.0005	0.0015	0.0025	0.0030	0.0040	0.0040	0.0045	0.0050	•	•
Cast iron	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	<300 Bhn	95	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Spheroidal graphite iron and	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
malleable cast iron	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Chilled cast iron	≤350 Bhn	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Ti and Ti-alloys	≤24 Rc	35	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
	>24-38 Rc	25	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>200-260 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Bronze, long-chipping	≤24 Rc	95	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Duroplastics	–	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 336

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	75	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	75	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Nitriding steels	≥24-30 Rc	35	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Tool steels	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
High speed steels	≥14-30 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Spring steels	≤330 Bhn	15	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	35	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
austenitic	≤24 Rc	25	0.0005	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
martensitic	≤24 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	95	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	75	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	75	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
malleable cast iron	<300 Bhn	65	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	195	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	160	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	95	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	120	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	75	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 345

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	90	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	90	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	24-30 Rc	45	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Alloyed heat-treatable steels	24-30 Rc	55	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>30-38 Rc	45	•	•	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	50	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>30-38 Rc	35	•	•	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Nitriding steels	≥24-30 Rc	45	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>30-38 Rc	30	•	•	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Tool steels	≤24 Rc	55	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-30 Rc	30	•	•	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
High speed steels	≥14-30 Rc	30	•	•	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Spring steels	≤330 Bhn	25	•	•	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Stainless steels, sulphured	≤24 Rc	45	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
austenitic	≤24 Rc	30	•	•	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
martensitic	≤24 Rc	35	•	•	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	<300 Bhn	90	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Spheroidal graphite iron and	≤240 Bhn	95	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
malleable cast iron	<300 Bhn	70	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Chilled cast iron	≤350 Bhn	25	•	•	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Bronze, short-chipping	≤200 Bhn	115	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>200-260 Bhn	95	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Bronze, long-chipping	≤24 Rc	90	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-30 Rc	70	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Duroplastics	–	55	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 390

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	130	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	95	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	130	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	95	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	130	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	16-24 Rc	95	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	24-30 Rc	70	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	65	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	45	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	130	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	55	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	35	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	45	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	30	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	65	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	30	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	30	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	20	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	45	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	30	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	35	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	10	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	15	•	0.0015	0.0025	0.0030	0.0040	0.0040	•	•	•	•
Cast iron	≤240 Bhn	130	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	95	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	110	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	80	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	20	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Ti and Ti-alloys	≤24 Rc	30	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
	>24-38 Rc	15	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	245	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	195	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	130	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	160	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	110	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Bronze, long-chipping	≤24 Rc	95	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	80	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	95	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 501

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	225	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	130	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 502

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>100-260 Bhn	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Free-cutting steels	≤24 Rc	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	16-24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	15	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
High speed steels	≥14-30 Rc	15	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	55	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	65	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	45	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
> 10 % Si	≤200 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Magnesium alloys	≤150 Bhn	180	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	70	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>200-260 Bhn	65	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	55	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Thermoplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 503

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>100-260 Bhn	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Free-cutting steels	≤24 Rc	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	16-24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed case hardened steels	24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>24-30 Rc	15	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
High speed steels	≥14-30 Rc	15	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	<300 Bhn	55	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	65	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	<300 Bhn	45	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
> 10 % Si	≤200 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Magnesium alloys	≤150 Bhn	180	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Copper, low-alloyed	≤120 Bhn	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	90	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Bronze, short-chipping	≤200 Bhn	70	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>200-260 Bhn	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Bronze, long-chipping	≤24 Rc	55	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Thermoplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 504

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	70	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>100-260 Bhn	55	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Free-cutting steels	≤24 Rc	70	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>24-30 Rc	55	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	70	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	16-24 Rc	55	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	35	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	70	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	30	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	25	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	35	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	15	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
High speed steels	≥14-30 Rc	15	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	25	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	70	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	55	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	65	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	45	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	145	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
> 10 % Si	≤200 Bhn	115	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Magnesium alloys	≤150 Bhn	180	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	70	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	90	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	70	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>200-260 Bhn	65	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	55	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	35	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Thermoplastics	–	55	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 515

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	195	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	16-24 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	24-30 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	130	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Alloyed case hardened steels	24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	35	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	40	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Cast iron	≤240 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{\text{SFM}}{\text{DIAM. in.}}$ x 3.82 IPM = IPR x RPM $\frac{\text{HOLE DEPTH in.}}{\text{IPM}}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 524

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Al wrought alloys	≤150 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	180	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	105	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 526

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>100-260 Bhn	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Free-cutting steels	≤24 Rc	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>24-30 Rc	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Unalloyed heat-treatable steels	≤16 Rc	70	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	16-24 Rc	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	35	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Alloyed case hardened steels	24-30 Rc	30	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	25	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	35	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>24-30 Rc	15	•	•	•	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
High speed steels	≥14-30 Rc	15	•	•	•	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	25	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	<300 Bhn	55	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	65	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	<300 Bhn	45	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	145	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
> 10 % Si	≤200 Bhn	115	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Magnesium alloys	≤150 Bhn	180	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Copper, low-alloyed	≤120 Bhn	70	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	90	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Bronze, short-chipping	≤200 Bhn	70	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>200-260 Bhn	65	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Bronze, long-chipping	≤24 Rc	55	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	35	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Thermoplastics	–	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 527

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>100-260 Bhn	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Free-cutting steels	≤24 Rc	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>24-30 Rc	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Unalloyed heat-treatable steels	≤16 Rc	70	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	16-24 Rc	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	35	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Alloyed case hardened steels	24-30 Rc	30	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	25	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	35	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>24-30 Rc	15	•	•	•	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
High speed steels	≥14-30 Rc	15	•	•	•	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	25	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	70	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	<300 Bhn	55	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	65	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	<300 Bhn	45	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	145	•	•	•	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
> 10 % Si	≤200 Bhn	115	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Magnesium alloys	≤150 Bhn	180	•	•	•	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Copper, low-alloyed	≤120 Bhn	70	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	90	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Bronze, short-chipping	≤200 Bhn	70	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>200-260 Bhn	65	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Bronze, long-chipping	≤24 Rc	55	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	35	•	•	•	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Thermoplastics	–	55	•	•	•	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 530

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	195	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	16-24 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	24-30 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	130	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Alloyed case hardened steels	24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	35	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	40	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Cast iron	≤240 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 535

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	70	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	70	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	70	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	55	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	180	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	110	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 549

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	16-24 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	65	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	260	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	260	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	205	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 550

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>100-260 Bhn	80	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Free-cutting steels	≤24 Rc	100	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>24-30 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	16-24 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	65	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	260	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Al wrought alloys	≤150 Bhn	260	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	205	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	160	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Magnesium alloys	≤150 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 551

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	90	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>100-260 Bhn	70	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Free-cutting steels	≤24 Rc	90	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	70	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Unalloyed heat-treatable steels	≤16 Rc	90	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	16-24 Rc	90	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	90	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	45	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	90	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	<300 Bhn	70	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	70	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	<300 Bhn	55	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	180	•	•	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
> 10 % Si	≤200 Bhn	145	•	•	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	90	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	110	•	•	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	70	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	45	•	•	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 552

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>100-260 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Free-cutting steels	≤24 Rc	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Spheroidal graphite iron and	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
malleable cast iron	<300 Bhn	75	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Al wrought alloys	≤150 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
> 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Magnesium alloys	≤150 Bhn	295	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Bronze, short-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>200-260 Bhn	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Thermoplastics	–	90	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 553

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>100-260 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Free-cutting steels	≤24 Rc	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
malleable cast iron	<300 Bhn	75	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Al wrought alloys	≤150 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Magnesium alloys	≤150 Bhn	295	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>200-260 Bhn	100	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 605

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
High speed steels	≥14-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Spring steels	≤330 Bhn	25	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	•	•	•
Stainless steels, sulphured	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
austenitic	≤24 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
martensitic	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	15	0.0005	0.0015	0.0025	0.0030	0.0040	0.0040	0.0045	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	25	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Ti and Ti-alloys	≤24 Rc	30	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	•	•	•
	>24-38 Rc	15	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 609

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	360	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>100-260 Bhn	320	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Free-cutting steels	≤24 Rc	390	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	280	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	250	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	16-24 Rc	240	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	24-30 Rc	220	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	220	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>30-38 Rc	180	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	250	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	220	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>30-38 Rc	180	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Nitriding steels	≥24-30 Rc	240	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	200	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Tool steels	≤24 Rc	120	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	100	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
High speed steels	≥14-30 Rc	90	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	70	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
austenitic	≤24 Rc	70	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	50	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	460	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	330	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	330	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	60	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>24-38 Rc	50	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	560	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	460	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	560	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	460	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	655	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	690	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
long-chipping	≤200 Bhn	650	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Bronze, short-chipping	≤200 Bhn	600	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{\text{SFM}}{\text{DIAM. in.}}$ x 3.82 IPM = IPR x RPM $\frac{\text{HOLE DEPTH in.}}{\text{IPM}}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 617

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	35	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
austenitic	≤24 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
martensitic	≤24 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	15	0.0005	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	15	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	25	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
	>24-38 Rc	15	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	65	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 618

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	65	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	45	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	45	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	30	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	35	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	30	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Nitriding steels	≥24-30 Rc	30	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	25	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Tool steels	≤24 Rc	45	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	25	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
High speed steels	≥14-30 Rc	25	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Spring steels	≤330 Bhn	15	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	30	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
austenitic	≤24 Rc	25	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
martensitic	≤24 Rc	30	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Hardened steels	≤40-48 Rc	5	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	15	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	65	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	50	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Chilled cast iron	≤350 Bhn	15	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	25	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
	>24-38 Rc	15	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	160	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
> 10 % Si	≤200 Bhn	130	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	75	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	95	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	65	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	50	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Duroplastics	–	45	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 619

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	65	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	45	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	45	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	30	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	35	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	30	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Nitriding steels	≥24-30 Rc	30	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	25	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Tool steels	≤24 Rc	45	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	25	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
High speed steels	≥14-30 Rc	25	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Spring steels	≤330 Bhn	15	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	30	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
austenitic	≤24 Rc	25	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
martensitic	≤24 Rc	30	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Hardened steels	≤40-48 Rc	5	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	15	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	65	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	50	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Chilled cast iron	≤350 Bhn	15	•	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	25	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
	>24-38 Rc	15	•	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	160	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
> 10 % Si	≤200 Bhn	130	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	75	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	95	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	65	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	50	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Duroplastics	–	45	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 622

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
High speed steels	≥14-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	95	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	70	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 651

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>100-260 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Free-cutting steels	≤24 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>24-30 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	16-24 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Alloyed heat-treatable steels	24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Alloyed case hardened steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	<300 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Spheroidal graphite iron and	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
malleable cast iron	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	260	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
> 10 % Si	≤200 Bhn	225	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Magnesium alloys	≤150 Bhn	325	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Copper, low-alloyed	≤120 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	160	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Bronze, short-chipping	≤200 Bhn	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>200-260 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Bronze, long-chipping	≤24 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
	>24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Duroplastics	–	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Thermoplastics	–	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 652

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	16-24 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	260	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	225	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	160	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 653

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
	>100-260 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Free-cutting steels	≤24 Rc	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
	>24-30 Rc	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Unalloyed heat-treatable steels	≤16 Rc	145	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
	16-24 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Alloyed heat-treatable steels	24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
Alloyed case hardened steels	24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
	<300 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	0.0245	•
> 10 % Si	≤200 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	180	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Bronze, short-chipping	≤200 Bhn	145	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>200-260 Bhn	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Bronze, long-chipping	≤24 Rc	110	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>24-30 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Duroplastics	–	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Thermoplastics	–	115	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 654

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	130	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
	>100-260 Bhn	100	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Free-cutting steels	≤24 Rc	130	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
	>24-30 Rc	100	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Unalloyed heat-treatable steels	≤16 Rc	130	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
	16-24 Rc	100	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
	24-30 Rc	50	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Alloyed heat-treatable steels	24-30 Rc	65	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	130	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
Alloyed case hardened steels	24-30 Rc	55	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	45	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	65	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	130	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
	<300 Bhn	100	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	115	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
	<300 Bhn	80	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	260	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	0.0245	•
> 10 % Si	≤200 Bhn	225	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
Magnesium alloys	≤150 Bhn	325	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	0.0200	•
Copper, low-alloyed	≤120 Bhn	130	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	160	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Bronze, short-chipping	≤200 Bhn	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>200-260 Bhn	115	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Bronze, long-chipping	≤24 Rc	100	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
	>24-30 Rc	80	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Duroplastics	–	65	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	0.0125	•
Thermoplastics	–	100	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	0.0160	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 657

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	30	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	10	0.0005	0.0015	0.0025	0.0030	0.0040	0.0040	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	25	0.0005	0.0015	0.0025	0.0030	0.0040	0.0040	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Ti and Ti-alloys	≤24 Rc	40	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
	>24-38 Rc	25	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 658

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	55	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Nitriding steels	≥24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Tool steels	≤24 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
High speed steels	≥14-30 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
malleable cast iron	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	275	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	225	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	115	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 659

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	24-30 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	55	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	35	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	55	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	15	0.0005	0.0015	0.0025	0.0030	0.0040	0.0040	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	30	0.0005	0.0015	0.0025	0.0030	0.0040	0.0040	•	•	•	•
Cast iron	≤240 Bhn	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Ti and Ti-alloys	≤24 Rc	45	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
	>24-38 Rc	30	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	145	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Bronze, long-chipping	≤24 Rc	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 660

Material group	Hardness	SFM	Feed Rate - IPR									
			0.0039 in. 0.100 mm	0.0063 in. 0.160 mm	0.0098 in. 0.250 mm	0.0118 in. 0.300 mm	0.0197 in. 0.500 mm	0.0248 in. 0.630 mm	0.0315 in. 0.800 mm	0.0394 in. 1.000 mm	0.0591 in. 1.500 mm	0.0787 in. 2.000 mm
Common structural steels	≤100 Bhn	85	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	>100-260 Bhn	75	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Free-cutting steels	≤24 Rc	75	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	>24-30 Rc	65	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Unalloyed heat-treatable steels	≤16 Rc	85	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
	16-24 Rc	75	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
	24-30 Rc	55	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Alloyed heat-treatable steels	24-30 Rc	55	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>30-38 Rc	50	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Unalloyed case hardened steels	≤230 Bhn	75	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Alloyed case hardened steels	24-30 Rc	55	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>30-38 Rc	50	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Nitriding steels	≥24-30 Rc	55	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>30-38 Rc	50	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Tool steels	≤24 Rc	65	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>24-30 Rc	55	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
High speed steels	≥14-30 Rc	55	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Spring steels	≤330 Bhn	30	0.0002	0.0002	0.0002	0.0002	0.0003	0.0004	0.0006	0.0001	0.0014	0.0019
Stainless steels, sulphured	≤24 Rc	25	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
austenitic	≤24 Rc	25	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
martensitic	≤24 Rc	25	0.0002	0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0012	0.0016	0.0021
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	105	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	<300 Bhn	90	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	75	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
	<300 Bhn	90	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	105	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0024	0.0028	0.0037
> 10 % Si	≤200 Bhn	75	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Magnesium alloys	≤150 Bhn	315	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013	0.0020	0.0024	0.0032
Copper, low-alloyed	≤120 Bhn	170	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	90	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0017	0.0021	0.0028
Bronze, short-chipping	≤200 Bhn	90	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>200-260 Bhn	75	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Bronze, long-chipping	≤24 Rc	50	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
	>24-30 Rc	45	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Duroplastics	–	65	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Thermoplastics	–	75	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0014	0.0019	0.0025
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 664

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>100-260 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Free-cutting steels	≤24 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	16-24 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	260	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	225	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	325	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	160	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>200-260 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Bronze, long-chipping	≤24 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Thermoplastics	–	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 666

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>100-260 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Free-cutting steels	≤24 Rc	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	35	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
malleable cast iron	<300 Bhn	70	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Magnesium alloys	≤150 Bhn	310	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>200-260 Bhn	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 667

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	115	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
	>100-260 Bhn	90	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	115	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	115	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
	24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	115	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	35	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
	>24-30 Rc	25	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	90	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
	<300 Bhn	70	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	225	0.0020	0.0065	0.0100	0.0125	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	310	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
	>200-260 Bhn	90	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
	>24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
Thermoplastics	–	90	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 668

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>100-260 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Free-cutting steels	≤24 Rc	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>24-30 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	16-24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	35	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	25	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	70	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	115	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 669

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
High speed steels	≥14-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Spring steels	≤330 Bhn	25	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
austenitic	≤24 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
martensitic	≤24 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Hardened steels	≤40-48 Rc	5	0.0005	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	15	0.0005	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	15	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	30	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
	>24-38 Rc	15	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 670

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>100-260 Bhn	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Free-cutting steels	≤24 Rc	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	16-24 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	24-30 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	30	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	30	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Nitriding steels	≥24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>30-38 Rc	25	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Tool steels	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	25	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
High speed steels	≥14-30 Rc	25	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Spring steels	≤330 Bhn	15	0.0005	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
austenitic	≤24 Rc	25	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
martensitic	≤24 Rc	30	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	15	0.0005	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Cast iron	≤240 Bhn	90	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	80	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
malleable cast iron	<300 Bhn	55	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Chilled cast iron	≤350 Bhn	15	0.0007	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	25	0.0005	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
	>24-38 Rc	15	0.0005	0.0015	0.0025	0.0030	0.0040	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	225	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Al wrought alloys	≤150 Bhn	225	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
> 10 % Si	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Magnesium alloys	≤150 Bhn	225	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	90	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>200-260 Bhn	80	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	70	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	55	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Duroplastics	–	45	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Thermoplastics	–	70	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 671

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	90	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
	>100-260 Bhn	70	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	90	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
	>24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	90	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
	16-24 Rc	70	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
	24-30 Rc	50	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	45	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
	>30-38 Rc	30	0.0007	0.0020	0.0030	0.0040	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	90	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	35	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
	>30-38 Rc	30	0.0007	0.0020	0.0030	0.0040	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
	>30-38 Rc	25	0.0007	0.0020	0.0030	0.0040	•	•	•	•	•	•
Tool steels	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
	>24-30 Rc	25	0.0007	0.0020	0.0030	0.0040	•	•	•	•	•	•
High speed steels	≥14-30 Rc	25	0.0007	0.0020	0.0030	0.0040	•	•	•	•	•	•
Spring steels	≤330 Bhn	15	0.0005	0.0015	0.0025	0.0030	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	30	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
austenitic	≤24 Rc	25	0.0007	0.0020	0.0030	0.0040	•	•	•	•	•	•
martensitic	≤24 Rc	30	0.0007	0.0020	0.0030	0.0040	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	15	0.0005	0.0015	0.0025	0.0030	•	•	•	•	•	•
Cast iron	≤240 Bhn	90	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
	<300 Bhn	70	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	80	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
	<300 Bhn	55	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	15	0.0007	0.0020	0.0030	0.0040	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	25	0.0005	0.0015	0.0025	0.0030	•	•	•	•	•	•
	>24-38 Rc	15	0.0005	0.0015	0.0025	0.0030	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	225	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	225	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	180	0.0017	0.0050	0.0080	0.0100	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	145	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	225	0.0015	0.0040	0.0065	0.0080	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	90	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	115	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	90	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
	>200-260 Bhn	80	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	70	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
	>24-30 Rc	55	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
Duroplastics	–	45	0.0010	0.0025	0.0040	0.0050	•	•	•	•	•	•
Thermoplastics	–	70	0.0012	0.0030	0.0050	0.0065	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 730

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	260	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>100-260 Bhn	225	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Free-cutting steels	≤24 Rc	260	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>24-30 Rc	225	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	260	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	16-24 Rc	225	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	24-30 Rc	195	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	195	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	260	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed case hardened steels	24-30 Rc	195	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	160	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	160	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	80	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	80	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	80	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	45	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Cast iron	≤240 Bhn	295	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	<300 Bhn	260	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	225	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	<300 Bhn	260	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>24-38 Rc	45	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	655	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	655	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	490	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
> 10 % Si	≤200 Bhn	390	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	590	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Copper, low-alloyed	≤120 Bhn	260	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	590	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
long-chipping	≤200 Bhn	590	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	390	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>200-260 Bhn	390	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, long-chipping	≤24 Rc	225	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	160	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Duroplastics	–	160	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	260	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•

RPM = $\frac{\text{SFM}}{\text{DIAM. in.}}$ x 3.82 IPM = IPR x RPM $\frac{\text{HOLE DEPTH in.}}{\text{IPM}}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 732

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	260	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>100-260 Bhn	225	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Free-cutting steels	≤24 Rc	190	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>24-30 Rc	185	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	230	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	16-24 Rc	185	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	24-30 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	120	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	90	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	260	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	105	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	80	0.0020	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Nitriding steels	≥24-30 Rc	90	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	120	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
austenitic	≤24 Rc	80	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
martensitic	≤24 Rc	80	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Hardened steels	≤40-48 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	45	0.0020	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Cast iron	≤240 Bhn	235	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	<300 Bhn	185	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	200	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
malleable cast iron	<300 Bhn	145	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Chilled cast iron	≤350 Bhn	50	0.0020	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
	>24-38 Rc	40	0.0020	0.0020	0.0030	0.0040	0.0050	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	460	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Al wrought alloys	≤150 Bhn	360	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	460	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
> 10 % Si	≤200 Bhn	360	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Magnesium alloys	≤150 Bhn	390	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	260	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	300	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
long-chipping	≤200 Bhn	295	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	290	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>200-260 Bhn	280	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	225	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	160	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Duroplastics	–	130	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	160	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	260	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•

Series # 768

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	295	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
Cast iron	≤240 Bhn	260	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
	<300 Bhn	130	•	0.0020	0.0030	0.0040	0.0050	0.0055	0.0065	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1080	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	920	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	360	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Brass, short-chipping	≤200 Bhn	260	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–											
Reinforced plastics - Kevlar	–											
Reinforced plastics - GFK / CFK	–											

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 769

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	<300 Bhn	330	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	<300 Bhn	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0020	0.0030	0.0040	0.0050	0.0055	0.0065	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1345	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
Al wrought alloys	≤150 Bhn	1345	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	1245	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
> 10 % Si	≤200 Bhn	1080	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	920	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	360	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>200-260 Bhn	260	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 773

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	395	•	0.0030	0.0050	0.0070	0.0080	0.0100	0.0125	•	•	•
	<300 Bhn	330	•	0.0030	0.0050	0.0070	0.0080	0.0100	0.0125	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	295	•	0.0030	0.0050	0.0070	0.0080	0.0100	0.0125	•	•	•
	<300 Bhn	260	•	0.0030	0.0050	0.0070	0.0080	0.0100	0.0125	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0013	0.0020	0.0025	0.0030	0.0040	0.0050	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1345	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Al wrought alloys	≤150 Bhn	1345	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	1245	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
> 10 % Si	≤200 Bhn	1080	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	920	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	360	•	0.0030	0.0050	0.0070	0.0080	0.0100	0.0125	•	•	•
	>200-260 Bhn	260	•	0.0025	0.0040	0.0050	0.0060	0.0080	0.0100	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 | IPM = IPR x RPM | $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time | mm = in. x 25.40 | m/min. = SFM ÷ 3.28 | mm/rev. = IPR x 25.40 | Bar = PSI ÷ 14.50 | Liter = Gal. ÷ 3.79

Series # 1047 / # 1042 (3xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	51/64 - 31/32 in. 20.001 - 25.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	330	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>100-260 Bhn	280	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Free-cutting steels	≤24 Rc	330	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	>24-30 Rc	280	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Unalloyed heat-treatable steels	≤16 Rc	330	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	16-24 Rc	315	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	24-30 Rc	280	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Alloyed heat-treatable steels	24-30 Rc	280	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>30-38 Rc	230	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Unalloyed case hardened steels	≤230 Bhn	330	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Alloyed case hardened steels	24-30 Rc	280	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>30-38 Rc	185	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Nitriding steels	≥24-30 Rc	265	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>30-38 Rc	185	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Tool steels	≤24 Rc	135	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>24-30 Rc	115	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
High speed steels	≥14-30 Rc	135	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Spring steels	≤330 Bhn	115	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Stainless steels, sulphured	≤24 Rc	135	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
austenitic	≤24 Rc	100	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
martensitic	≤24 Rc	85	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Hardened steels	≤40-48 Rc	70	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	70	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Cast iron	≤240 Bhn	520	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	<300 Bhn	390	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Spheroidal graphite iron and	≤240 Bhn	390	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
malleable cast iron	<300 Bhn	325	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Chilled cast iron	≤350 Bhn	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Ti and Ti-alloys	≤24 Rc	100	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
	>24-38 Rc	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Aluminium and Al-alloys	≤120 Bhn	725	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al wrought alloys	≤150 Bhn	660	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al cast alloys ≤ 10 % Si	≤200 Bhn	590	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
> 10 % Si	≤200 Bhn	490	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Magnesium alloys	≤150 Bhn	655	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Copper, low-alloyed	≤120 Bhn	260	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Brass, short-chipping	≤200 Bhn	685	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
long-chipping	≤200 Bhn	455	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, short-chipping	≤200 Bhn	260	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>200-260 Bhn	210	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, long-chipping	≤24 Rc	160	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>24-30 Rc	130	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Duroplastics	–	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Thermoplastics	–	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - Kevlar	–	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - GFK / CFK	–	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200

Series # 1047 / # 1043 (5xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	51/64 - 31/32 in. 20.001 - 25.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	315	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>100-260 Bhn	265	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Free-cutting steels	≤24 Rc	315	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	>24-30 Rc	265	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Unalloyed heat-treatable steels	≤16 Rc	315	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	16-24 Rc	300	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	24-30 Rc	265	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Alloyed heat-treatable steels	24-30 Rc	265	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>30-38 Rc	215	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Unalloyed case hardened steels	≤230 Bhn	315	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Alloyed case hardened steels	24-30 Rc	265	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>30-38 Rc	185	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Nitriding steels	≥24-30 Rc	265	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>30-38 Rc	185	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Tool steels	≤24 Rc	135	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>24-30 Rc	115	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
High speed steels	≥14-30 Rc	135	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Spring steels	≤330 Bhn	115	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Stainless steels, sulphured	≤24 Rc	135	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
austenitic	≤24 Rc	100	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
martensitic	≤24 Rc	85	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Hardened steels	≤40-48 Rc	70	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	70	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Cast iron	≤240 Bhn	490	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	<300 Bhn	360	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Spheroidal graphite iron and	≤240 Bhn	360	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
malleable cast iron	<300 Bhn	295	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Chilled cast iron	≤350 Bhn	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Ti and Ti-alloys	≤24 Rc	100	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
	>24-38 Rc	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Aluminium and Al-alloys	≤120 Bhn	660	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al wrought alloys	≤150 Bhn	660	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al cast alloys ≤ 10 % Si	≤200 Bhn	555	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
> 10 % Si	≤200 Bhn	455	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Magnesium alloys	≤150 Bhn	655	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Copper, low-alloyed	≤120 Bhn	260	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Brass, short-chipping	≤200 Bhn	685	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
long-chipping	≤200 Bhn	455	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, short-chipping	≤200 Bhn	260	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>200-260 Bhn	210	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, long-chipping	≤24 Rc	160	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>24-30 Rc	130	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Duroplastics	–	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Thermoplastics	–	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - Kevlar	–	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - GFK / CFK	–	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 1047 / # 2748 (7xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	51/64 - 31/32 in. 20.001 - 25.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	300	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>100-260 Bhn	265	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Free-cutting steels	≤24 Rc	300	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>24-30 Rc	265	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Unalloyed heat-treatable steels	≤16 Rc	300	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	16-24 Rc	280	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	24-30 Rc	250	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Alloyed heat-treatable steels	24-30 Rc	250	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>30-38 Rc	215	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Unalloyed case hardened steels	≤230 Bhn	300	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Alloyed case hardened steels	24-30 Rc	250	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>30-38 Rc	185	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Nitriding steels	≥24-30 Rc	265	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
	>30-38 Rc	185	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Tool steels	≤24 Rc	135	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
	>24-30 Rc	115	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
High speed steels	≥14-30 Rc	135	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Spring steels	≤330 Bhn	115	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Stainless steels, sulphured	≤24 Rc	135	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
austenitic	≤24 Rc	100	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
martensitic	≤24 Rc	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Hardened steels	≤40-48 Rc	70	0.0035	0.0040	0.0050	0.0065	0.0065	0.0080
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	70	0.0035	0.0040	0.0050	0.0065	0.0065	0.0080
Cast iron	≤240 Bhn	490	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	<300 Bhn	360	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	360	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	<300 Bhn	295	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Chilled cast iron	≤350 Bhn	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Ti and Ti-alloys	≤24 Rc	100	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
	>24-38 Rc	85	0.0035	0.0040	0.0050	0.0065	0.0065	0.0080
Aluminium and Al-alloys	≤120 Bhn	660	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Al wrought alloys	≤150 Bhn	660	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Al cast alloys ≤ 10 % Si	≤200 Bhn	555	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
> 10 % Si	≤200 Bhn	455	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Magnesium alloys	≤150 Bhn	655	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Copper, low-alloyed	≤120 Bhn	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Brass, short-chipping	≤200 Bhn	685	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
long-chipping	≤200 Bhn	455	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Bronze, short-chipping	≤200 Bhn	260	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>200-260 Bhn	210	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Bronze, long-chipping	≤24 Rc	160	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>24-30 Rc	130	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Duroplastics	–	260	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Thermoplastics	–	260	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Reinforced plastics - Kevlar	–	260	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Reinforced plastics - GFK / CFK	–	260	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160

Series # 1131

Material group	Hardness	SFM	Feed Rate - IPR								
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	155	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
	>100-260 Bhn	120	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Free-cutting steels	≤24 Rc	155	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
	>24-30 Rc	120	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	155	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	16-24 Rc	120	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	24-30 Rc	65	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Alloyed heat-treatable steels	24-30 Rc	80	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>30-38 Rc	65	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Unalloyed case hardened steels	≤230 Bhn	160	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Alloyed case hardened steels	24-30 Rc	70	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>30-38 Rc	50	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Nitriding steels	≥24-30 Rc	65	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>30-38 Rc	45	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Tool steels	≤24 Rc	75	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>24-30 Rc	45	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
High speed steels	≥14-30 Rc	45	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Spring steels	≤330 Bhn	35	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Stainless steels, sulphured	≤24 Rc	65	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
austenitic	≤24 Rc	45	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
martensitic	≤24 Rc	50	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Hardened steels	≤40-48 Rc	10	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	30	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	•	•	•
Cast iron	≤240 Bhn	155	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
	<300 Bhn	120	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	135	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
	<300 Bhn	95	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Chilled cast iron	≤350 Bhn	35	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Ti and Ti-alloys	≤24 Rc	45	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
	>24-38 Rc	30	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	310	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
> 10 % Si	≤200 Bhn	245	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	155	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	195	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	135	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Bronze, long-chipping	≤24 Rc	120	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>24-30 Rc	95	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	120	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 1132

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	195	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
	>100-260 Bhn	155	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Free-cutting steels	≤24 Rc	195	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
	>24-30 Rc	155	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	195	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	16-24 Rc	155	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	24-30 Rc	80	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Alloyed heat-treatable steels	24-30 Rc	95	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>30-38 Rc	80	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Unalloyed case hardened steels	≤230 Bhn	200	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Alloyed case hardened steels	24-30 Rc	90	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>30-38 Rc	65	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Nitriding steels	≥24-30 Rc	80	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>30-38 Rc	55	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Tool steels	≤24 Rc	95	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>24-30 Rc	55	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
High speed steels	≥14-30 Rc	55	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Spring steels	≤330 Bhn	45	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Stainless steels, sulphured	≤24 Rc	80	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
austenitic	≤24 Rc	55	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
martensitic	≤24 Rc	65	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Hardened steels	≤40-48 Rc	15	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
	>48-60 Rc	45	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	35	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	•	•	•
Cast iron	≤240 Bhn	195	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
	<300 Bhn	155	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Spheroidal graphite iron and	≤240 Bhn	170	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
malleable cast iron	<300 Bhn	120	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Chilled cast iron	≤350 Bhn	45	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Ti and Ti-alloys	≤24 Rc	55	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
	>24-38 Rc	35	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	390	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
> 10 % Si	≤200 Bhn	310	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	195	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	245	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	170	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Bronze, long-chipping	≤24 Rc	155	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>24-30 Rc	120	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	155	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 1183

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	360	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>100-260 Bhn	295	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
Free-cutting steels	≤24 Rc	425	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
	>24-30 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	325	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
	16-24 Rc	310	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Alloyed heat-treatable steels	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>30-38 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
Unalloyed case hardened steels	≤230 Bhn	360	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Alloyed case hardened steels	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>30-38 Rc	210	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Nitriding steels	≥24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	•	•	•
	>30-38 Rc	245	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Tool steels	≤24 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	•	•	•
	>24-30 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
High speed steels	≥14-30 Rc	145	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	•	•	•
Spring steels	≤330 Bhn	145	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	•	•	•
Stainless steels, sulphured	≤24 Rc	145	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
austenitic	≤24 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
martensitic	≤24 Rc	110	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	620	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
	<300 Bhn	360	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
Spheroidal graphite iron and	≤240 Bhn	360	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
malleable cast iron	<300 Bhn	310	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	785	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
Al wrought alloys	≤150 Bhn	785	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
> 10 % Si	≤200 Bhn	555	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 1184

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	330	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>100-260 Bhn	280	•	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	•	•	•
Free-cutting steels	≤24 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
	>24-30 Rc	280	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	16-24 Rc	280	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Alloyed heat-treatable steels	24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>30-38 Rc	245	•	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	•	•	•
Unalloyed case hardened steels	≤230 Bhn	330	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
Alloyed case hardened steels	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>30-38 Rc	215	•	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	•	•	•
Nitriding steels	≥24-30 Rc	245	•	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	•	•	•
	>30-38 Rc	230	•	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	•	•	•
Tool steels	≤24 Rc	165	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>24-30 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	115	•	0.0020	0.0030	0.0040	0.0050	0.0055	0.0065	•	•	•
Stainless steels, sulphured	≤24 Rc	95	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0080	•	•	•
austenitic	≤24 Rc	90	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0080	•	•	•
martensitic	≤24 Rc	90	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0065	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	525	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
	<300 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	<300 Bhn	310	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
Al wrought alloys	≤150 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	560	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
> 10 % Si	≤200 Bhn	460	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 1221

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	85	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>30-38 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	180	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	70	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>30-38 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Nitriding steels	≥24-30 Rc	65	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>30-38 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Tool steels	≤24 Rc	85	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
High speed steels	≥14-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Spring steels	≤330 Bhn	35	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	65	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 1223

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	130	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	180	•	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
	<300 Bhn	130	•	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	120	•	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
malleable cast iron	<300 Bhn	100	•	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	345	•	0.0080	0.0125	0.0160	0.0200	•	•	•	•	•
Al wrought alloys	≤150 Bhn	260	•	0.0080	0.0125	0.0160	0.0200	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	340	•	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	260	•	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Magnesium alloys	≤150 Bhn	345	•	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	180	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	130	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>24-30 Rc	100	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Duroplastics	–	85	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 1242

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	330	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>100-260 Bhn	280	•	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	•	•	•
Free-cutting steels	≤24 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
	>24-30 Rc	280	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	16-24 Rc	280	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Alloyed heat-treatable steels	24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>30-38 Rc	245	•	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	•	•	•
Unalloyed case hardened steels	≤230 Bhn	330	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
Alloyed case hardened steels	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>30-38 Rc	215	•	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	•	•	•
Nitriding steels	≥24-30 Rc	245	•	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	•	•	•
	>30-38 Rc	230	•	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	•	•	•
Tool steels	≤24 Rc	165	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>24-30 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	115	•	0.0020	0.0030	0.0040	0.0050	0.0055	0.0065	•	•	•
Stainless steels, sulphured	≤24 Rc	95	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0080	•	•	•
austenitic	≤24 Rc	90	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0080	•	•	•
martensitic	≤24 Rc	90	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0065	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	525	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
	<300 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Spheroidal graphite iron and	≤240 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
malleable cast iron	<300 Bhn	310	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
Al wrought alloys	≤150 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	560	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
> 10 % Si	≤200 Bhn	460	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 1243

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	330	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>100-260 Bhn	280	•	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	•	•	•
Free-cutting steels	≤24 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
	>24-30 Rc	280	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	16-24 Rc	280	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Alloyed heat-treatable steels	24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>30-38 Rc	245	•	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	•	•	•
Unalloyed case hardened steels	≤230 Bhn	330	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
Alloyed case hardened steels	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>30-38 Rc	215	•	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	•	•	•
Nitriding steels	≥24-30 Rc	245	•	0.0040	0.0065	0.0080	0.0100	0.0110	0.0125	•	•	•
	>30-38 Rc	230	•	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	•	•	•
Tool steels	≤24 Rc	165	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	>24-30 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0090	0.0100	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	115	•	0.0020	0.0030	0.0040	0.0050	0.0055	0.0065	•	•	•
Stainless steels, sulphured	≤24 Rc	95	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0080	•	•	•
austenitic	≤24 Rc	90	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0080	•	•	•
martensitic	≤24 Rc	90	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0065	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	525	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
	<300 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
	<300 Bhn	310	•	0.0050	0.0080	0.0100	0.0125	0.0140	0.0160	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
Al wrought alloys	≤150 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	560	•	0.0080	0.0125	0.0160	0.0200	0.0220	0.0245	•	•	•
> 10 % Si	≤200 Bhn	460	•	0.0065	0.0100	0.0125	0.0160	0.0180	0.0200	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 1452

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	280	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>100-260 Bhn	250	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Free-cutting steels	≤24 Rc	300	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>24-30 Rc	220	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	16-24 Rc	185	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	24-30 Rc	170	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	170	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	140	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	195	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed case hardened steels	24-30 Rc	170	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	140	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	185	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>30-38 Rc	155	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	95	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>24-30 Rc	80	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	70	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	55	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	55	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
martensitic	≤24 Rc	40	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	360	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	255	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	255	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	230	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	50	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-38 Rc	40	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	435	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	360	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	435	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	360	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	510	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	535	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
long-chipping	≤200 Bhn	500	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 1662

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	360	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>100-260 Bhn	295	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Free-cutting steels	≤24 Rc	425	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>24-30 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Unalloyed heat-treatable steels	≤16 Rc	325	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	16-24 Rc	310	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Alloyed heat-treatable steels	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Unalloyed case hardened steels	≤230 Bhn	360	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Alloyed case hardened steels	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	210	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Nitriding steels	≥24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	245	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Tool steels	≤24 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>24-30 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
High speed steels	≥14-30 Rc	145	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Spring steels	≤330 Bhn	145	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Stainless steels, sulphured	≤24 Rc	145	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
austenitic	≤24 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
martensitic	≤24 Rc	110	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Hardened steels	≤40-48 Rc	130	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
	>48-60 Rc	80	•	0.0015	0.0025	0.0030	0.0040	0.0040	0.0045	0.0050	•	•
Special alloys	≤38 Rc	80	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Cast iron	≤240 Bhn	620	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	<300 Bhn	360	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Spheroidal graphite iron and	≤240 Bhn	360	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
malleable cast iron	<300 Bhn	310	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Chilled cast iron	≤350 Bhn	95	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Ti and Ti-alloys	≤24 Rc	110	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>24-38 Rc	95	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Aluminium and Al-alloys	≤120 Bhn	785	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al wrought alloys	≤150 Bhn	785	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
> 10 % Si	≤200 Bhn	555	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Magnesium alloys	≤150 Bhn	750	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Copper, low-alloyed	≤120 Bhn	310	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Brass, short-chipping	≤200 Bhn	820	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
long-chipping	≤200 Bhn	555	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Bronze, short-chipping	≤200 Bhn	310	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>200-260 Bhn	260	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Bronze, long-chipping	≤24 Rc	225	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>24-30 Rc	195	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 1702

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	325	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	275	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	>24-30 Rc	275	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	16-24 Rc	275	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>30-38 Rc	245	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	325	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Alloyed case hardened steels	24-30 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>30-38 Rc	210	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Nitriding steels	≥24-30 Rc	245	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>30-38 Rc	225	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Tool steels	≤24 Rc	160	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>24-30 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
High speed steels	≥14-30 Rc	130	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	110	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	115	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
austenitic	≤24 Rc	110	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	110	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Hardened steels	≤40-48 Rc	110	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
	>48-60 Rc	65	•	0.0015	0.0025	0.0030	0.0040	0.0040	•	•	•	•
Special alloys	≤38 Rc	65	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Cast iron	≤240 Bhn	520	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	<300 Bhn	390	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	390	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
malleable cast iron	<300 Bhn	310	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Chilled cast iron	≤350 Bhn	80	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	95	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
	>24-38 Rc	80	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Al wrought alloys	≤150 Bhn	655	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	555	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
> 10 % Si	≤200 Bhn	455	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Magnesium alloys	≤150 Bhn	655	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Copper, low-alloyed	≤120 Bhn	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Brass, short-chipping	≤200 Bhn	685	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
long-chipping	≤200 Bhn	455	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Bronze, short-chipping	≤200 Bhn	260	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
	>200-260 Bhn	210	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, long-chipping	≤24 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	145	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 2458

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	75	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	55	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	55	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	40	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	75	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	60	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	20	0.0005	0.0015	0.0025	0.0030	0.0040	0.0040	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	30	0.0005	0.0015	0.0025	0.0030	0.0040	0.0040	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	40	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Ti and Ti-alloys	≤24 Rc	50	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
	>24-38 Rc	30	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 2463

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	340	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>100-260 Bhn	300	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Free-cutting steels	≤24 Rc	340	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>24-30 Rc	300	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	340	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	16-24 Rc	300	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	255	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	255	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	340	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	255	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	215	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	215	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	105	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	105	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
austenitic	≤24 Rc	105	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
martensitic	≤24 Rc	105	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Hardened steels	≤40-48 Rc	85	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Cast iron	≤240 Bhn	385	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	340	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	300	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	340	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	85	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	855	0.0025	0.0080	0.0125	0.0160	0.0200	•	•	•	•	•
Al wrought alloys	≤150 Bhn	855	0.0025	0.0080	0.0125	0.0160	0.0200	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	640	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	510	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Magnesium alloys	≤150 Bhn	770	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	340	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	770	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
long-chipping	≤200 Bhn	770	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	510	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>200-260 Bhn	510	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	300	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>24-30 Rc	215	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	215	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Thermoplastics	–	170	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	340	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 2464

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	330	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>100-260 Bhn	295	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Free-cutting steels	≤24 Rc	330	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>24-30 Rc	295	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	330	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	16-24 Rc	295	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	260	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	260	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	330	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	260	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	215	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	215	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	100	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	100	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
austenitic	≤24 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
martensitic	≤24 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Hardened steels	≤40-48 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Cast iron	≤240 Bhn	375	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	<300 Bhn	360	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	295	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
malleable cast iron	<300 Bhn	260	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-38 Rc	65	0.0010	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	855	0.0025	0.0080	0.0125	0.0160	0.0200	•	•	•	•	•
Al wrought alloys	≤150 Bhn	855	0.0025	0.0080	0.0125	0.0160	0.0200	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	640	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	510	0.0020	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
Magnesium alloys	≤150 Bhn	770	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	340	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	770	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
long-chipping	≤200 Bhn	770	0.0170	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	510	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	>200-260 Bhn	510	0.0017	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	300	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	>24-30 Rc	215	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	165	0.0015	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Thermoplastics	–	215	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	330	0.0012	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•

Series # 2477

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	475	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>100-260 Bhn	395	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Free-cutting steels	≤24 Rc	560	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
	>24-30 Rc	475	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
	16-24 Rc	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	345	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Unalloyed case hardened steels	≤230 Bhn	475	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	280	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Nitriding steels	≥24-30 Rc	360	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	345	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Tool steels	≤24 Rc	260	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
	>24-30 Rc	215	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
High speed steels	≥14-30 Rc	195	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Spring steels	≤330 Bhn	195	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
austenitic	≤24 Rc	180	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
martensitic	≤24 Rc	165	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Hardened steels	≤40-48 Rc	180	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
	>48-60 Rc	115	•	0.00200	0.00300	0.00400	0.00500	0.00500	0.00550	•	•	•
Special alloys	≤38 Rc	115	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Cast iron	≤240 Bhn	690	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
	<300 Bhn	525	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Spheroidal graphite iron and	≤240 Bhn	460	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
malleable cast iron	<300 Bhn	425	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
Ti and Ti-alloys	≤24 Rc	150	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
	>24-38 Rc	130	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1015	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Al wrought alloys	≤150 Bhn	1015	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	855	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
> 10 % Si	≤200 Bhn	720	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Magnesium alloys	≤150 Bhn	920	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Copper, low-alloyed	≤120 Bhn	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Brass, short-chipping	≤200 Bhn	1065	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
long-chipping	≤200 Bhn	720	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>200-260 Bhn	345	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Bronze, long-chipping	≤24 Rc	295	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
	>24-30 Rc	260	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 2479

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	475	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>100-260 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Free-cutting steels	≤24 Rc	560	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	>24-30 Rc	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	16-24 Rc	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	345	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Unalloyed case hardened steels	≤230 Bhn	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	280	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Nitriding steels	≥24-30 Rc	350	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	330	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Tool steels	≤24 Rc	240	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
High speed steels	≥14-30 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Spring steels	≤330 Bhn	195	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
austenitic	≤24 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
martensitic	≤24 Rc	165	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Hardened steels	≤40-48 Rc	180	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>48-60 Rc	115	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Special alloys	≤38 Rc	115	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Cast iron	≤240 Bhn	690	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
	<300 Bhn	525	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
Spheroidal graphite iron and	≤240 Bhn	450	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
malleable cast iron	<300 Bhn	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Ti and Ti-alloys	≤24 Rc	150	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-38 Rc	130	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Aluminium and Al-alloys	≤120 Bhn	1015	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al wrought alloys	≤150 Bhn	1015	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	855	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
> 10 % Si	≤200 Bhn	720	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Magnesium alloys	≤150 Bhn	920	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Copper, low-alloyed	≤120 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Brass, short-chipping	≤200 Bhn	1065	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
long-chipping	≤200 Bhn	720	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>200-260 Bhn	345	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Bronze, long-chipping	≤24 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 2485 / # 5242 (3xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	51/64 - 31/32 in. 20.001 - 25.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	430	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>100-260 Bhn	365	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Free-cutting steels	≤24 Rc	430	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	>24-30 Rc	365	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Unalloyed heat-treatable steels	≤16 Rc	430	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	16-24 Rc	410	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	24-30 Rc	365	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Alloyed heat-treatable steels	24-30 Rc	365	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>30-38 Rc	300	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Unalloyed case hardened steels	≤230 Bhn	430	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Alloyed case hardened steels	24-30 Rc	365	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>30-38 Rc	230	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Nitriding steels	≥24-30 Rc	345	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>30-38 Rc	230	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Tool steels	≤24 Rc	185	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>24-30 Rc	165	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
High speed steels	≥14-30 Rc	185	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Spring steels	≤330 Bhn	165	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Stainless steels, sulphured	≤24 Rc	185	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
austenitic	≤24 Rc	135	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
martensitic	≤24 Rc	115	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Hardened steels	≤40-48 Rc	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Cast iron	≤240 Bhn	685	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	<300 Bhn	505	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Spheroidal graphite iron and	≤240 Bhn	505	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
malleable cast iron	<300 Bhn	425	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Chilled cast iron	≤350 Bhn	115	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Ti and Ti-alloys	≤24 Rc	135	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
	>24-38 Rc	115	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Aluminium and Al-alloys	≤120 Bhn	955	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al wrought alloys	≤150 Bhn	855	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al cast alloys ≤ 10 % Si	≤200 Bhn	770	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
> 10 % Si	≤200 Bhn	635	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Magnesium alloys	≤150 Bhn	850	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Copper, low-alloyed	≤120 Bhn	340	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Brass, short-chipping	≤200 Bhn	885	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
long-chipping	≤200 Bhn	590	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, short-chipping	≤200 Bhn	340	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>200-260 Bhn	275	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, long-chipping	≤24 Rc	210	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>24-30 Rc	180	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Duroplastics	–	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Thermoplastics	–	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - Kevlar	–	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - GFK / CFK	–	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 2485 / # 5243 (5xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	51/64 - 31/32 in. 20.001 - 25.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	410	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>100-260 Bhn	345	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Free-cutting steels	≤24 Rc	410	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	>24-30 Rc	345	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Unalloyed heat-treatable steels	≤16 Rc	410	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	16-24 Rc	395	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	24-30 Rc	345	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Alloyed heat-treatable steels	24-30 Rc	345	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>30-38 Rc	280	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Unalloyed case hardened steels	≤230 Bhn	410	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Alloyed case hardened steels	24-30 Rc	345	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>30-38 Rc	230	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Nitriding steels	≥24-30 Rc	345	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>30-38 Rc	230	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Tool steels	≤24 Rc	185	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>24-30 Rc	165	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
High speed steels	≥14-30 Rc	185	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Spring steels	≤330 Bhn	165	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Stainless steels, sulphured	≤24 Rc	185	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
austenitic	≤24 Rc	135	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
martensitic	≤24 Rc	115	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Hardened steels	≤40-48 Rc	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	85	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Cast iron	≤240 Bhn	635	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	<300 Bhn	475	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Spheroidal graphite iron and	≤240 Bhn	475	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
malleable cast iron	<300 Bhn	390	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Chilled cast iron	≤350 Bhn	115	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Ti and Ti-alloys	≤24 Rc	135	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
	>24-38 Rc	115	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Aluminium and Al-alloys	≤120 Bhn	855	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al wrought alloys	≤150 Bhn	855	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al cast alloys ≤ 10 % Si	≤200 Bhn	720	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
> 10 % Si	≤200 Bhn	590	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Magnesium alloys	≤150 Bhn	850	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Copper, low-alloyed	≤120 Bhn	340	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Brass, short-chipping	≤200 Bhn	885	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
long-chipping	≤200 Bhn	590	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, short-chipping	≤200 Bhn	340	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>200-260 Bhn	275	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, long-chipping	≤24 Rc	210	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>24-30 Rc	180	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Duroplastics	–	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Thermoplastics	–	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - Kevlar	–	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - GFK / CFK	–	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200

Series # 2485 / # 5248 (7xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	451/64 - 31/32 in. 20.001 - 25.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	395	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>100-260 Bhn	345	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Free-cutting steels	≤24 Rc	395	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>24-30 Rc	345	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Unalloyed heat-treatable steels	≤16 Rc	395	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	16-24 Rc	365	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	24-30 Rc	330	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Alloyed heat-treatable steels	24-30 Rc	330	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>30-38 Rc	280	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Unalloyed case hardened steels	≤230 Bhn	395	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Alloyed case hardened steels	24-30 Rc	330	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>30-38 Rc	230	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Nitriding steels	≥24-30 Rc	345	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
	>30-38 Rc	230	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
Tool steels	≤24 Rc	185	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
	>24-30 Rc	165	0.0050	0.0065	0.0080	0.0080	0.0100	0.0125
High speed steels	≥14-30 Rc	185	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Spring steels	≤330 Bhn	165	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Stainless steels, sulphured	≤24 Rc	185	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
austenitic	≤24 Rc	135	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
martensitic	≤24 Rc	115	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Hardened steels	≤40-48 Rc	85	0.0035	0.0040	0.0050	0.0065	0.0065	0.0080
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	85	0.0035	0.0040	0.0050	0.0065	0.0065	0.0080
Cast iron	≤240 Bhn	635	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	<300 Bhn	475	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Spheroidal graphite iron and	≤240 Bhn	475	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
malleable cast iron	<300 Bhn	390	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Chilled cast iron	≤350 Bhn	115	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Ti and Ti-alloys	≤24 Rc	135	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
	>24-38 Rc	115	0.0035	0.0040	0.0050	0.0065	0.0065	0.0080
Aluminium and Al-alloys	≤120 Bhn	855	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Al wrought alloys	≤150 Bhn	855	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Al cast alloys ≤ 10 % Si	≤200 Bhn	720	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
> 10 % Si	≤200 Bhn	590	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Magnesium alloys	≤150 Bhn	850	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Copper, low-alloyed	≤120 Bhn	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Brass, short-chipping	≤200 Bhn	885	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
long-chipping	≤200 Bhn	590	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Bronze, short-chipping	≤200 Bhn	340	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>200-260 Bhn	275	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Bronze, long-chipping	≤24 Rc	210	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>24-30 Rc	180	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Duroplastics	–	340	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Thermoplastics	–	340	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Reinforced plastics - Kevlar	–	340	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Reinforced plastics - GFK / CFK	–	340	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160

Note: When drilling from solid with #5248 holder, spot drilling (>140° point angle to a depth of at least 2/3 insert diameter) is recommended.

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 2601

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	185	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	185	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	100	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	120	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	90	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	105	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	80	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Nitriding steels	≥24-30 Rc	90	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	65	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Tool steels	≤24 Rc	120	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	65	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
High speed steels	≥14-30 Rc	65	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	90	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	80	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	235	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	185	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	200	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
malleable cast iron	<300 Bhn	145	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	50	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	460	•	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	360	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	235	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	295	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	185	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	145	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	120	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 2602

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	235	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	210	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
	24-30 Rc	120	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	145	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	120	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	130	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	100	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Nitriding steels	≥24-30 Rc	120	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>30-38 Rc	85	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Tool steels	≤24 Rc	145	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	85	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
High speed steels	≥14-30 Rc	85	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	120	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	100	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	295	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
	<300 Bhn	235	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	260	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
malleable cast iron	<300 Bhn	185	•	0.0050	0.0080	0.0100	0.0125	•	•	•	•	•
Chilled cast iron	≤350 Bhn	60	•	0.0025	0.0040	0.0050	0.0065	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	560	•	0.0065	0.0100	0.0125	0.0160	•	•	•	•	•
> 10 % Si	≤200 Bhn	460	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	295	•	0.0040	0.0065	0.0080	0.0100	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	340	•	0.0065	0.0080	0.0100	0.0100	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	235	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
	>24-30 Rc	185	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Duroplastics	–	145	•	0.0030	0.0050	0.0065	0.0080	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 2747 / # 5242 (3xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	51/64 - 31/32 in. 20.001 - 25.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	325	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	<300 Bhn	260	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Spheroidal graphite iron and	≤240 Bhn	260	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
malleable cast iron	<300 Bhn	230	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Chilled cast iron	≤350 Bhn	35	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	660	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al wrought alloys	≤150 Bhn	595	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al cast alloys ≤ 10 % Si	≤200 Bhn	490	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
> 10 % Si	≤200 Bhn	390	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Magnesium alloys	≤150 Bhn	590	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Copper, low-alloyed	≤120 Bhn	225	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Brass, short-chipping	≤200 Bhn	585	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
long-chipping	≤200 Bhn	390	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, short-chipping	≤200 Bhn	230	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>200-260 Bhn	160	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, long-chipping	≤24 Rc	145	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>24-30 Rc	115	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Duroplastics	–	165	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Thermoplastics	–	165	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - Kevlar	–	165	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - GFK / CFK	–	165	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200

Series # 2747 / # 5243 (5xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	51/64 - 31/32 in. 20.001 - 25.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	295	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
	<300 Bhn	230	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Spheroidal graphite iron and	≤240 Bhn	230	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
malleable cast iron	<300 Bhn	195	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Chilled cast iron	≤350 Bhn	35	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	595	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al wrought alloys	≤150 Bhn	595	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Al cast alloys ≤ 10 % Si	≤200 Bhn	455	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
> 10 % Si	≤200 Bhn	355	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Magnesium alloys	≤150 Bhn	590	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
Copper, low-alloyed	≤120 Bhn	230	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Brass, short-chipping	≤200 Bhn	585	0.0125	0.0160	0.0200	0.0200	0.0250	0.0315
long-chipping	≤200 Bhn	390	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, short-chipping	≤200 Bhn	230	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>200-260 Bhn	160	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Bronze, long-chipping	≤24 Rc	145	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	>24-30 Rc	115	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Duroplastics	–	165	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Thermoplastics	–	165	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - Kevlar	–	165	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Reinforced plastics - GFK / CFK	–	165	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 2747 / # 5248 (7xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	51/64 - 31/32 in. 20.001 - 25.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•						
Spring steels	≤330 Bhn	•						
Stainless steels, sulphured	≤24 Rc	•						
austenitic	≤24 Rc	•						
martensitic	≤24 Rc	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	295	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
	<300 Bhn	230	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Spheroidal graphite iron and	≤240 Bhn	230	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
malleable cast iron	<300 Bhn	195	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Chilled cast iron	≤350 Bhn	35	0.0040	0.0050	0.0065	0.0065	0.0080	0.0100
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	595	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Al wrought alloys	≤150 Bhn	595	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Al cast alloys ≤ 10 % Si	≤200 Bhn	455	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
> 10 % Si	≤200 Bhn	355	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Magnesium alloys	≤150 Bhn	590	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
Copper, low-alloyed	≤120 Bhn	230	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Brass, short-chipping	≤200 Bhn	585	0.0100	0.0125	0.0160	0.0160	0.0200	0.0250
long-chipping	≤200 Bhn	390	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Bronze, short-chipping	≤200 Bhn	230	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>200-260 Bhn	160	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
Bronze, long-chipping	≤24 Rc	145	0.0080	0.0100	0.0125	0.0125	0.0160	0.0200
	>24-30 Rc	115	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Duroplastics	–	165	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Thermoplastics	–	165	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Reinforced plastics - Kevlar	–	165	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160
Reinforced plastics - GFK / CFK	–	165	0.0065	0.0080	0.0100	0.0100	0.0125	0.0160

Note: When driling from solid with #5248 holder, spot drilling (≥140° point angle to a depth of at least 2/3 insert diameter) is recommended.

Series # 4024 / # 4042 (3xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			29/64 - 31/64 in. 11.500 - 12.500 mm	1/2 - 5/8 in. 12.501 - 15.870 mm				
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	325	0.0125	0.0160	•	•	•	•
	<300 Bhn	260	0.0125	0.0160	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	260	0.0125	0.0160	•	•	•	•
malleable cast iron	<300 Bhn	230	0.0100	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	30	0.0040	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	655	0.0125	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	590	0.0125	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	490	0.0125	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	390	0.0125	0.0160	•	•	•	•
Magnesium alloys	≤150 Bhn	590	0.0125	0.0160	•	•	•	•
Copper, low-alloyed	≤120 Bhn	230	0.0100	0.0125	•	•	•	•
Brass, short-chipping	≤200 Bhn	585	0.0125	0.0160	•	•	•	•
long-chipping	≤200 Bhn	390	0.0100	0.0125	•	•	•	•
Bronze, short-chipping	≤200 Bhn	230	0.0100	0.0125	•	•	•	•
	>200-260 Bhn	160	0.0100	0.0125	•	•	•	•
Bronze, long-chipping	≤24 Rc	145	0.0100	0.0125	•	•	•	•
	>24-30 Rc	115	0.0080	0.0100	•	•	•	•
Duroplastics	–	165	0.0080	0.0100	•	•	•	•
Thermoplastics	–	165	0.0080	0.0100	•	•	•	•
Reinforced plastics - Kevlar	–	165	0.0080	0.0100	•	•	•	•
Reinforced plastics - GFK / CFK	–	165	0.0080	0.0100	•	•	•	•

RPM = $\frac{\text{SFM}}{\text{DIAM. in.}}$ x 3.82 IPM = IPR x RPM $\frac{\text{HOLE DEPTH in.}}{\text{IPM}}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 4024 / # 4043 (5xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			29/64 - 31/64 in. 11.500 - 12.500 mm	1/2 - 5/8 in. 12.501 - 15.870 mm				
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	295	0.0125	0.0160	•	•	•	•
	<300 Bhn	230	0.0125	0.0160	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	230	0.0125	0.0160	•	•	•	•
malleable cast iron	<300 Bhn	195	0.0100	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	30	0.0040	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	590	0.0125	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	590	0.0125	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	455	0.0125	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	355	0.0125	0.0160	•	•	•	•
Magnesium alloys	≤150 Bhn	590	0.0125	0.0160	•	•	•	•
Copper, low-alloyed	≤120 Bhn	230	0.0100	0.0125	•	•	•	•
Brass, short-chipping	≤200 Bhn	585	0.0125	0.0160	•	•	•	•
long-chipping	≤200 Bhn	390	0.0100	0.0125	•	•	•	•
Bronze, short-chipping	≤200 Bhn	230	0.0100	0.0125	•	•	•	•
	>200-260 Bhn	160	0.0100	0.0125	•	•	•	•
Bronze, long-chipping	≤24 Rc	145	0.0100	0.0125	•	•	•	•
	>24-30 Rc	115	0.0080	0.0100	•	•	•	•
Duroplastics	–	165	0.0080	0.0100	•	•	•	•
Thermoplastics	–	165	0.0080	0.0100	•	•	•	•
Reinforced plastics - Kevlar	–	165	0.0080	0.0100	•	•	•	•
Reinforced plastics - GFK / CFK	–	165	0.0080	0.0100	•	•	•	•

Series # 4024 / # 4048 (7xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			29/64 - 31/64 in. 11.500 - 12.500 mm	1/2 - 5/8 in. 12.501 - 15.870 mm				
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	295	0.0100	0.0125	•	•	•	•
	<300 Bhn	230	0.0100	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	230	0.0100	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	195	0.0080	0.0100	•	•	•	•
Chilled cast iron	≤350 Bhn	30	0.0040	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	590	0.0100	0.0125	•	•	•	•
Al wrought alloys	≤150 Bhn	590	0.0100	0.0125	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	455	0.0100	0.0125	•	•	•	•
> 10 % Si	≤200 Bhn	355	0.0100	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	590	0.0100	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	230	0.0080	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	585	0.0100	0.0125	•	•	•	•
long-chipping	≤200 Bhn	390	0.0080	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	230	0.0080	0.0100	•	•	•	•
	>200-260 Bhn	160	0.0080	0.0100	•	•	•	•
Bronze, long-chipping	≤24 Rc	145	0.0080	0.0100	•	•	•	•
	>24-30 Rc	115	0.0065	0.0080	•	•	•	•
Duroplastics	–	165	0.0065	0.0080	•	•	•	•
Thermoplastics	–	165	0.0065	0.0080	•	•	•	•
Reinforced plastics - Kevlar	–	165	0.0065	0.0080	•	•	•	•
Reinforced plastics - GFK / CFK	–	165	0.0065	0.0080	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 4025 / # 4042 (3xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			29/64 - 31/64 in. 11.500 - 12.500 mm	1/2 - 5/8 in. 12.501 - 15.870 mm				
Common structural steels	≤100 Bhn	325	0.0100	0.0125	•	•	•	•
	>100-260 Bhn	275	0.0080	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	325	0.0125	0.0160	•	•	•	•
	>24-30 Rc	275	0.0100	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	325	0.0100	0.0125	•	•	•	•
	16-24 Rc	310	0.0100	0.0125	•	•	•	•
	24-30 Rc	275	0.0080	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	275	0.0100	0.0125	•	•	•	•
	>30-38 Rc	225	0.0080	0.0100	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	325	0.0125	0.0160	•	•	•	•
Alloyed case hardened steels	24-30 Rc	275	0.0100	0.0125	•	•	•	•
	>30-38 Rc	180	0.0065	0.0080	•	•	•	•
Nitriding steels	≥24-30 Rc	260	0.0080	0.0100	•	•	•	•
	>30-38 Rc	180	0.0065	0.0080	•	•	•	•
Tool steels	≤24 Rc	130	0.0080	0.0100	•	•	•	•
	>24-30 Rc	110	0.0065	0.0080	•	•	•	•
High speed steels	≥14-30 Rc	130	0.0050	0.0065	•	•	•	•
Spring steels	≤330 Bhn	110	0.0040	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	130	0.0050	0.0065	•	•	•	•
austenitic	≤24 Rc	95	0.0050	0.0065	•	•	•	•
martensitic	≤24 Rc	80	0.0050	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	65	0.0040	0.0050	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	65	0.0040	0.0050	•	•	•	•
Cast iron	≤240 Bhn	520	0.0125	0.0160	•	•	•	•
	<300 Bhn	390	0.0125	0.0160	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	390	0.0125	0.0160	•	•	•	•
malleable cast iron	<300 Bhn	325	0.0100	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	80	0.0040	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	95	0.0050	0.0065	•	•	•	•
	>24-38 Rc	80	0.0040	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	720	0.0125	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	655	0.0125	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	590	0.0125	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	490	0.0125	0.0160	•	•	•	•
Magnesium alloys	≤150 Bhn	655	0.0125	0.0160	•	•	•	•
Copper, low-alloyed	≤120 Bhn	260	0.0100	0.0125	•	•	•	•
Brass, short-chipping	≤200 Bhn	685	0.0125	0.0160	•	•	•	•
long-chipping	≤200 Bhn	455	0.0100	0.0125	•	•	•	•
Bronze, short-chipping	≤200 Bhn	260	0.0100	0.0125	•	•	•	•
	>200-260 Bhn	210	0.0100	0.0125	•	•	•	•
Bronze, long-chipping	≤24 Rc	160	0.0100	0.0125	•	•	•	•
	>24-30 Rc	130	0.0080	0.0100	•	•	•	•
Duroplastics	–	260	0.0080	0.0100	•	•	•	•
Thermoplastics	–	260	0.0080	0.0100	•	•	•	•
Reinforced plastics - Kevlar	–	260	0.0080	0.0100	•	•	•	•
Reinforced plastics - GFK / CFK	–	260	0.0080	0.0100	•	•	•	•

Series # 4025 / # 4043 (5xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			29/64 - 31/64 in. 11.500 - 12.500 mm	1/2 - 5/8 in. 12.501 - 15.870 mm				
Common structural steels	≤100 Bhn	310	0.0100	0.0125	•	•	•	•
	>100-260 Bhn	260	0.0080	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	310	0.0125	0.0160	•	•	•	•
	>24-30 Rc	260	0.0100	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	310	0.0100	0.0125	•	•	•	•
	16-24 Rc	295	0.0100	0.0125	•	•	•	•
	24-30 Rc	260	0.0080	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	260	0.0100	0.0125	•	•	•	•
	>30-38 Rc	210	0.0080	0.0100	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	310	0.0125	0.0160	•	•	•	•
Alloyed case hardened steels	24-30 Rc	260	0.0100	0.0125	•	•	•	•
	>30-38 Rc	180	0.0065	0.0080	•	•	•	•
Nitriding steels	≥24-30 Rc	260	0.0080	0.0100	•	•	•	•
	>30-38 Rc	180	0.0065	0.0080	•	•	•	•
Tool steels	≤24 Rc	130	0.0080	0.0100	•	•	•	•
	>24-30 Rc	110	0.0065	0.0080	•	•	•	•
High speed steels	≥14-30 Rc	130	0.0050	0.0065	•	•	•	•
Spring steels	≤330 Bhn	110	0.0040	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	130	0.0050	0.0065	•	•	•	•
austenitic	≤24 Rc	95	0.0050	0.0065	•	•	•	•
martensitic	≤24 Rc	80	0.0050	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	65	0.0040	0.0050	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	65	0.0040	0.0050	•	•	•	•
Cast iron	≤240 Bhn	490	0.0125	0.0160	•	•	•	•
	<300 Bhn	360	0.0125	0.0160	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	360	0.0125	0.0160	•	•	•	•
malleable cast iron	<300 Bhn	295	0.0100	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	80	0.0040	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	95	0.0050	0.0065	•	•	•	•
	>24-38 Rc	80	0.0040	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	655	0.0125	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	655	0.0125	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	555	0.0125	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	455	0.0125	0.0160	•	•	•	•
Magnesium alloys	≤150 Bhn	655	0.0125	0.0160	•	•	•	•
Copper, low-alloyed	≤120 Bhn	260	0.0100	0.0125	•	•	•	•
Brass, short-chipping	≤200 Bhn	685	0.0125	0.0160	•	•	•	•
long-chipping	≤200 Bhn	455	0.0100	0.0125	•	•	•	•
Bronze, short-chipping	≤200 Bhn	260	0.0100	0.0125	•	•	•	•
	>200-260 Bhn	210	0.0100	0.0125	•	•	•	•
Bronze, long-chipping	≤24 Rc	160	0.0100	0.0125	•	•	•	•
	>24-30 Rc	130	0.0080	0.0100	•	•	•	•
Duroplastics	–	260	0.0080	0.0100	•	•	•	•
Thermoplastics	–	260	0.0080	0.0100	•	•	•	•
Reinforced plastics - Kevlar	–	260	0.0080	0.0100	•	•	•	•
Reinforced plastics - GFK / CFK	–	260	0.0080	0.0100	•	•	•	•

RPM = SFM / DIAM. in. x 3.82 | IPM = IPR x RPM | HOLE DEPTH in. / IPM x 60 = Cut Time | mm = in. x 25.40 | m/min. = SFM ÷ 3.28 | mm/rev. = IPR x 25.40 | Bar = PSI ÷ 14.50 | Liter = Gal. ÷ 3.79

Series # 4025 / # 4048 (7xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			29/64 - 31/64 in. 11.500 - 12.500 mm	1/2 - 5/8 in. 12.501 - 15.870 mm				
Common structural steels	≤100 Bhn	295	0.0080	0.0100	•	•	•	•
	>100-260 Bhn	260	0.0065	0.0080	•	•	•	•
Free-cutting steels	≤24 Rc	295	0.0100	0.0125	•	•	•	•
	>24-30 Rc	260	0.0080	0.0100	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	295	0.0080	0.0100	•	•	•	•
	16-24 Rc	275	0.0080	0.0100	•	•	•	•
	24-30 Rc	245	0.0065	0.0080	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	245	0.0080	0.0100	•	•	•	•
	>30-38 Rc	210	0.0065	0.0080	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	295	0.0100	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	245	0.0080	0.0100	•	•	•	•
	>30-38 Rc	180	0.0065	0.0080	•	•	•	•
Nitriding steels	≥24-30 Rc	260	0.0080	0.0100	•	•	•	•
	>30-38 Rc	180	0.0065	0.0080	•	•	•	•
Tool steels	≤24 Rc	130	0.0065	0.0080	•	•	•	•
	>24-30 Rc	110	0.0050	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	130	0.0040	0.0050	•	•	•	•
Spring steels	≤330 Bhn	110	0.0040	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	130	0.0040	0.0050	•	•	•	•
austenitic	≤24 Rc	95	0.0040	0.0050	•	•	•	•
martensitic	≤24 Rc	80	0.0040	0.0050	•	•	•	•
Hardened steels	≤40-48 Rc	65	0.0035	0.0040	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	65	0.0035	0.0040	•	•	•	•
Cast iron	≤240 Bhn	490	0.0100	0.0125	•	•	•	•
	<300 Bhn	360	0.0100	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	360	0.0100	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	295	0.0080	0.0100	•	•	•	•
Chilled cast iron	≤350 Bhn	80	0.0040	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	95	0.0040	0.0050	•	•	•	•
	>24-38 Rc	80	0.0035	0.0040	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	655	0.0100	0.0125	•	•	•	•
Al wrought alloys	≤150 Bhn	655	0.0100	0.0125	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	555	0.0100	0.0125	•	•	•	•
> 10 % Si	≤200 Bhn	455	0.0100	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	655	0.0100	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	260	0.0080	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	685	0.0100	0.0125	•	•	•	•
long-chipping	≤200 Bhn	455	0.0080	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	260	0.0080	0.0100	•	•	•	•
	>200-260 Bhn	210	0.0080	0.0100	•	•	•	•
Bronze, long-chipping	≤24 Rc	160	0.0080	0.0100	•	•	•	•
	>24-30 Rc	130	0.0065	0.0080	•	•	•	•
Duroplastics	–	260	0.0065	0.0080	•	•	•	•
Thermoplastics	–	260	0.0065	0.0080	•	•	•	•
Reinforced plastics - Kevlar	–	260	0.0065	0.0080	•	•	•	•
Reinforced plastics - GFK / CFK	–	260	0.0065	0.0080	•	•	•	•

Series # 4026 / # 4042 (3xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm				
Common structural steels	≤100 Bhn	425	0.0100	0.0125	•	•	•	•
	>100-260 Bhn	360	0.0080	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	425	0.0125	0.0160	•	•	•	•
	>24-30 Rc	360	0.0100	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	0.0100	0.0125	•	•	•	•
	16-24 Rc	410	0.0100	0.0125	•	•	•	•
	24-30 Rc	360	0.0080	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	360	0.0100	0.0125	•	•	•	•
	>30-38 Rc	295	0.0080	0.0100	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	425	0.0125	0.0160	•	•	•	•
Alloyed case hardened steels	24-30 Rc	360	0.0100	0.0125	•	•	•	•
	>30-38 Rc	225	0.0065	0.0080	•	•	•	•
Nitriding steels	≥24-30 Rc	340	0.0080	0.0100	•	•	•	•
	>30-38 Rc	225	0.0065	0.0080	•	•	•	•
Tool steels	≤24 Rc	180	0.0080	0.0100	•	•	•	•
	>24-30 Rc	160	0.0065	0.0080	•	•	•	•
High speed steels	≥14-30 Rc	180	0.0050	0.0065	•	•	•	•
Spring steels	≤330 Bhn	160	0.0040	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	180	0.0050	0.0065	•	•	•	•
austenitic	≤24 Rc	130	0.0050	0.0065	•	•	•	•
martensitic	≤24 Rc	110	0.0050	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	80	0.0040	0.0050	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	80	0.0040	0.0050	•	•	•	•
Cast iron	≤240 Bhn	685	0.0125	0.0160	•	•	•	•
	<300 Bhn	505	0.0125	0.0160	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	505	0.0125	0.0160	•	•	•	•
malleable cast iron	<300 Bhn	425	0.0100	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	110	0.0040	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	130	0.0050	0.0065	•	•	•	•
	>24-38 Rc	110	0.0040	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	950	0.0125	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	850	0.0125	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	770	0.0125	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	635	0.0125	0.0160	•	•	•	•
Magnesium alloys	≤150 Bhn	850	0.0125	0.0160	•	•	•	•
Copper, low-alloyed	≤120 Bhn	340	0.0100	0.0125	•	•	•	•
Brass, short-chipping	≤200 Bhn	885	0.0125	0.0160	•	•	•	•
long-chipping	≤200 Bhn	590	0.0100	0.0125	•	•	•	•
Bronze, short-chipping	≤200 Bhn	340	0.0100	0.0125	•	•	•	•
	>200-260 Bhn	275	0.0100	0.0125	•	•	•	•
Bronze, long-chipping	≤24 Rc	210	0.0100	0.0125	•	•	•	•
	>24-30 Rc	180	0.0080	0.0100	•	•	•	•
Duroplastics	–	340	0.0080	0.0100	•	•	•	•
Thermoplastics	–	340	0.0080	0.0100	•	•	•	•
Reinforced plastics - Kevlar	–	340	0.0080	0.0100	•	•	•	•
Reinforced plastics - GFK / CFK	–	340	0.0080	0.0100	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 4026 / # 4043 (5xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm				
Common structural steels	≤100 Bhn	410	0.0100	0.0125	•	•	•	•
	>100-260 Bhn	340	0.0080	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	410	0.0125	0.0160	•	•	•	•
	>24-30 Rc	340	0.0100	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	410	0.0100	0.0125	•	•	•	•
	16-24 Rc	390	0.0100	0.0125	•	•	•	•
	24-30 Rc	340	0.0080	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	340	0.0100	0.0125	•	•	•	•
	>30-38 Rc	275	0.0080	0.0100	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	410	0.0125	0.0160	•	•	•	•
Alloyed case hardened steels	24-30 Rc	340	0.0100	0.0125	•	•	•	•
	>30-38 Rc	225	0.0065	0.0080	•	•	•	•
Nitriding steels	≥24-30 Rc	340	0.0080	0.0100	•	•	•	•
	>30-38 Rc	225	0.0065	0.0080	•	•	•	•
Tool steels	≤24 Rc	180	0.0080	0.0100	•	•	•	•
	>24-30 Rc	160	0.0065	0.0080	•	•	•	•
High speed steels	≥14-30 Rc	180	0.0050	0.0065	•	•	•	•
Spring steels	≤330 Bhn	160	0.0040	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	180	0.0050	0.0065	•	•	•	•
austenitic	≤24 Rc	130	0.0050	0.0065	•	•	•	•
martensitic	≤24 Rc	110	0.0050	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	80	0.0040	0.0050	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	80	0.0040	0.0050	•	•	•	•
Cast iron	≤240 Bhn	635	0.0125	0.0160	•	•	•	•
	<300 Bhn	475	0.0125	0.0160	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	475	0.0125	0.0160	•	•	•	•
malleable cast iron	<300 Bhn	390	0.0100	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	110	0.0040	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	130	0.0050	0.0065	•	•	•	•
	>24-38 Rc	110	0.0040	0.0050	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	850	0.0125	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	850	0.0125	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	720	0.0125	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	590	0.0125	0.0160	•	•	•	•
Magnesium alloys	≤150 Bhn	850	0.0125	0.0160	•	•	•	•
Copper, low-alloyed	≤120 Bhn	340	0.0100	0.0125	•	•	•	•
Brass, short-chipping	≤200 Bhn	885	0.0125	0.0160	•	•	•	•
long-chipping	≤200 Bhn	590	0.0100	0.0125	•	•	•	•
Bronze, short-chipping	≤200 Bhn	340	0.0100	0.0125	•	•	•	•
	>200-260 Bhn	275	0.0100	0.0125	•	•	•	•
Bronze, long-chipping	≤24 Rc	210	0.0100	0.0125	•	•	•	•
	>24-30 Rc	180	0.0080	0.0100	•	•	•	•
Duroplastics	–	340	0.0080	0.0100	•	•	•	•
Thermoplastics	–	340	0.0080	0.0100	•	•	•	•
Reinforced plastics - Kevlar	–	340	0.0080	0.0100	•	•	•	•
Reinforced plastics - GFK / CFK	–	340	0.0080	0.0100	•	•	•	•

Series # 4026 / # 4048 (7xD body)

Material group	Hardness	SFM	Feed Rate - IPR					
			≤16.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	41/64 - 25/32 in. 16.001 - 20.000 mm	63/64 - 1 17/64 in. 25.001 - 31.500 mm	1 1/4 - 1 9/16 in. 31.501 - 40.000 mm	1 37/64 - 1 61/64 in. 40.001 - 50.000 mm
Common structural steels	≤100 Bhn	390	0.0080	0.0100	•	•	•	•
	>100-260 Bhn	340	0.0065	0.0080	•	•	•	•
Free-cutting steels	≤24 Rc	390	0.0100	0.0125	•	•	•	•
	>24-30 Rc	340	0.0080	0.0100	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	390	0.0080	0.0100	•	•	•	•
	16-24 Rc	360	0.0080	0.0100	•	•	•	•
	24-30 Rc	325	0.0065	0.0080	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	325	0.0080	0.0100	•	•	•	•
	>30-38 Rc	275	0.0065	0.0080	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	390	0.0100	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	325	0.0080	0.0100	•	•	•	•
	>30-38 Rc	225	0.0065	0.0080	•	•	•	•
Nitriding steels	≥24-30 Rc	340	0.0080	0.0100	•	•	•	•
	>30-38 Rc	225	0.0065	0.0080	•	•	•	•
Tool steels	≤24 Rc	180	0.0065	0.0080	•	•	•	•
	>24-30 Rc	160	0.0050	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	180	0.0040	0.0050	•	•	•	•
Spring steels	≤330 Bhn	160	0.0040	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	180	0.0040	0.0050	•	•	•	•
austenitic	≤24 Rc	130	0.0040	0.0050	•	•	•	•
martensitic	≤24 Rc	110	0.0040	0.0050	•	•	•	•
Hardened steels	≤40-48 Rc	80	0.0035	0.0040	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•
Special alloys	≤38 Rc	80	0.0035	0.0040	•	•	•	•
Cast iron	≤240 Bhn	635	0.0100	0.0125	•	•	•	•
	<300 Bhn	475	0.0100	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	475	0.0100	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	390	0.0080	0.0100	•	•	•	•
Chilled cast iron	≤350 Bhn	110	0.0040	0.0050	•	•	•	•
Ti and Ti-alloys	≤24 Rc	130	0.0040	0.0050	•	•	•	•
	>24-38 Rc	110	0.0035	0.0040	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	850	0.0100	0.0125	•	•	•	•
Al wrought alloys	≤150 Bhn	850	0.0100	0.0125	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	720	0.0100	0.0125	•	•	•	•
> 10 % Si	≤200 Bhn	590	0.0100	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	850	0.0100	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	340	0.0080	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	885	0.0100	0.0125	•	•	•	•
long-chipping	≤200 Bhn	590	0.0080	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	340	0.0080	0.0100	•	•	•	•
	>200-260 Bhn	275	0.0080	0.0100	•	•	•	•
Bronze, long-chipping	≤24 Rc	210	0.0080	0.0100	•	•	•	•
	>24-30 Rc	180	0.0065	0.0080	•	•	•	•
Duroplastics	–	340	0.0065	0.0080	•	•	•	•
Thermoplastics	–	340	0.0065	0.0080	•	•	•	•
Reinforced plastics - Kevlar	–	340	0.0065	0.0080	•	•	•	•
Reinforced plastics - GFK / CFK	–	340	0.0065	0.0080	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 | IPM = IPR x RPM | $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time | mm = in. x 25.40 | m/min. = SFM ÷ 3.28, mm/rev. = IPR x 25.40 | Bar = PSI ÷ 14.50, Liter = Gal. ÷ 3.79

Series # 4044

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	460	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>100-260 Bhn	395	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Free-cutting steels	≤24 Rc	550	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>24-30 Rc	480	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Unalloyed heat-treatable steels	≤16 Rc	415	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	16-24 Rc	400	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	24-30 Rc	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	335	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Unalloyed case hardened steels	≤230 Bhn	465	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	270	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Nitriding steels	≥24-30 Rc	340	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	325	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Tool steels	≤24 Rc	230	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>24-30 Rc	175	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
High speed steels	≥14-30 Rc	195	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Spring steels	≤330 Bhn	195	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
austenitic	≤24 Rc	175	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
martensitic	≤24 Rc	155	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Hardened steels	≤40-48 Rc	175	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
	>48-60 Rc	110	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Special alloys	≤38 Rc	110	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Cast iron	≤240 Bhn	640	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	<300 Bhn	525	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Spheroidal graphite iron and	≤240 Bhn	435	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
malleable cast iron	<300 Bhn	415	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Ti and Ti-alloys	≤24 Rc	140	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
	>24-38 Rc	130	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Aluminium and Al-alloys	≤120 Bhn	1000	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al wrought alloys	≤150 Bhn	1000	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	845	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
> 10 % Si	≤200 Bhn	710	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Magnesium alloys	≤150 Bhn	900	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Copper, low-alloyed	≤120 Bhn	400	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Brass, short-chipping	≤200 Bhn	1050	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
long-chipping	≤200 Bhn	710	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>200-260 Bhn	345	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Bronze, long-chipping	≤24 Rc	285	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	250	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 4112/4107 (3xD body)

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	425	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	>100-260 Bhn	360	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Free-cutting steels	≤24 Rc	425	•	•	•	•	0.012	0.016	0.020	0.025	•	•
	>24-30 Rc	360	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	16-24 Rc	410	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	24-30 Rc	360	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Alloyed heat-treatable steels	24-30 Rc	360	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	>30-38 Rc	295	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Unalloyed case hardened steels	≤230 Bhn	425	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Alloyed case hardened steels	24-30 Rc	360	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	>30-38 Rc	230	•	•	•	•	0.006	0.008	0.010	0.012	•	•
Nitriding steels	≥24-30 Rc	345	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	>30-38 Rc	230	•	•	•	•	0.006	0.008	0.010	0.012	•	•
Tool steels	≤24 Rc	195	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	>24-30 Rc	180	•	•	•	•	0.006	0.008	0.010	0.012	•	•
High speed steels	≥14-30 Rc	180	•	•	•	•	0.005	0.006	0.010	0.010	•	•
Spring steels	≤330 Bhn	165	•	•	•	•	0.004	0.005	0.016	0.008	•	•
Stainless steels, sulphured	≤24 Rc	180	•	•	•	•	0.005	0.006	0.010	0.010	•	•
austenitic	≤24 Rc	130	•	•	•	•	0.005	0.006	0.010	0.010	•	•
martensitic	≤24 Rc	115	•	•	•	•	0.005	0.006	0.010	0.010	•	•
Hardened steels	≤40-48 Rc	80	•	•	•	•	0.004	0.005	0.016	0.008	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	80	•	•	•	•	0.004	0.005	0.016	0.008	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	130	•	•	•	•	0.005	0.006	0.010	0.010	•	•
	>24-38 Rc	115	•	•	•	•	0.004	0.005	0.016	0.008	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 4112/4108 (5xD body)

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	410	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	>100-260 Bhn	345	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Free-cutting steels	≤24 Rc	410	•	•	•	•	0.012	0.016	0.020	0.025	•	•
	>24-30 Rc	345	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Unalloyed heat-treatable steels	≤16 Rc	410	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	16-24 Rc	395	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	24-30 Rc	345	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Alloyed heat-treatable steels	24-30 Rc	345	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	>30-38 Rc	280	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Unalloyed case hardened steels	≤230 Bhn	410	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Alloyed case hardened steels	24-30 Rc	345	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	>30-38 Rc	230	•	•	•	•	0.006	0.008	0.010	0.012	•	•
Nitriding steels	≥24-30 Rc	345	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	>30-38 Rc	230	•	•	•	•	0.006	0.008	0.010	0.012	•	•
Tool steels	≤24 Rc	180	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	>24-30 Rc	165	•	•	•	•	0.006	0.008	0.010	0.012	•	•
High speed steels	≥14-30 Rc	180	•	•	•	•	0.005	0.006	0.010	0.010	•	•
Spring steels	≤330 Bhn	165	•	•	•	•	0.004	0.005	0.016	0.008	•	•
Stainless steels, sulphured	≤24 Rc	180	•	•	•	•	0.005	0.006	0.010	0.010	•	•
austenitic	≤24 Rc	130	•	•	•	•	0.005	0.006	0.010	0.010	•	•
martensitic	≤24 Rc	115	•	•	•	•	0.005	0.006	0.010	0.010	•	•
Hardened steels	≤40-48 Rc	80	•	•	•	•	0.004	0.005	0.016	0.008	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	80	•	•	•	•	0.004	0.005	0.016	0.008	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	130	•	•	•	•	0.005	0.006	0.010	0.010	•	•
	>24-38 Rc	115	•	•	•	•	0.004	0.005	0.016	0.008	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 4112/4109 (7xD body)

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	395	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	>100-260 Bhn	345	•	•	•	•	0.006	0.008	0.010	0.012	•	•
Free-cutting steels	≤24 Rc	395	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	>24-30 Rc	345	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Unalloyed heat-treatable steels	≤16 Rc	395	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	16-24 Rc	360	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	24-30 Rc	330	•	•	•	•	0.006	0.008	0.010	0.012	•	•
Alloyed heat-treatable steels	24-30 Rc	330	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	>30-38 Rc	280	•	•	•	•	0.006	0.008	0.010	0.012	•	•
Unalloyed case hardened steels	≤230 Bhn	395	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Alloyed case hardened steels	24-30 Rc	330	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	>30-38 Rc	230	•	•	•	•	0.006	0.008	0.010	0.012	•	•
Nitriding steels	≥24-30 Rc	345	•	•	•	•	0.006	0.008	0.010	0.012	•	•
	>30-38 Rc	230	•	•	•	•	0.005	0.006	0.008	0.010	•	•
Tool steels	≤24 Rc	180	•	•	•	•	0.006	0.008	0.010	0.012	•	•
	>24-30 Rc	165	•	•	•	•	0.005	0.006	0.008	0.010	•	•
High speed steels	≥14-30 Rc	180	•	•	•	•	0.004	0.005	0.006	0.008	•	•
Spring steels	≤330 Bhn	165	•	•	•	•	0.004	0.005	0.006	0.008	•	•
Stainless steels, sulphured	≤24 Rc	180	•	•	•	•	0.004	0.005	0.006	0.008	•	•
austenitic	≤24 Rc	130	•	•	•	•	0.004	0.005	0.006	0.008	•	•
martensitic	≤24 Rc	115	•	•	•	•	0.004	0.005	0.006	0.008	•	•
Hardened steels	≤40-48 Rc	80	•	•	•	•	0.003	0.004	0.005	0.006	•	•
	>48-60 Rc	0	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	80	•	•	•	•	0.003	0.004	0.005	0.006	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn										•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 4113/4107 (3xD body)

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	330	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	<300 Bhn	295	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Spheroidal graphite iron and	≤240 Bhn	395	•	•	•	•	0.012	0.016	0.020	0.025	•	•
malleable cast iron	<300 Bhn	330	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Chilled cast iron	≤350 Bhn	295	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 4113/4108 (5xD body)

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	330	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	<300 Bhn	295	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Spheroidal graphite iron and	≤240 Bhn	395	•	•	•	•	0.012	0.016	0.020	0.025	•	•
malleable cast iron	<300 Bhn	330	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Chilled cast iron	≤350 Bhn	295	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 4113/4109 (7xD body)

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	260	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	<300 Bhn	230	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Spheroidal graphite iron and	≤240 Bhn	330	•	•	•	•	0.012	0.016	0.020	0.025	•	•
malleable cast iron	<300 Bhn	260	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Chilled cast iron	≤350 Bhn	230	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 4114/4107 (3xD body)

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1000	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Al wrought alloys	≤150 Bhn	1000	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	845	•	•	•	•	0.012	0.016	0.020	0.025	•	•
> 10 % Si	≤200 Bhn	710	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Magnesium alloys	≤150 Bhn	900	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Copper, low-alloyed	≤120 Bhn	400	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Brass, short-chipping	≤200 Bhn	1050	•	•	•	•	0.012	0.016	0.020	0.025	•	•
long-chipping	≤200 Bhn	710	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Bronze, short-chipping	≤200 Bhn	410	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	>200-260 Bhn	345	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{\text{SFM}}{\text{DIAM. in.}}$ x 3.82 IPM = IPR x RPM $\frac{\text{HOLE DEPTH in.}}{\text{IPM}}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 4114/4108 (5xD body)

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	590	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Al wrought alloys	≤150 Bhn	590	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	460	•	•	•	•	0.012	0.016	0.020	0.025	•	•
> 10 % Si	≤200 Bhn	360	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Magnesium alloys	≤150 Bhn	590	•	•	•	•	0.012	0.016	0.020	0.025	•	•
Copper, low-alloyed	≤120 Bhn	230	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Brass, short-chipping	≤200 Bhn	590	•	•	•	•	0.012	0.016	0.020	0.025	•	•
long-chipping	≤200 Bhn	395	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Bronze, short-chipping	≤200 Bhn	195	•	•	•	•	0.010	0.012	0.016	0.020	•	•
	>200-260 Bhn	130	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 4114/4109 (7xD body)

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	•	•	•	•	•	•	•	•	•	•	•
malleable cast iron	<300 Bhn	•	•	•	•	•	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	590	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Al wrought alloys	≤150 Bhn	590	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	460	•	•	•	•	0.010	0.012	0.016	0.020	•	•
> 10 % Si	≤200 Bhn	360	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Magnesium alloys	≤150 Bhn	590	•	•	•	•	0.010	0.012	0.016	0.020	•	•
Copper, low-alloyed	≤120 Bhn	230	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Brass, short-chipping	≤200 Bhn	590	•	•	•	•	0.010	0.012	0.016	0.020	•	•
long-chipping	≤200 Bhn	395	•	•	•	•	0.008	0.010	0.012	0.016	•	•
Bronze, short-chipping	≤200 Bhn	195	•	•	•	•	0.008	0.010	0.012	0.016	•	•
	>200-260 Bhn	130	•	•	•	•	0.006	0.008	0.010	0.012	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 5020, 5021, 5024, 5026 - EB100 Less than 35xD

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	330	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
	>100-260 Bhn	280	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	295	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
	>24-30 Rc	260	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	295	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
	16-24 Rc	260	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
	24-30 Rc	245	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	245	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
	>30-38 Rc	215	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	260	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	245	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
	>30-38 Rc	215	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	245	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
	>30-38 Rc	215	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
Tool steels	≤24 Rc	245	0.0002	0.0003	0.0004	0.0006	•	•	•	•	•	•
	>24-30 Rc	215	0.0002	0.0003	0.0004	0.0006	•	•	•	•	•	•
High speed steels	≥14-30 Rc	180	0.0001	0.0002	0.0003	0.0004	•	•	•	•	•	•
Spring steels	≤330 Bhn	215	0.0002	0.0003	0.0004	0.0006	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	180	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
austenitic	≤24 Rc	150	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
martensitic	≤24 Rc	115	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	100	0.0002	0.0003	0.0004	0.0006	•	•	•	•	•	•
	>48-60 Rc	80	0.0001	0.0002	0.0003	0.0004	•	•	•	•	•	•
Special alloys	≤38 Rc	115	0.0001	0.0002	0.0003	0.0004	•	•	•	•	•	•
Cast iron	≤240 Bhn	280	0.0005	0.0009	0.0014	0.0020	•	•	•	•	•	•
	<300 Bhn	260	0.0005	0.0009	0.0014	0.0020	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	260	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
malleable cast iron	<300 Bhn	230	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	180	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	115	0.0001	0.0002	0.0003	0.0004	•	•	•	•	•	•
	>24-38 Rc	100	0.0001	0.0002	0.0003	0.0004	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	490	0.0008	0.0016	0.0024	0.0028	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	395	0.0008	0.0016	0.0024	0.0028	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	490	0.0013	0.0024	0.0033	0.0047	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	425	0.0013	0.0024	0.0033	0.0047	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	360	0.0008	0.0016	0.0024	0.0028	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	245	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	395	0.0013	0.0024	0.0033	0.0047	•	•	•	•	•	•
long-chipping	≤200 Bhn	295	0.0013	0.0024	0.0033	0.0047	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	310	0.0008	0.0016	0.0024	0.0028	•	•	•	•	•	•
	>200-260 Bhn	310	0.0008	0.0016	0.0024	0.0028	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	230	0.0008	0.0016	0.0024	0.0028	•	•	•	•	•	•
	>24-30 Rc	230	0.0008	0.0016	0.0024	0.0028	•	•	•	•	•	•
Duroplastics	–	245	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
Thermoplastics	–	230	0.0003	0.0006	0.0009	0.0015	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	195	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	165	0.0002	0.0004	0.0005	0.0010	•	•	•	•	•	•

Series # 5020, 5021, 5024, 5026 - EB100 Greater than 35xD

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	310	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
	>100-260 Bhn	260	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	280	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
	>24-30 Rc	245	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	280	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
	16-24 Rc	245	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
	24-30 Rc	230	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	230	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
	>30-38 Rc	195	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	245	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	230	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
	>30-38 Rc	195	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	230	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
	>30-38 Rc	195	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
Tool steels	≤24 Rc	230	0.00008	0.00018	0.00028	0.00043	•	•	•	•	•	•
	>24-30 Rc	195	0.00008	0.00018	0.00028	0.00043	•	•	•	•	•	•
High speed steels	≥14-30 Rc	165	0.00008	0.00018	0.00028	0.00043	•	•	•	•	•	•
Spring steels	≤330 Bhn	195	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	165	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
austenitic	≤24 Rc	130	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
martensitic	≤24 Rc	115	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	80	0.00008	0.00018	0.00028	0.00043	•	•	•	•	•	•
	>48-60 Rc	65	0.00008	0.00018	0.00028	0.00043	•	•	•	•	•	•
Special alloys	≤38 Rc	100	0.00008	0.00018	0.00028	0.00043	•	•	•	•	•	•
Cast iron	≤240 Bhn	260	0.00031	0.00055	0.00094	0.00150	•	•	•	•	•	•
	<300 Bhn	245	0.00031	0.00055	0.00094	0.00150	•	•	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	245	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
malleable cast iron	<300 Bhn	215	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
Chilled cast iron	≤350 Bhn	165	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	100	0.00008	0.00018	0.00028	0.00043	•	•	•	•	•	•
	>24-38 Rc	80	0.00008	0.00018	0.00028	0.00043	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	460	0.00031	0.00055	0.00094	0.00150	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	375	0.00031	0.00055	0.00094	0.00150	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	460	0.00079	0.00157	0.00240	0.00276	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	395	0.00079	0.00157	0.00240	0.00276	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	0	0.00047	0.00087	0.00138	0.00197	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	230	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	375	0.00079	0.00157	0.00240	0.00276	•	•	•	•	•	•
long-chipping	≤200 Bhn	280	0.00079	0.00157	0.00240	0.00276	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	295	0.00047	0.00087	0.00138	0.00197	•	•	•	•	•	•
	>200-260 Bhn	295	0.00047	0.00087	0.00138	0.00197	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	215	0.00047	0.00087	0.00138	0.00197	•	•	•	•	•	•
	>24-30 Rc	215	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
Duroplastics	–	230	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
Thermoplastics	–	215	0.00024	0.00035	0.00051	0.00098	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	180	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	150	0.00016	0.00026	0.00035	0.00059	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 5510

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	475	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>100-260 Bhn	395	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Free-cutting steels	≤24 Rc	560	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
	>24-30 Rc	475	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
	16-24 Rc	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	345	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Unalloyed case hardened steels	≤230 Bhn	475	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	280	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Nitriding steels	≥24-30 Rc	360	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	345	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Tool steels	≤24 Rc	260	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
	>24-30 Rc	215	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
High speed steels	≥14-30 Rc	195	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Spring steels	≤330 Bhn	195	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
austenitic	≤24 Rc	180	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
martensitic	≤24 Rc	165	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Hardened steels	≤40-48 Rc	180	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
	>48-60 Rc	115	•	0.00200	0.00300	0.00400	0.00500	0.00500	0.00550	•	•	•
Special alloys	≤38 Rc	115	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Cast iron	≤240 Bhn	690	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
	<300 Bhn	525	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Spheroidal graphite iron and	≤240 Bhn	460	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
malleable cast iron	<300 Bhn	425	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
Ti and Ti-alloys	≤24 Rc	150	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
	>24-38 Rc	130	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1015	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Al wrought alloys	≤150 Bhn	1015	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	855	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
> 10 % Si	≤200 Bhn	720	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Magnesium alloys	≤150 Bhn	920	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Copper, low-alloyed	≤120 Bhn	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Brass, short-chipping	≤200 Bhn	1065	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
long-chipping	≤200 Bhn	720	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>200-260 Bhn	345	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Bronze, long-chipping	≤24 Rc	295	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
	>24-30 Rc	260	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 5511

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	475	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>100-260 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Free-cutting steels	≤24 Rc	560	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	>24-30 Rc	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	16-24 Rc	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	345	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Unalloyed case hardened steels	≤230 Bhn	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	280	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Nitriding steels	≥24-30 Rc	350	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	330	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Tool steels	≤24 Rc	240	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
High speed steels	≥14-30 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Spring steels	≤330 Bhn	195	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
austenitic	≤24 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
martensitic	≤24 Rc	165	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Hardened steels	≤40-48 Rc	180	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>48-60 Rc	115	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Special alloys	≤38 Rc	115	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Cast iron	≤240 Bhn	690	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
	<300 Bhn	525	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
Spheroidal graphite iron and	≤240 Bhn	450	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
malleable cast iron	<300 Bhn	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Ti and Ti-alloys	≤24 Rc	150	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-38 Rc	130	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Aluminium and Al-alloys	≤120 Bhn	1015	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al wrought alloys	≤150 Bhn	1015	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	855	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
> 10 % Si	≤200 Bhn	720	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Magnesium alloys	≤150 Bhn	920	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Copper, low-alloyed	≤120 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Brass, short-chipping	≤200 Bhn	1065	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
long-chipping	≤200 Bhn	720	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>200-260 Bhn	345	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Bronze, long-chipping	≤24 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 5512

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	460	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>100-260 Bhn	395	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Free-cutting steels	≤24 Rc	550	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>24-30 Rc	480	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Unalloyed heat-treatable steels	≤16 Rc	415	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	16-24 Rc	400	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	24-30 Rc	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	335	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Unalloyed case hardened steels	≤230 Bhn	465	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	270	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Nitriding steels	≥24-30 Rc	340	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	325	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Tool steels	≤24 Rc	230	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>24-30 Rc	175	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
High speed steels	≥14-30 Rc	195	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Spring steels	≤330 Bhn	195	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
austenitic	≤24 Rc	175	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
martensitic	≤24 Rc	155	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Hardened steels	≤40-48 Rc	175	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
	>48-60 Rc	110	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Special alloys	≤38 Rc	110	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Cast iron	≤240 Bhn	640	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	<300 Bhn	525	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Spheroidal graphite iron and	≤240 Bhn	435	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
malleable cast iron	<300 Bhn	415	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Ti and Ti-alloys	≤24 Rc	140	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
	>24-38 Rc	130	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Aluminium and Al-alloys	≤120 Bhn	1000	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al wrought alloys	≤150 Bhn	1000	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	845	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
> 10 % Si	≤200 Bhn	710	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Magnesium alloys	≤150 Bhn	900	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Copper, low-alloyed	≤120 Bhn	400	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Brass, short-chipping	≤200 Bhn	1050	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
long-chipping	≤200 Bhn	710	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>200-260 Bhn	345	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Bronze, long-chipping	≤24 Rc	285	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	250	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 5513

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	395	•	0.004	0.0065	0.008	0.01	0.01	0.011	•	•	•
	<300 Bhn	330	•	0.004	0.0065	0.008	0.01	0.01	0.011	•	•	•
Spheroidal graphite iron and	≤240 Bhn	295	•	0.004	0.0065	0.008	0.01	0.01	0.011	•	•	•
malleable cast iron	<300 Bhn	260	•	0.004	0.0065	0.008	0.01	0.01	0.011	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.002	0.003	0.004	0.005	0.0055	0.0065	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1345	•	0.0065	0.01	0.0125	0.016	0.018	0.02	•	•	•
Al wrought alloys	≤150 Bhn	1345	•	0.0065	0.01	0.0125	0.016	0.018	0.02	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	1245	•	0.0065	0.01	0.0125	0.016	0.018	0.02	•	•	•
> 10 % Si	≤200 Bhn	1080	•	0.0065	0.01	0.0125	0.016	0.018	0.02	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	920	•	0.005	0.008	0.01	0.0125	0.0125	0.014	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	360	•	0.004	0.0065	0.008	0.01	0.01	0.011	•	•	•
	>200-260 Bhn	260	•	0.003	0.005	0.0065	0.008	0.008	0.009	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•									•	•
Duroplastics	–	•									•	•
Thermoplastics	–	•									•	•
Reinforced plastics - Kevlar	–	•									•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Note: Pilot holes (depth ≥1xD) are recommended when drilling depths greater than 7xD. The pilot hole can be produced with a short, rigid drill. The diameter should be 0.01 - 0.02 mm larger than the diameter of the finish drill. Ratio drills can produce their own pilot hole by reducing speed and feed rates by 30-40%.

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 5514

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	425	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	>100-260 Bhn	360	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Free-cutting steels	≤24 Rc	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
	>24-30 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	16-24 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	24-30 Rc	345	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	345	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	>30-38 Rc	330	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	>30-38 Rc	280	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Nitriding steels	≥24-30 Rc	330	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>30-38 Rc	295	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Tool steels	≤24 Rc	215	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
High speed steels	≥14-30 Rc	150	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Spring steels	≤330 Bhn	150	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Stainless steels, sulphured	≤24 Rc	180	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	150	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
martensitic	≤24 Rc	150	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	150	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>48-60 Rc	80	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Special alloys	≤38 Rc	80	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Cast iron	≤240 Bhn	690	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
	<300 Bhn	510	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	510	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
malleable cast iron	<300 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Chilled cast iron	≤350 Bhn	115	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Ti and Ti-alloys	≤24 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-38 Rc	115	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	855	•	0.0100	0.0160	0.0200	0.0245	0.0245	•	•	•	•
Al wrought alloys	≤150 Bhn	855	•	0.0100	0.0160	0.0200	0.0245	0.0245	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	720	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
> 10 % Si	≤200 Bhn	590	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Magnesium alloys	≤150 Bhn	855	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Copper, low-alloyed	≤120 Bhn	360	•	0.0065	0.0065	0.0100	0.0125	0.0125	•	•	•	•
Brass, short-chipping	≤200 Bhn	885	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
long-chipping	≤200 Bhn	590	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Bronze, short-chipping	≤200 Bhn	360	•	0.0065	0.0065	0.0100	0.0125	0.0125	•	•	•	•
	>200-260 Bhn	330	•	0.0050	0.0050	0.0080	0.0100	0.0100	•	•	•	•
Bronze, long-chipping	≤24 Rc	240	•	0.0050	0.0050	0.0080	0.0100	0.0100	•	•	•	•
	>24-30 Rc	215	•	0.0050	0.0050	0.0080	0.0100	0.0100	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 5515

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	425	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	>100-260 Bhn	360	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Free-cutting steels	≤24 Rc	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
	>24-30 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	16-24 Rc	360	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	24-30 Rc	345	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	345	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	>30-38 Rc	330	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
	>30-38 Rc	280	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Nitriding steels	≥24-30 Rc	320	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>30-38 Rc	280	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Tool steels	≤24 Rc	195	•	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	145	•	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
High speed steels	≥14-30 Rc	150	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Spring steels	≤330 Bhn	150	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Stainless steels, sulphured	≤24 Rc	180	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	150	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
martensitic	≤24 Rc	150	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	150	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
	>48-60 Rc	80	•	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Special alloys	≤38 Rc	80	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Cast iron	≤240 Bhn	690	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
	<300 Bhn	510	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	475	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
malleable cast iron	<300 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Chilled cast iron	≤350 Bhn	115	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Ti and Ti-alloys	≤24 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-38 Rc	115	•	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	855	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Al wrought alloys	≤150 Bhn	855	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	700	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
> 10 % Si	≤200 Bhn	560	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Magnesium alloys	≤150 Bhn	855	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
Copper, low-alloyed	≤120 Bhn	360	•	0.0065	0.0100	0.0100	0.0125	0.0160	•	•	•	•
Brass, short-chipping	≤200 Bhn	885	•	0.0080	0.0125	0.0160	0.0200	0.0200	•	•	•	•
long-chipping	≤200 Bhn	590	•	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Bronze, short-chipping	≤200 Bhn	360	•	0.0065	0.0100	0.0100	0.0125	0.0160	•	•	•	•
	>200-260 Bhn	330	•	0.0050	0.0080	0.0080	0.0100	0.0125	•	•	•	•
Bronze, long-chipping	≤24 Rc	240	•	0.0050	0.0080	0.0080	0.0100	0.0125	•	•	•	•
	>24-30 Rc	215	•	0.0050	0.0080	0.0080	0.0100	0.0125	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 5518

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	260	•	0.0035	0.005	0.008	0.008	0.01	0.0125	0.016	•	•
	>100-260 Bhn	210	•	0.0025	0.004	0.0065	0.0065	0.008	0.01	0.0125	•	•
Free-cutting steels	≤24 Rc	295	•	0.004	0.0065	0.01	0.01	0.0125	0.016	0.02	•	•
	>24-30 Rc	245	•	0.0035	0.005	0.008	0.008	0.01	0.0125	0.016	•	•
Unalloyed heat-treatable steels	≤16 Rc	225	•	0.0035	0.005	0.008	0.008	0.01	0.0125	0.016	•	•
	16-24 Rc	210	•	0.0035	0.005	0.008	0.008	0.01	0.0125	0.016	•	•
	24-30 Rc	195	•	0.0035	0.005	0.008	0.008	0.01	0.0125	0.016	•	•
Alloyed heat-treatable steels	24-30 Rc	195	•	0.0035	0.005	0.008	0.008	0.01	0.0125	0.016	•	•
	>30-38 Rc	160	•	0.0025	0.004	0.0065	0.0065	0.008	0.01	0.0125	•	•
Unalloyed case hardened steels	≤230 Bhn	260	•	0.004	0.0065	0.01	0.01	0.0125	0.016	0.02	•	•
Alloyed case hardened steels	24-30 Rc	195	•	0.0035	0.005	0.008	0.008	0.01	0.0125	0.016	•	•
	>30-38 Rc	160	•	0.0025	0.004	0.0065	0.0065	0.008	0.01	0.0125	•	•
Nitriding steels	≥24-30 Rc	180	•	0.0025	0.004	0.0065	0.0065	0.008	0.01	0.0125	•	•
	>30-38 Rc	160	•	0.0025	0.004	0.0065	0.0065	0.008	0.01	0.0125	•	•
Tool steels	≤24 Rc	145	•	0.0025	0.004	0.0065	0.0065	0.008	0.01	0.0125	•	•
	>24-30 Rc	110	•	0.0025	0.004	0.0065	0.0065	0.008	0.01	0.0125	•	•
High speed steels	≥14-30 Rc	95	•	0.002	0.0035	0.005	0.005	0.0065	0.008	0.01	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	325	•	0.004	0.0065	0.01	0.01	0.0125	0.016	0.02	•	•
	<300 Bhn	260	•	0.004	0.0065	0.01	0.01	0.0125	0.016	0.02	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	260	•	0.004	0.0065	0.01	0.01	0.0125	0.016	0.02	•	•
	<300 Bhn	225	•	0.004	0.0065	0.01	0.01	0.0125	0.016	0.02	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	590	•	0.005	0.008	0.0125	0.0125	0.016	0.02	0.025	•	•
Al wrought alloys	≤150 Bhn	520	•	0.005	0.008	0.0125	0.0125	0.016	0.02	0.025	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	490	•	0.005	0.008	0.0125	0.0125	0.016	0.02	0.025	•	•
> 10 % Si	≤200 Bhn	390	•	0.004	0.0065	0.01	0.01	0.0125	0.016	0.02	•	•
Magnesium alloys	≤150 Bhn	590	•	0.004	0.0065	0.01	0.01	0.0125	0.016	0.02	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	590	•	0.004	0.0065	0.01	0.01	0.0125	0.016	0.02	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 5519

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	195	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	16-24 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	24-30 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
martensitic	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	205	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
long-chipping	≤200 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	160	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>200-260 Bhn	95	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Bronze, long-chipping	≤24 Rc	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	95	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Thermoplastics	–	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 5520

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	195	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	160	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	16-24 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	24-30 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	45	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	70	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	40	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
martensitic	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	145	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	225	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	295	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	260	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	205	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
long-chipping	≤200 Bhn	130	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	160	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>200-260 Bhn	95	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Bronze, long-chipping	≤24 Rc	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	95	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Thermoplastics	–	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 5521

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	155	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	125	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	16-24 Rc	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	24-30 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	100	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Alloyed case hardened steels	24-30 Rc	60	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	60	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	30	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	30	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	230	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	185	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	205	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 5522

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	155	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	125	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	16-24 Rc	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	24-30 Rc	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	80	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	100	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Alloyed case hardened steels	24-30 Rc	60	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	60	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	30	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Stainless steels, sulphured	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
martensitic	≤24 Rc	50	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	30	0.0007	0.0020	0.0030	0.0040	0.0050	0.0050	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	230	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	185	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	205	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 5523

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	155	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	125	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	16-24 Rc	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	24-30 Rc	65	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	35	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
martensitic	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	180	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	180	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	230	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	185	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	205	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	165	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
long-chipping	≤200 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>200-260 Bhn	75	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Bronze, long-chipping	≤24 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	75	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Thermoplastics	–	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 5524

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>100-260 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Free-cutting steels	≤24 Rc	155	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	>24-30 Rc	125	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	130	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	16-24 Rc	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	24-30 Rc	65	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Alloyed case hardened steels	24-30 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Nitriding steels	≥24-30 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>30-38 Rc	35	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Tool steels	≤24 Rc	55	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
High speed steels	≥14-30 Rc	30	0.0010	0.0025	0.0040	0.0050	0.0065	0.0065	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	50	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
austenitic	≤24 Rc	35	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
martensitic	≤24 Rc	45	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	115	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
	<300 Bhn	90	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Spheroidal graphite iron and	≤240 Bhn	100	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
malleable cast iron	<300 Bhn	80	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	180	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al wrought alloys	≤150 Bhn	180	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	230	0.0020	0.0065	0.0100	0.0125	0.0160	0.0160	•	•	•	•
> 10 % Si	≤200 Bhn	185	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Magnesium alloys	≤150 Bhn	205	0.0017	0.0050	0.0080	0.0100	0.0125	0.0125	•	•	•	•
Copper, low-alloyed	≤120 Bhn	80	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Brass, short-chipping	≤200 Bhn	165	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
long-chipping	≤200 Bhn	100	0.0015	0.0040	0.0065	0.0080	0.0100	0.0100	•	•	•	•
Bronze, short-chipping	≤200 Bhn	130	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>200-260 Bhn	75	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Bronze, long-chipping	≤24 Rc	100	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
	>24-30 Rc	75	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Duroplastics	–	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Thermoplastics	–	65	0.0012	0.0030	0.0050	0.0065	0.0080	0.0080	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 5525

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	290	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>100-260 Bhn	265	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Free-cutting steels	≤24 Rc	325	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>24-30 Rc	300	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Unalloyed heat-treatable steels	≤16 Rc	290	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	16-24 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	24-30 Rc	265	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Alloyed heat-treatable steels	24-30 Rc	265	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	195	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Unalloyed case hardened steels	≤230 Bhn	290	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Alloyed case hardened steels	24-30 Rc	265	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Nitriding steels	≥24-30 Rc	190	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	155	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Tool steels	≤24 Rc	145	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>24-30 Rc	110	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
High speed steels	≥14-30 Rc	115	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Spring steels	≤330 Bhn	115	•	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	•	•
Stainless steels, sulphured	≤24 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
austenitic	≤24 Rc	130	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
martensitic	≤24 Rc	140	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	370	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	<300 Bhn	350	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Spheroidal graphite iron and	≤240 Bhn	245	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
malleable cast iron	<300 Bhn	260	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•	•	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	485	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al wrought alloys	≤150 Bhn	485	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	490	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
> 10 % Si	≤200 Bhn	390	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Magnesium alloys	≤150 Bhn	485	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Copper, low-alloyed	≤120 Bhn	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Brass, short-chipping	≤200 Bhn	390	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
long-chipping	≤200 Bhn	390	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Bronze, short-chipping	≤200 Bhn	135	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	125	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Duroplastics	–	•									•	•
Thermoplastics	–	•									•	•
Reinforced plastics - Kevlar	–	•									•	•
Reinforced plastics - GFK / CFK	–	•									•	•

Note: Pilot holes (depth ≥1xD) are recommended when drilling greater than 7xD. The pilot hole can be produced with a short, rigid drill. The diameter should be 0.01 - 0.02 mm larger than the diameter of the finish drill. Ratio drills can produce their own pilot hole by reducing speed and feed rates by 30-40%.

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 5610

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	475	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>100-260 Bhn	395	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Free-cutting steels	≤24 Rc	560	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
	>24-30 Rc	475	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
	16-24 Rc	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	345	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Unalloyed case hardened steels	≤230 Bhn	475	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	280	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Nitriding steels	≥24-30 Rc	360	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	345	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Tool steels	≤24 Rc	260	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
	>24-30 Rc	215	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
High speed steels	≥14-30 Rc	195	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Spring steels	≤330 Bhn	195	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
austenitic	≤24 Rc	180	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
martensitic	≤24 Rc	165	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Hardened steels	≤40-48 Rc	180	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
	>48-60 Rc	115	•	0.00200	0.00300	0.00400	0.00500	0.00500	0.00550	•	•	•
Special alloys	≤38 Rc	115	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Cast iron	≤240 Bhn	690	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
	<300 Bhn	525	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Spheroidal graphite iron and	≤240 Bhn	460	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
malleable cast iron	<300 Bhn	425	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
Ti and Ti-alloys	≤24 Rc	150	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
	>24-38 Rc	130	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1015	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Al wrought alloys	≤150 Bhn	1015	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	855	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
> 10 % Si	≤200 Bhn	720	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Magnesium alloys	≤150 Bhn	920	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Copper, low-alloyed	≤120 Bhn	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Brass, short-chipping	≤200 Bhn	1065	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
long-chipping	≤200 Bhn	720	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>200-260 Bhn	345	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Bronze, long-chipping	≤24 Rc	295	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
	>24-30 Rc	260	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 5611

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	475	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>100-260 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Free-cutting steels	≤24 Rc	560	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	>24-30 Rc	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	16-24 Rc	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	345	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Unalloyed case hardened steels	≤230 Bhn	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	280	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Nitriding steels	≥24-30 Rc	350	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	330	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Tool steels	≤24 Rc	240	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
High speed steels	≥14-30 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Spring steels	≤330 Bhn	195	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
austenitic	≤24 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
martensitic	≤24 Rc	165	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Hardened steels	≤40-48 Rc	180	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>48-60 Rc	115	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Special alloys	≤38 Rc	115	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Cast iron	≤240 Bhn	690	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
	<300 Bhn	525	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
Spheroidal graphite iron and	≤240 Bhn	450	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
malleable cast iron	<300 Bhn	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Ti and Ti-alloys	≤24 Rc	150	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-38 Rc	130	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Aluminium and Al-alloys	≤120 Bhn	1015	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al wrought alloys	≤150 Bhn	1015	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	855	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
> 10 % Si	≤200 Bhn	720	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Magnesium alloys	≤150 Bhn	920	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Copper, low-alloyed	≤120 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Brass, short-chipping	≤200 Bhn	1065	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
long-chipping	≤200 Bhn	720	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>200-260 Bhn	345	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Bronze, long-chipping	≤24 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 5612

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	460	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>100-260 Bhn	395	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Free-cutting steels	≤24 Rc	550	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>24-30 Rc	480	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Unalloyed heat-treatable steels	≤16 Rc	415	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	16-24 Rc	400	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	24-30 Rc	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	335	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Unalloyed case hardened steels	≤230 Bhn	465	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	270	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Nitriding steels	≥24-30 Rc	340	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>30-38 Rc	325	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Tool steels	≤24 Rc	230	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
	>24-30 Rc	175	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
High speed steels	≥14-30 Rc	195	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Spring steels	≤330 Bhn	195	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
austenitic	≤24 Rc	175	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
martensitic	≤24 Rc	155	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Hardened steels	≤40-48 Rc	175	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
	>48-60 Rc	110	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Special alloys	≤38 Rc	110	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Cast iron	≤240 Bhn	640	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	<300 Bhn	525	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Spheroidal graphite iron and	≤240 Bhn	435	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
malleable cast iron	<300 Bhn	415	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Ti and Ti-alloys	≤24 Rc	140	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
	>24-38 Rc	130	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Aluminium and Al-alloys	≤120 Bhn	1000	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al wrought alloys	≤150 Bhn	1000	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	845	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
> 10 % Si	≤200 Bhn	710	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Magnesium alloys	≤150 Bhn	900	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Copper, low-alloyed	≤120 Bhn	400	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Brass, short-chipping	≤200 Bhn	1050	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
long-chipping	≤200 Bhn	710	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>200-260 Bhn	345	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Bronze, long-chipping	≤24 Rc	285	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	250	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 6068

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	395	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
	<300 Bhn	330	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Spheroidal graphite iron and	≤240 Bhn	295	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
malleable cast iron	<300 Bhn	260	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0016	0.0025	0.0035	0.0040	0.0050	0.0060	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1345	•	0.0050	0.0080	0.0125	0.0125	0.0160	0.0200	•	•	•
Al wrought alloys	≤150 Bhn	1345	•	0.0050	0.0080	0.0125	0.0125	0.0160	0.0200	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	1245	•	0.0050	0.0080	0.0125	0.0125	0.0160	0.0200	•	•	•
> 10 % Si	≤200 Bhn	1080	•	0.0050	0.0080	0.0125	0.0125	0.0160	0.0200	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	920	•	0.0060	0.0125	0.0160	0.0200	0.0250	0.0250	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	360	•	0.0040	0.0060	0.0100	0.0100	0.0120	0.0160	•	•	•
	>200-260 Bhn	260	•	0.0030	0.0050	0.0080	0.0080	0.0100	0.0125	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 6069

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	395	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
	<300 Bhn	330	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Spheroidal graphite iron and	≤240 Bhn	295	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
malleable cast iron	<300 Bhn	260	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0016	0.0025	0.0035	0.0040	0.0050	0.0060	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1345	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Al wrought alloys	≤150 Bhn	1345	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	1245	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
> 10 % Si	≤200 Bhn	1080	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	920	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	360	•	0.0040	0.0060	0.0095	0.0100	0.0125	0.0160	•	•	•
	>200-260 Bhn	260	•	0.0030	0.0050	0.0075	0.0080	0.0100	0.0125	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Series # 6070

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	395	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
	<300 Bhn	330	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
Spheroidal graphite iron and	≤240 Bhn	295	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
malleable cast iron	<300 Bhn	260	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0013	0.0020	0.0025	0.0030	0.0040	0.0050	•	•	•
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1345	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
Al wrought alloys	≤150 Bhn	1345	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	1245	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
> 10 % Si	≤200 Bhn	1080	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	920	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	360	•	0.0040	0.0060	0.0090	0.0100	0.0125	0.0160	•	•	•
	>200-260 Bhn	260	•	0.0030	0.0050	0.0070	0.0080	0.0100	0.0125	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•									•	•
Thermoplastics	–	•									•	•
Reinforced plastics - Kevlar	–	•									•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Note: Pilot holes (depth ≥1xD) are recommended when drilling depths greater than 7xD. The pilot hole can be produced with a short, rigid drill. The diameter should be 0.01 - 0.02 mm larger than the diameter of the finish drill. Ratio drills can produce their own pilot hole by reducing speed and feed rates by 30-40%.

RPM = $\frac{\text{SFM}}{\text{DIAM. in.}}$ x 3.82 IPM = IPR x RPM $\frac{\text{HOLE DEPTH in.}}{\text{IPM}}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 6400

Material group	Hardness	SFM	Feed Rate - IPR									
			0.0315 in. 0.800 mm	0.0394 in. 1.000 mm	0.0591 in. 1.500 mm	0.0787 in. 2.000 mm	0.0984 in. 2.500 mm	0.1181 in. 3.000 mm				
Common structural steels	≤100 Bhn	295 - 395	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
	>100-260 Bhn	295 - 360	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
Free-cutting steels	≤24 Rc	295 - 395	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
	>24-30 Rc	260 - 330	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
Unalloyed heat-treatable steels	≤16 Rc	260 - 360	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
	16-24 Rc	260 - 360	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
	24-30 Rc	260 - 330	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
Alloyed heat-treatable steels	24-30 Rc	260 - 330	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
	>30-38 Rc	197 - 260	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
Unalloyed case hardened steels	≤230 Bhn	295 - 360	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
Alloyed case hardened steels	24-30 Rc	230 - 330	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
	>30-38 Rc	200 - 260	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
Nitriding steels	≥24-30 Rc	200 - 260	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
	>30-38 Rc	165 - 230	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
Tool steels	≤24 Rc	130 - 200	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
	>24-30 Rc	130 - 200	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
High speed steels	≥14-30 Rc	130 - 200	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Spring steels	≤330 Bhn	130 - 200	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Stainless steels, sulphured	≤24 Rc	100	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
austenitic	≤24 Rc	50	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
martensitic	≤24 Rc	100	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Hardened steels	≤40-48 Rc											
	>48-60 Rc											
Special alloys	≤38 Rc	35	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
Cast iron	≤240 Bhn	< 490	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
	<300 Bhn	< 460	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
Spheroidal graphite iron and	≤240 Bhn	< 460	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
malleable cast iron	<300 Bhn	< 425	0.0035	0.0043	0.0067	0.0091	0.0110	0.0134				
Chilled cast iron	≤350 Bhn											
Ti and Ti-alloys	≤24 Rc	50	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
	>24-38 Rc	50	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
Aluminium and Al-alloys	≤120 Bhn	200 - 260	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
Al wrought alloys	≤150 Bhn	200 - 260	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
Al cast alloys ≤ 10 % Si	≤200 Bhn	395 - 490	0.0013	0.0017	0.0026	0.0036	0.0047	0.0059				
> 10 % Si	≤200 Bhn	395 - 490	0.0013	0.0017	0.0026	0.0036	0.0047	0.0059				
Magnesium alloys	≤150 Bhn											
Copper, low-alloyed	≤120 Bhn											
Brass, short-chipping	≤200 Bhn											
long-chipping	≤200 Bhn											
Bronze, short-chipping	≤200 Bhn											
	>200-260 Bhn											
Bronze, long-chipping	≤24 Rc											
	>24-30 Rc											
Duroplastics	–											
Thermoplastics	–											
Reinforced plastics - Kevlar	–											
Reinforced plastics - GFK / CFK	–											

Series # 6401

Material group	Hardness	SFM	Feed Rate - IPR									
			0.0315 in. 0.800 mm	0.0394 in. 1.000 mm	0.0591 in. 1.500 mm	0.0787 in. 2.000 mm	0.0984 in. 2.500 mm	0.1181 in. 3.000 mm				
Common structural steels	≤100 Bhn	295 - 395	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
	>100-260 Bhn	295 - 360	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
Free-cutting steels	≤24 Rc	295 - 395	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
	>24-30 Rc	260 - 330	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
Unalloyed heat-treatable steels	≤16 Rc	260 - 360	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
	16-24 Rc	260 - 360	0.0031	0.0039	0.0059	0.0079	0.0098	0.0118				
	24-30 Rc	260 - 330	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
Alloyed heat-treatable steels	24-30 Rc	260 - 330	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
	>30-38 Rc	197 - 260	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
Unalloyed case hardened steels	≤230 Bhn	295 - 360	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
Alloyed case hardened steels	24-30 Rc	230 - 330	0.0028	0.0035	0.0051	0.0071	0.0087	0.0106				
	>30-38 Rc	200 - 260	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
Nitriding steels	≥24-30 Rc	200 - 260	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
	>30-38 Rc	165 - 230	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
Tool steels	≤24 Rc	130 - 200	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
	>24-30 Rc	130 - 200	0.0024	0.0031	0.0047	0.0063	0.0079	0.0094				
High speed steels	≥14-30 Rc	130 - 200	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Spring steels	≤330 Bhn	130 - 200	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Stainless steels, sulphured	≤24 Rc	100	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
austenitic	≤24 Rc	50	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
martensitic	≤24 Rc	100	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Hardened steels	≤40-48 Rc											
	>48-60 Rc											
Special alloys	≤38 Rc	35	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
Cast iron	≤240 Bhn	< 490	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
	<300 Bhn	< 460	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
Spheroidal graphite iron and	≤240 Bhn	< 460	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
malleable cast iron	<300 Bhn	< 425	0.0035	0.0043	0.0067	0.0091	0.0110	0.0134				
Chilled cast iron	≤350 Bhn											
Ti and Ti-alloys	≤24 Rc	50	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
	>24-38 Rc	50	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
Aluminium and Al-alloys	≤120 Bhn	200 - 260	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
Al wrought alloys	≤150 Bhn	200 - 260	0.0035	0.0047	0.0071	0.0094	0.0134	0.0142				
Al cast alloys ≤ 10 % Si	≤200 Bhn	395 - 490	0.0013	0.0017	0.0026	0.0036	0.0047	0.0059				
> 10 % Si	≤200 Bhn	395 - 490	0.0013	0.0017	0.0026	0.0036	0.0047	0.0059				
Magnesium alloys	≤150 Bhn											
Copper, low-alloyed	≤120 Bhn											
Brass, short-chipping	≤200 Bhn											
long-chipping	≤200 Bhn											
Bronze, short-chipping	≤200 Bhn											
	>200-260 Bhn											
Bronze, long-chipping	≤24 Rc											
	>24-30 Rc											
Duroplastics	–											
Thermoplastics	–											
Reinforced plastics - Kevlar	–											
Reinforced plastics - GFK / CFK	–											

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 6408 and 6412

Material group	Hardness	SFM	Feed Rate - IPR									
			0.0315 in. 0.800 mm	0.0394 in. 1.000 mm	0.0591 in. 1.500 mm	0.0787 in. 2.000 mm	0.0984 in. 2.500 mm	0.1181 in. 3.000 mm				
Common structural steels	≤100 Bhn	295 - 395	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
	>100-260 Bhn	295 - 360	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
Free-cutting steels	≤24 Rc	295 - 395	0.0013	0.0017	0.0026	0.0036	0.0047	0.0059				
	>24-30 Rc	260 - 330	0.0013	0.0017	0.0026	0.0036	0.0047	0.0059				
Unalloyed heat-treatable steels	≤16 Rc	260 - 360	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
	16-24 Rc	260 - 360	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
	24-30 Rc	260 - 330	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
Alloyed heat-treatable steels	24-30 Rc	260 - 328	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
	>30-38 Rc	200 - 260	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
Unalloyed case hardened steels	≤230 Bhn	295 - 360	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Alloyed case hardened steels	24-30 Rc	230 - 330	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
	>30-38 Rc	200 - 260	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
Nitriding steels	≥24-30 Rc	200 - 260	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
	>30-38 Rc	165 - 230	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Tool steels	≤24 Rc	130 - 200	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
	>24-30 Rc	130 - 200	0.0009	0.0013	0.0020	0.0028	0.0037	0.0047				
High speed steels	≥14-30 Rc	130 - 200	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Spring steels	≤330 Bhn	130 - 200	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Stainless steels, sulphured	≤24 Rc	200 - 260	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
austenitic	≤24 Rc	200	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
martensitic	≤24 Rc	200 - 260	0.0006	0.0009	0.0014	0.0020	0.0028	0.0035				
Hardened steels	≤40-48 Rc											
	>48-60 Rc											
Special alloys	≤38 Rc	80	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
Cast iron	≤240 Bhn	< 490	0.0016	0.0024	0.0035	0.0047	0.0059	0.0071				
	<300 Bhn	< 460	0.0016	0.0024	0.0035	0.0047	0.0059	0.0071				
Spheroidal graphite iron and	≤240 Bhn	< 460	0.0016	0.0024	0.0035	0.0047	0.0059	0.0071				
malleable cast iron	<300 Bhn	< 425	0.0016	0.0024	0.0035	0.0047	0.0059	0.0071				
Chilled cast iron	≤350 Bhn											
Ti and Ti-alloys	≤24 Rc	115	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
	>24-38 Rc	115	0.0003	0.0005	0.0008	0.0013	0.0018	0.0024				
Aluminium and Al-alloys	≤120 Bhn	200 - 260	0.0003	0.0005	0.0007	0.00094	0.0013	0.0014				
Al wrought alloys	≤150 Bhn	200 - 260	0.0003	0.0005	0.0007	0.00094	0.0013	0.0014				
Al cast alloys ≤ 10 % Si	≤200 Bhn	395 - 490	0.0001	0.0002	0.00026	0.00036	0.0005	0.0006				
> 10 % Si	≤200 Bhn	395 - 490	0.0001	0.0002	0.00026	0.00036	0.0005	0.0006				
Magnesium alloys	≤150 Bhn											
Copper, low-alloyed	≤120 Bhn											
Brass, short-chipping	≤200 Bhn											
long-chipping	≤200 Bhn											
Bronze, short-chipping	≤200 Bhn											
	>200-260 Bhn											
Bronze, long-chipping	≤24 Rc											
	>24-30 Rc											
Duroplastics	–											
Thermoplastics	–											
Reinforced plastics - Kevlar	–											
Reinforced plastics - GFK / CFK	–											

Note: Pilot holes (depth ≥1xD) are recommended when drilling depths greater than 7xD. The pilot hole can be produced with a short, rigid drill. The diameter should be 0.01 - 0.02 mm larger than the diameter of the finish drill. Ratio drills can produce their own pilot hole by reducing speed and feed rates by 30-40%.

Series # 6501

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	685	•	0.0060	0.0125	0.0160	0.0200	0.0250	0.0250	•	•	•
	<300 Bhn	520	•	0.0060	0.0125	0.0160	0.0200	0.0250	0.0250	•	•	•
Spheroidal graphite iron and	≤240 Bhn	520	•	0.0060	0.0125	0.0160	0.0200	0.0250	0.0250	•	•	•
malleable cast iron	<300 Bhn	425	•	0.0060	0.0100	0.0160	0.0160	0.0200	0.0250	•	•	•
Chilled cast iron	≤350 Bhn		•							•	•	•
CGI	<220 Bhn	425	•	0.0060	0.0100	0.0150	0.0160	0.0200	0.0250	•	•	•
	<300 Bhn	325	•	0.0060	0.0100	0.0150	0.0160	0.0200	0.0250	•	•	•
ADI 800-1000 (N/mm2)		260	•	0.0060	0.0100	0.0150	0.0160	0.0200	0.0250	•	•	•
1200-1400 (N/mm2)		195	•	0.0060	0.0100	0.0150	0.0160	0.0200	0.0250	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 6502

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>100-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Free-cutting steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	•	•	•	•	•	•	•	•	•	•	•
	16-24 Rc	•	•	•	•	•	•	•	•	•	•	•
	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Alloyed heat-treatable steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Unalloyed case hardened steels	≤230 Bhn	•	•	•	•	•	•	•	•	•	•	•
Alloyed case hardened steels	24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Nitriding steels	≥24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
	>30-38 Rc	•	•	•	•	•	•	•	•	•	•	•
Tool steels	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
High speed steels	≥14-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Spring steels	≤330 Bhn	•	•	•	•	•	•	•	•	•	•	•
Stainless steels, sulphured	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
austenitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
martensitic	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
Hardened steels	≤40-48 Rc	•	•	•	•	•	•	•	•	•	•	•
	>48-60 Rc	•	•	•	•	•	•	•	•	•	•	•
Special alloys	≤38 Rc	•	•	•	•	•	•	•	•	•	•	•
Cast iron	≤240 Bhn	685	•	0.0060	0.0100	0.0160	0.0160	0.0200	0.0250	•	•	•
	<300 Bhn	520	•	0.0060	0.0100	0.0160	0.0160	0.0200	0.0250	•	•	•
Spheroidal graphite iron and	≤240 Bhn	520	•	0.0060	0.0100	0.0160	0.0160	0.0200	0.0250	•	•	•
malleable cast iron	<300 Bhn	425	•	0.0050	0.0080	0.0125	0.0125	0.0160	0.0200	•	•	•
Chilled cast iron	≤350 Bhn		•	•	•	•	•	•	•	•	•	•
CGI	<220 Bhn	425	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
	<300 Bhn	325	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
ADI 800-1000 (N/mm²)		260	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
1200-1400 (N/mm²)		195	•	0.0050	0.0080	0.0120	0.0125	0.0160	0.0200	•	•	•
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•	•	•	•	•
Copper, low-alloyed	≤120 Bhn	•	•	•	•	•	•	•	•	•	•	•
Brass, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
long-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, short-chipping	≤200 Bhn	•	•	•	•	•	•	•	•	•	•	•
	>200-260 Bhn	•	•	•	•	•	•	•	•	•	•	•
Bronze, long-chipping	≤24 Rc	•	•	•	•	•	•	•	•	•	•	•
	>24-30 Rc	•	•	•	•	•	•	•	•	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•

Series # 6511

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	360	0.004	0.006	0.010	0.014	0.016	0.020				
	>100-260 Bhn	360	0.004	0.006	0.010	0.014	0.016	0.020				
Free-cutting steels	≤24 Rc	395	0.004	0.006	0.010	0.014	0.016	0.020				
	>24-30 Rc	395	0.004	0.006	0.010	0.014	0.016	0.020				
Unalloyed heat-treatable steels	≤16 Rc	360	0.003	0.004	0.006	0.009	0.010	0.012				
	16-24 Rc	360	0.004	0.006	0.010	0.014	0.016	0.020				
	24-30 Rc	330	0.003	0.005	0.008	0.011	0.012	0.016				
Alloyed heat-treatable steels	24-30 Rc	360	0.003	0.005	0.008	0.011	0.012	0.016				
	>30-38 Rc	360	0.003	0.004	0.006	0.009	0.010	0.012				
Unalloyed case hardened steels	≤230 Bhn	360	0.004	0.006	0.010	0.014	0.016	0.020				
Alloyed case hardened steels	24-30 Rc	360	0.003	0.005	0.008	0.011	0.012	0.016				
	>30-38 Rc	360	0.003	0.004	0.006	0.009	0.010	0.012				
Nitriding steels	≥24-30 Rc	330	0.002	0.003	0.005	0.007	0.008	0.010				
	>30-38 Rc	260	0.002	0.003	0.005	0.007	0.008	0.010				
Tool steels	≤24 Rc	330	0.003	0.004	0.006	0.009	0.010	0.012				
	>24-30 Rc	260	0.002	0.003	0.005	0.007	0.008	0.010				
High speed steels	≥14-30 Rc	165	0.002	0.003	0.005	0.007	0.008	0.010				
Spring steels	≤330 Bhn	165	0.002	0.003	0.005	0.007	0.008	0.010				
Stainless steels, sulphured	≤24 Rc	330	0.002	0.003	0.005	0.007	0.008	0.010				
austenitic	≤24 Rc	230	0.001	0.002	0.002	0.004	0.004	0.005				
martensitic	≤24 Rc	330	0.002	0.003	0.005	0.007	0.008	0.010				
Hardened steels	≤40-48 Rc	165	0.002	0.002	0.004	0.006	0.006	0.008				
	>48-60 Rc	165	0.001	0.002	0.004	0.006	0.006	0.008				
Special alloys	≤38 Rc	100	0.004	0.002	0.002	0.004	0.004	0.005				
Cast iron	≤240 Bhn	460	0.004	0.006	0.010	0.014	0.016	0.020				
	<300 Bhn	330	0.004	0.006	0.010	0.014	0.016	0.020				
Spheroidal graphite iron and	≤240 Bhn	460	0.004	0.006	0.010	0.014	0.016	0.020				
malleable cast iron	<300 Bhn	330	0.004	0.006	0.010	0.014	0.016	0.020				
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•				
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•				
	>24-38 Rc	•	•	•	•	•	•	•				
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•				
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•				
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•				
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•				
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•				
Copper, low-alloyed	≤120 Bhn	395	•	0.001	0.002	0.003	0.003	0.004				
Brass, short-chipping	≤200 Bhn	395	0.004	0.006	0.010	0.014	0.016	0.020				
long-chipping	≤200 Bhn											
Bronze, short-chipping	≤200 Bhn											
	>200-260 Bhn											
Bronze, long-chipping	≤24 Rc											
	>24-30 Rc											
Duroplastics	–											
Thermoplastics	–											
Reinforced plastics - Kevlar	–											
Reinforced plastics - GFK / CFK	–											

Note: Pilot holes (depth >1xD) are recommended when using RT100T drills. Use a series 5514 or similar drill to drill a minimum of 1xD deep. Then enter the pilot hole with the RT100T drill at approx 300 rev/min and 500 mm/min speed, start high coolant pressure and increase RPM. Drill to hole depth without pecking.

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 6512

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	330	0.004	0.006	0.010	0.014	0.016	0.020				
	>100-260 Bhn	330	0.004	0.006	0.010	0.014	0.016	0.020				
Free-cutting steels	≤24 Rc	395	0.004	0.006	0.010	0.014	0.016	0.020				
	>24-30 Rc	330	0.004	0.006	0.010	0.014	0.016	0.020				
Unalloyed heat-treatable steels	≤16 Rc	360	0.003	0.004	0.006	0.009	0.010	0.012				
	16-24 Rc	330	0.004	0.006	0.010	0.014	0.016	0.020				
	24-30 Rc	330	0.003	0.005	0.008	0.011	0.012	0.016				
Alloyed heat-treatable steels	24-30 Rc	330	0.003	0.005	0.008	0.011	0.012	0.016				
	>30-38 Rc	330	0.003	0.004	0.006	0.009	0.010	0.012				
Unalloyed case hardened steels	≤230 Bhn	330	0.004	0.006	0.010	0.014	0.016	0.020				
Alloyed case hardened steels	24-30 Rc	330	0.003	0.005	0.008	0.011	0.012	0.016				
	>30-38 Rc	330	0.003	0.004	0.006	0.009	0.010	0.012				
Nitriding steels	≥24-30 Rc	260	0.002	0.003	0.005	0.007	0.008	0.010				
	>30-38 Rc	195	0.002	0.003	0.005	0.007	0.008	0.010				
Tool steels	≤24 Rc	295	0.003	0.004	0.006	0.009	0.010	0.012				
	>24-30 Rc	230	0.002	0.002	0.004	0.006	0.006	0.008				
High speed steels	≥14-30 Rc	165	0.002	0.002	0.004	0.006	0.006	0.008				
Spring steels	≤330 Bhn	165	0.002	0.002	0.004	0.006	0.006	0.008				
Stainless steels, sulphured	≤24 Rc	330	0.002	0.003	0.005	0.007	0.008	0.010				
austenitic	≤24 Rc	230	0.001	0.002	0.002	0.004	0.004	0.005				
martensitic	≤24 Rc	330	0.002	0.003	0.005	0.007	0.008	0.010				
Hardened steels	≤40-48 Rc	165	0.002	0.002	0.004	0.006	0.006	0.008				
	>48-60 Rc	165	0.001	0.002	0.004	0.006	0.006	0.008				
Special alloys	≤38 Rc	100	0.004	0.002	0.002	0.004	0.004	0.005				
Cast iron	≤240 Bhn	425	0.004	0.006	0.010	0.014	0.016	0.020				
	<300 Bhn	295	0.004	0.006	0.010	0.014	0.016	0.020				
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	425	0.004	0.006	0.010	0.014	0.016	0.020				
	<300 Bhn	295	0.004	0.006	0.010	0.014	0.016	0.020				
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•				
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•				
	>24-38 Rc	•	•	•	•	•	•	•				
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•				
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•				
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•				
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•				
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•				
Copper, low-alloyed	≤120 Bhn	395	•	0.001	0.002	0.003	0.003	0.004				
Brass, short-chipping	≤200 Bhn	360	0.004	0.006	0.010	0.014	0.016	0.020				
long-chipping	≤200 Bhn											
Bronze, short-chipping	≤200 Bhn											
	>200-260 Bhn											
Bronze, long-chipping	≤24 Rc		Note: Pilot holes (depth >1xD) are recommended when using RT100T drills. Use a series 5514 or similar drill to drill a minimum of 1xD deep. Then enter the pilot hole with the RT100T drill at approx 300 rev/min and 500 mm/min speed, start high coolant pressure and increase RPM. Drill to hole depth without pecking.									
	>24-30 Rc											
Duroplastics	–											
Thermoplastics	–											
Reinforced plastics - Kevlar	–											
Reinforced plastics - GFK / CFK	–											

Series # 6513

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	260	0.003	0.005	0.008	0.012	0.012	0.016				
	>100-260 Bhn	260	0.003	0.005	0.008	0.012	0.012	0.016				
Free-cutting steels	≤24 Rc	360	0.004	0.006	0.010	0.015	0.016	0.020				
	>24-30 Rc	330	0.004	0.006	0.010	0.015	0.016	0.020				
Unalloyed heat-treatable steels	≤16 Rc	360	0.003	0.004	0.006	0.009	0.010	0.012				
	16-24 Rc	260	0.003	0.005	0.008	0.012	0.012	0.016				
	24-30 Rc	260	0.003	0.005	0.008	0.012	0.012	0.016				
Alloyed heat-treatable steels	24-30 Rc	260	0.003	0.005	0.008	0.012	0.012	0.016				
	>30-38 Rc	260	0.003	0.004	0.006	0.009	0.010	0.012				
Unalloyed case hardened steels	≤230 Bhn	260	0.003	0.005	0.008	0.012	0.012	0.016				
Alloyed case hardened steels	24-30 Rc	260	0.003	0.004	0.006	0.009	0.010	0.012				
	>30-38 Rc	260	0.003	0.004	0.006	0.009	0.010	0.012				
Nitriding steels	≥24-30 Rc	260	0.002	0.003	0.005	0.007	0.008	0.010				
	>30-38 Rc	195	0.002	0.003	0.005	0.007	0.008	0.010				
Tool steels	≤24 Rc	260	0.003	0.004	0.006	0.009	0.010	0.012				
	>24-30 Rc	230	0.002	0.002	0.004	0.006	0.006	0.008				
High speed steels	≥14-30 Rc	165	0.002	0.002	0.004	0.006	0.006	0.008				
Spring steels	≤330 Bhn	165	0.002	0.002	0.004	0.006	0.006	0.008				
Stainless steels, sulphured	≤24 Rc	260	0.002	0.003	0.005	0.007	0.008	0.010				
austenitic	≤24 Rc	230	0.001	0.002	0.003	0.005	0.005	0.006				
martensitic	≤24 Rc	260	0.002	0.003	0.005	0.007	0.008	0.010				
Hardened steels	≤40-48 Rc	165	0.002	0.002	0.004	0.006	0.006	0.008				
	>48-60 Rc	165	0.002	0.002	0.004	0.006	0.006	0.008				
Special alloys	≤38 Rc	100	0.001	0.002	0.002	0.004	0.004	0.005				
Cast iron	≤240 Bhn	395	0.004	0.006	0.010	0.015	0.016	0.020				
	<300 Bhn	260	0.004	0.006	0.010	0.015	0.016	0.020				
Spheroidal graphite iron and malleable cast iron	≤240 Bhn	395	0.004	0.006	0.010	0.015	0.016	0.020				
	<300 Bhn	260	0.004	0.006	0.010	0.015	0.016	0.020				
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•				
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•				
	>24-38 Rc	•	•	•	•	•	•	•				
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•				
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•				
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•				
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•				
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•				
Copper, low-alloyed	≤120 Bhn	395	0.001	0.001	0.002	0.004	0.003	0.004				
Brass, short-chipping	≤200 Bhn	330	0.004	0.006	0.010	0.015	0.016	0.020				
long-chipping	≤200 Bhn											
Bronze, short-chipping	≤200 Bhn											
	>200-260 Bhn											
Bronze, long-chipping	≤24 Rc		Note: Pilot holes (depth >1xD) are recommended when using RT100T drills. Use a series 5514 or similar drill to drill a minimum of 1xD deep. Then enter the pilot hole with the RT100T drill at approx 300 rev/min and 500 mm/min speed, start high coolant pressure and increase RPM. Drill to hole depth without pecking.									
	>24-30 Rc											
Duroplastics	–											
Thermoplastics	–											
Reinforced plastics - Kevlar	–											
Reinforced plastics - GFK / CFK	–											

RPM = $\frac{SFM}{DIAM.\ in.}$ x 3.82 IPM = IPR x RPM $\frac{HOLE\ DEPTH\ in.}{IPM}$ x 60 = Cut Time mm = in. x 25.40 m/min. = SFM ÷ 3.28 mm/rev. = IPR x 25.40 Bar = PSI ÷ 14.50 Liter = Gal. ÷ 3.79

Series # 6514

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	260	0.003	0.005	0.008	0.012	0.012	0.016				
	>100-260 Bhn	260	0.003	0.005	0.008	0.012	0.012	0.016				
Free-cutting steels	≤24 Rc	330	0.004	0.006	0.010	0.015	0.016	0.020				
	>24-30 Rc	330	0.004	0.006	0.010	0.015	0.016	0.020				
Unalloyed heat-treatable steels	≤16 Rc	360	0.003	0.004	0.006	0.009	0.010	0.012				
	16-24 Rc	260	0.003	0.005	0.008	0.012	0.012	0.016				
	24-30 Rc	260	0.003	0.005	0.008	0.012	0.012	0.016				
Alloyed heat-treatable steels	24-30 Rc	260	0.003	0.005	0.008	0.012	0.012	0.016				
	>30-38 Rc	260	0.003	0.004	0.006	0.009	0.010	0.012				
Unalloyed case hardened steels	≤230 Bhn	260	0.003	0.005	0.008	0.012	0.012	0.016				
Alloyed case hardened steels	24-30 Rc	260	0.003	0.004	0.006	0.009	0.010	0.012				
	>30-38 Rc	260	0.003	0.004	0.006	0.009	0.010	0.012				
Nitriding steels	≥24-30 Rc	260	0.002	0.003	0.005	0.007	0.008	0.010				
	>30-38 Rc	195	0.002	0.003	0.005	0.007	0.008	0.010				
Tool steels	≤24 Rc	260	0.003	0.004	0.006	0.009	0.010	0.012				
	>24-30 Rc	230	0.002	0.002	0.004	0.006	0.006	0.008				
High speed steels	≥14-30 Rc	165	0.002	0.002	0.004	0.006	0.006	0.008				
Spring steels	≤330 Bhn	165	0.002	0.002	0.004	0.006	0.006	0.008				
Stainless steels, sulphured	≤24 Rc	260	0.002	0.003	0.005	0.007	0.008	0.010				
austenitic	≤24 Rc	230	0.001	0.002	0.003	0.005	0.005	0.006				
martensitic	≤24 Rc	260	0.002	0.003	0.005	0.007	0.008	0.010				
Hardened steels	≤40-48 Rc	165	0.002	0.002	0.004	0.006	0.006	0.008				
	>48-60 Rc	165	0.002	0.002	0.004	0.006	0.006	0.008				
Special alloys	≤38 Rc	100	0.001	0.002	0.002	0.004	0.004	0.005				
Cast iron	≤240 Bhn	395	0.004	0.006	0.010	0.015	0.016	0.020				
	<300 Bhn	260	0.004	0.006	0.010	0.015	0.016	0.020				
Spheroidal graphite iron and	≤240 Bhn	395	0.004	0.006	0.010	0.015	0.016	0.020				
malleable cast iron	<300 Bhn	260	0.004	0.006	0.010	0.015	0.016	0.020				
Chilled cast iron	≤350 Bhn	•	•	•	•	•	•	•				
Ti and Ti-alloys	≤24 Rc	•	•	•	•	•	•	•				
	>24-38 Rc	•	•	•	•	•	•	•				
Aluminium and Al-alloys	≤120 Bhn	•	•	•	•	•	•	•				
Al wrought alloys	≤150 Bhn	•	•	•	•	•	•	•				
Al cast alloys ≤ 10 % Si	≤200 Bhn	•	•	•	•	•	•	•				
> 10 % Si	≤200 Bhn	•	•	•	•	•	•	•				
Magnesium alloys	≤150 Bhn	•	•	•	•	•	•	•				
Copper, low-alloyed	≤120 Bhn	395	0.001	0.001	0.002	0.004	0.003	0.004				
Brass, short-chipping	≤200 Bhn	330	0.004	0.006	0.010	0.015	0.016	0.020				
long-chipping	≤200 Bhn											
Bronze, short-chipping	≤200 Bhn											
	>200-260 Bhn											
Bronze, long-chipping	≤24 Rc											
	>24-30 Rc											
Duroplastics	–											
Thermoplastics	–											
Reinforced plastics - Kevlar	–											
Reinforced plastics - GFK / CFK	–											

Note: Pilot holes (depth >1xD) are recommended when using RT100T drills. Use a series 5514 or similar drill to drill a minimum of 1xD deep. Then enter the pilot hole with the RT100T drill at approx 300 rev/min and 500 mm/min speed, start high coolant pressure and increase RPM. Drill to hole depth without pecking.

Series # 8510

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	475	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>100-260 Bhn	395	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Free-cutting steels	≤24 Rc	560	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
	>24-30 Rc	475	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
	16-24 Rc	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	345	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Unalloyed case hardened steels	≤230 Bhn	475	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	280	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Nitriding steels	≥24-30 Rc	360	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>30-38 Rc	345	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Tool steels	≤24 Rc	260	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
	>24-30 Rc	215	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
High speed steels	≥14-30 Rc	195	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Spring steels	≤330 Bhn	195	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
austenitic	≤24 Rc	180	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
martensitic	≤24 Rc	165	•	0.00400	0.00650	0.00800	0.01000	0.01000	0.01100	•	•	•
Hardened steels	≤40-48 Rc	180	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
	>48-60 Rc	115	•	0.00200	0.00300	0.00400	0.00500	0.00500	0.00550	•	•	•
Special alloys	≤38 Rc	115	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Cast iron	≤240 Bhn	690	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
	<300 Bhn	525	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Spheroidal graphite iron and	≤240 Bhn	460	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
malleable cast iron	<300 Bhn	425	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Chilled cast iron	≤350 Bhn	130	•	0.00250	0.00400	0.00500	0.00650	0.00650	0.00700	•	•	•
Ti and Ti-alloys	≤24 Rc	150	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
	>24-38 Rc	130	•	0.00300	0.00500	0.00650	0.00800	0.00800	0.00900	•	•	•
Aluminium and Al-alloys	≤120 Bhn	1015	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Al wrought alloys	≤150 Bhn	1015	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	855	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
> 10 % Si	≤200 Bhn	720	•	0.01000	0.01600	0.02000	0.02450	0.02450	0.02650	•	•	•
Magnesium alloys	≤150 Bhn	920	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
Copper, low-alloyed	≤120 Bhn	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Brass, short-chipping	≤200 Bhn	1065	•	0.00800	0.01250	0.01600	0.02000	0.02000	0.02200	•	•	•
long-chipping	≤200 Bhn	720	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.00650	0.01000	0.01250	0.01600	0.01600	0.01800	•	•	•
	>200-260 Bhn	345	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Bronze, long-chipping	≤24 Rc	295	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
	>24-30 Rc	260	•	0.00500	0.00800	0.01000	0.01250	0.01250	0.01400	•	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

Using These Tables. The Speeds & Feeds listed below are conservative recommendations for initial setup. In actual use, depending on the machining environment and workpiece material, significantly higher speeds and feeds may be achievable. Using the below as a starting point, cutting speed/feed can be gradually adjusted upwords until the optimum settings per application are found. Questions? Contact us by telephone at (800) 776-6170.

Series # 8511

Material group	Hardness	SFM	Feed Rate - IPR									
			1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	≤100 Bhn	475	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>100-260 Bhn	395	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Free-cutting steels	≤24 Rc	560	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	>24-30 Rc	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Unalloyed heat-treatable steels	≤16 Rc	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
	16-24 Rc	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Alloyed heat-treatable steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	345	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Unalloyed case hardened steels	≤230 Bhn	475	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Alloyed case hardened steels	24-30 Rc	395	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	280	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Nitriding steels	≥24-30 Rc	350	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>30-38 Rc	330	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Tool steels	≤24 Rc	240	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
High speed steels	≥14-30 Rc	195	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Spring steels	≤330 Bhn	195	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Stainless steels, sulphured	≤24 Rc	195	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
austenitic	≤24 Rc	180	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
martensitic	≤24 Rc	165	•	0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125	•	•
Hardened steels	≤40-48 Rc	180	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
	>48-60 Rc	115	•	0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065	•	•
Special alloys	≤38 Rc	115	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
Cast iron	≤240 Bhn	690	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
	<300 Bhn	525	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
Spheroidal graphite iron and	≤240 Bhn	450	•	0.0100	0.0160	0.0200	0.0245	0.0245	0.0265	0.0290	•	•
malleable cast iron	<300 Bhn	425	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Chilled cast iron	≤350 Bhn	130	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Ti and Ti-alloys	≤24 Rc	150	•	0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100	•	•
	>24-38 Rc	130	•	0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080	•	•
Aluminium and Al-alloys	≤120 Bhn	1015	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al wrought alloys	≤150 Bhn	1015	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Al cast alloys ≤ 10 % Si	≤200 Bhn	855	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
> 10 % Si	≤200 Bhn	720	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Magnesium alloys	≤150 Bhn	920	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
Copper, low-alloyed	≤120 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Brass, short-chipping	≤200 Bhn	1065	•	0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245	•	•
long-chipping	≤200 Bhn	720	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
Bronze, short-chipping	≤200 Bhn	410	•	0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200	•	•
	>200-260 Bhn	345	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Bronze, long-chipping	≤24 Rc	295	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
	>24-30 Rc	260	•	0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160	•	•
Duroplastics	–	•	•	•	•	•	•	•	•	•	•	•
Thermoplastics	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - Kevlar	–	•	•	•	•	•	•	•	•	•	•	•
Reinforced plastics - GFK / CFK	–	•	•	•	•	•	•	•	•	•	•	•

GUHRING

STANDARD & SPECIAL PRODUCT RANGE

• HSS, HSCO & PM Standards •

GU 500 DZ Universal Drills
GT 500 DZ High Performance Drills
GT 100 Parabolic Flute Deep Hole Drills
Coolant-Through GT 100 IC Parabolic Flute Deep Hole Drills
GT 80 Parabolic Flute Deep Hole Drills
Coolant-Through GT 80 IC Parabolic Flute Deep Hole Drills
GT 50 Parabolic Flute Deep Hole Drills
General Purpose Drills
Heavy Duty Drills
Heavy Duty Split Point Drills
Low Helix Drills
High Helix Drills
Micro-Precision Drills
NC Spot Drills
Drill-Countersinks
High Performance HSS-E Taps
High Performance PM HSS-E Taps

• HSS & HSCO Specials •

Drills
Step Drills
Step Drill Reamers
Step Core Drills
Step Core Drill Reamers
Reamers
Step Reamers
Subland Drills
Subland Drill Reamers
Subland Core Drills
Taps

• Carbide Standards •

RT 100 U/F High Penetration Drills
RT 100 X High Penetration Drills
RT 100 R High Penetration Drills
RT 100 T Deep Hole Drills
Coolant-Through RT 100 U/F/C High Penetration Drills
Coolant-Through RT 150 GG Straight-Flute High Penetration Drills
Coolant-Through HT/RT 800 WP Interchangeable Insert Drills
GS 200 U/G Three-Flute High Precision Drills
GT 100 Parabolic Flute Deep Hole Drills
Exclusive Line® Small-Diameter Drills
EB 100 Small-Diameter Single-Flute Gun Drills
General Purpose Drills
NC Spot Drills
RF 100 Variable Helix End Mills
PRO-Line Universal End Mills
TECH-Line High Performance End Mills

• Carbide Specials •

Drills
RT High Performance Drills
G Drills
Gun Drills
Three- & Four-Flute Drills
Step Drills
Step Drill Reamers
Step Core Drills
Step Core Drill Reamers
Reamers
Step Reamers
Subland Drills
Subland Drill Reamers
Subland Core Drills
Taps
End Mills

• PCD Specials •

• Coating Services •

Titanium Nitride (TiN)
Titanium Carbonitride (TiCN)
Titanium Aluminum Nitride (TiAlN)
FIREX® Special Multilayer Hard Coating
Super A (AlTiN)
MolyGlide® Lubricating Soft Coating
Nitride / Steam Oxide
nano-FIREX® micro thin film gradient structure

• Reconditioning Service •

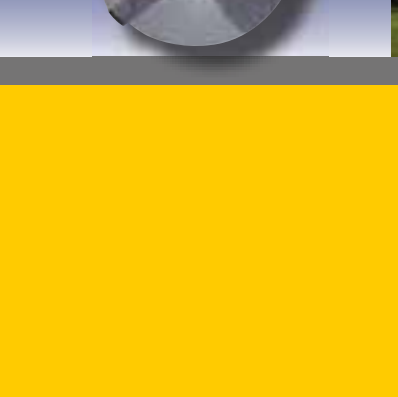
• GM 300 Modular HSK • Toolholding System

Hydraulic / Shrink / Collet Chucks
Adapters
Collets

• GE 100 Modular • Tooling System





2010 Full Line Drill Catalog

GUHRING

GUHRING
The Tool Company

Guhring, Inc.
P.O. Box 643, Brookfield, WI 53008-0643

Shipping Address
1445 Commerce Avenue
Brookfield, WI 53045
Tel (262) 784-6730 (800) 776-6170
Fax (262) 784-9096

www.guhring.com

West Coast Distribution Center
17902 Georgetown Lane
Huntington Beach, CA 92647

Guhring Corporation
20 Steckle Place, Unit #14
Kitchener, ON N2E 2C3
Tel (519) 748-9664 (800) 463-5555
Fax (519) 748-2954

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