



Where **high performance**
is the **standard**[®]



Including

 **M.A. FORD**[®]
High Performance Cutting Tools
ADVANCED PRODUCT GROUP

GP Drill Section
Product Catalog
2020

www.maford.com



Where **high performance** is the **standard**®



For 100 years, M.A. FORD® has been at the cutting edge of tooling design and manufacturing and has developed an enviable global reputation for performance and precision in advanced solid carbide tooling, serving over 60 countries worldwide.

Our innovative cutting geometries, materials and coating technologies are providing effective manufacturing solutions to an expanding and increasingly diverse range of industries from agriculture and construction to aerospace, power generation and automotive, to name but a few.

M.A. FORD® – Where *high performance* is the *standard*.®
























































⚠ WARNING: This product can expose you to chemicals including nickel, cobalt, and lead, which are known to the State of California to cause cancer, and chemicals including lead which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Series Number by Page

GP Drills		
Series No.	Cat. Pg.	Tech Pg.
200	94	164
200 Sets	101	164
200S	73,134	157,164
204	102	166
205	104	168
206	111	166
207	113	168
224	117	167
226	119	167
300	121	170
302	125	172
306	130	172
402	133	174
403	74,135	174
404	74,135	174
405	136	174

For product information, call your local distributor.

Twister® GP Drills Page 93-136

Series	Tool Illustration	Coolant	Size Range	Length	Drill Point Angle	Helix Angle	Material Group	Page
200	 Hi-Roc®		#68 - 25/32" 0.8mm - 20.0mm		135°	Straight Flute		94-100
200 Sets	 Hi-Roc®		3/64" - 1/4" 2.0mm - 8.0mm		135°	Straight Flute		101
204	 Inch Jobbers		#80 - 25/32"		118°	21°		102-103
205	 Hi-Tuff®		#80 - 25/32" 0.3mm - 20.0mm		135°	12°		104-110
206	 Inch Stub		#60 - 25/32"		118°	21°		111-112
207			#42 - 1/2" 2.4mm - 12.0mm		Brad & Spur	35°		113-116
224	 Metric Jobbers		0.3mm - 14.0mm		118°	21°		117-118
226	 Metric Stub		1.0mm - 14.0mm		118°	21°		119-120
300			#80 - 1/4" 0.5mm - 3.15mm		118°	35°		121-124
302	 Micro Drill		#102 - 1/8" 0.1mm - 3.15mm		130°	35°		125-129
306			#30 - 1/4" 3.2mm - 3.95mm		165°	35°		130-132
402	 Center Drill		#00 - #6 0.5mm - 5.0mm	—	—	—		133
200S	 Spot Drill		1/8" - 5/8" 3.0mm - 16.0mm		145°	Straight Flute		134
403	 Spot Drill		3/16" - 1/2" 5.0mm - 12.0mm		120°	21°		135
404	 Spot Drill		3/16" - 1/2" 5.0mm - 12.0mm		90°	21°		135
405	 Center Drill		#00 - #6	—	—	—		136
Technical Information								138-176

Twister® GP

General Purpose Drills

M.A. Ford® drills are designed for maximum flexibility and performance when drilling a wide variety of materials, ranging from soft, non-ferrous materials to hardened steels. Twister® GP drills are an excellent choice for all general purpose hole-making and provide these high performance benefits:

- High feed rates with excellent chip evacuation.
- Accurate hole size in a wide range of materials.
- Pre-drilling and follow-up operations can often be eliminated because of the quality and performance of M.A. Ford® drills.
- Minimal wander produces maximum precision, productivity and drill life.
- Web-thinned drill designs are available for reduced power requirements, lower temperatures and extended drill life.
- Three-flute geometries are available to reduce chip load/tooth and increase tool life in highly alloyed steels.
- Available in a wide range of styles, sizes, lengths and coatings.
- **Uncoated standard catalog tools can be coated upon request. Contact customer service for details.**

ISO 9001:2015 Certified



Twister® GP Series 200 / 200 Sets

Twister® GP Series 204

Twister® GP Series 205

Twister® GP Series 206

Twister® GP Series 207

Twister® GP Series 224

Twister® GP Series 226

Twister® GP Series 300

Twister® GP Series 302

Twister® GP Series 306

Twister® GP Series 402

Twister® GP Series 200S

Twister® GP Series 403

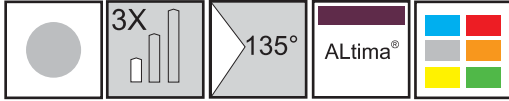
Twister® GP Series 404

Twister® GP Series 405



Where **high performance** is the **standard**®

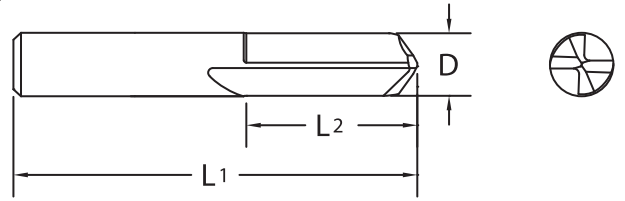
Hi-Roc® Series 200



Designed to drill hardened steel in the 42-65 Rockwell "C" range.



- Produces chips without generating excessive heat.
- Accurately sized holes are produced without annealing or softening the workpiece.
- Reamer type finishes are easily produced.
- Both a production drill and salvage or reclaim tool.
- Straight flute.



Uncoated		ALtima®		Diameter			OAL		Flute Length		
Tool No.	EDP	Tool No.	EDP	D			L1		L2		
				Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm
20003100	20001				68		.0310	1-1/2		3/16	
20003120	20004			1/32			.0312	1-1/2		3/16	
20003150	20007					0.80	.0315		38		5.0
20003200	20010				67		.0320	1-1/2		7/32	
20003300	20013				66		.0330	1-1/2		7/32	
20003350	20016					0.85	.0335		38		5.5
20003500	20019				65		.0350	1-1/2		7/32	
20003540	20022					0.90	.0354		38		5.5
20003600	20025				64		.0360	1-1/2		7/32	
20003700	20028				63		.0370	1-1/2		1/4	
20003740	20031					0.95	.0374		38		6.0
20003800	20034				62		.0380	1-1/2		1/4	
20003900	20037				61		.0390	1-1/2		1/4	
20003940	20040					1.00	.0394		38		6.5
20004000	20043				60		.0400	1-1/2		1/4	
20004100	20046				59		.0410	1-1/2		1/4	
20004130	20049					1.05	.0413		38		6.5
20004200	20052				58		.0420	1-1/2		1/4	
20004300	20055				57		.0430	1-1/2		1/4	
20004330	20058					1.10	.0433		38		6.5
20004520	20061					1.15	.0452		38		6.5
20004650	20064				56		.0465	1-1/2		1/4	
20004680	20067			3/64			.0468	1-1/2		1/4	
20004720	20070					1.20	.0472		38		8.0
20004920	20073					1.25	.0492		38		8.0
20005110	20076					1.30	.0511		38		8.0
20005200	20079				55		.0520	1-1/2		5/16	
20005310	20082					1.35	.0531		38		8.0
20005500	20085				54		.0550	1-1/2		5/16	
20005510	20088					1.40	.0551		38		8.0
20005710	20091					1.45	.0571		38		8.0
20005900	20094					1.50	.0590		38		8.0

Inch	
D	Tolerance
.0310 - .7812	+.0000/-0.0005

Metric (mm)	
D	Tolerance
0.80 - 20.00	+.000/-0.013



Series 200 Continued

Uncoated		ALtima®		Diameter				OAL		Flute Length	
Tool No.	EDP	Tool No.	EDP	D				L1		L2	
				Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm
20005950	20097				53		.0595	1-1/2		5/16	
20006250	20100			1/16			.0625	1-1/2		5/16	
20006300	20103					1.60	.0630		38		8.0
20006350	20106				52		.0635	1-1/2		5/16	
20006690	20109					1.70	.0669		38		9.5
20006700	20112				51		.0670	1-1/2		3/8	
20007000	20115				50		.0700	1-1/2		3/8	
20007080	20118					1.80	.0708		38		9.5
20007300	20121				49		.0730	1-1/2		3/8	
20007480	20124					1.90	.0748		38		9.5
20007600	20127				48		.0760	1-1/2		3/8	
20007810	20130			5/64			.0781	1-1/2		3/8	
20007850	20133				47		.0785	1-1/2		3/8	
20007870	20136					2.00	.0787		38		9.5
20008100	20139				46		.0810	1-1/2		1/2	
20008200	20142				45		.0820	1-1/2		1/2	
20008270	20145					2.10	.0827		38		12.5
20008600	20148				44		.0860	1-1/2		1/2	
20008660	20151					2.20	.0866		38		12.5
20008900	20154				43		.0890	1-1/2		1/2	
20009060	20157					2.30	.0906		38		12.5
20009350	20160				42		.0935	1-1/2		1/2	
20009370	20163			3/32			.0937	1-1/2		1/2	
20009450	20166					2.40	.0945		38		12.5
20009600	20169				41		.0960	1-1/2		1/2	
20009800	20172				40		.0980	1-1/2		1/2	
20009840	20175					2.50	.0984		38		12.5
20009950	20178				39		.0995	1-1/2		1/2	
20010150	20184				38		.1015	1-1/2		1/2	
20010240	20187					2.60	.1024		38		16.0
20010400	20190				37		.1040	1-1/2		5/8	
20010630	20193					2.70	.1063		38		16.0
20010650	20196				36		.1065	1-1/2		5/8	
20010930	20199			7/64			.1093	1-1/2		5/8	
20011000	20202				35		.1100	1-1/2		5/8	
20011020	20205					2.80	.1102		38		16.0
20011100	20208				34		.1110	1-1/2		5/8	
20011300	20211				33		.1130	1-1/2		5/8	
20011420	20214					2.90	.1142		38		16.0
20011600	20217				32		.1160	1-1/2		5/8	
20011810	20220	20011810A	96400			3.00	.1181		38		16.0
20012000	20223				31		.1200	1-1/2		5/8	

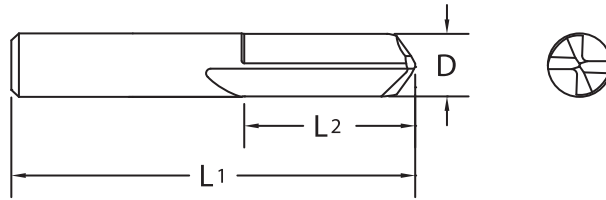
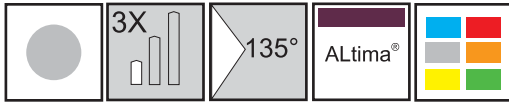


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Twister® Hi-Roc®

Series 200 Continued



Uncoated		ALtima®		Diameter				OAL		Flute Length	
				D				L1		L2	
Tool No.	EDP	Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm
20012200	20226	20012200A	96401			3.10	.1220		38		16.0
20012500	20229			1/8			.1250	1-1/2		5/8	
20012600	20232	20012600A	96402			3.20	.1260		38		16.0
20012850	20235				30		.1285	2		5/8	
20012990	20238	20012990A	96403			3.30	.1299		38		16.0
20013390	20241	20013390A	96404			3.40	.1339		51		16.0
20013600	20244				29		.1360	2		5/8	
20013780	20247	20013780A	96405			3.50	.1378		51		16.0
20014050	20250				28		.1405	2		5/8	
20014060	20253			9/64			.1406	2		5/8	
20014170	20256	20014170A	96406			3.60	.1417		51		16.0
20014400	20259				27		.1440	2		5/8	
20014570	20262	20014570A	96407			3.70	.1457		51		16.0
20014700	20265				26		.1470	2		5/8	
20014950	20268				25		.1495	2		5/8	
20014960	20271	20014960A	96408			3.80	.1496		51		16.0
20015200	20274				24		.1520	2		5/8	
20015350	20277	20015350A	96409			3.90	.1535		51		16.0
20015400	20280				23		.1540	2		5/8	
20015620	20283			5/32			.1562	2		5/8	
20015700	20286				22		.1570	2		5/8	
20015750	20289	20015750A	96410			4.00	.1575		51		16.0
20015900	20292				21		.1590	2		5/8	
20016100	20295				20		.1610	2		5/8	
20016140	20298	20016140A	96411			4.10	.1614		51		16.0
20016540	20301	20016540A	96412			4.20	.1654		51		16.0
20016600	20304				19		.1660	2		5/8	
20016930	20307	20016930A	96413			4.30	.1693		51		16.0
20016950	20310				18		.1695	2		5/8	
20017180	20313			11/64			.1718	2		5/8	
20017300	20316				17		.1730	2		5/8	
20017320	20319	20017320A	96414			4.40	.1732		51		16.0
20017700	20322				16		.1770	2		5/8	
20017720	20325	20017720A	96415			4.50	.1772		51		16.0
20018000	20328				15		.1800	2		5/8	
20018110	20331	20018110A	96416			4.60	.1811		51		16.0
20018200	20334				14		.1820	2		5/8	
20018500	20337	20018500A	96417			4.70	.1850	2	51	5/8	16.0

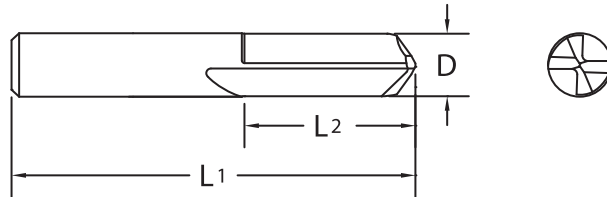
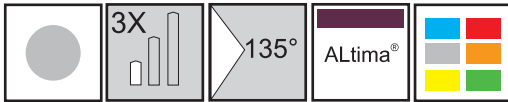


Series 200 Continued

Uncoated		ALtima®		Diameter				OAL		Flute Length	
Tool No.	EDP	Tool No.	EDP	D				L1		L2	
				Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm
20018750	20340			3/16			.1875	2		5/8	
20018890	20343	20018890A	96418			4.80	.1889		51		16.0
20018900	20346				12		.1890	2		5/8	
20019100	20349				11		.1910	2		5/8	
20019290	20352	20019290A	96419			4.90	.1929		51		16.0
20019350	20355				10		.1935	2		5/8	
20019600	20358				9		.1960	2		3/4	
20019680	20361	20019680A	96420			5.00	.1968		51		19.0
20019900	20364				8		.1990	2		3/4	
20020080	20370	20020080A	96421			5.10	.2008		51		19.0
20020100	20373				7		.2010	2		3/4	
20020310	20376			13/64			.2031	2		3/4	
20020400	20379				6		.2040	2		3/4	
20020470	20382	20020470A	96422			5.20	.2047		51		19.0
20020550	20385				5		.2055	2		3/4	
20020860	20388	20020860A	96423			5.30	.2086		51		19.0
20020900	20391				4		.2090	2		3/4	
20021260	20394	20021260A	96424			5.40	.2126		51		19.0
20021300	20397				3		.2130	2		3/4	
20021650	20400	20021650A	96425			5.50	.2165		51		19.0
20021870	20403			7/32			.2187	2		3/4	
20022050	20406	20022050A	96426			5.60	.2205		51		19.0
20022100	20409				2		.2210	2		3/4	
20022440	20412	20022440A	96427			5.70	.2244		51		19.0
20022800	20415				1		.2280	2		3/4	
20022830	20418	20022830A	96428			5.80	.2283		51		19.0
20023230	20421	20023230A	96429			5.90	.2323		51		19.0
20023400	20424				A		.2340	2		3/4	
20023430	20427			15/64			.2343	2		3/4	
20023620	20430	20023620A	96430			6.00	.2362		51		19.0
20023800	20433				B		.2380	2		3/4	
20024020	20436	20024020A	96431			6.10	.2402		51		19.0
20024200	20439				C		.2420	2		3/4	
20024410	20442	20024410A	96432			6.20	.2441		51		19.0
20024600	20445				D		.2460	2		3/4	
20024800	20448	20024800A	96433			6.30	.2480		51		19.0
20025000	20451			1/4	E		.2500	2		3/4	
20025190	20454	20025190A	96434			6.40	.2519		51		19.0
20025590	20457	20025590A	96435			6.50	.2559		51		19.0
20025700	20460				F		.2570	2		3/4	
20025980	20463	20025980A	96436			6.60	.2598		64		19.0
20026100	20466				G		.2610	2-1/2		3/4	



Series 200 Continued



Uncoated		ALtima®		Diameter				OAL		Flute Length	
Tool No.	EDP	Tool No.	EDP	D				L1		L2	
				Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm
20026370	20469	20026370A	96437			6.70	.2637		64		19.0
20026560	20472			17/64			.2656	2-1/2		3/4	
20026600	20475				H		.2660	2-1/2		3/4	
20026770	20478	20026770A	96438			6.80	.2677		64		19.0
20027160	20481	20027160A	96439			6.90	.2716		64		19.0
20027200	20484				I		.2720	2-1/2		3/4	
20027560	20487	20027560A	96440			7.00	.2756		64		19.0
20027700	20490				J		.2770	2-1/2		3/4	
20027950	20493	20027950A	96441			7.10	.2795		64		19.0
20028100	20496				K		.2810	2-1/2		3/4	
20028120	20499			9/32			.2812	2-1/2		3/4	
20028340	20502	20028340A	96442			7.20	.2834		64		19.0
20028740	20505	20028740A	96443			7.30	.2874		64		19.0
20029000	20508				L		.2900	2-1/2		3/4	
20029130	20511	20029130A	96444			7.40	.2913		64		19.0
20029500	20514				M		.2950	2-1/2		3/4	
20029530	20517	20029530A	96445			7.50	.2953		64		19.0
20029680	20520			19/64			.2968	2-1/2		3/4	
20029920	20523	20029920A	96446			7.60	.2992		64		19.0
20030200	20529				N		.3020	2-1/2		3/4	
20030310	20532	20030310A	96447			7.70	.3031		64		19.0
20030710	20535	20030710A	96448			7.80	.3071		64		19.0
20031100	20538	20031100A	96449			7.90	.3110		64		19.0
20031250	20541			5/16			.3125	2-1/2		3/4	
20031500	20544	20031500A	96450			8.00	.3150		64		19.0
20031600	20547				O		.3160	2-1/2		3/4	
20031890	20550	20031890A	96451			8.10	.3189		64		19.0
20032280	20553	20032280A	96452			8.20	.3228		64		25.5
20032300	20556				P		.3230	2-1/2		1	
20032670	20559	20032670A	96453			8.30	.3267		64		25.5
20032810	20562			21/64			.3281	2-1/2		1	
20033070	20565	20033070A	96454			8.40	.3307		64		25.5
20033200	20568				Q		.3320	2-1/2		1	
20033460	20571	20033460A	96455			8.50	.3346		64		25.5
20033850	20574	20033850A	96456			8.60	.3385		64		25.5
20033900	20577				R		.3390	2-1/2		1	
20034250	20580	20034250A	96457			8.70	.3425		64		25.5
20034370	20583			11/32			.3437	2-1/2		1	
20034640	20586	20034640A	96458			8.80	.3464		64		25.5
20034800	20589				S		.3480	2-1/2		1	

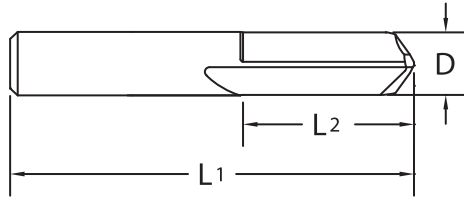
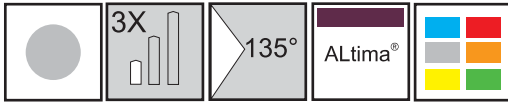


Series 200 Continued

Uncoated		ALtima®		Diameter				OAL		Flute Length	
Tool No.	EDP	Tool No.	EDP	D				L1		L2	
				Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm
20035040	20592	20035040A	96459			8.90	.3504		64		25.5
20035430	20595	20035430A	96460			9.00	.3543		64		25.5
20035800	20598				T		.3580	2-1/2		1	
20035820	20601	20035820A	96461			9.10	.3582		64		25.5
20035930	20604			23/64			.3593	2-1/2		1	
20036220	20607	20036220A	96462			9.20	.3622		64		25.5
20036610	20610	20036610A	96463			9.30	.3661		64		25.5
20036800	20613				U		.3680	2-1/2		1	
20037000	20616	20037000A	96464			9.40	.3700		64		25.5
20037400	20619	20037400A	96465			9.50	.3740		64		25.5
20037500	20622			3/8			.3750	2-1/2		1	
20037700	20625				V		.3770	2-1/2		1	
20037790	20628	20037790A	96466			9.60	.3779		64		25.5
20038190	20631	20038190A	96467			9.70	.3819		70		25.5
20038580	20634	20038580A	96468			9.80	.3858		70		25.5
20038600	20637				W		.3860	2-3/4		1	
20038970	20640	20038970A	96469			9.90	.3897		70		25.5
20039060	20643			25/64			.3906	2-3/4		1	
20039370	20646	20039370A	96470			10.00	.3937		70		25.5
20039700	20649				X		.3970	2-3/4		1	
20039760	20652	20039760A	96471			10.10	.3976		70		25.5
20040150	20655	20040150A	96472			10.20	.4015		70		25.5
20040400	20658				Y		.4040	2-3/4		1	
20040550	20661	20040550A	96473			10.30	.4055		70		25.5
20040620	20664			13/32			.4062	2-3/4		1	
20040940	20667	20040940A	96474			10.40	.4094		70		25.5
20041300	20670				Z		.4130	2-3/4		1	
20041340	20673	20041340A	96475			10.50	.4134		70		25.5
20041730	20676	20041730A	96476			10.60	.4173		70		25.5
20042120	20679	20042120A	96477			10.70	.4212		70		25.5
20042180	20682			27/64			.4218	2-3/4		1	
20042520	20685	20042520A	96478			10.80	.4252		70		25.5
20042910	20688	20042910A	96479			10.90	.4291		70		25.5
20043310	20691	20043310A	96480			11.00	.4331		70		25.5
20043700	20694	20043700A	96481			11.10	.4370		70		25.5
20043750	20697			7/16			.4375	2-3/4		1	
20044090	20700	20044090A	96482			11.20	.4409		70		25.5
20044490	20703	20044490A	96483			11.30	.4449		76		25.5
20044880	20706	20044880A	96484			11.40	.4488		76		25.5
20045270	20709	20045270A	96485			11.50	.4527		76		25.5
20045310	20712			29/64			.4531	3		1	
20045670	20715	20045670A	96486			11.60	.4567		76		25.5
20046060	20718	20046060A	96487			11.70	.4606		76		25.5
20046450	20721	20046450A	96488			11.80	.4645		76		25.5



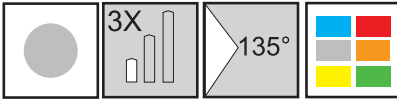
Series 200 Continued



Uncoated		ALtima®		Diameter				OAL		Flute Length	
Tool No.	EDP	Tool No.	EDP	D				L1		L2	
				Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm
20046850	20724	20046850A	96489			11.90	.4685		76		25.5
20046870	20727			15/32			.4687	3		1	
20047240	20730	20047240A	96490			12.00	.4724		76		25.5
20048440	20733			31/64			.4844	3		1	
20049210	20736	20049210A	96491			12.50	.4921		76		25.5
20050000	20739			1/2			.5000	3		1	
20051180	20742	20051180A	96492			13.00	.5118		89		28.5
20051560	20745			33/64			.5156	3-1/2		1-1/8	
20053120	20748			17/32			.5312	3-1/2		1-1/8	
20053150	20751	20053150A	96493			13.50	.5315		89		28.5
20054690	20754			35/64			.5469	3-1/2		1-1/8	
20055120	20757	20055120A	96494			14.00	.5512		89		28.5
20056250	20760			9/16			.5625	3-1/2		1-1/8	
20057080	20763	20057080A	96495			14.50	.5708		89		32.0
20057810	20766			37/64			.5781	3-1/2		1-1/4	
20059050	20769	20059050A	96496			15.00	.5905		89		32.0
20059380	20772			19/32			.5938	3-1/2		1-1/4	
20060940	20775			39/64			.6094	3-1/2		1-1/4	
20061020	20778	20061020A	96497			15.50	.6102		89		32.0
20062500	20781			5/8			.6250	3-1/2		1-1/4	
20062990	20784	20062990A	96498			16.00	.6299		89		32.0
20064060	20787			41/64			.6406	4		1-1/2	
20064960	20790	20064960A	96499			16.50	.6496		102		38.0
20065620	20793			21/32			.6562	4		1-1/2	
20066930	20796	20066930A	96500			17.00	.6693		102		38.0
20067190	20799			43/64			.6719	4		1-1/2	
20068750	20802			11/16			.6875	4		1-1/2	
20068900	20805	20068900A	96501			17.50	.6890		102		38.0
20070310	20808			45/64			.7031	4		1-1/2	
20070870	20811	20070870A	96502			18.00	.7087		102		38.0
20071880	20814			23/32			.7188	4		1-1/2	
20072830	20817	20072830A	96503			18.50	.7283		102		38.0
20073440	20820			47/64			.7344	4		1-1/2	
20074800	20823	20074800A	96504			19.00	.7480		102		38.0
20075000	20826			3/4			.7500	4		1-1/2	
20076560	20829			49/64			.7656	4		1-1/2	
20078120	20832			25/32			.7812	4		1-1/2	
20078740	20835	20078740A	96505			20.00	.7874		102		38.0



Hi-Roc® Series 200 Sets



Available in five popular sets. Each set contains a selection of more frequently used drills.

- Packed in a plastic case.
- Used for drilling bolt studs, welds and other hard materials.
- Ideal for tool box.



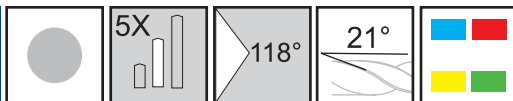
		Sets										
Tool No.	EDP	Sizes per Set										
		20010000	20181	1/8"	3/16"	1/4"	5/16"	3/8"				
20020000	20367	1/16"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"				
20030000	20526	3/64"	1/16"	5/64"	3/32"	7/64"	1/8"	9/64"	5/32"	11/64"	3/16"	
20040000	20653	2.0mm	3.0mm	4.0mm	5.0mm	6.0mm						
20060000	20773	2.0mm	2.5mm	3.0mm	4.0mm	5.0mm	6.0mm	8.0mm				



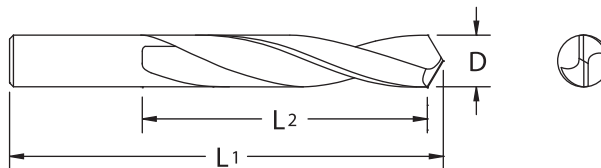
Page 164



Twister® GP Series 204



- Designed to allow high feed rates with good chip flow.
- Four facet drill point minimizes drill wander and assures accurately sized holes.



See Series 224 on page 117 for mm size Jobber Drills.

Tool No.	EDP	Diameter			OAL	Flute Length	
		D				L1	L2
		Inch	Wire	Decimal			
20401350	24004		80	.0135	1-1/2	1/4	
20401450	24010		79	.0145	1-1/2	1/4	
20401560	24013	1/64		.0156	1-1/2	1/4	
20401600	24019		78	.0160	1-1/2	1/4	
20401800	24025		77	.0180	1-1/2	1/4	
20402000	24031		76	.0200	1-1/2	1/4	
20402100	24034		75	.0210	1-1/2	1/4	
20402250	24040		74	.0225	1-1/2	1/4	
20402400	24046		73	.0240	1-1/2	1/4	
20402500	24049		72	.0250	1-1/2	5/16	
20402600	24055		71	.0260	1-1/2	5/16	
20402800	24061		70	.0280	1-1/2	5/16	
20402920	24064		69	.0292	1-1/2	5/16	
20403100	24070		68	.0310	1-1/2	3/8	
20403120	24073	1/32		.0312	1-1/2	3/8	
20403200	24079		67	.0320	1-1/2	3/8	
20403300	24082		66	.0330	1-1/2	3/8	
20403500	24088		65	.0350	1-1/2	3/8	
20403600	24094		64	.0360	1-1/2	1/2	
20403700	24097		63	.0370	1-1/2	1/2	
20403800	24103		62	.0380	1-1/2	1/2	
20403900	24106		61	.0390	1-1/2	1/2	
20404000	24112		60	.0400	1-1/2	3/4	
20404100	24115		59	.0410	1-1/2	3/4	
20404200	24121		58	.0420	1-1/2	3/4	
20404300	24124		57	.0430	1-1/2	3/4	
20404650	24133		56	.0465	1-1/2	3/4	
20404690	24136	3/64		.0469	1-1/2	3/4	
20405200	24148		55	.0520	1-1/2	3/4	
20405500	24154		54	.0550	1-1/2	3/4	
20405950	24166		53	.0595	1-1/2	3/4	
20406250	24169	1/16		.0625	1-1/2	3/4	
20406350	24175		52	.0635	1-1/2	3/4	
20406700	24181		51	.0670	1-1/2	3/4	

Tool No.	EDP	Diameter			OAL	Flute Length	
		D				L1	L2
		Inch	Wire	Decimal			
20407000	24184		50	.0700	1-3/4	7/8	
20407300	24190		49	.0730	1-3/4	7/8	
20407600	24196		48	.0760	1-3/4	7/8	
20407810	24199	5/64		.0781	1-3/4	7/8	
20407850	24202		47	.0785	1-3/4	7/8	
20408100	24208		46	.0810	1-3/4	7/8	
20408200	24211		45	.0820	1-3/4	7/8	
20408600	24217		44	.0860	2	1	
20408900	24223		43	.0890	2	1	
20409350	24229		42	.0935	2	1	
20409380	24232	3/32		.0938	2	1	
20409600	24238		41	.0960	2	1	
20409800	24241		40	.0980	2	1	
20409950	24247		39	.0995	2-1/4	1-1/4	
20410150	24250		38	.1015	2-1/4	1-1/4	
20410400	24256		37	.1040	2-1/4	1-1/4	
20410650	24262		36	.1065	2-1/4	1-1/4	
20410940	24265	7/64		.1094	2-1/4	1-1/4	
20411000	24268		35	.1100	2-1/4	1-1/4	
20411100	24274		34	.1110	2-1/4	1-1/4	
20411300	24277		33	.1130	2-1/4	1-1/4	
20411600	24283		32	.1160	2-1/4	1-1/4	
20412000	24289		31	.1200	2-1/4	1-1/4	
20412500	24295	1/8		.1250	2-1/4	1-1/4	
20412850	24301		30	.1285	2-1/4	1-1/4	
20413600	24310		29	.1360	2-1/2	1-3/8	
20414050	24316		28	.1405	2-1/2	1-3/8	
20414060	24319	9/64		.1406	2-1/2	1-3/8	
20414400	24325		27	.1440	2-1/2	1-3/8	
20414700	24331		26	.1470	2-1/2	1-3/8	
20414950	24334		25	.1495	2-1/2	1-3/8	
20415200	24340		24	.1520	2-1/2	1-3/8	
20415400	24346		23	.1540	2-1/2	1-3/8	
20415620	24349	5/32		.1562	2-1/2	1-3/8	

Inch	
D	Tolerance
.0135 - .7812	+.0000/-.0005



Series 204 Continued

Tool No.	EDP	Diameter			OAL	Flute Length	
		D				L1	L2
		Inch	Wire	Decimal			
20415700	24352		22	.1570	2-1/2	1-3/8	
20415900	24358		21	.1590	2-1/2	1-3/8	
20416100	24361		20	.1610	2-1/2	1-3/8	
20416600	24370		19	.1660	2-3/4	1-5/8	
20416950	24376		18	.1695	2-3/4	1-5/8	
20417190	24379	11/64		.1719	2-3/4	1-5/8	
20417300	24382		17	.1730	2-3/4	1-5/8	
20417700	24388		16	.1770	2-3/4	1-5/8	
20418000	24394		15	.1800	2-3/4	1-5/8	
20418200	24400		14	.1820	2-3/4	1-5/8	
20418500	24403		13	.1850	2-3/4	1-5/8	
20418750	24406	3/16		.1875	2-3/4	1-5/8	
20418900	24412		12	.1890	2-3/4	1-5/8	
20419100	24415		11	.1910	2-3/4	1-5/8	
20419350	24421		10	.1935	2-3/4	1-5/8	
20419600	24424		9	.1960	3	1-3/4	
20419900	24430		8	.1990	3	1-3/4	
20420100	24436		7	.2010	3	1-3/4	
20420310	24439	13/64		.2031	3	1-3/4	
20420400	24442		6	.2040	3	1-3/4	
20420550	24448		5	.2055	3	1-3/4	
20420900	24454		4	.2090	3	1-3/4	
20421300	24460		3	.2130	3	1-3/4	
20421870	24466	7/32		.2187	3	1-3/4	
20422100	24472		2	.2210	3	1-3/4	
20422800	24478		1	.2280	3	1-3/4	
20423400	24487		A	.2340	3-1/4	2	
20423440	24490	15/64		.2344	3-1/4	2	
20423800	24496		B	.2380	3-1/4	2	
20424200	24502		C	.2420	3-1/4	2	
20424600	24508		D	.2460	3-1/4	2	
20425000	24514	1/4		.2500	3-1/4	2	
20425700	24523		F	.2570	3-1/4	2	
20426100	24529		G	.2610	3-1/2	2-1/8	
20426560	24535	17/64		.2656	3-1/2	2-1/8	
20426600	24538		H	.2660	3-1/2	2-1/8	
20427200	24547		I	.2720	3-1/2	2-1/8	
20427700	24553		J	.2770	3-1/2	2-1/8	
20428100	24559		K	.2810	3-1/2	2-1/8	
20428120	24562	9/32		.2812	3-1/2	2-1/8	
20429000	24571		L	.2900	3-1/2	2-1/8	
20429500	24577		M	.2950	3-3/4	2-3/8	
20429690	24583	19/64		.2969	3-3/4	2-3/8	
20430200	24589		N	.3020	3-3/4	2-3/8	
20431250	24601	5/16		.3125	3-3/4	2-3/8	
20431600	24607		O	.3160	3-3/4	2-3/8	

Tool No.	EDP	Diameter			OAL	Flute Length	
		D				L1	L2
		Inch	Wire	Decimal			
20432300	24616		P	.3230	3-3/4	2-3/8	
20432810	24622	21/64		.3281	4	2-1/2	
20433200	24628		Q	.3320	4	2-1/2	
20433900	24637		R	.3390	4	2-1/2	
20434380	24643	11/32		.3438	4	2-1/2	
20434800	24649		S	.3480	4	2-1/2	
20435800	24658		T	.3580	4-1/4	2-3/4	
20435940	24664	23/64		.3594	4-1/4	2-3/4	
20436800	24673		U	.3680	4-1/4	2-3/4	
20437500	24682	3/8		.3750	4-1/4	2-3/4	
20437700	24685		V	.3770	4-1/2	2-7/8	
20438600	24697		W	.3860	4-1/2	2-7/8	
20439060	24703	25/64		.3906	4-1/2	2-7/8	
20439700	24709		X	.3970	4-1/2	2-7/8	
20440400	24718		Y	.4040	4-1/2	2-7/8	
20440620	24724	13/32		.4062	4-1/2	2-7/8	
20441300	24730		Z	.4130	4-1/2	2-7/8	
20442190	24742	27/64		.4219	4-1/2	2-7/8	
20443750	24757	7/16		.4375	4-1/2	2-7/8	
20445310	24772	29/64		.4531	4-3/4	3	
20446880	24787	15/32		.4688	4-3/4	3	
20448440	24793	31/64		.4844	4-3/4	3	
20450000	24799	1/2		.5000	4-3/4	3	
20451560	24805	33/64		.5156	5	3-1/4	
20453120	24808	17/32		.5312	5	3-1/4	
20454690	24814	35/64		.5469	5	3-1/4	
20456250	24820	9/16		.5625	5	3-1/4	
20457810	24826	37/64		.5781	5-1/4	3-1/2	
20459380	24832	19/32		.5938	5-1/4	3-1/2	
20460940	24835	39/64		.6094	5-1/4	3-1/2	
20462500	24841	5/8		.6250	5-1/4	3-1/2	
20464060	24847	41/64		.6406	5-1/2	3-5/8	
20465620	24853	21/32		.6562	5-1/2	3-5/8	
20467190	24859	43/64		.6719	5-1/2	3-5/8	
20468750	24862	11/16		.6875	5-1/2	3-5/8	
20470310	24868	45/64		.7031	5-3/4	3-7/8	
20471880	24874	23/32		.7188	5-3/4	3-7/8	
20473440	24880	47/64		.7344	5-3/4	3-7/8	
20475000	24886	3/4		.7500	5-3/4	3-7/8	
20476560	24889	49/64		.7656	6	4	
20478120	24892	25/32		.7812	6	4	

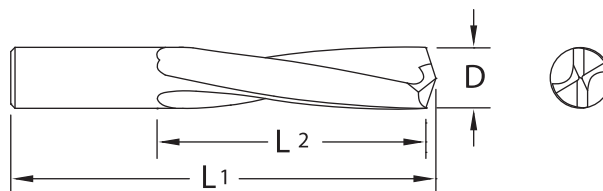
See Series 224 on page 117 for mm size Jobber Drills.



Twister® Hi-Tuff® Series 205



Designed for drilling stainless steel, tool steels, titanium, nickel based alloys and other high strength ferrous metals.



- Screw machine lengths and a heavy web provide extra rigidity and strength.
- Web-thinned drill point reduces power requirements, lowers drilling temperatures and extends tool life.

- Slow spiral.
- ALtima® coating upon request.

Uncoated		TiN		Diameter				OAL		Flute Length	
Tool No.	EDP	Tool No.	EDP	D				L1		L2	
				Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20501180	25001					0.30	.0118		38		5.0
20501350	25004					80	.0135	1-1/2		3/16	
20501380	25007					0.35	.0138		38		5.0
20501450	25010					79	.0145	1-1/2		3/16	
20501560	25013			1/64			.0156	1-1/2		3/16	
20501570	25016					0.40	.0157		38		5.0
20501600	25019					78	.0160	1-1/2		3/16	
20501770	25022					0.45	.0177		38		5.0
20501800	25025					77	.0180	1-1/2		3/16	
20501970	25028					0.50	.0197		38		6.5
20502000	25031					76	.0200	1-1/2		1/4	
20502100	25034					75	.0210	1-1/2		1/4	
20502170	25037					0.55	.0217		38		6.5
20502250	25040					74	.0225	1-1/2		1/4	
20502360	25043					0.60	.0236		38		6.5
20502400	25046					73	.0240	1-1/2		1/4	
20502500	25049					72	.0250	1-1/2		5/16	
20502560	25052					0.65	.0256		38		8.0
20502600	25055					71	.0260	1-1/2		5/16	
20502760	25058					0.70	.0276		38		8.0
20502800	25061					70	.0280	1-1/2		5/16	
20502920	25064					69	.0292	1-1/2		5/16	
20502950	25067					0.75	.0295		38		8.0
20503100	25070					68	.0310	1-1/2		3/8	
20503120	25073	20503120T	25074	1/32			.0312	1-1/2		3/8	
20503150	25076					0.80	.0315		38		9.5
20503200	25079					67	.0320	1-1/2		3/8	
20503300	25082					66	.0330	1-1/2		3/8	
20503350	25085					0.85	.0335		38		9.5
20503500	25088					65	.0350	1-1/2		7/16	
20503540	25091					0.90	.0354		38		11.0
20503600	25094					64	.0360	1-1/2		7/16	
20503700	25097					63	.0370	1-1/2		7/16	
20503740	25100					0.95	.0374		38		11.0

Inch	
D	Tolerance
.0135 - .7812	+.0000/-0.0005

Metric (mm)	
D	Tolerance
0.30 - 20.00	+.000/-0.013

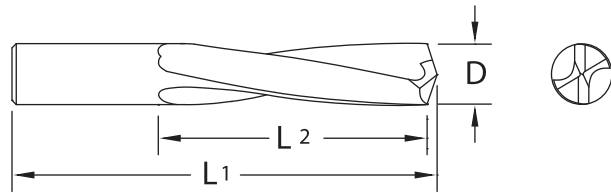
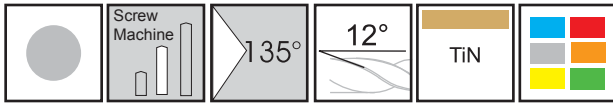


Series 205 Continued

Uncoated		TIN		Diameter				OAL		Flute Length	
				D				L1		L2	
Tool No.	EDP	Tool No.	EDP	Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20503800	25103				62		.0380	1-1/2		7/16	
20503900	25106				61		.0390	1-1/2		7/16	
20503940	25109	20503940T	25110			1.00	.0394		38		12.5
20504000	25112				60		.0400	1-1/2		1/2	
20504100	25115				59		.0410	1-1/2		1/2	
20504130	25118					1.05	.0413		38		12.5
20504200	25121				58		.0420	1-1/2		1/2	
20504300	25124				57		.0430	1-1/2		1/2	
20504330	25127					1.10	.0433		38		12.5
20504520	25130					1.15	.0452		38		12.5
20504650	25133				56		.0465	1-1/2		1/2	
20504690	25136	20504690T	25137	3/64			.0469	1-1/2		1/2	
20504720	25139					1.20	.0472		38		12.5
20504920	25142					1.25	.0492		41		16.0
20505110	25145					1.30	.0511		41		16.0
20505200	25148				55		.0520	1-5/8		5/8	
20505310	25151					1.35	.0531		41		16.0
20505500	25154				54		.0550	1-5/8		5/8	
20505510	25157					1.40	.0551		41		16.0
20505710	25160					1.45	.0571		41		16.0
20505900	25163	20505900T	25164			1.50	.0590		41		16.0
20505950	25166				53		.0595	1-5/8		5/8	
20506250	25169	20506250T	25170	1/16			.0625	1-5/8		5/8	
20506300	25172					1.60	.0630		41		16.0
20506350	25175				52		.0635	1-11/16		11/16	
20506690	25178					1.70	.0669		43		17.5
20506700	25181				51		.0670	1-11/16		11/16	
20507000	25184	20507000T	20507		50		.0700	1-11/16		11/16	
20507080	25187					1.80	.0708		43		17.5
20507300	25190				49		.0730	1-11/16		11/16	
20507480	25193					1.90	.0748		43		17.5
20507600	25196				48		.0760	1-11/16		11/16	
20507810	25199	20507810T	25200	5/64			.0781	1-11/16		11/16	
20507850	25202				47		.0785	1-3/4		3/4	
20507870	25205	20507870T	25206			2.00	.0787		44		19.0
20508100	25208				46		.0810	1-3/4		3/4	
20508200	25211				45		.0820	1-3/4		3/4	
20508270	25214					2.10	.0827		44		19.0
20508600	25217				44		.0860	1-3/4		3/4	
20508660	25220					2.20	.0866		44		19.0
20508900	25223	20508900T	25224		43		.0890	1-3/4		3/4	
20509060	25226					2.30	.0906		44		19.0
20509350	25229				42		.0935	1-3/4		3/4	
20509380	25232	20509380T	25233	3/32			.0938	1-3/4		3/4	
20509450	25235					2.40	.0945		44		19.0
20509600	25238				41		.0960	1-13/16		13/16	



Series 205 Continued



Uncoated		TiN		Diameter				OAL		Flute Length	
Tool No.	EDP	Tool No.	EDP	Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20509800	25241				40		.0980	1-13/16		13/16	
20509840	25244	20509840T	25245			2.50	.0984		46		20.5
20509950	25247				39		.0995	1-13/16		13/16	
20510150	25250				38		.1015	1-13/16		13/16	
20510240	25253					2.60	.1024		46		20.5
20510400	25256				37		.1040	1-13/16		13/16	
20510630	25259					2.70	.1063		46		20.5
20510650	25262				36		.1065	1-13/16		13/16	
20510940	25265	20510940T	25266	7/64			.1094	1-13/16		13/16	
20511000	25268				35		.1100	1-7/8		7/8	
20511020	25271					2.80	.1102		48		22.0
20511100	25274				34		.1110	1-7/8		7/8	
20511300	25277				33		.1130	1-7/8		7/8	
20511420	25280					2.90	.1142		48		22.0
20511600	25283				32		.1160	1-7/8		7/8	
20511810	25286	20511810T	25287			3.00	.1181		48		22.0
20512000	25289				31		.1200	1-7/8		7/8	
20512200	25292					3.10	.1220		48		22.0
20512500	25295	20512500T	25296	1/8			.1250	1-7/8		7/8	
20512600	25298					3.20	.1260		48		22.0
20512850	25301				30		.1285	1-15/16		15/16	
20512990	25304					3.30	.1299		49		24.0
20513390	25307					3.40	.1339		49		24.0
20513600	25310				29		.1360	1-15/16		15/16	
20513780	25313	20513780T	25314			3.50	.1378		49		24.0
20514050	25316				28		.1405	1-15/16		15/16	
20514060	25319	20514060T	25320	9/64			.1406	1-15/16		15/16	
20514170	25322					3.60	.1417		49		24.0
20514400	25325				27		.1440	2-1/16		1	
20514570	25328					3.70	.1457		52		25.5
20514700	25331				26		.1470	2-1/16		1	
20514950	25334				25		.1495	2-1/16		1	
20514960	25337					3.80	.1496		52		25.5
20515200	25340				24		.1520	2-1/16		1	
20515350	25343					3.90	.1535		52		25.5
20515400	25346				23		.1540	2-1/16		1	
20515620	25349	20515620T	25350	5/32			.1562	2-1/16		1	
20515700	25352				22		.1570	2-1/8		1-1/16	
20515750	25355	20515750T	25356			4.00	.1575		54		27.0
20515900	25358				21		.1590	2-1/8		1-1/16	
20516100	25361				20		.1610	2-1/8		1-1/16	
20516140	25364					4.10	.1614		54		27.0

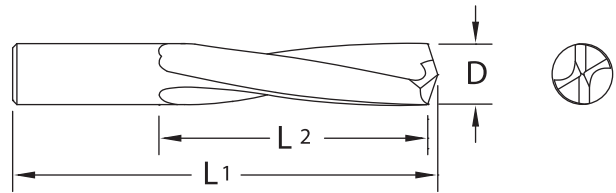
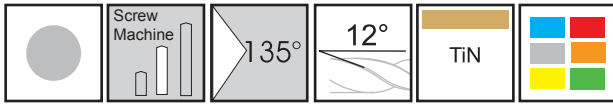


Series 205 Continued

Uncoated		TiN		Diameter				OAL		Flute Length	
				D				L1		L2	
Tool No.	EDP	Tool No.	EDP	Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20516540	25367					4.20	.1654		54		27.0
20516600	25370				19		.1660	2-1/8		1-1/16	
20516930	25373					4.30	.1693		54		27.0
20516950	25376				18		.1695	2-1/8		1-1/16	
20517190	25379	20517190T	25380	11/64			.1719	2-1/8		1-1/16	
20517300	25382				17		.1730	2-3/16		1-1/8	
20517320	25385					4.40	.1732		56		28.5
20517700	25388				16		.1770	2-3/16		1-1/8	
20517720	25391	20517720T	25392			4.50	.1772		56		28.5
20518000	25394				15		.1800	2-3/16		1-1/8	
20518110	25397					4.60	.1811		56		28.5
20518200	25400				14		.1820	2-3/16		1-1/8	
20518500	25403				13	4.70	.1850	2-3/16	56	1-1/8	28.5
20518750	25406	20518750T	25407	3/16			.1875	2-3/16		1-1/8	
20518890	25409					4.80	.1889		57		30.0
20518900	25412				12		.1890	2-1/4		1-3/16	
20519100	25415				11		.1910	2-1/4		1-3/16	
20519290	25418					4.90	.1929		57		30.0
20519350	25421				10		.1935	2-1/4		1-3/16	
20519600	25424				9		.1960	2-1/4		1-3/16	
20519680	25427	20519680T	25428			5.00	.1968		57		30.0
20519900	25430				8		.1990	2-1/4		1-3/16	
20520080	25433					5.10	.2008		57		30.0
20520100	25436				7		.2010	2-1/4		1-3/16	
20520310	25439	20520310T	25440	13/64			.2031	2-1/4		1-3/16	
20520400	25442				6		.2040	2-3/8		1-1/4	
20520470	25445					5.20	.2047		60		32.0
20520550	25448				5		.2055	2-3/8		1-1/4	
20520860	25451					5.30	.2086		60		32.0
20520900	25454				4		.2090	2-3/8		1-1/4	
20521260	25457					5.40	.2126		60		32.0
20521300	25460				3		.2130	2-3/8		1-1/4	
20521650	25463	20521650T	25464			5.50	.2165		60		32.0
20521870	25466	20521870T	25467	7/32			.2187	2-3/8		1-1/4	
20522050	25469					5.60	.2205		62		33.4
20522100	25472				2		.2210	2-7/16		1-5/16	
20522440	25475					5.70	.2244		62		33.4
20522800	25478				1		.2280	2-7/16		1-5/16	
20522830	25481					5.80	.2283		62		33.4
20523230	25484					5.90	.2323		62		33.4
20523400	25487				A		.2340	2-7/16		1-5/16	
20523440	25490	20523440T	25491	15/64			.2344	2-7/16		1-5/16	
20523620	25493	20523620T	25494			6.00	.2362		64		35.0
20523800	25496				B		.2380	2-1/2		1-3/8	
20524020	25499					6.10	.2402		64		35.0
20524200	25502				C		.2420	2-1/2		1-3/8	



Series 205 Continued



Uncoated		TiN		Diameter				OAL		Flute Length	
Tool No.	EDP	Tool No.	EDP	D				L1		L2	
				Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20524410	25505					6.20	.2441		64		35.0
20524600	25508				D		.2460	2-1/2		1-3/8	
20524800	25511					6.30	.2480		64		35.0
20525000	25514	20525000T	25515	1/4	E		.2500	2-1/2		1-3/8	
20525190	25517					6.40	.2519		64		35.0
20525590	25520	20525590T	25521			6.50	.2559		67		36.5
20525700	25523				F		.2570	2-5/8		1-7/16	
20525980	25526					6.60	.2598		67		36.5
20526100	25529				G		.2610	2-5/8		1-7/16	
20526370	25532					6.70	.2637		67		36.5
20526560	25535	20526560T	25536	17/64			.2656	2-5/8		1-7/16	
20526600	25538				H		.2660	2-11/16		1-1/2	
20526770	25541					6.80	.2677		68		38.0
20527160	25544					6.90	.2716		68		38.0
20527200	25547				I		.2720	2-11/16		1-1/2	
20527560	25550	20527560T	25551			7.00	.2756		68		38.0
20527700	25553				J		.2770	2-11/16		1-1/2	
20527950	25556					7.10	.2795		68		38.0
20528100	25559				K		.2810	2-11/16		1-1/2	
20528120	25562	20528120T	25563	9/32			.2812	2-11/16		1-1/2	
20528340	25565					7.20	.2834		68		38.0
20528740	25568					7.30	.2874		68		38.0
20529000	25571				L		.2900	2-3/4		1-9/16	
20529130	25574					7.40	.2913		70		39.5
20529500	25577				M		.2950	2-3/4		1-9/16	
20529530	25580	20529530T	25581			7.50	.2953		70		39.5
20529690	25583	20529690T	25584	19/64			.2969	2-3/4		1-9/16	
20529920	25586					7.60	.2992		70		39.5
20530200	25589				N		.3020	2-13/16		1-5/8	
20530310	25592					7.70	.3031		71		41.5
20530710	25595					7.80	.3071		71		41.5
20531100	25598					7.90	.3110		71		41.5
20531250	25601	20531250T	25602	5/16			.3125	2-13/16		1-5/8	
20531500	25604	20531500T	25605			8.00	.3150		71		41.5
20531600	25607				O		.3160	2-15/16		1-11/16	
20531890	25610					8.10	.3189		75		43.0
20532280	25613					8.20	.3228		75		43.0
20532300	25616				P		.3230	2-15/16		1-11/16	
20532670	25619					8.30	.3267		75		43.0
20532810	25622	20532810T	25623	21/64			.3281	2-15/16		1-11/16	
20533070	25625					8.40	.3307		75		43.0
20533200	25628				Q		.3320	2-15/16		1-11/16	

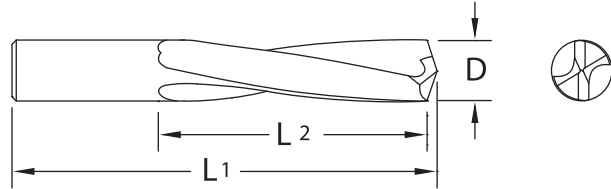
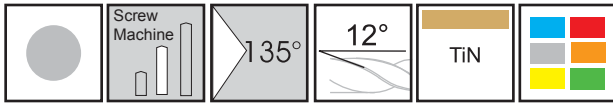


Series 205 Continued

Uncoated		TiN		Diameter				OAL		Flute Length	
				D				L1		L2	
Tool No.	EDP	Tool No.	EDP	Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20533460	25631	20533460T	25632			8.50	.3346		75		43.0
20533850	25634					8.60	.3385		75		43.0
20533900	25637				R		.3390	2-15/16		1-11/16	
20534250	25640					8.70	.3425		75		43.0
20534380	25643	20534380T	25644	11/32			.3438	2-15/16		1-11/16	
20534640	25646					8.80	.3464		75		43.0
20534800	25649				S		.3480	3-1/16		1-3/4	
20535040	25652					8.90	.3504		78		44.5
20535430	25655	20535430T	25656			9.00	.3543		78		44.5
20535800	25658				T		.3580	3-1/16		1-3/4	
20535820	25661					9.10	.3582		78		44.5
20535940	25664	20535940T	25665	23/64			.3594	3-1/16		1-3/4	
20536220	25667					9.20	.3622		78		44.5
20536610	25670					9.30	.3661		79		46.0
20536800	25673				U		.3680	3-1/8		1-13/16	
20537000	25676					9.40	.3700		79		46.0
20537400	25679	20537400T	25680			9.50	.3740		79		46.0
20537500	25682	20537500T	25683	3/8			.3750	3-1/8		1-13/16	
20537700	25685				V		.3770	3-1/4		1-7/8	
20537790	25688					9.60	.3779		83		47.5
20538190	25691					9.70	.3819		83		47.5
20538580	25694					9.80	.3858		83		47.5
20538600	25697				W		.3860	3-1/4		1-7/8	
20538970	25700					9.90	.3897		83		47.5
20539060	25703	20539060T	25704	25/64			.3906	3-1/4		1-7/8	
20539370	25706	20539370T	25707			10.00	.3937		84		49.0
20539700	25709				X		.3970	3-5/16		1-15/16	
20539760	25712					10.10	.3976		84		49.0
20540150	25715					10.20	.4015		84		49.0
20540400	25718				Y		.4040	3-5/16		1-15/16	
20540550	25721					10.30	.4055		84		49.0
20540620	25724	20540620T	25725	13/32			.4062	3-5/16		1-15/16	
20540940	25727					10.40	.4094		84		49.0
20541300	25730				Z		.4130	3-3/8		2	
20541340	25733	20541340T	25734			10.50	.4134		86		51.0
20541730	25736					10.60	.4173		86		51.0
20542120	25739					10.70	.4212		86		51.0
20542190	25742	20542190T	25743	27/64			.4219	3-3/8		2	
20542520	25745					10.80	.4252		86		51.0
20542910	25748					10.90	.4291		87		52.5
20543310	25751	20543310T	25752			11.00	.4331		87		52.5
20543700	25754					11.10	.4370		87		52.5
20543750	25757	20543750T	25758	7/16			.4375	3-7/16		2-1/16	
20544090	25760					11.20	.4409		87		52.5
20544490	25763					11.30	.4449		92		54.0
20544880	25766					11.40	.4488		92		54.0



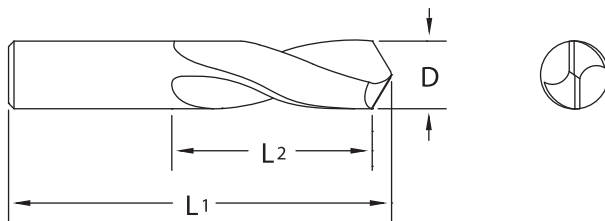
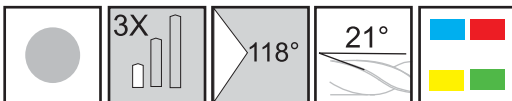
Series 205 Continued



Uncoated		TiN		Diameter				OAL		Flute Length	
Tool No.	EDP	Tool No.	EDP	D				L1		L2	
				Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20545270	25769	20545270T	25770			11.50	.4527		92		54.0
20545310	25772	20545310T	25773	29/64			.4531	3-5/8		2-1/8	
20545670	25775					11.60	.4567		92		54.0
20546060	25778					11.70	.4606		92		54.0
20546450	25781					11.80	.4645		92		54.0
20546850	25784					11.90	.4685		92		54.0
20546880	25787	20546880T	25788	15/32			.4688	3-5/8		2-1/8	
20547240	25790	20547240T	25791			12.00	.4724		94		55.5
20548440	25793	20548440T	25794	31/64			.4844	3-11/16		2-3/16	
20549210	25796					12.50	.4921		95		57.0
20550000	25799	20550000T	25800	1/2			.5000	3-3/4		2-1/4	
20551180	25802	20551180T	25803			13.00	.5118		98		60.5
20551560	25805			33/64			.5156	3-7/8		2-3/8	
20553120	25808			17/32			.5312	3-7/8		2-3/8	
20553150	25811					13.50	.5315		102		63.5
20554690	25814			35/64			.5469	4		2-1/2	
20555120	25817	20555120T	25818			14.00	.5512		102		63.5
20556250	25820	20556250T	25821	9/16			.5625	4		2-1/2	
20557080	25823					14.50	.5708		105		66.5
20557810	25826			37/64			.5781	4-1/8		2-5/8	
20559050	25829	20559050T	25830			15.00	.5905		105		66.5
20559380	25832			19/32			.5938	4-1/8		2-5/8	
20560940	25835			39/64			.6094	4-1/4		2-3/4	
20561020	25838					15.50	.6102		108		70.0
20562500	25841	20562500T	25842	5/8			.6250	4-1/4		2-3/4	
20562990	25844	20562990T	25845			16.00	.6299		108		70.0
20564060	25847			41/64			.6406	4-1/2		2-7/8	
20564960	25850					16.50	.6496		114		73.0
20565620	25853			21/32			.6562	4-1/2		2-7/8	
20566930	25856	20566930T	25857			17.00	.6693		117		73.0
20567190	25859			43/64			.6719	4-5/8		2-7/8	
20568750	25862	20568750T	25863	11/16			.6875	4-5/8		2-7/8	
20568900	25865					17.50	.6890		121		76.0
20570310	25868			45/64			.7031	4-3/4		3	
20570870	25871	20570870T	25872			18.00	.7087		121		76.0
20571880	25874			23/32			.7188	4-3/4		3	
20572830	25877					18.50	.7283		127		79.5
20573440	25880			47/64			.7344	5		3-1/8	
20574800	25883	20574800T	25884			19.00	.7480		127		79.5
20575000	25886	20575000T	25887	3/4			.7500	5		3-1/8	
20576560	25889			49/64			.7656	5-1/4		3-1/4	
20578120	25892			25/32			.7812	5-1/4		3-1/4	
20578740	25895	20578740T	25896			20.00	.7874		133		82.5



Twister® GP Series 206



- Designed to allow high feed rates with good chip flow.
- Four facet drill point minimizes drill wander and assures accurately sized holes.
- Shorter length reduces deflection and vibration, increases drill accuracy and improves tool life.

Tool No.	EDP	Diameter			OAL	Flute Length
		Inch	Wire	Decimal		
20604000	26004		60	.0400	1-1/2	3/8
20604100	26007		59	.0410	1-1/2	3/8
20604200	26013		58	.0420	1-1/2	3/8
20604300	26016		57	.0430	1-1/2	3/8
20604650	26025		56	.0465	1-1/2	3/8
20604690	26028	3/64		.0469	1-1/2	3/8
20605200	26040		55	.0520	1-1/2	3/8
20605500	26046		54	.0550	1-1/2	3/8
20605950	26058		53	.0595	1-1/2	3/8
20606250	26061	1/16		.0625	1-1/2	3/8
20606350	26067		52	.0635	1-1/2	3/8
20606700	26073		51	.0670	1-1/2	3/8
20607000	26076		50	.0700	1-1/2	3/8
20607300	26082		49	.0730	1-1/2	3/8
20607600	26088		48	.0760	1-1/2	1/2
20607810	26091	5/64		.0781	1-1/2	1/2
20607850	26094		47	.0785	1-1/2	1/2
20608100	26100		46	.0810	1-1/2	1/2
20608200	26103		45	.0820	1-1/2	1/2
20608600	26109		44	.0860	2	1/2
20608900	26115		43	.0890	2	1/2
20609350	26121		42	.0935	2	1/2
20609380	26124	3/32		.0938	2	1/2
20609600	26130		41	.0960	2	1/2
20609800	26133		40	.0980	2	5/8
20609950	26139		39	.0995	2	5/8
20610150	26142		38	.1015	2	5/8
20610400	26148		37	.1040	2	5/8
20610650	26154		36	.1065	2	5/8
20610940	26157	7/64		.1094	2	5/8
20611000	26160		35	.1100	2	5/8
20611100	26166		34	.1110	2	5/8
20611300	26169		33	.1130	2	5/8
20611600	26175		32	.1160	2	5/8

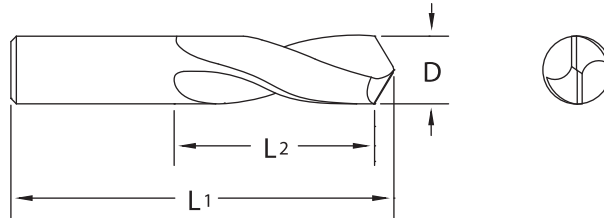
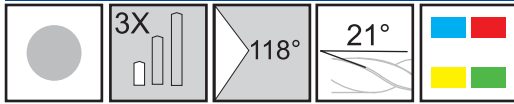
Tool No.	EDP	Diameter			OAL	Flute Length
		Inch	Wire	Decimal		
20612000	26181		31	.1200	2	5/8
20612500	26187	1/8		.1250	2	5/8
20612850	26193		30	.1285	2	5/8
20613600	26202		29	.1360	2	5/8
20614050	26208		28	.1405	2	5/8
20614060	26211	9/64		.1406	2	5/8
20614400	26217		27	.1440	2	5/8
20614700	26223		26	.1470	2	5/8
20614950	26226		25	.1495	2	5/8
20615200	26232		24	.1520	2	5/8
20615400	26238		23	.1540	2	5/8
20615620	26241	5/32		.1562	2	3/4
20615700	26244		22	.1570	2	3/4
20615900	26250		21	.1590	2	3/4
20616100	26253		20	.1610	2	3/4
20616600	26262		19	.1660	2-1/8	3/4
20616950	26268		18	.1695	2-1/8	3/4
20617190	26271	11/64		.1719	2-1/8	3/4
20617300	26274		17	.1730	2-1/8	3/4
20617700	26280		16	.1770	2-1/8	3/4
20618000	26286		15	.1800	2-3/16	3/4
20618200	26292		14	.1820	2-3/16	3/4
20618500	26295		13	.1850	2-3/16	3/4
20618750	26298	3/16		.1875	2-3/16	3/4
20618900	26304		12	.1890	2-3/16	3/4
20619100	26307		11	.1910	2-3/16	3/4
20619350	26313		10	.1935	2-3/16	3/4
20619600	26316		9	.1960	2-1/4	3/4

Inch	
D	Tolerance
.0400 - .7812	+ .0000/- .0005

See Series 226 on page 119 for mm size Stub Drills



Series 206 Continued



Tool No.	EDP	Diameter			OAL	Flute Length
		D				
		Inch	Wire	Decimal		
20619900	26322		8	.1990	2-1/4	3/4
20620100	26328		7	.2010	2-1/4	3/4
20620310	26331	13/64		.2031	2-1/4	3/4
20620400	26334		6	.2040	2-1/4	3/4
20620550	26340		5	.2055	2-1/4	3/4
20620900	26346		4	.2090	2-1/4	3/4
20621300	26352		3	.2130	2-1/2	1
20621870	26358	7/32		.2187	2-1/2	1
20622100	26364		2	.2210	2-1/2	1
20622800	26370		1	.2280	2-1/2	1
20623400	26379		A	.2340	2-1/2	1
20623440	26382	15/64		.2344	2-1/2	1
20623800	26388		B	.2380	2-1/2	1
20624200	26394		C	.2420	2-1/2	1
20624600	26400		D	.2460	2-1/2	1
20625000	26406	1/4	E	.2500	2-1/2	1
20625700	26415		F	.2570	2-1/2	1
20626100	26421		G	.2610	2-1/2	1
20626560	26427	17/64		.2656	2-1/2	1
20626600	26430		H	.2660	2-1/2	1
20627200	26439		I	.2720	2-1/2	1
20627700	26445		J	.2770	2-1/2	1
20628100	26451		K	.2810	2-1/2	1
20628120	26454	9/32		.2812	2-1/2	1
20629000	26463		L	.2900	2-1/2	1
20629500	26469		M	.2950	2-1/2	1-1/4
20629690	26475	19/64		.2969	2-1/2	1-1/4
20630200	26481		N	.3020	2-1/2	1-1/4
20631250	26493	5/16		.3125	2-1/2	1-1/4
20631600	26499		O	.3160	2-1/2	1-1/4
20632300	26508		P	.3230	2-1/2	1-1/4
20632810	26514	21/64		.3281	2-1/2	1-1/4
20633200	26520		Q	.3320	2-1/2	1-1/4
20633900	26529		R	.3390	2-1/2	1-1/4
20634380	26535	11/32		.3438	2-1/2	1-1/4
20634800	26541		S	.3480	2-1/2	1-1/4
20635800	26550		T	.3580	2-1/2	1-1/4
20635940	26556	23/64		.3594	2-1/2	1-1/4
20636800	26565		U	.3680	2-1/2	1-1/4
20637500	26574	3/8		.3750	2-1/2	1-1/4

Tool No.	EDP	Diameter			OAL	Flute Length
		D				
		Inch	Wire	Decimal		
20637700	26577		V	.3770	2-1/2	1-1/4
20638600	26589		W	.3860	2-3/4	1-1/4
20639060	26595	25/64		.3906	2-3/4	1-1/4
20639700	26601		X	.3970	2-3/4	1-1/4
20640400	26610		Y	.4040	2-3/4	1-1/4
20640620	26616	13/32		.4062	2-3/4	1-1/4
20641300	26622		Z	.4130	2-3/4	1-1/4
20642190	26634	27/64		.4219	2-3/4	1-1/4
20643750	26649	7/16		.4375	2-3/4	1-1/4
20645310	26664	29/64		.4531	3	1-1/4
20646880	26679	15/32		.4688	3	1-1/4
20648440	26685	31/64		.4844	3	1-1/4
20650000	26691	1/2		.5000	3	1-1/4
20651560	26697	33/64		.5156	3-1/2	1-3/8
20653120	26700	17/32		.5312	3-1/2	1-3/8
20654690	26706	35/64		.5469	3-1/2	1-1/2
20656250	26712	9/16		.5625	3-1/2	1-1/2
20657810	26718	37/64		.5781	3-1/2	1-5/8
20659380	26724	19/32		.5938	3-1/2	1-5/8
20660940	26727	39/64		.6094	3-1/2	1-3/4
20662500	26733	5/8		.6250	3-1/2	1-3/4
20664060	26739	41/64		.6406	4	1-7/8
20665620	26745	21/32		.6562	4	1-7/8
20667190	26751	43/64		.6719	4	1-7/8
20668750	26754	11/16		.6875	4	1-7/8
20670310	26760	45/64		.7031	4	2
20671880	26766	23/32		.7188	4	2-1/8
20673440	26772	47/64		.7344	4	2-1/8
20675000	26778	3/4		.7500	4	2-1/8
20676560	26781	49/64		.7656	4	2-1/4
20678120	26784	25/32		.7812	4	2-1/4

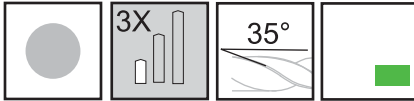
See Series 226 on page 119 for mm size Stub Drills



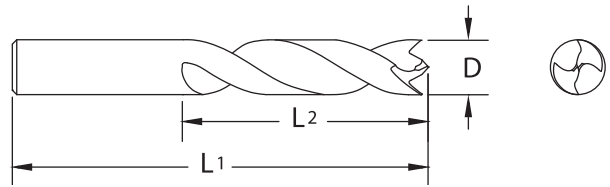
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Twister® GP Series 207



Designed for drilling Carbon Fiber Reinforced Polymer (CFRP), graphite and aramid fiber (kevlar) reinforced composite materials.



- No delamination.
- Eliminate fuzz or "fray" at exit.
- Brad and spur point.

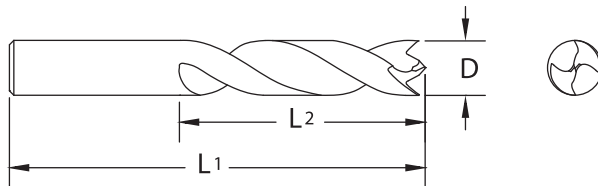
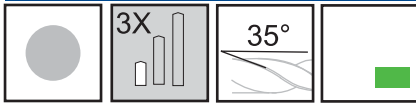
Tool No.	EDP	Diameter				OAL		Flute Length	
		D				L1		L2	
		Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20709350	27001		42		.0935	1-3/4		1/2	
20709380	27004	3/32			.0938	1-3/4		1/2	
20709450	27007			2.40	.0945		44		12.5
20709600	27010		41		.0960	1-13/16		1/2	
20709800	27013		40		.0980	1-13/16		1/2	
20709840	27016			2.50	.0984		46		12.5
20709950	27019		39		.0995	1-13/16		1/2	
20710150	27022		38		.1015	1-13/16		1/2	
20710240	27025			2.60	.1024		46		12.5
20710400	27028		37		.1040	1-13/16		1/2	
20710630	27031			2.70	.1063		46		12.5
20710650	27034		36		.1065	1-13/16		1/2	
20710940	27037	7/64			.1094	1-13/16		1/2	
20711000	27040		35		.1100	1-7/8		5/8	
20711020	27043			2.80	.1102		48		16.0
20711100	27046		34		.1110	1-7/8		5/8	
20711300	27049		33		.1130	1-7/8		5/8	
20711420	27052			2.90	.1142		48		16.0
20711600	27055		32		.1160	1-7/8		5/8	
20711810	27058			3.00	.1181		48		16.0
20712000	27061		31		.1200	1-7/8		5/8	
20712200	27064			3.10	.1220		48		16.0
20712500	27067	1/8			.1250	1-7/8		5/8	
20712600	27070			3.20	.1260		48		16.0
20712850	27073		30		.1285	1-15/16		11/16	
20712990	27076			3.30	.1299		49		17.5
20713390	27079			3.40	.1339		49		17.5
20713600	27082		29		.1360	1-15/16		11/16	
20713780	27085			3.50	.1378		49		17.5
20714050	27088		28		.1405	1-15/16		11/16	
20714060	27091	9/64			.1406	1-15/16		11/16	
20714170	27094			3.60	.1417		49		17.5
20714400	27097		27		.1440	2-1/16		3/4	
20714570	27100			3.70	.1457		52		19.0
20714700	27103		26		.1470	2-1/16		3/4	
20714950	27106		25		.1495	2-1/16		3/4	
20714960	27109			3.80	.1496		52		19.0
20715200	27112		24		.1520	2-1/16		3/4	

Inch	
D	Tolerance
.0935 - .5000	+0.0000/-0.0005

Metric (mm)	
D	Tolerance
2.40 - 12.00	+0.000/-0.013



Series 207 Continued



Tool No.	EDP	Diameter				OAL		Flute Length	
		D				L1		L2	
		Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20715350	27115			3.90	.1535		52		19.0
20715400	27118		23		.1540	2-1/16		3/4	
20715620	27121	5/32			.1562	2-1/16		3/4	
20715700	27124		22		.1570	2-1/8		7/8	
20715750	27127			4.00	.1575		54		22.0
20715900	27130		21		.1590	2-1/8		7/8	
20716100	27133		20		.1610	2-1/8		7/8	
20716140	27136			4.10	.1614		54		22.0
20716540	27139			4.20	.1654		54		22.0
20716600	27142		19		.1660	2-1/8		7/8	
20716930	27145			4.30	.1693		54		22.0
20716950	27148		18		.1695	2-1/8		7/8	
20717190	27151	11/64			.1719	2-1/8		7/8	
20717300	27154		17		.1730	2-3/16		15/16	
20717320	27157			4.40	.1732		56		24.0
20717700	27160		16		.1770	2-3/16		15/16	
20717720	27163			4.50	.1772		56		24.0
20718000	27166		15		.1800	2-3/16		15/16	
20718110	27169			4.60	.1811		56		24.0
20718200	27172		14		.1820	2-3/16		15/16	
20718500	27175		13	4.7	.1850	2-3/16	56	15/16	24.0
20718750	27178	3/16			.1875	2-3/16		15/16	
20718890	27181			4.80	.1889		57		25.5
20718900	27184		12		.1890	2-1/4		1	
20719100	27187		11		.1910	2-1/4		1	
20719290	27190			4.90	.1929		57		25.5
20719350	27193		10		.1935	2-1/4		1	
20719600	27196		9		.1960	2-1/4		1	
20719680	27199			5.00	.1968		57		25.5
20719900	27202		8		.1990	2-1/4		1	
20720080	27205			5.10	.2008		57		25.5
20720100	27208		7		.2010	2-1/4		1	
20720310	27211	13/64			.2031	2-1/4		1	
20720400	27214		6		.2040	2-3/8		1-1/16	
20720470	27217			5.20	.2047		60		27.0
20720550	27220		5		.2055	2-3/8		1-1/16	
20720860	27223			5.30	.2086		60		27.0
20720900	27226		4		.2090	2-3/8		1-1/16	
20721260	27229			5.40	.2126		60		27.0
20721300	27232		3		.2130	2-3/8		1-1/16	
20721650	27235			5.50	.2165		60		27.0
20721870	27238	7/32			.2187	2-3/8		1-1/16	

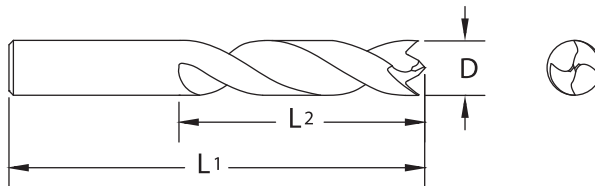
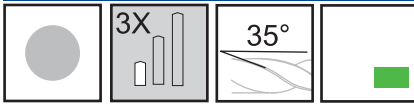


Series 207 Continued

Tool No.	EDP	Diameter				OAL		Flute Length	
		D				L1		L2	
		Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20722050	27241			5.60	.2205		62		28.5
20722100	27244		2		.2210	2-7/16		1-1/8	
20722440	27247			5.70	.2244		62		28.5
20722800	27250		1		.2280	2-7/16		1-1/8	
20722830	27253			5.80	.2283		62		28.5
20723230	27256			5.90	.2323		62		28.5
20723400	27259		A		.2340	2-7/16		1-1/8	
20723440	27262	15/64			.2344	2-7/16		1-1/8	
20723620	27265			6.00	.2362		64		32.0
20723800	27268		B		.2380	2-1/2		1-1/4	
20724020	27271			6.10	.2402		64		32.0
20724200	27274		C		.2420	2-1/2		1-1/4	
20724410	27277			6.20	.2441		64		32.0
20724600	27280		D		.2460	2-1/2		1-1/4	
20724800	27283			6.30	.2480		64		32.0
20725000	27286	1/4	E		.2500	2-1/2		1-1/4	
20725190	27289			6.40	.2519		64		32.0
20725590	27292			6.50	.2559		67		33.5
20725700	27295		F		.2570	2-5/8		1-5/16	
20726100	27298		G		.2610	2-5/8		1-5/16	
20726560	27301	17/64			.2656	2-5/8		1-5/16	
20726600	27304		H		.2660	2-11/16		1-3/8	
20727200	27307		I		.2720	2-11/16		1-3/8	
20727560	27310			7.00	.2756		68		35.0
20727700	27313		J		.2770	2-11/16		1-3/8	
20728100	27316		K		.2810	2-11/16		1-3/8	
20728120	27319	9/32			.2812	2-11/16		1-3/8	
20729000	27322		L		.2900	2-3/4		1-3/8	
20729500	27325		M		.2950	2-3/4		1-3/8	
20729530	27328			7.50	.2953		70		35.0
20729690	27331	19/64			.2969	2-3/4		1-3/8	
20730200	27334		N		.3020	2-13/16		1-1/2	
20731250	27337	5/16			.3125	2-13/16		1-1/2	
20731500	27340			8.00	.3150		71		38.0
20731600	27343		O		.3160	2-15/16		1-9/16	
20732300	27346		P		.3230	2-15/16		1-9/16	
20732810	27349	21/64			.3281	2-15/16		1-9/16	
20733200	27352		Q		.3320	2-15/16		1-9/16	
20733460	27355			8.50	.3346		75		39.5
20733900	27358		R		.3390	2-15/16		1-9/16	
20734380	27361	11/32			.3438	2-15/16		1-9/16	
20734800	27364		S		.3480	3-1/16		1-9/16	
20735430	27367			9.00	.3543		78		39.5
20735800	27370		T		.3580	3-1/16		1-9/16	



Series 207 Continued



Tool No.	EDP	Diameter				OAL		Flute Length	
		D				L1		L2	
		Inch	Wire	mm	Decimal	Inch	mm	Inch	mm
20735940	27373	23/64			.3594	3-1/16		1-9/16	
20736800	27376		U		.3680	3-1/8		1-5/8	
20737400	27379			9.50	.3740		79		41.5
20737500	27382	3/8			.3750	3-1/8		1-5/8	
20737700	27385		V		.3770	3-1/4		1-3/4	
20738600	27388		W		.3860	3-1/4		1-3/4	
20739060	27391	25/64			.3906	3-1/4		1-3/4	
20739370	27394			10.00	.3937		84		44.5
20739700	27397		X		.3970	3-5/16		1-3/4	
20740400	27400		Y		.4040	3-5/16		1-3/4	
20740620	27403	13/32			.4062	3-5/16		1-3/4	
20741300	27406		Z		.4130	3-3/8		1-13/16	
20741340	27409			10.50	.4134		86		46.0
20742190	27412	27/64			.4219	3-3/8		1-13/16	
20743310	27415			11.00	.4331		87		47.5
20743750	27418	7/16			.4375	3-7/16		1-7/8	
20745270	27421			11.50	.4527		92		51.0
20745310	27424	29/64			.4531	3-5/8		2	
20746880	27427	15/32			.4688	3-5/8		2	
20747240	27430			12.00	.4724		94		54.0
20748440	27433	31/64			.4844	3-11/16		2-1/8	
20750000	27436	1/2			.5000	3-3/4		2-1/8	

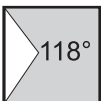
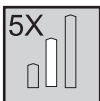
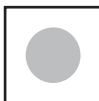


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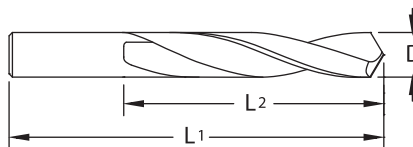
ISO 9001:2015 Certified



Twister® GP Series 224



Metric/
DIN
338



- Designed to allow high feed rates with good chip flow.
- Four facet drill point minimizes drill wander and assures accurately sized holes.

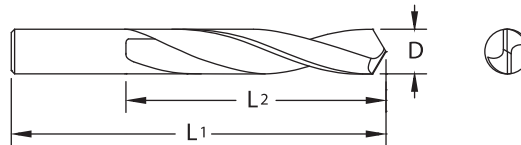
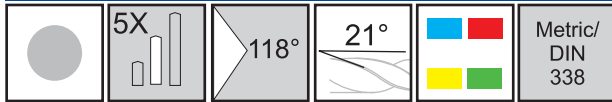
Tool No.	EDP	Diameter		OAL	Flute Length		Tool No.	EDP	Diameter		OAL	Flute Length	
		mm	Decimal		L1	L2			mm	Decimal		L1	L2
22401180	24002	0.30	.0118	26	3	22410630	24260	2.70	.1063	61	33		
22401380	24008	0.35	.0138	26	4	22411020	24272	2.80	.1102	61	33		
22401570	24017	0.40	.0157	26	5	22411420	24281	2.90	.1142	61	33		
22401770	24023	0.45	.0177	26	5	22411810	24287	3.00	.1181	61	33		
22401970	24029	0.50	.0197	26	6	22412200	24293	3.10	.1220	65	36		
22402170	24038	0.55	.0217	26	7	22412600	24299	3.20	.1260	65	36		
22402360	24044	0.60	.0236	26	7	22412990	24305	3.30	.1299	65	36		
22402560	24053	0.65	.0256	26	8	22413390	24308	3.40	.1339	70	39		
22402760	24059	0.70	.0276	28	9	22413780	24314	3.50	.1378	70	39		
22402950	24068	0.75	.0295	28	9	22414170	24323	3.60	.1417	70	39		
22403150	24077	0.80	.0315	30	10	22414570	24329	3.70	.1457	70	39		
22403350	24086	0.85	.0335	30	10	22414960	24338	3.80	.1496	75	43		
22403540	24092	0.90	.0354	32	11	22415350	24344	3.90	.1535	75	43		
22403740	24101	0.95	.0374	32	11	22415750	24356	4.00	.1575	75	43		
22403940	24110	1.00	.0394	34	12	22416140	24365	4.10	.1614	75	43		
22404130	24119	1.05	.0413	34	12	22416540	24368	4.20	.1654	75	43		
22404330	24128	1.10	.0433	36	14	22416930	24374	4.30	.1693	80	47		
22404520	24131	1.15	.0452	36	14	22417320	24386	4.40	.1732	80	47		
22404720	24140	1.20	.0472	38	16	22417720	24392	4.50	.1772	80	47		
22404920	24143	1.25	.0492	38	16	22418110	24398	4.60	.1811	80	47		
22405110	24146	1.30	.0511	38	16	22418500	24404	4.70	.1850	80	47		
22405310	24152	1.35	.0531	40	18	22418890	24410	4.80	.1889	86	52		
22405510	24158	1.40	.0551	40	18	22419290	24419	4.90	.1929	86	52		
22405710	24161	1.45	.0571	40	18	22419680	24428	5.00	.1968	86	52		
22405900	24164	1.50	.0590	40	18	22420080	24434	5.10	.2008	86	52		
22406300	24173	1.60	.0630	43	20	22420470	24446	5.20	.2047	86	52		
22406690	24179	1.70	.0669	43	20	22420860	24452	5.30	.2086	86	52		
22407080	24188	1.80	.0708	46	22	22421260	24458	5.40	.2126	93	57		
22407480	24194	1.90	.0748	46	22	22421650	24464	5.50	.2165	93	57		
22407870	24206	2.00	.0787	49	24	22422050	24470	5.60	.2205	93	57		
22408270	24215	2.10	.0827	49	24	22422440	24476	5.70	.2244	93	57		
22408660	24221	2.20	.0866	53	27	22422830	24482	5.80	.2283	93	57		
22409060	24227	2.30	.0906	53	27	22423230	24485	5.90	.2323	93	57		
22409450	24236	2.40	.0945	57	30	22423620	24494	6.00	.2362	93	57		
22409840	24245	2.50	.0984	57	30	22424020	24500	6.10	.2402	101	63		
22410240	24254	2.60	.1024	57	30	22424410	24506	6.20	.2441	101	63		

Metric (mm)	
D	Tolerance
0.30 - 20.00	+0.00/-0.013

See Series 204 on page 102 for inch size Jobber Drills.



Series 224 Continued



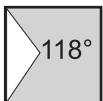
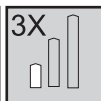
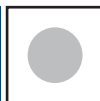
Tool No.	EDP	Diameter		OAL	Flute Length
		D			
		mm	Decimal	L1	L2
22424800	24512	6.30	.2480	101	63
22425190	24518	6.40	.2519	101	63
22425590	24521	6.50	.2559	101	63
22425980	24527	6.60	.2598	101	63
22426370	24533	6.70	.2637	101	63
22426770	24542	6.80	.2677	109	69
22427160	24545	6.90	.2716	109	69
22427560	24551	7.00	.2756	109	69
22427950	24557	7.10	.2795	109	69
22428340	24566	7.20	.2834	109	69
22428740	24569	7.30	.2874	109	69
22429130	24575	7.40	.2913	109	69
22429530	24581	7.50	.2953	109	69
22429920	24587	7.60	.2992	117	75
22430310	24593	7.70	.3031	117	75
22430710	24596	7.80	.3071	117	75
22431100	24599	7.90	.3110	117	75
22431500	24605	8.00	.3150	117	75
22431890	24611	8.10	.3189	117	75
22432280	24614	8.20	.3228	117	75
22432670	24620	8.30	.3267	117	75
22433070	24626	8.40	.3307	117	75
22433460	24632	8.50	.3346	117	75
22433850	24635	8.60	.3385	125	81
22434250	24641	8.70	.3425	125	81
22434640	24647	8.80	.3464	125	81
22435040	24653	8.90	.3504	125	81
22435430	24656	9.00	.3543	125	81
22435820	24662	9.10	.3582	125	81
22436220	24668	9.20	.3622	125	81
22436610	24671	9.30	.3661	125	81
22437000	24677	9.40	.3700	125	81

Tool No.	EDP	Diameter		OAL	Flute Length
		D			
		mm	Decimal	L1	L2
22437400	24680	9.50	.3740	125	81
22437790	24689	9.60	.3779	133	87
22438190	24692	9.70	.3819	133	87
22438580	24695	9.80	.3858	133	87
22438970	24701	9.90	.3897	133	87
22439370	24707	10.00	.3937	133	87
22439760	24713	10.10	.3976	133	87
22440150	24716	10.20	.4015	133	87
22440550	24722	10.30	.4055	133	87
22440940	24728	10.40	.4094	133	87
22441340	24734	10.50	.4134	133	87
22441730	24737	10.60	.4173	133	87
22442120	24740	10.70	.4212	142	94
22442520	24746	10.80	.4252	142	94
22442910	24749	10.90	.4291	142	94
22443310	24752	11.00	.4331	142	94
22443700	24755	11.10	.4370	142	94
22444090	24761	11.20	.4409	142	94
22444490	24764	11.30	.4449	142	94
22444880	24767	11.40	.4488	142	94
22445270	24770	11.50	.4527	142	94
22445670	24776	11.60	.4567	142	94
22446060	24779	11.70	.4606	142	94
22446450	24782	11.80	.4645	142	94
22446850	24785	11.90	.4685	151	101
22447240	24791	12.00	.4724	151	101
22449210	24797	12.50	.4921	151	101
22451180	24803	13.00	.5118	151	101
22453150	24812	13.50	.5315	160	108
22455120	24818	14.00	.5512	160	108



See Series 204 on page 102 for inch size Jobber Drills.

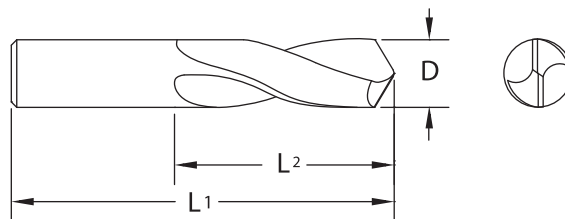
Twister® GP Series 226



Metric/
DIN
6539

See Series 206 on page 111 for inch size Stub Drills.

Recommended for drilling cast iron, aluminum, bronze and magnesium alloys and other abrasive, but easily machined materials.



- Designed to allow high feed rates with good chip flow.
- Four facet drill point minimizes drill wander and assures accurately sized holes.
- Shorter length reduces deflection and vibration, increases drill accuracy and improves tool life.

Tool No.	EDP	Diameter		OAL	Flute Length	
		D			L1	L2
		mm	Decimal			
22603940	26002	1.00	.0394	26	6	
22604130	26011	1.05	.0413	28	7	
22604330	26020	1.10	.0433	28	7	
22604520	26023	1.15	.0452	30	8	
22604720	26032	1.20	.0472	30	8	
22604920	26035	1.25	.0492	30	8	
22605110	26038	1.30	.0511	30	8	
22605310	26044	1.35	.0531	32	9	
22605510	26050	1.40	.0551	32	9	
22605710	26053	1.45	.0571	32	9	
22605900	26056	1.50	.0590	32	9	
22606300	26065	1.60	.0630	34	10	
22606690	26071	1.70	.0669	34	10	
22607080	26080	1.80	.0708	36	11	
22607480	26086	1.90	.0748	36	11	
22607870	26098	2.00	.0787	38	12	
22608270	26107	2.10	.0827	38	12	
22608660	26113	2.20	.0866	40	13	
22609060	26119	2.30	.0906	40	13	
22609450	26128	2.40	.0945	43	14	
22609840	26137	2.50	.0984	43	14	
22610240	26146	2.60	.1024	43	14	
22610630	26152	2.70	.1063	46	16	
22611020	26164	2.80	.1102	46	16	
22611420	26173	2.90	.1142	46	16	
22611810	26179	3.00	.1181	46	16	
22612200	26185	3.10	.1220	49	18	
22612600	26191	3.20	.1260	49	18	
22612990	26197	3.30	.1299	49	18	
22613390	26200	3.40	.1339	52	20	
22613780	26206	3.50	.1378	52	20	
22614170	26215	3.60	.1417	52	20	

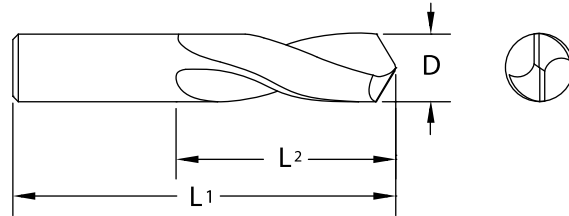
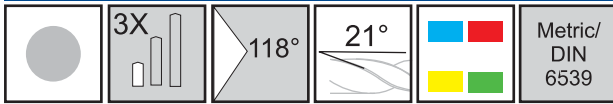
Tool No.	EDP	Diameter		OAL	Flute Length	
		D			L1	L2
		mm	Decimal			
22614570	26221	3.70	.1457	52	20	
22614960	26230	3.80	.1496	55	22	
22615350	26236	3.90	.1535	55	22	
22615750	26248	4.00	.1575	55	22	
22616140	26257	4.10	.1614	55	22	
22616540	26260	4.20	.1654	55	22	
22616930	26266	4.30	.1693	58	24	
22617320	26278	4.40	.1732	58	24	
22617720	26284	4.50	.1772	58	24	
22618110	26290	4.60	.1811	58	24	
22618500	26296	4.70	.1850	58	24	
22618890	26302	4.80	.1889	62	26	
22619290	26311	4.90	.1929	62	26	
22619680	26320	5.00	.1968	62	26	
22620080	26326	5.10	.2008	62	26	
22620470	26338	5.20	.2047	62	26	
22620860	26344	5.30	.2086	62	26	
22621260	26350	5.40	.2126	66	28	
22621650	26356	5.50	.2165	66	28	
22622050	26362	5.60	.2205	66	28	
22622440	26368	5.70	.2244	66	28	
22622830	26374	5.80	.2283	66	28	
22623230	26377	5.90	.2323	66	28	
22623620	26386	6.00	.2362	66	28	
22624020	26392	6.10	.2402	70	31	
22624410	26398	6.20	.2441	70	31	
22624800	26404	6.30	.2480	70	31	
22625190	26410	6.40	.2519	70	31	
22625590	26413	6.50	.2559	70	31	
22625980	26419	6.60	.2598	70	31	
22626370	26425	6.70	.2637	70	31	
22626770	26434	6.80	.2677	74	34	

Metric (mm)	
D	Tolerance
1.00 - 20.00	+0.000/-0.013



Page 167

Series 226 Continued



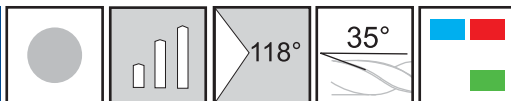
Tool No.	EDP	Diameter		OAL	Flute Length	
		D			L1	L2
		mm	Decimal			
22627160	26437	6.90	.2716	74	34	
22627560	26443	7.00	.2756	74	34	
22627950	26449	7.10	.2795	74	34	
22628340	26458	7.20	.2834	74	34	
22628740	26461	7.30	.2874	74	34	
22629130	26467	7.40	.2913	74	34	
22629530	26473	7.50	.2953	74	34	
22629920	26479	7.60	.2992	79	37	
22630310	26485	7.70	.3031	79	37	
22630710	26488	7.80	.3071	79	37	
22631100	26491	7.90	.3110	79	37	
22631500	26497	8.00	.3150	79	37	
22631890	26503	8.10	.3189	79	37	
22632280	26506	8.20	.3228	79	37	
22632670	26512	8.30	.3267	79	37	
22633070	26518	8.40	.3307	79	37	
22633460	26524	8.50	.3346	79	37	
22633850	26527	8.60	.3385	84	40	
22634250	26533	8.70	.3425	84	40	
22634640	26539	8.80	.3464	84	40	
22635040	26545	8.90	.3504	84	40	
22635430	26548	9.00	.3543	84	40	
22635820	26554	9.10	.3582	84	40	
22636220	26560	9.20	.3622	84	40	
22636610	26563	9.30	.3661	84	40	
22637000	26569	9.40	.3700	84	40	
22637400	26572	9.50	.3740	84	40	
22637790	26581	9.60	.3779	89	43	

Tool No.	EDP	Diameter		OAL	Flute Length	
		D			L1	L2
		mm	Decimal			
22638190	26584	9.70	.3819	89	43	
22638580	26587	9.80	.3858	89	43	
22638970	26593	9.90	.3897	89	43	
22639370	26599	10.00	.3937	89	43	
22639760	26605	10.10	.3976	89	43	
22640150	26608	10.20	.4015	89	43	
22640550	26614	10.30	.4055	89	43	
22640940	26620	10.40	.4094	89	43	
22641340	26626	10.50	.4134	89	43	
22641730	26629	10.60	.4173	89	43	
22642120	26632	10.70	.4212	95	47	
22642520	26638	10.80	.4252	95	47	
22642910	26641	10.90	.4291	95	47	
22643310	26644	11.00	.4331	95	47	
22643700	26647	11.10	.4370	95	47	
22644090	26653	11.20	.4409	95	47	
22644490	26656	11.30	.4449	95	47	
22644880	26659	11.40	.4488	95	47	
22645270	26662	11.50	.4527	95	47	
22645670	26668	11.60	.4567	95	47	
22646060	26671	11.70	.4606	95	47	
22646450	26674	11.80	.4645	95	47	
22646850	26677	11.90	.4685	102	51	
22647240	26683	12.00	.4724	102	51	
22649210	26689	12.50	.4921	102	51	
22651180	26695	13.00	.5118	102	51	
22653150	26704	13.50	.5315	107	54	
22655120	26710	14.00	.5512	107	54	



See Series 206 on page 111 for inch size Stub Drills.

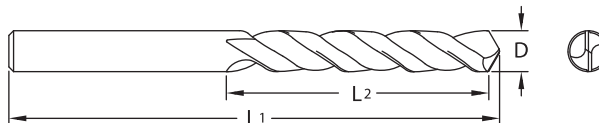
Twister® GP Series 300



Designed for drilling soft metals as well as glass reinforced circuit boards, phenolic-epoxies and other abrasive, but easily machined materials.



- Sizes from .0135 to .250.
- Over 150 sizes available.



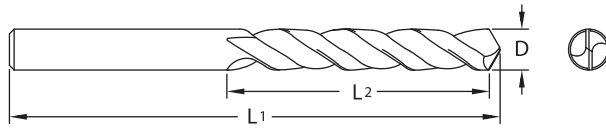
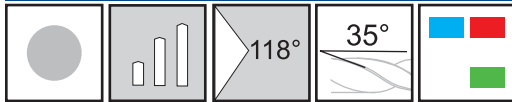
Tool No.	EDP	Diameter				OAL		Flute Length	
		D				L1		L2	
		Inch	Letter/Wire	mm	Decimal	Inch	mm	Inch	mm
30001350	30001		80		.0135	1-1/2		1/4	
30001450	30005		79		.0145	1-1/2		1/4	
30001560	30009	1/64			.0156	1-1/2		1/4	
30001600	30013		78		.0160	1-1/2		1/4	
30001800	30017		77		.0180	1-1/2		1/4	
30001970	30021			0.50	.0197		38		9.5
30002000	30025		76		.0200	1-1/2		3/8	
30002100	30029		75		.0210	1-1/2		3/8	
30002170	30033			0.55	.0217		38		9.5
30002250	30037		74		.0225	1-1/2		3/8	
30002360	30041			0.60	.0236		38		9.5
30002400	30045		73		.0240	1-1/2		3/8	
30002500	30049		72		.0250	1-1/2		1/2	
30002560	30053			0.65	.0256		38		12.5
30002600	30057		71		.0260	1-1/2		1/2	
30002760	30061			0.70	.0276		38		12.5
30002800	30065		70		.0280	1-1/2		1/2	
30002920	30069		69		.0292	1-1/2		1/2	
30002950	30073			0.75	.0295		38		12.5
30003100	30077		68		.0310	1-1/2		1/2	
30003120	30081	1/32			.0312	1-1/2		1/2	
30003150	30085			0.80	.0315		38		12.5
30003200	30089		67		.0320	1-1/2		1/2	
30003300	30093		66		.0330	1-1/2		1/2	
30003350	30097			0.85	.0335		38		12.5
30003500	30101		65		.0350	1-1/2		5/8	
30003540	30105			0.90	.0354		38		16.0
30003600	30109		64		.0360	1-1/2		5/8	
30003700	30113		63		.0370	1-1/2		5/8	
30003740	30117			0.95	.0374		38		16.0
30003800	30121		62		.0380	1-1/2		5/8	
30003900	30125		61		.0390	1-1/2		5/8	
30003940	30129			1.00	.0394		38		16.0
30004000	30133		60		.0400	1-1/2		5/8	

Inch	
D	Tolerance
.0135 - .2500	+ .0000 / - .0005

Metric (mm)	
D	Tolerance
0.50 - 3.15	+ .000 / - .013



Series 300 Continued



Tool No.	EDP	Diameter				OAL		Flute Length	
		D				L1		L2	
		Inch	Letter/Wire	mm	Decimal	Inch	mm	Inch	mm
30004100	30137		59		.0410	1-1/2		5/8	
30004130	30141			1.05	.0413		38		16.0
30004200	30145		58		.0420	1-1/2		5/8	
30004300	30149		57		.0430	1-1/2		5/8	
30004330	30153			1.10	.0433		38		16.0
30004520	30157			1.15	.0452		38		16.0
30004650	30161		56		.0465	1-1/2		5/8	
30004690	30165	3/64			.0469	1-1/2		5/8	
30004720	30169			1.20	.0472		38		16.0
30004920	30173			1.25	.0492		38		16.0
30005110	30177			1.30	.0511		38		16.0
30005200	30181		55		.0520	1-1/2		5/8	
30005310	30185			1.35	.0531		38		16.0
30005500	30189		54		.0550	1-1/2		5/8	
30005510	30193			1.40	.0551		38		16.0
30005710	30197			1.45	.0571		38		16.0
30005900	30201			1.50	.0590		38		16.0
30005950	30205		53		.0595	1-1/2		5/8	
30006100	30209			1.55	.0610		38		16.0
30006250	30213	1/16			.0625	1-1/2		5/8	
30006300	30217			1.60	.0630		38		16.0
30006350	30221		52		.0635	1-1/2		5/8	
30006490	30225			1.65	.0649		38		16.0
30006690	30229			1.70	.0669		38		16.0
30006700	30233		51		.0670	1-1/2		5/8	
30006890	30237			1.75	.0689		38		16.0
30007000	30241		50		.0700	1-1/2		5/8	
30007080	30245			1.80	.0708		38		16.0
30007280	30249			1.85	.0728		38		16.0
30007300	30253		49		.0730	1-1/2		5/8	
30007480	30257			1.90	.0748		38		16.0
30007600	30261		48		.0760	1-1/2		5/8	
30007670	30265			1.95	.0767		38		16.0
30007810	30269	5/64			.0781	1-1/2		5/8	
30007850	30273		47		.0785	1-1/2		5/8	
30007870	30277			2.00	.0787		38		16.0
30008070	30281			2.05	.0807		38		16.0
30008100	30285		46		.0810	1-1/2		5/8	
30008200	30289		45		.0820	1-1/2		5/8	
30008270	30293			2.10	.0827		38		16.0
30008460	30297			2.15	.0846		38		16.0
30008600	30301		44		.0860	1-1/2		5/8	

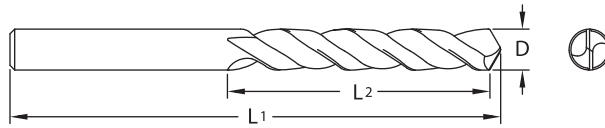
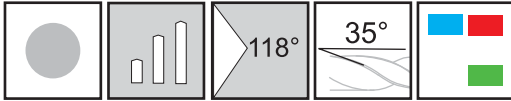


Series 300 Continued

Tool No.	EDP	Diameter				OAL		Flute Length	
		D				L1		L2	
		Inch	Letter/Wire	mm	Decimal	Inch	mm	Inch	mm
30008660	30305			2.20	.0866		38		16.0
30008860	30309			2.25	.0886		38		16.0
30008900	30313		43		.0890	1-1/2		5/8	
30009060	30317			2.30	.0906		38		16.0
30009250	30321			2.35	.0925		38		16.0
30009350	30325		42		.0935	1-1/2		5/8	
30009380	30329	3/32			.0938	1-1/2		5/8	
30009450	30333			2.40	.0945		38		16.0
30009600	30337		41		.0960	1-1/2		5/8	
30009650	30341			2.45	.0965		38		16.0
30009800	30345		40		.0980	1-1/2		5/8	
30009840	30349			2.50	.0984		38		16.0
30009950	30353		39		.0995	1-1/2		5/8	
30010040	30357			2.55	.1004		38		16.0
30010150	30361		38		.1015	1-1/2		5/8	
30010240	30365			2.60	.1024		38		16.0
30010400	30369		37		.1040	1-1/2		5/8	
30010430	30371			2.65	.1043		38		16.0
30010630	30373			2.70	.1063		38		16.0
30010650	30377		36		.1065	1-1/2		5/8	
30010830	30381			2.75	.1083		38		16.0
30010940	30385	7/64			.1094	1-1/2		5/8	
30011000	30389		35		.1100	1-1/2		5/8	
30011020	30393			2.80	.1102		38		16.0
30011100	30397		34		.1110	1-1/2		5/8	
30011220	30401			2.85	.1122		38		16.0
30011300	30405		33		.1130	1-1/2		5/8	
30011420	30409			2.90	.1142		38		16.0
30011600	30413		32		.1160	1-1/2		5/8	
30011610	30415			2.95	.1161		38		16.0
30011810	30417			3.00	.1181		38		16.0
30012000	30421		31		.1200	1-1/2		5/8	
30012010	30423			3.05	.1201		38		16.0
30012200	30425			3.10	.1220		38		16.0
30012400	30427			3.15	.1240		38		16.0
30012500	30429	1/8			.1250	1-1/2		5/8	
30012850	30437		30		.1285	1-1/2		3/4	
30013600	30441		29		.1360	1-1/2		3/4	
30014050	30445		28		.1405	1-1/2		3/4	
30014060	30449	9/64			.1406	1-1/2		3/4	
30014400	30453		27		.1440	1-1/2		3/4	
30014700	30457		26		.1470	1-1/2		3/4	
30014950	30461		25		.1495	1-1/2		3/4	
30015200	30465		24		.1520	1-1/2		3/4	
30015400	30469		23		.1540	1-1/2		3/4	
30015620	30473	5/32			.1562	1-1/2		3/4	



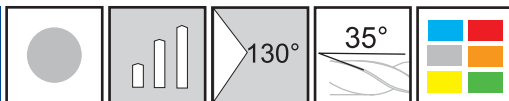
Series 300 Continued



Tool No.	EDP	Diameter				OAL		Flute Length	
		D				L1		L2	
		Inch	Letter/Wire	mm	Decimal	Inch	mm	Inch	mm
30015700	30477		22		.1570	1-1/2		3/4	
30015900	30481		21		.1590	1-1/2		3/4	
30016100	30485		20		.1610	1-1/2		3/4	
30016600	30489		19		.1660	1-1/2		3/4	
30016950	30493		18		.1695	1-1/2		3/4	
30017190	30497	11/64			.1719	1-1/2		3/4	
30017300	30501		17		.1730	1-1/2		3/4	
30017700	30505		16		.1770	1-1/2		3/4	
30018000	30509		15		.1800	1-1/2		3/4	
30018200	30513		14		.1820	1-1/2		3/4	
30018500	30517		13		.1850	1-1/2		3/4	
30018750	30521	3/16			.1875	1-1/2		3/4	
30018900	30525		12		.1890	1-1/2		3/4	
30019100	30529		11		.1910	1-1/2		3/4	
30019350	30533		10		.1935	1-1/2		3/4	
30019600	30537		9		.1960	1-1/2		3/4	
30019900	30541		8		.1990	1-1/2		3/4	
30020100	30545		7		.2010	1-1/2		3/4	
30020310	30549	13/64			.2031	1-1/2		3/4	
30020400	30553		6		.2040	1-1/2		3/4	
30020550	30557		5		.2055	1-1/2		3/4	
30020900	30561		4		.2090	1-1/2		3/4	
30021300	30565		3		.2130	1-1/2		3/4	
30021870	30569	7/32			.2187	1-1/2		3/4	
30022100	30573		2		.2210	1-1/2		3/4	
30022800	30577		1		.2280	1-1/2		3/4	
30023400	30581		A		.2340	1-1/2		3/4	
30023440	30585	15/64			.2344	1-1/2		3/4	
30023800	30589		B		.2380	1-1/2		3/4	
30024200	30593		C		.2420	1-1/2		3/4	
30024600	30597		D		.2460	1-1/2		3/4	
30025000	30601	1/4	E		.2500	1-1/2		3/4	



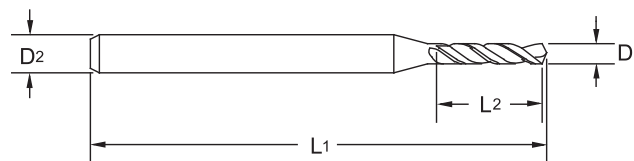
Twister® GP Series 302



Micro drills are manufactured in up to 3 different flute lengths, depending on diameter.



- Drills available with color coded depth setting rings upon request.



Tool No.	EDP	Diameter				Shank		OAL		Flute Length	
		D1				D2		L1		L2	
		Inch	Letter/Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm
30200390	32001		102	0.10	.0039	1/8	3.175	1-1/2	38	.065	1.70
30200430	32005		101		.0043	1/8		1-1/2		.065	
30200470	32009		100		.0047	1/8		1-1/2		.065	
30200510	32013		99		.0051	1/8		1-1/2		.065	
30200550	32017		98		.0055	1/8		1-1/2		.065	
30200590	32021		97	0.15	.0059	1/8	3.175	1-1/2	38	.100	2.50
30200600	32025				.0060	1/8		1-1/2		.100	
30200630	32029		96		.0063	1/8		1-1/2		.100	
30200670	32033		95		.0067	1/8		1-1/2		.100	
30200700	32037				.0070	1/8		1-1/2		.100	
30200710	32041		94		.0071	1/8		1-1/2		.100	
30200750	32045		93		.0075	1/8		1-1/2		.100	
30200780	32049			0.20	.0078		3.175		38		3.20
30200790	32053		92		.0079	1/8		1-1/2		.125	
30200800	32057				.0080	1/8		1-1/2		.125	
30200830	32061		91		.0083	1/8		1-1/2		.125	
30200870	32065		90		.0087	1/8		1-1/2		.125	
30200900	32069				.0090	1/8		1-1/2		.125	
30200910	32073		89		.0091	1/8		1-1/2		.125	
30200950	32077		88		.0095	1/8		1-1/2		.125	
30200980	32081			0.25	.0098		3.175		38		3.80
30201000	32085		87		.0100	1/8		1-1/2		.150	
30201050	32089		86		.0105	1/8		1-1/2		.150	
30201100	32093		85		.0110	1/8		1-1/2		.150	
30201150	32097		84		.0115	1/8		1-1/2		.150	
30201180	32101			0.30	.0118		3.175		38		4.80
30201200	32105		83		.0120	1/8		1-1/2		.190	
30201250	32109		82		.0125	1/8		1-1/2		.190	
30201300	32113		81		.0130	1/8		1-1/2		.190	
30201350	32117		80		.0135	1/8		1-1/2		.190	
30201351	32119		80		.0135	1/8		1-1/2		.250	
30201380	32121			0.35	.0138		3.175		38		4.80
30201381	32123			0.35	.0138		3.175		38		6.35
30201450	32125		79		.0145	1/8		1-1/2		.190	

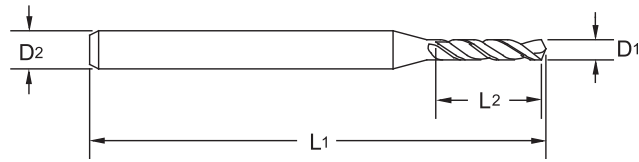
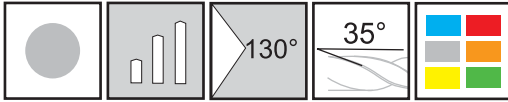
Inch	
D1	Tolerance
≤ 0.010	+0.000/-0.0003
> 0.010	+0.000/-0.0005
L1	Tolerance
≤ 0.010	+/-0.005
> 0.010	+/-0.005
D2	Tolerance
≤ .125	+0.000/-0.0002

Metric (mm)	
D1	Tolerance
≤ 0.25	+0.000/-0.008
> 0.25	+0.000/-0.013
L1	Tolerance
≤ 0.25	+/-0.130
> 0.25	+/-0.130
D2	Tolerance
≤ 3.18	+0.000/-0.005

For our High Performance Micro Drill see page 87 for the 305 Series.



Series 302 Continued



Tool No.	EDP	Diameter				Shank		OAL		Flute Length	
		D1				D2		L1		L2	
		Inch	Letter/Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm
30201451	32127		79		.0145	1/8		1-1/2		.250	
30201560	32129	1/64			.0156	1/8		1-1/2		.190	
30201561	32131	1/64			.0156	1/8		1-1/2		.250	
30201570	32133			0.40	.0157		3.175		38		4.80
30201571	32135			0.40	.0157		3.175		38		6.35
30201600	32137		78		.0160	1/8		1-1/2		.190	
30201601	32139		78		.0160	1/8		1-1/2		.250	
30201770	32141			0.45	.0177		3.175		38		4.80
30201771	32143			0.45	.0177		3.175		38		6.35
30201772	32144			0.45	.0177		3.175		38		8.13
30201800	32145		77		.0180	1/8		1-1/2		.190	
30201801	32147		77		.0180	1/8		1-1/2		.250	
30201802	32148		77		.0180	1/8		1-1/2		.320	
30201970	32149			0.50	.0197		3.175		38		4.80
30201971	32151			0.50	.0197		3.175		38		6.35
30201972	32152			0.50	.0197		3.175		38		8.13
30202000	32153		76		.0200	1/8		1-1/2		.190	
30202001	32155		76		.0200	1/8		1-1/2		.250	
30202002	32156		76		.0200	1/8		1-1/2		.320	
30202100	32157		75		.0210	1/8		1-1/2		.190	
30202101	32159		75		.0210	1/8		1-1/2		.250	
30202102	32160		75		.0210	1/8		1-1/2		.320	
30202170	32161			0.55	.0217		3.175		38		4.80
30202171	32163			0.55	.0217		3.175		38		6.35
30202172	32164			0.55	.0217		3.175		38		8.13
30202250	32165		74		.0225	1/8		1-1/2		.190	
30202251	32167		74		.0225	1/8		1-1/2		.250	
30202252	32168		74		.0225	1/8		1-1/2		.320	
30202360	32169			0.60	.0236		3.175		38		4.80
30202361	32171			0.60	.0236		3.175		38		6.35
30202362	32172			0.60	.0236		3.175		38		8.13
30202400	32173		73		.0240	1/8		1-1/2		.190	
30202401	32175		73		.0240	1/8		1-1/2		.250	
30202402	32176		73		.0240	1/8		1-1/2		.320	
30202500	32177		72		.0250	1/8		1-1/2		.190	
30202501	32179		72		.0250	1/8		1-1/2		.250	
30202502	32180		72		.0250	1/8		1-1/2		.320	
30202560	32181			0.65	.0256		3.175		38		4.80
30202561	32183			0.65	.0256		3.175		38		6.35
30202562	32184			0.65	.0256		3.175		38		8.13
30202600	32185		71		.0260	1/8		1-1/2		.190	
30202601	32187		71		.0260	1/8		1-1/2		.250	



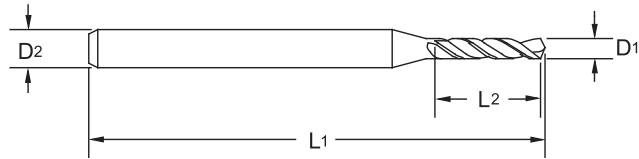
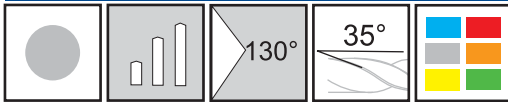
Series 302 Continued

Tool No.	EDP	Diameter				Shank		OAL		Flute Length	
		D1				D2		L1		L2	
		Inch	Letter/Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm
30202602	32188		71		.0260	1/8		1-1/2		.320	
30202760	32189			0.70	.0276		3.175		38		6.35
30202761	32191			0.70	.0276		3.175		38		8.13
30202762	32192			0.70	.0276		3.175		38		10.16
30202800	32193		70		.0280	1/8		1-1/2		.250	
30202801	32195		70		.0280	1/8		1-1/2		.320	
30202802	32196		70		.0280	1/8		1-1/2		.400	
30202920	32197		69		.0292	1/8		1-1/2		.250	
30202921	32199		69		.0292	1/8		1-1/2		.320	
30202922	32200		69		.0292	1/8		1-1/2		.400	
30202950	32201			0.75	.0295		3.175		38		6.35
30202951	32203			0.75	.0295		3.175		38		8.13
30202952	32204			0.75	.0295		3.175		38		10.16
30203100	32205		68		.0310	1/8		1-1/2		.250	
30203101	32207		68		.0310	1/8		1-1/2		.400	
30203120	32209	1/32			.0312	1/8		1-1/2		.250	
30203121	32211	1/32			.0312	1/8		1-1/2		.400	
30203150	32213			0.80	.0315		3.175		38		6.35
30203151	32215			0.80	.0315		3.175		38		10.16
30203200	32217		67		.0320	1/8		1-1/2		.250	
30203201	32219		67		.0320	1/8		1-1/2		.400	
30203300	32221		66		.0330	1/8		1-1/2		.250	
30203301	32223		66		.0330	1/8		1-1/2		.400	
30203350	32225			0.85	.0335		3.175		38		6.35
30203351	32227			0.85	.0335		3.175		38		10.16
30203500	32229		65		.0350	1/8		1-1/2		.400	
30203540	32233			0.90	.0354		3.175		38		10.16
30203600	32237		64		.0360	1/8		1-1/2		.400	
30203700	32241		63		.0370	1/8		1-1/2		.400	
30203740	32245			0.95	.0374		3.175		38		10.16
30203800	32249		62		.0380	1/8		1-1/2		.400	
30203900	32253		61		.0390	1/8		1-1/2		.400	
30203940	32257			1.00	.0394		3.175		38		10.16
30204000	32261		60		.0400	1/8		1-1/2		.400	
30204100	32265		59		.0410	1/8		1-1/2		.400	
30204130	32269			1.05	.0413		3.175		38		10.16
30204200	32273		58		.0420	1/8		1-1/2		.400	
30204300	32277		57		.0430	1/8		1-1/2		.400	
30204330	32281			1.10	.0433		3.175		38		10.16
30204520	32285			1.15	.0452		3.175		38		10.16
30204650	32289		56		.0465	1/8		1-1/2		.400	
30204690	32293	3/64			.0469	1/8		1-1/2		.400	
30204720	32297			1.20	.0472		3.175		38		10.16
30204920	32301			1.25	.0492		3.175		38		10.16



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Series 302 Continued



Tool No.	EDP	Diameter				Shank		OAL		Flute Length	
		D1				D2		L1		L2	
		Inch	Letter/Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm
30205110	32305			1.30	.0511		3.175		38		10.16
30205200	32309		55		.0520	1/8		1-1/2		.400	
30205310	32313			1.35	.0531		3.175		38		10.16
30205500	32317		54		.0550	1/8		1-1/2		.400	
30205510	32321			1.40	.0551		3.175		38		10.16
30205710	32325			1.45	.0571		3.175		38		10.16
30205900	32329			1.50	.0590		3.175		38		10.16
30205950	32333		53		.0595	1/8		1-1/2		.400	
30206100	32341			1.55	.0610		3.175		38		10.16
30206250	32345	1/16			.0625	1/8		1-1/2		.480	
30206300	32349			1.60	.0630		3.175		38		12.19
30206350	32353		52		.0635	1/8		1-1/2		.480	
30206490	32357			1.65	.0649		3.175		38		12.19
30206690	32361			1.70	.0669		3.175		38		12.19
30206700	32365		51		.0670	1/8		1-1/2		.480	
30206890	32369			1.75	.0689		3.175		38		12.19
30207000	32373		50		.0700	1/8		1-1/2		.480	
30207080	32377			1.80	.0708		3.175		38		12.19
30207280	32381			1.85	.0728		3.175		38		12.19
30207300	32385		49		.0730	1/8		1-1/2		.480	
30207480	32389			1.90	.0748		3.175		38		12.19
30207600	32393		48		.0760	1/8		1-1/2		.480	
30207670	32397			1.95	.0767		3.175		38		12.19
30207810	32401	5/64			.0781	1/8		1-1/2		.480	
30207850	32405		47		.0785	1/8		1-1/2		.480	
30207870	32409			2.00	.0787		3.175		38		12.19
30208070	32413			2.05	.0807		3.175		38		12.19
30208100	32417		46		.0810	1/8		1-1/2		.480	
30208200	32421		45		.0820	1/8		1-1/2		.480	
30208270	32425			2.10	.0827		3.175		38		12.19
30208460	32429			2.15	.0846		3.175		38		12.19
30208600	32433		44		.0860	1/8		1-1/2		.480	
30208660	32437			2.20	.0866		3.175		38		12.19
30208860	32441			2.25	.0886		3.175		38		12.19
30208900	32445		43		.0890	1/8		1-1/2		.480	
30209060	32449			2.30	.0906		3.175		38		12.19
30209250	32453			2.35	.0925		3.175		38		12.19
30209350	32457		42		.0935	1/8		1-1/2		.480	
30209380	32461	3/32			.0938	1/8		1-1/2		.480	
30209450	32465			2.40	.0945		3.175		38		12.19



Series 302 Continued

Tool No.	EDP	Diameter				Shank		OAL		Flute Length	
		D1				D2		L1		L2	
		Inch	Letter/Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm
30209600	32469		41		.0960	1/8		1-1/2		.480	
30209650	32473			2.45	.0965		3.175		38		12.19
30209800	32477		40		.0980	1/8		1-1/2		.480	
30209840	32481			2.50	.0984		3.175		38		12.19
30209950	32485		39		.0995	1/8		1-1/2		.480	
30210040	32489			2.55	.1004		3.175		38		12.19
30210150	32493		38		.1015	1/8		1-1/2		.480	
30210240	32497			2.60	.1024		3.175		38		12.19
30210400	32501		37		.1040	1/8		1-1/2		.480	
30210430	32503			2.65	.1043		3.175		38		12.19
30210630	32509			2.70	.1063		3.175		38		12.19
30210650	32513		36		.1065	1/8		1-1/2		.480	
30210830	32517			2.75	.1083		3.175		38		12.19
30210940	32521	7/64			.1094	1/8		1-1/2		.480	
30211000	32525		35		.1100	1/8		1-1/2		.480	
30211020	32529			2.80	.1102		3.175		38		12.19
30211100	32533		34		.1110	1/8		1-1/2		.480	
30211220	32537			2.85	.1122		3.175		38		12.19
30211300	32541		33		.1130	1/8		1-1/2		.480	
30211420	32545			2.90	.1142		3.175		38		12.19
30211600	32549		32		.1160	1/8		1-1/2		.480	
30211610	32551			2.95	.1161		3.175		38		12.19
30211810	32553			3.00	.1181		3.175		38		12.19
30212000	32557		31		.1200	1/8		1-1/2		.480	
30212010	32559			3.05	.1201		3.175		38		12.19
30212200	32561			3.10	.1220		3.175		38		12.19
30212400	32565			3.15	.1240		3.175		38		12.19
30212500	32569	1/8			.1250	1/8		1-1/2		.480	

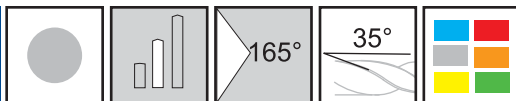


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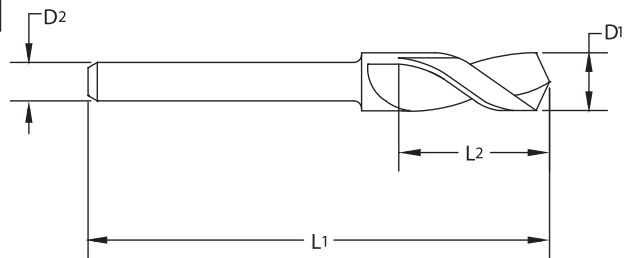


For product information, call your local distributor.

Twister® GP Series 306



- Drills available with color coded depth setting rings upon request.



Tool No.	EDP	Diameter			Shank		OAL		Flute Length		Stock Status
		D1			D2		L1		L2		• Stocked
		Inch/Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	o Non-Stocked
30612600	36003		3.20	.1260		3.175		38		12.2	•
30612800	36005		3.25	.1280		3.175		38		12.2	o
30612850	36007	30		.1285	1/8		1-1/2		.480		•
30612990	36009		3.30	.1299		3.175		38		12.2	•
30613190	36011		3.35	.1319		3.175		38		12.2	•
30613390	36013		3.40	.1339		3.175		38		12.2	o
30613580	36015		3.45	.1358		3.175		38		12.2	o
30613600	36017	29		.1360	1/8		1-1/2		.480		•
30613780	36019		3.50	.1378		3.175		38		12.2	o
30613980	36021		3.55	.1398		3.175		38		12.2	o
30614050	36023	28		.1405	1/8		1-1/2		.480		•
30614060	36025	9/64		.1406	1/8		1-1/2		.480		•
30614170	36027		3.60	.1417		3.175		38		12.2	o
30614370	36029		3.65	.1437		3.175		38		12.2	o
30614400	36031	27		.1440	1/8		1-1/2		.480		•
30614570	36033		3.70	.1457		3.175		38		12.2	o
30614700	36035	26		.1470	1/8		1-1/2		.480		o
30614760	36037		3.75	.1476		3.175		38		12.2	o
30614950	36039	25		.1495	1/8		1-1/2		.480		•
30614960	36041		3.80	.1496		3.175		38		12.2	o
30615160	36042		3.85	.1516		3.175		38		12.2	o
30615200	36043	24		.1520	1/8		1-1/2		.480		•
30615350	36045		3.90	.1535		3.175		38		12.2	o
30615400	36047	23		.1540	1/8		1-1/2		.480		o
30615550	36049		3.95	.1555		3.175		38		12.2	•
30615620	36051	5/32		.1562	1/8		1-1/2		.480		•
30615700	36053	22		.1570	1/8		1-1/2		.480		o
30615750	36055		4.00	.1575		3.175		38		12.2	o
30615900	36057	21		.1590	1/8		1-1/2		.480		•
30615940	36059		4.05	.1594		3.175		38		12.2	o
30616100	36061	20		.1610	1/8		1-1/2		.480		o
30616140	36063		4.10	.1614		3.175		38		12.2	o
30616340	36065		4.15	.1634		3.175		38		12.2	o
30616540	36067		4.20	.1654		3.175		38		12.2	o
30616600	36069	19		.1660	1/8		1-1/2		.480		•
30616730	36071		4.25	.1673		3.175		38		12.2	o

Inch	
D1	Tolerance
.1285 - .2570	+0/-.0005
L1	Tolerance
.1285 - .2570	+/- .005
D2	Tolerance
.1285 - .2570	+0/-.0005

Metric (mm)	
D1	Tolerance
3.20 - 6.35	+0/-.013
L1	Tolerance
3.20 - 6.35	+/- .130
D2	Tolerance
3.20 - 6.35	+0/-.013



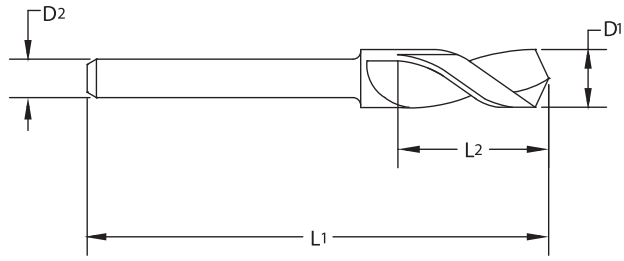
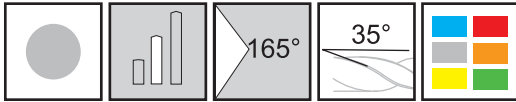
Series 306 Continued

Tool No.	EDP	Diameter			Shank		OAL		Flute Length		Stock Status	
		D1			D2		L1		L2		• Stocked	
		Inch/Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	o Non-Stocked	
30616930	36073		4.30	.1693		3.175		38		12.2		o
30616950	36075	18		.1695	1/8		1-1/2		.480			o
30617130	36077		4.35	.1713		3.175		38		12.2		o
30617190	36079	11/64		.1719	1/8		1-1/2		.480			o
30617300	36081	17		.1730	1/8		1-1/2		.480			o
30617320	36083		4.40	.1732		3.175		38		12.2		o
30617520	36085		4.45	.1752		3.175		38		12.2		o
30617700	36087	16		.1770	1/8		1-1/2		.480			o
30617720	36089		4.50	.1772		3.175		38		12.2		o
30617910	36091		4.55	.1791		3.175		38		12.2		o
30618000	36093	15		.1800	1/8		1-1/2		.480			o
30618110	36095		4.60	.1811		3.175		38		12.2		o
30618200	36097	14		.1820	1/8		1-1/2		.480			o
30618310	36099		4.65	.1831		3.175		38		12.2		o
30618500	36101	13	4.70	.1850	1/8	3.175	1-1/2	38	.480	12.2		o
30618700	36103		4.75	.1870		3.175		38		12.2		o
30618750	36105	3/16		.1875	1/8		1-1/2		.480			•
30618900	36107	12	4.80	.1890	1/8	3.175	1-1/2	38	.480	12.2		o
30619090	36109		4.85	.1909		3.175		38		12.2		o
30619100	36111	11		.1910	1/8		1-1/2		.480			o
30619290	36113		4.90	.1929		3.175		38		12.2		o
30619350	36115	10		.1935	1/8		1-1/2		.480			o
30619490	36117		4.95	.1949		3.175		38		12.2		o
30619600	36119	9		.1960	1/8		1-1/2		.480			o
30619690	36121		5.00	.1969		3.175		38		12.2		o
30619880	36123		5.05	.1988		3.175		38		12.2		o
30619900	36125	8		.1990	1/8		1-1/2		.480			o
30620080	36127		5.10	.2008		3.175		38		12.2		o
30620100	36129	7		.2010	1/8		1-1/2		.480			o
30620280	36131		5.15	.2028		3.175		38		12.2		o
30620310	36133	13/64		.2031	1/8		1-1/2		.480			o
30620400	36135	6		.2040	1/8		1-1/2		.480			o
30620470	36137		5.20	.2047		3.175		38		12.2		o
30620550	36139	5		.2055	1/8		1-1/2		.480			o
30620670	36141		5.25	.2067		3.175		38		12.2		o
30620870	36143		5.30	.2087		3.175		38		12.2		o
30620900	36145	4		.2090	1/8		1-1/2		.480			o
30621060	36147		5.35	.2106		3.175		38		12.2		o
30621260	36149		5.40	.2126		3.175		38		12.2		o
30621300	36151	3		.2130	1/8		1-1/2		.480			o
30621460	36153		5.45	.2146		3.175		38		12.2		o
30621650	36155		5.50	.2165		3.175		38		12.2		o
30621850	36157		5.55	.2185		3.175		38		12.2		o
30621870	36159	7/32		.2187	1/8		1-1/2		.480			•



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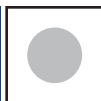
Series 306 Continued



Tool No.	EDP	Diameter			Shank		OAL		Flute Length		Stock Status
		D1			D2		L1		L2		• Stocked
		Inch/Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	o Non-Stocked
30622050	36161		5.60	.2205		3.175		38		12.2	o
30622100	36163	2		.2210	1/8		1-1/2		.480		o
30622240	36165		5.65	.2224		3.175		38		12.2	o
30622440	36167		5.70	.2244		3.175		38		12.2	o
30622640	36169		5.75	.2264		3.175		38		12.2	o
30622800	36171	1		.2280	1/8		1-1/2		.480		o
30622830	36173		5.80	.2283		3.175		38		12.2	o
30623030	36175		5.85	.2303		3.175		38		12.2	o
30623230	36177		5.90	.2323		3.175		38		12.2	o
30623400	36179	A		.2340	1/8		1-1/2		.480		o
30623430	36181		5.95	.2343		3.175		38		12.2	o
30623440	36183	15/64		.2344	1/8		1-1/2		.480		o
30623620	36185		6.00	.2362		3.175		38		12.2	o
30623800	36187	B		.2380	1/8		1-1/2		.480		o
30623820	36188		6.05	.2382		3.175		38		12.2	o
30624020	36189		6.10	.2402		3.175		38		12.2	o
30624200	36191	C		.2420	1/8		1-1/2		.480		o
30624210	36192		6.15	.2421		3.175		38		12.2	o
30624410	36193		6.20	.2441		3.175		38		12.2	o
30624600	36195	D		.2460	1/8		1-1/2		.480		o
30624610	36197		6.25	.2461		3.175		38		12.2	o
30624800	36199		6.30	.2480		3.175		38		12.2	o
30625000	36201	1/4 & E	6.35	.2500	1/8	3.175	1-1/2	38	.480	12.2	•
30625700	36203	F		.2570	1/8		1-1/2		.480		o

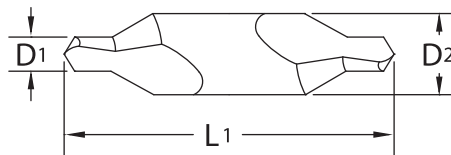


Twister® GP Series 402



Metric/
DIN
333A

Designed to maintain accurate center holes on long production runs, or when precise centering is required.



- 60° included angle.
- Solid carbide construction helps reduce tool changes when centering abrasive or difficult to machine materials.

Tool No.	EDP	Diameter			Shank		OAL	
		D1			D2		L1	
		Size	Inch	mm	Inch	mm	Inch	mm
40201970	40201			0.5		3.15		31.5*
40202500	40205	00	.025		1/8		1-1/2	
40203100	40209	0	1/32		1/8		1-1/2	
40203150	40213			0.8		3.15		31.5*
40203940	40217			1.0		3.15		31.5
40204680	40221	1	3/64		1/8		1-1/2	
40204920	40225			1.25		3.15		31.5
40206300	40229			1.6		4.0		35.5
40207810	40233	2	5/64		3/16		1-7/8	
40207870	40237			2.0		5.0		40
40209840	40241			2.5		6.3		45
40210930	40245	3	7/64		1/4		2	
40212400	40249			3.15		8.0		50
40212500	40253	4	1/8		5/16		2-1/8	
40215750	40257			4.0		10.0		56
40218750	40261	5	3/16		7/16		2-3/4	
40219680	40265			5.0		12.5		63
40221870	40269	6	7/32		1/2		3	

Inch	
D1	Tolerance
.0250 - 7/32	+ .003/- .000

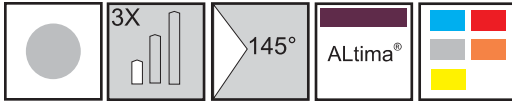
Metric (mm)	
D1	Tolerance
0.50 - 5.0	+ .076/- .000



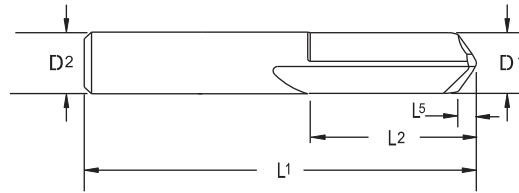
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*Overall length not to DIN specifications.

Twister® Series 200S



Spot Drills for High Performance Drills.



Tool No.	EDP	Diameter			Shank		OAL		Flute Length		Point Length	
		D1 (h7)			D2 (h6)		L1		L2		L5	
		Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm
200S11810A	20221		3.0	.1181		3.0		38		16		0.41
200S12500A	20230	1/8		.1250	1/8		1-1/2		5/8		0.017	
200S23620A	20431		6.0	.2362		6.0		51		19		0.83
200S25000A	20452	1/4		.2500	1/4		2		3/4		0.034	
200S31250A	20542	5/16		.3125	5/16		2-1/2		3/4		0.043	
200S31500A	20545		8.0	.3150		8.0		64		19		1.10
200S37500A	20623	3/8		.3750	3/8		2-1/2		1		0.052	
200S39370A	20647		10.0	.3937		10.0		70		25		1.38
200S47240A	20731		12.0	.4724		12.0		76		25		1.65
200S50000A	20740	1/2		.5000	1/2		3		1		0.069	
200S62500A	20782	5/8		.6250	5/8		3-1/2		1-1/4		0.086	
200S62990A	20785		16.0	.6299		16.0		89		32		2.20

Inch	
D1	Tolerance (h7)
.1182 - .2362	+0/- .00047
.2363 - .3937	+0/- .00059
.3938 - .6250	+0/- .00071

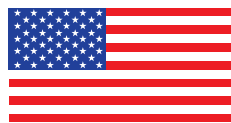
Inch	
D2	Tolerance (h6)
.1182 - .2362	+0/- .00031
.2363 - .3937	+0/- .00035
.3938 - .6250	+0/- .00043

Metric (mm)	
D1	Tolerance (h7)
3.0	+0/- .010
3.01 - 6.0	+0/- .012
6.01 - 10.0	+0/- .015
10.01 - 16.0	+0/- .018

Metric (mm)	
D2	Tolerance (h6)
3.0	+0/- .006
3.01 - 6.0	+0/- .008
6.01 - 10.0	+0/- .009
10.01 - 16.0	+0/- .011

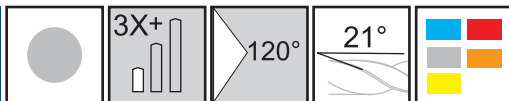


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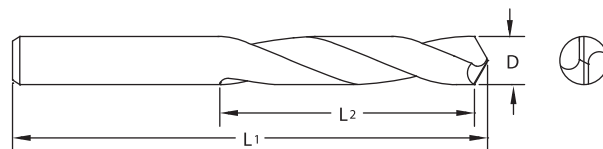


Made in USA

Twister® GP Series 403



Designed for accurate spotting on NC machines. Solid carbide construction, short lengths and no body clearance make this a very rigid tool.



- Can be used at higher speeds and feeds, compatible with other carbide tooling.
- Easy to repoint because there is no web taper.

Tool No.	EDP	Diameter			OAL		Flute Length	
		D			L1		L2	
		Inch	mm	Decimal	Inch	mm	Inch	mm
40318750	40301	3/16		.1875	2		1	
40319680	40305		5.0	.1968		51		26.0
40323620	40309		6.0	.2362		51		26.0
40325000	40313	1/4		.2500	2		1	
40331250	40317	5/16		.3125	2-1/2		1	
40331500	40321		8.0	.3150		64		26.0
40337500	40325	3/8		.3750	2-1/2		1	
40339370	40329		10.0	.3937		70		30.0
40347240	40333		12.0	.4724		76		39.5
40350000	40337	1/2		.5000	3		1-9/16	

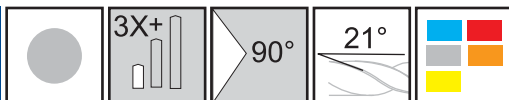
Inch	
D	Tolerance
.1875 - .5000	+0.0000/-0.0005

Metric (mm)	
D	Tolerance
5.00 - 12.00	+0.0000/-0.0130

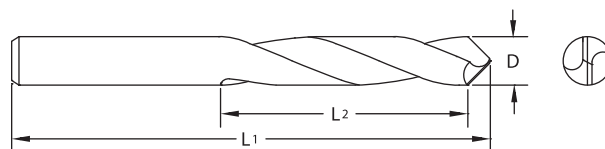


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Twister® GP Series 404



Designed for accurate spotting on NC machines. Solid carbide construction, short lengths and no body clearance make this a very rigid tool.



- Can be used at higher speeds and feeds, compatible with other carbide tooling.
- Easy to repoint because there is no web taper.

Tool No.	EDP	Diameter			OAL		Flute Length	
		D			L1		L2	
		Inch	mm	Decimal	Inch	mm	Inch	mm
40418750	40401	3/16		.1875	2		1	
40419680	40405		5.0	.1968		51		26.0
40423620	40409		6.0	.2362		51		26.0
40425000	40413	1/4		.2500	2		1	
40431250	40417	5/16		.3125	2-1/2		1	
40431500	40421		8.0	.3150		64		26.0
40437500	40425	3/8		.3750	2-1/2		1	
40439370	40429		10.0	.3937		70		30.0
40447240	40433		12.0	.4724		76		39.5
40450000	40437	1/2		.5000	3		1-9/16	

Inch	
D	Tolerance
.1875 - .5000	+0.0000/-0.0005

Metric (mm)	
D	Tolerance
5.00 - 12.00	+0.0000/-0.0130

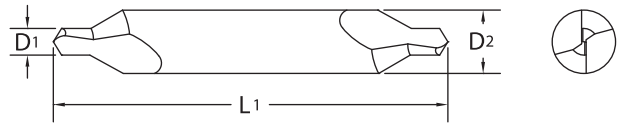


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Twister® GP Series 405



Designed to maintain accurate center holes on long production runs or when precise centering is required.



- 60° included angle.
- Solid carbide construction helps reduce tool changes when centering abrasive or difficult to machine materials.

Tool No.	EDP	Diameter		Shank	OAL
		Size	D1	D2	L1
40502500	40501	00	.0250	1/8	5
40503100	40505	0	1/32	1/8	5
40504680	40509	1	3/64	1/8	5
40507810	40513	2	5/64	3/16	5
40510930	40517	3	7/64	1/4	5
40512500	40521	4	1/8	5/16	5
40518750	40525	5	3/16	7/16	5
40521870	40529	6	7/32	1/2	5

Inch	
D1	Tolerance
.0250 - 7/32	+ .003/- .000



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ISO 9001:2015 Certified



High Performance Drill Selection Chart



Our industry leading high performance drill with the same high quality that helped set the standard.



Multipurpose high quality drill for most drilling applications adding stability, hole quality, tool life, and finish (excludes some work hardening materials).



An economical choice perfect for job shop and batch production work requiring a high performance drill option.

Series	Drill Lgth	Size Range Inch	Size Range mm	Margin	D1 Tol.	D2 Tol.	Helix	Point Angle	Coolant Fed	DIN	Coating	Application Recommendations							
												TEMA* Sizes	Steel	Hardened Steel	Stainless Steel	PH Stainless Steel	Cast Iron	Titanium	High Temp Alloys
CXDSS	3X	#31-3/4	3.0-20.0	Double	m7	h6	30°	140°	N	6537K	ALtima® Plus	X	1st	2nd	2nd	2nd	1st	2nd	2nd
CXDSR	5X	#31-5/8	3.0-16.0	Double	m7	h6	30°	140°	N	6537L	ALtima® Plus	X	1st	2nd	2nd	2nd	1st	2nd	2nd
CXDSC	3X	#31-5/8	3.0-16.0	Double	m7	h6	30°	140°	Y	6537K	ALtima® Plus	X	1st	2nd	1st	2nd	1st	1st	2nd
CXDRC	5X	#31-3/4	3.0-20.0	Double	m7	h6	30°	140°	Y	6537L	ALtima® Plus	X	1st	2nd	1st	2nd	1st	1st	2nd
CXDCL	8X	#31-5/8	3.0-16.0	Double	m7	h6	30°	140°	Y		ALtima® Plus	X	1st	2nd	1st	2nd	1st	1st	2nd
2XDSS	3X	#31-3/4	2.5-20.0	Single	h7	h6	30°	142°	N		ALtima®	X	2nd	1st	1st	1st	2nd	1st	1st
2XDSC	5X	1/64-5/8	0.5-16.0	Single	h7	h6	30°	142°	N		ALtima®	X	2nd	1st	1st	1st	2nd	1st	1st
2XDSC	3X	#31-5/8	3.0-16.0	Single	h7	h6	30°	142°	Y	6537K	ALtima®	X	2nd	1st	1st	1st	2nd	2nd	1st
2XDRC	5X	#31-3/4	3.0-20.0	Single	h7	h6	30°	142°	Y		ALtima®	X	2nd	1st	1st	1st	2nd	2nd	1st
2XDCL	7X+	#31-1/2	3.0-12.0	Single	h7	h6	30°	142°	Y		ALtima®	X	2nd	1st	1st	1st	2nd	2nd	1st
2XDCE	12X-25X**	1/4 - 1/2	5.0-12.0	Double	h7	h6	30°	142°	Y		ALtima®		2nd	1st	1st	1st	2nd	2nd	1st
HPDSR	5X	#31-5/8	3.0-16.0	Single	h7	h6	30°	140°	N	6537L	ALtima®		3rd	3rd	3rd	3rd	3rd	3rd	3rd
HPDCR	5X	#31-5/8	3.0-16.0	Single	h7	h6	30°	140°	Y	6537L	ALtima®		3rd	3rd	3rd	3rd	3rd	3rd	3rd

Note: For drilling applications involving cross holes and/or optimal hole finishes, use the CXD style drill.

*TEMA - Tubular Exchange Manufacturer's Association

**Length varies depending on size.

Inch	
D1	Tolerance (m7)
.0000 - .1181	+ .00008/+ .00047
.1182 - .2362	+ .00016/+ .00063
.2363 - .3937	+ .00024/+ .00083
.3938 - .7087	+ .00027/+ .00098
.7088 - .7500	+ .00031/+ .00114

Inch	
D1	Tolerance (h7)
.0000 - .1181	+0/- .00039
.1182 - .2362	+0/- .00047
.2363 - .3937	+0/- .00059
.3938 - .7087	+0/- .00071
.7088 - .7500	+0/- .00083

Inch	
D2	Tolerance (h6)
.0000 - .1181	+0/- .00024
.1182 - .2362	+0/- .00031
.2363 - .3937	+0/- .00035
.3938 - .7087	+0/- .00043
.7088 - .7500	+0/- .00051

Metric (mm)	
D1	Tolerance (m7)
0 - 3.0	+ .002/+ .012
3.01 - 6.0	+ .004/+ .016
6.01 - 10.0	+ .006/+ .021
10.01 - 18.0	+ .007/+ .025
18.01 - 20.0	+ .008/+ .029

Metric (mm)	
D1	Tolerance (h7)
0 - 3.0	+0/- .010
3.01 - 6.0	+0/- .012
6.01 - 10.0	+0/- .015
10.01 - 18.0	+0/- .018
18.01 - 20.0	+0/- .021

Metric (mm)	
D2	Tolerance (h6)
0 - 3.0	+0/- .006
3.01 - 6.0	+0/- .008
6.01 - 10.0	+0/- .009
10.01 - 18.0	+0/- .011
18.01 - 20.0	+0/- .013

M.A. Ford® Coating	Microhardness (HV)	Maximum Service Temp.	Friction Coefficient
ALtima®	3100	1100° C / 2012° F	0.42
ALtima® Plus	3200	1100° C / 2012° F	0.25

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

For product information, call your local distributor.

Twister® Drill Icon Glossary

	Solid
	Coolant Fed
	Drill Length
	Drill Point Angle
	Helix Angle
	Coatings
	DIN Specs

Workpiece Material Group	
	Steels
	Stainless Steels
	Cast Iron
	Special Alloys
	Hardened Steels (35-65Rc)
	Non-Ferrous

Cutting Calculations and Definitions		Metric	U.S.
ae	= Width of cut, radial depth of cut	(mm)	(inch)
ap	= Depth of cut, axial depth of cut	(mm)	(inch)
Dc	= Cutter diameter	(mm)	(inch)
f	= Feed per revolution	(mm/rev)	(IPR)
fz	= Feed per tooth	(mm/tooth)	(IPT)
zn	= Number of teeth	Number	
n	= RPM	(rev/min)	(rev/min)
Q	= Metal removal rate	(cm³/min)	(in³/min)
vc	= Cutting speed	(m/min)	(SFM)
vf	= Feed speed	(mm/min)	(IPM)
Dw	= Working diameter	(mm)	(inch)

Formulas

Inch

RPM (n) = SFM (vc) x 3.82/Tool Diam.
IPM (vf) = RPM (n) x IPR (f)

Conversion Inch to Metric

SFM (vc) to m/min (vc) = SFM (vc) x .3048
IPM (vf) to mm/min (vf) = IPM (vf) x 25.4

Metric

RPM (n) = m/min (vc) x 318.057/Tool Diam.
mm/min (vf) = RPM (n) x mm/Revolution (f).

Conversion Metric to Inch

m/min (vc) to SFM (vc) = (m/min)/.3048
mm/min (vf) to IPM (vf) = (mm/min)/25.4

Safety Note

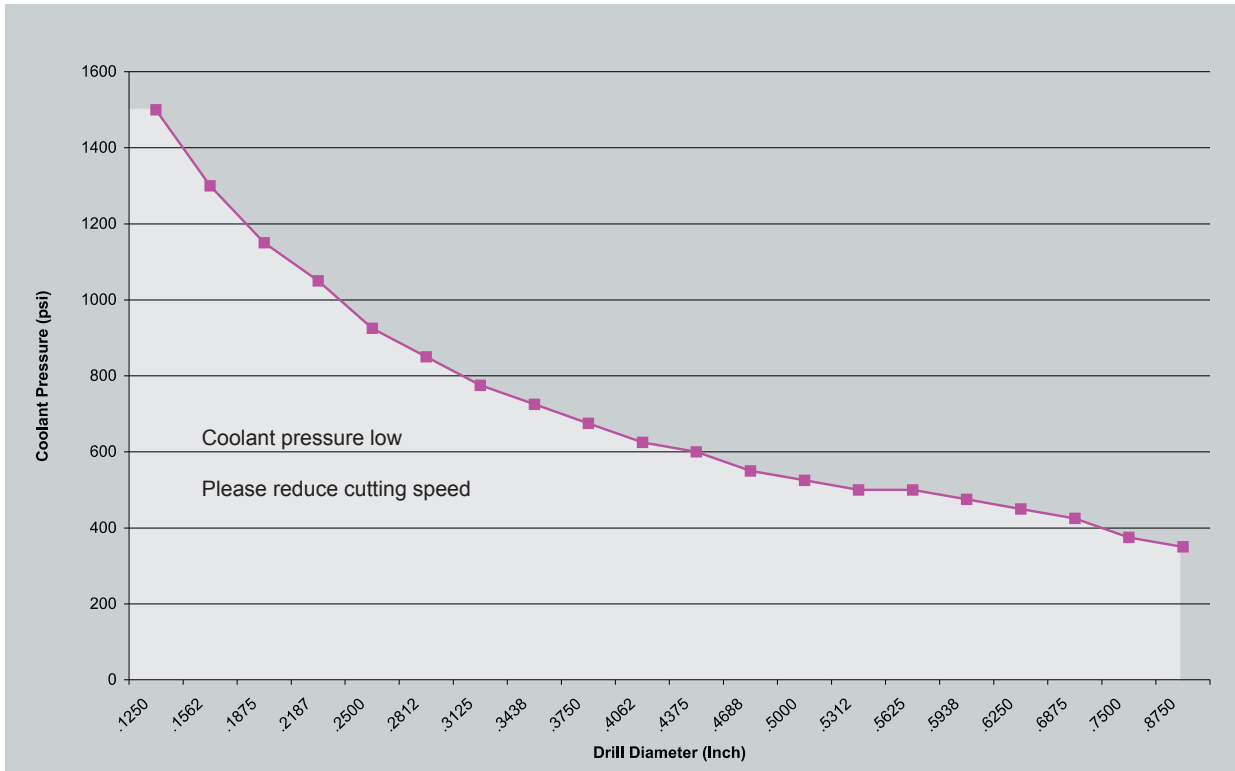
Always wear the appropriate personal protective equipment such as safety glasses and protective clothing when using solid carbide or HSS cutting tools. Machines should be fully guarded.

Drill Troubleshooting

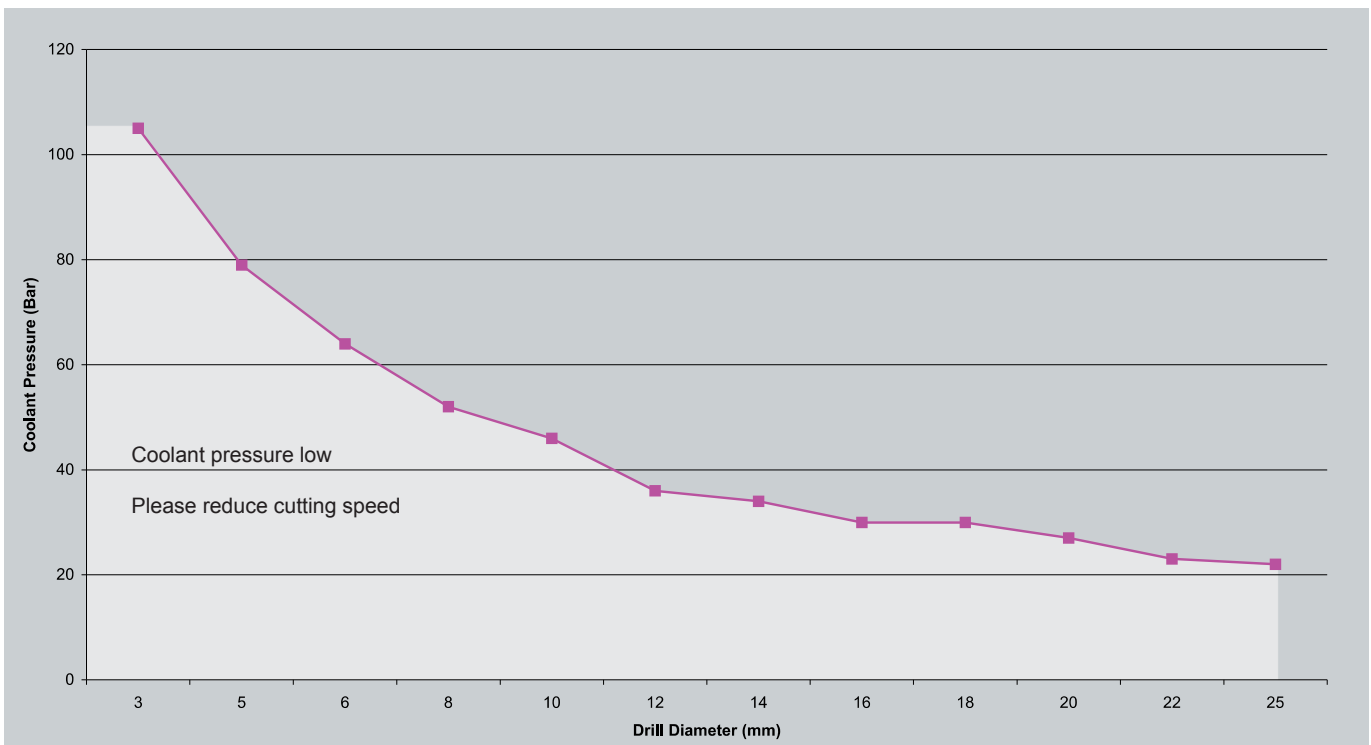
Possible Solutions	Problem																																
	Tool Deterioration											Chip Formation	Tool Life	Workpiece					Process														
	Flank wear	Margin wear	Breakage	Flaking	Creater wear	Chisel edge wear	Corner chipping	Flute chipping	Cutting edge chipping	Cutting edge wear	Point center chipping	Rake face	Scoring on tool body	Long stringy	Varied chip form	Blue/brown chips	Tool Life	Undersized hole	Oversized hole	Poor alignment	Poor surface finish	Heavy burr breakout	Retract marks	Hole location	Hole straightness	Deflection	Point Deflection	Galling	Vibration	Abnormal noise	Chip packing	No drill penetration	
Reduce feed or reduce at exit	x		x			x	x	x	x		x	x					x	x	x	x	x											x	
Reduce feed at entrance			x															x		x			x								x		
Consistent feed rate			x											x	x													x		x			
Increase feed	x					x				x				x				x	x														
Reduce speed	x	x			x	x			x								x	x									x	x	x				
Increase speed																				x													
Coolant			x	x	x				x			x					x	x		x	x										x		
Coolant increase flow	x		x			x	x		x					x	x	x				x	x										x		
Coolant filter	x		x	x					x								x	x		x	x										x		
Setup																			x	x	x	x	x	x	x						x		
Workpiece clamp rigid		x	x			x	x		x			x					x		x	x	x	x	x	x							x		
Collet accuracy			x						x										x					x	x			x					
Tool holder fit .0008			x						x										x					x	x								
Alignment			x						x										x													x	
Peck drill			x																														
Concentricity		x	x	x					x	x			x							x	x		x	x	x		x		x				
Do not extract tool during peck																																	

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

Coolant Pressure - Inch
 Recommended Minimum Coolant Pressure



Coolant Pressure - Metric
 Recommended Minimum Coolant Pressure



Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

For product information, call your local distributor.

Twister® GP Hi-Roc®

Recommended Cutting Data 200 / 200S - Inch

Workpiece Material Group	I S O	Hardness	Tool Series	T Y P E	D E P T H	vc - SFM	Drill Diameter							
							1/32	1/16	1/8	1/4	3/8	1/2	5/8	3/4
							f - IPR							
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	200	●	3	330	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			200S		3		.0005	.0010	.0015	.0030	.0040	.0050	.0060	.0060
			200A		3		.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	200	●	3	265	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			200S		3		.0005	.0010	.0015	.0030	.0040	.0050	.0060	.0060
			200A		3		.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	200	●	3	230	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			200S		3		.0005	.0010	.0015	.0030	.0040	.0050	.0060	.0060
			200A		3		.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Hardened Steel	H	45 to 65 Rc	200	●	3	50	.0003	.0010	.0010	.0010	.0020	.0020	.0020	.0030
			200S		3		.0002	.0005	.0005	.0005	.0010	.0010	.0010	.0015
			200A		3		.0003	.0010	.0010	.0010	.0020	.0020	.0020	.0030
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	200	●	3	150	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			200S		3		.0005	.0010	.0015	.0030	.0040	.0050	.0060	.0060
			200A		3		.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	up to 28 Rc	200	●	3	100	.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			200S		3		.0002	.0003	.0010	.0020	.0025	.0030	.0040	.0050
			200A		3		.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	200	●	3	70	.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			200S		3		.0002	.0003	.0010	.0020	.0025	.0030	.0040	.0050
			200A		3		.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	200	●	3	180	.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			200S		3		.0002	.0003	.0010	.0020	.0025	.0030	.0040	.0050
			200A		3		.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
Cas-Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	200	●	3	365	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			200S		3		.0005	.0010	.0015	.0030	.0040	.0050	.0060	.0060
			200A		3		.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	200	●	3	265	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			200S		3		.0005	.0010	.0015	.0030	.0040	.0050	.0060	.0060
			200A		3		.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Plastics	N		200	●	3	300	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			200S		3		.0005	.0010	.0015	.0030	.0040	.0050	.0060	.0060
			200A		3		.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Kevlar/Graphite	N		200	●	3	300	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			200S		3		.0005	.0010	.0015	.0030	.0040	.0050	.0060	.0060
			200A		3		.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

Twister® GP Hi-Roc®

Recommended Cutting Data 200 / 200S - Metric

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	vc - m/min	Drill Diameter (mm)								
							1	1.5	3	6	8	10	12	16	20
							f - mm/Rev								
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	200	●	3	100	.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
			200S		3		.0130	.0250	.0380	.0760	.1020	.1270	.1520	.1520	.1600
			200A		3		.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	200	●	3	80	.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
			200S		3		.0130	.0250	.0380	.0760	.1020	.1270	.1520	.1520	.1600
			200A		3		.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	200	●	3	45	.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
			200S		3		.0130	.0250	.0380	.0760	.1020	.1270	.1520	.1520	.1600
			200A		3		.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
Hardened Steel	H	45 to 65 Rc	200	●	3	15	.0063	.0254	.0254	.0254	.0508	.0508	.0508	.0762	.0800
			200S		3		.0038	.0127	.0127	.0127	.0254	.0254	.0254	.0381	.0400
			200A		3		.0063	.0254	.0254	.0254	.0508	.0508	.0508	.0760	.0800
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	200	●	3	45	.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
			200S		3		.0130	.0250	.0380	.0760	.1020	.1270	.1520	.1520	.1600
			200A		3		.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	up to 28 Rc	200	●	3	30	.0060	.0130	.0510	.1020	.1270	.1520	.2030	.2500	.2700
			200S		3		.0040	.0060	.0250	.0510	.0640	.0760	.1020	.1270	.1400
			200A		3		.0060	.0130	.0510	.1020	.1270	.1520	.2030	.2500	.2700
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	200	●	3	20	.0060	.0130	.0510	.1020	.1270	.1520	.2030	.2500	.2700
			200S		3		.0040	.0060	.0250	.0510	.0640	.0760	.1020	.1270	.1400
			200A		3		.0060	.0130	.0510	.1020	.1270	.1520	.2030	.2500	.2700
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	200	●	3	55	.0060	.0130	.0510	.1020	.1270	.1520	.2030	.2500	.2700
			200S		3		.0040	.0060	.0250	.0510	.0640	.0760	.1020	.1270	.1400
			200A		3		.0060	.0130	.0510	.1020	.1270	.1520	.2030	.2500	.2700
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	200	●	3	110	.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
			200S		3		.0130	.0250	.0380	.0760	.1020	.1270	.1520	.1520	.1600
			200A		3		.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	200	●	3	80	.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
			200S		3		.0130	.0250	.0380	.0760	.1020	.1270	.1520	.1520	.1600
			200A		3		.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
Plastics	N		200	●	3	90	.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
			200S		3		.0130	.0250	.0380	.0760	.1020	.1270	.1520	.1520	.1600
			200A		3		.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
Kevlar/Graphite	N		200	●	3	90	.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300
			200S		3		.0130	.0250	.0380	.0760	.1020	.1270	.1520	.1520	.1600
			200A		3		.0250	.0510	.0760	.1520	.2030	.2540	.2790	.3000	.3300

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

For product information, call your local distributor.

Recommended Cutting Data 204 / 206 - Inch



Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	vc - SFM	Drill Diameter							
							1/32	1/16	1/8	1/4	3/8	1/2	5/8	3/4
							f - IPR							
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	206	●	3	175	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			204		5									
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	206	●	3	165	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			204		5									
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	206	●	3	150	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			204		5									
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	M	up to 28 Rc	206	●	3	195	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			204		5									
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	206	●	3	125	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			204		5									
Plastics	N		206	●	3	400	.00025	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			204		5									
Kevlar/Graphite	N		206	●	3	400	.00025	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			204		5									
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	206	●	3	275	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			204		5									
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	206	●	3	175	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			204		5									

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

Recommended Cutting Data 224 / 226 - Metric

Workpiece Material Group	I S O	Hardness	Tool Series	T Y P E	D E P T H	vc - m/min	Drill Diameter (mm)							
							1	1.5	3	6	10	12	16	20
							f - mm/Rev							
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	226	●	3	55	.025	.050	.076	.152	.203	.254	.275	.305
			224		5									
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	226	●	3	50	.025	.050	.076	.152	.203	.254	.275	.305
			224		5									
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	226	●	3	45	.025	.050	.076	.152	.203	.254	.275	.305
			224		5									
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	M	up to 28 Rc	226	●	3	60	.025	.050	.076	.152	.203	.254	.275	.305
			224		5									
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	226	●	3	40	.025	.050	.076	.152	.203	.254	.275	.305
			224		5									
Plastics	N		226	●	3	120	.006	.013	.050	.076	.101	.152	.203	.225
			224		5									
Kevlar/Graphite	N		226	●	3	120	.006	.013	.050	.076	.101	.152	.203	.225
			224		5									
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	226	●	3	85	.025	.050	.076	.152	.203	.254	.275	.305
			224		5									
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	226	●	3	55	.025	.050	.076	.152	.203	.254	.275	.305
			224		5									

Recommended Cutting Data 205 / 207 - Inch

Workpiece Material Group	I S O	Hardness	Tool Series	T Y P E	D E P T H	vc - SFM	Drill Diameter							
							1/32	1/16	1/8	1/4	3/8	1/2	5/8	3/4
							f - IPR							
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	205		Screw Machine	175	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			205T				.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, 1 to W310	P	28 to 38 Rc	205		Screw Machine	165	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			205T				.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	205		Screw Machine	150	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			205T				.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	205		Screw Machine	140	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			205T				.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	up to 28 Rc	205		Screw Machine	60	.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			205T				.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	205		Screw Machine	60	.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			205T				.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	205		Screw Machine	80	.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			205T				.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	205		Screw Machine	175	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			205T				.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Cast Iron - Ductile & Malleable CGI, 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	205		Screw Machine	175	.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
			205T				.0010	.0020	.0030	.0060	.0080	.0100	.0110	.0120
Plastics	N		205		Screw Machine	300	.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			205T				.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
			207				.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
Kevlar/Graphite	N		207			3	.0003	.0005	.0020	.0040	.0050	.0060	.0080	.0100
Hardened Steel	H	45 to 65 Rc	205		Screw Machine	50	.0003	.0010	.0010	.0010	.0020	.0020	.0020	.0030
			205T				.0003	.0010	.0010	.0010	.0020	.0020	.0020	.0030

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

Recommended Cutting Data 205 / 207 - Metric

Workpiece Material Group	I S O	Hardness	Tool Series	T Y P E	D E P T H	vc - m/min	Drill Diameter (mm)							
							1	2	3	6	10	12	16	20
							f - mm/Rev							
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	205	●	Screw Machine	55	.025	.050	.078	.152	.203	.254	.275	.305
			205T				.025	.050	.078	.152	.203	.254	.275	.305
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	205	●	Screw Machine	45	.025	.050	.078	.152	.203	.254	.275	.305
			205T				.025	.050	.078	.152	.203	.254	.275	.305
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	205	●	Screw Machine	35	.025	.050	.078	.152	.203	.254	.275	.305
			205T				.025	.050	.078	.152	.203	.254	.275	.305
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	205	●	Screw Machine	45	.025	.050	.078	.152	.203	.254	.275	.305
			205T				.025	.050	.078	.152	.203	.254	.275	.305
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	up to 28 Rc	205	●	Screw Machine	20	.006	.013	.050	.076	.101	.152	.203	.225
			205T				.006	.013	.050	.076	.101	.152	.203	.225
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	205	●	Screw Machine	20	.006	.013	.050	.076	.101	.152	.203	.225
			205T				.006	.013	.050	.076	.101	.152	.203	.225
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	205	●	Screw Machine	25	.006	.013	.050	.076	.101	.152	.203	.225
			205T				.006	.013	.050	.076	.101	.152	.203	.225
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	205	●	Screw Machine	55	.025	.050	.078	.152	.203	.254	.275	.305
			205T				.025	.050	.078	.152	.203	.254	.275	.305
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	205	●	Screw Machine	55	.025	.050	.078	.152	.203	.254	.275	.305
			205T				.025	.050	.078	.152	.203	.254	.275	.305
Plastics	N		205	●	Screw Machine	90	.006	.013	.050	.076	.101	.152	.203	.225
			205T				.006	.013	.050	.076	.101	.152	.203	.225
			207				.006	.013	.050	.076	.101	.152	.203	.225
Kevlar/Graphite	N		207		3	115	.006	.013	.050	.076	.101	.152	.203	.225
Hardened Steel	H	45 to 65 Rc	205	●	Screw Machine	15	.0063	.0254	.0254	.0254	.0508	.0508	.0508	.0762
			205T				.0063	.0254	.0254	.0254	.0508	.0508	.0508	.0762

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

For product information, call your local distributor.

Recommended Cutting Data 300 - Inch

Workpiece Material Group	ISO	Hardness	TYPE	vc - SFM	Drill Diameter					
					1/64	1/32	1/16	1/8	3/16	1/4
					f - IPR					
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	●	175	.0007	.0010	.0020	.0030	.0040	.0060
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc		150	.0007	.0010	.0020	.0030	.0040	.0060
Aluminum (<10% Si) 6061-T6 / 7075-T6	N	●	●	400	.0007	.0010	.0020	.0030	.0040	.0060
Aluminum (>10% Si) Copper / Brass	N			250	.0007	.0010	.0020	.0030	.0040	.0060
Plastics	N			300	.0007	.0010	.0020	.0030	.0040	.0060
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	●	275	.0007	.0010	.0020	.0030	.0040	.0060
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB		175	.0007	.0010	.0020	.0030	.0040	.0060

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

Recommended Cutting Data 300 - Metric

Workpiece Material Group	I S O	Hardness	T Y P E	vc - m/min	Drill Diameter (mm)			
					0.5	1	2	3
					f - mm/Rev			
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	●	55	.017	.025	.050	.076
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc		45	.017	.025	.050	.076
Aluminum (<10% Si) 6061-T6 / 7075-T6	N	●	●	120	.017	.025	.050	.076
Aluminum (>10% Si) Copper / Brass	N			75	.017	.025	.050	.076
Plastics	N			90	.017	.025	.050	.076
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	●	85	.017	.025	.050	.076
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, 4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB		55	.017	.025	.050	.076



Recommended Cutting Data 302 / 306 - Inch

Workpiece Material Group	ISO	Hardness	TYPE	vc - SFM	Drill Diameter				
					1/64	1/32	1/16	3/32	1/8
					f - IPR				
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	●	300	.0003	.0006	.0012	.0018	.0023
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc		225	.0003	.0006	.0012	.0018	.0023
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc		200	.0003	.0006	.0012	.0018	.0023
Hardened Steels A2 / 52100	H	35-45 Rc	●	50	.0001	.0003	.0005	.0008	.0010
Free Machining Stainless	M	up to 28 Rc	●	175	.0003	.0006	.0012	.0018	.0023
Stainless Steel - Austenitic 304 / 316	M	up to 28 Rc		200	.0003	.0006	.0012	.0018	.0023
Stainless Steel - Ferritic / Martensitic	M	up to 28 Rc		100	.0003	.0006	.0012	.0018	.0023
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	over 28 Rc		75	.0003	.0006	.0012	.0018	.0023
Aluminum (<10% Si)	N		●	450	.0006	.0012	.0020	.0030	.0040
Aluminum (>10% Si)	N			325	.0006	.0012	.0020	.0030	.0040
Plastics	N			550	.0006	.0012	.0020	.0030	.0040
Composites / Fiber Reinforced Materials / Circuit Boards	N			650	.001-.0015	.0020	.0030	.0040	.0050
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	●	400	.0003	.0006	.0012	.0018	.0023
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB		350	.0003	.0006	.0012	.0018	.0023
Titanium 6Al-4V	S	up to 42 Rc	●	60	.0003	.0006	.0012	.0018	.0023
High Temp Alloys Inconel / Hastelloy / Waspeloy / Nickel Based Alloys-Monel	S	up to 42 Rc		50	.0001	.0003	.0005	.0008	.0010

Chiploads above .006 are not recommended since location problems become more evident.

In typical circuit board materials, Micro Drills operate efficiently in the 600-700 SFM (180-215 m/min) ranges. Higher speed rates tend to produce excessive drill wear and early failure. In general, smaller diameter drills are limited to slower speeds, because of machine limitations.

Feed rates can be set extremely high in most applications, because of the quality and design features of the M.A. Ford® Micro Drill. However, certain precautions should be taken for proper performance and safety. When determining optimum feed rates, consider the following factors:

- Spindle motors must be rated at least one hp (1 horsepower).
- To prevent delamination, entry materials must be used.
- Pressure foot clamping must be appropriate.

When drilling harder materials, the Micro Drill life may be variable. Drilling set ups must be precise. The drill TIR must be less than .0001" (.0025 mm). The feed axis motion must be smooth without any play. Machining practices are very important.

Note: Micro drills should be kept in their original packaging, or equivalent when not in use. Mechanical micrometers are not recommended for checking size.

Recommended Cutting Data 302 / 306 - Metric

Workpiece Material Group	ISO	Hardness	TYPE	vc - m/min	Drill Diameter (mm)				
					0.5	1	2	2.5	3
					f - mm/Rev				
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	●	90	.0075	.0150	.0300	.0450	.0560
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc		70	.0075	.0150	.0300	.0450	.0560
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc		60	.0075	.0150	.0300	.0450	.0560
Hardened Steels A2 / 52100	H	35-45 Rc	●	15	.0035	.0075	.0150	.0190	.0260
Free Machining Stainless	M	up to 28 Rc	●	55	.0075	.0150	.0300	.0450	.0560
Stainless Steel - Austenitic 304 / 316	M	up to 28 Rc		60	.0075	.0150	.0300	.0450	.0560
Stainless Steel - Ferritic / Martensitic	M	up to 28 Rc		30	.0075	.0150	.0300	.0450	.0560
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	over 28 Rc		25	.0075	.0150	.0300	.0450	.0560
Aluminum (<10% Si)	N	●	●	140	.0150	.0300	.0600	.0800	.1000
Aluminum (>10% Si)	N			100	.0150	.0300	.0600	.0800	.1000
Plastics	N			170	.0150	.0300	.0600	.0800	.1000
Composites / Fiber Reinforced Materials / Circuit Boards	N			200	.025-.038	.0510	.0760	.1020	.1270
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	●	120	.0075	.0150	.0300	.0450	.0560
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB		110	.0075	.0150	.0300	.0450	.0560
Titanium 6Al-4V	S	up to 42 Rc	●	20	.0075	.0150	.0300	.0450	.0560
High Temp Alloys Inconel / Hastelloy / Waspeloy / Nickel Based Alloys-Monel	S	up to 42 Rc		15	.0025	.0075	.0120	.0200	.0250

Chiploads above .140 are not recommended since location problems become more evident.

In typical circuit board materials, Micro Drills operate efficiently in the 600-700 SFM (180-215 m/min) ranges. Higher speed rates tend to produce excessive drill wear and early failure. In general, smaller diameter drills are limited to slower speeds, because of machine limitations.

Feed rates can be set extremely high in most applications, because of the quality and design features of the M.A. Ford® Micro Drill. However, certain precautions should be taken for proper performance and safety. When determining optimum feed rates, consider the following factors:

- Spindle motors must be rated at least one hp (1 horsepower).
- To prevent delamination, entry materials must be used.
- Pressure foot clamping must be appropriate.

When drilling harder materials, the Micro Drill life may be variable. Drilling set ups must be precise. The drill TIR must be less than .0001" (.0025 mm). The feed axis motion must be smooth without any play. Machining practices are very important.

Note: Micro drills should be kept in their original packaging, or equivalent when not in use. Mechanical micrometers are not recommended for checking size.

Recommended Cutting Data 402 / 403 / 404 / 405 - Inch

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	vc - SFM	Drill Diameter					
						1/32	1/16	1/8	1/4	3/8	1/2
						f - IPR					
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	402	●	175	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404								
			405								
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	402	●	165	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404								
			405								
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	402	●	150	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404								
			405								
Hardened Steels A2 / 52100	H	35 to 45 Rc	402	●	50	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404/405								
Stainless Steel - Austenitic 304 / 316	M	up to 28 Rc	402	●	125	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404								
			405								
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	over 28 Rc	402	●	60	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404								
			405								
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	402	●	275	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404								
			405								
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	402	●	175	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404								
			405								
Titanium 6Al-4V	S	up to 42 Rc	402	●	80	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404								
			405								
High Temp Alloys Inconel / Hastelloy / Waspeloy / Nickel Based Alloys-Monel	S	up to 42 Rc	402	●	40	.0005	.0010	.0015	.0030	.0040	.0050
			403								
			404								
			405								

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

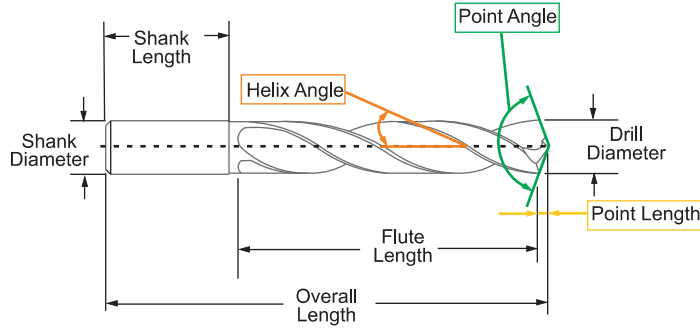
Recommended Cutting Data 402 / 403 / 404 / 405 - Metric

Workpiece Material Group	I S O	Hardness	Tool Series	T Y P E	vc - m/min	Drill Diameter (mm)					
						1	2	3	6	10	12
						f - mm/Rev					
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	402	●	55	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	402	●	50	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	402	●	45	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								
Hardened Steels A2 / 52100	H	35 to 45 Rc	402	●	15	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								
Stainless Steel - Austenitic 304 / 316	M	up to 28 Rc	402	●	40	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	over 28 Rc	402	●	20	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	402	●	85	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	402	●	55	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								
Titanium 6Al-4V	S	up to 42 Rc	402	●	25	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								
High Temp Alloys Inconel / Hastelloy / Waspeloy / Nickel Based Alloys-Monel	S	up to 42 Rc	402	●	10	.013	.025	.038	.076	.102	.127
			403								
			404								
			405								

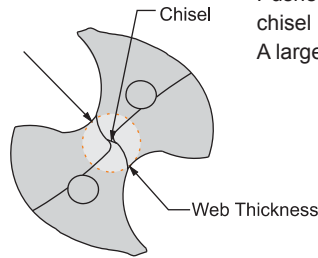
Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

For product information, call your local distributor.

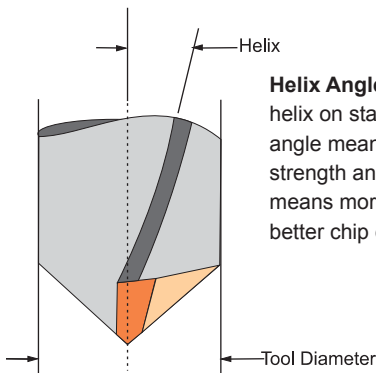
Drill Terminology



Chisel Edge – The non-cutting tip of the drill. Pushes, rather than cuts material. Having a smaller chisel means that a tool will cut more aggressively. A larger chisel means that a tool will be stronger.

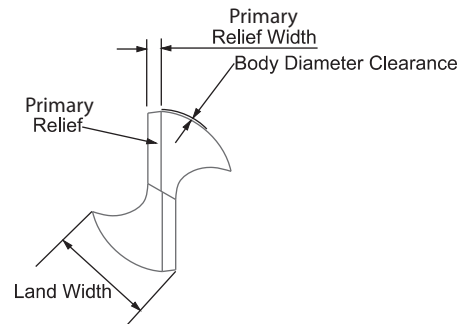


Web – The core of the drill that is left from the fluting operation. A thicker web means added rigidity, while a smaller web means more chip evacuation. On two flute drills, typically varies from 16% - 30% of the tool diameter.

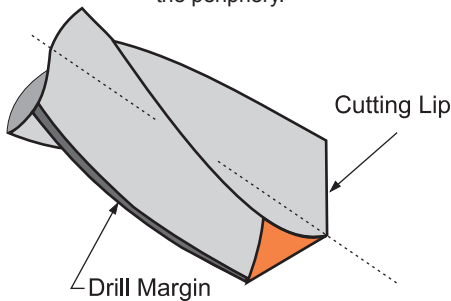


Helix Angle - Varies from 0° to 35° helix on standard tools. Lower helix angle means more rigidity and strength and a higher helix angle means more aggressive drilling and better chip evacuation.

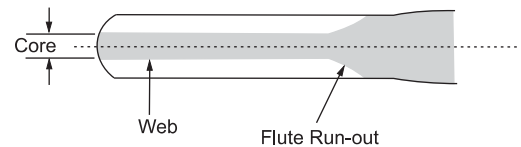
Margin Width – Provides a surface to support the drill inside the hole during the drilling operation. M.A. Ford® offers both single margin and double margin geometries. Margin widths are a balancing act between friction build-up vs. tool support in the drilling operation.



Cutting Lip - The cutting edges of a two flute drill extending from the chisel edge to the periphery.



Land Width – The amount of material left on the drill per side, from the fluting operation. Larger land widths mean more rigidity, while smaller land widths allow for better chip evacuation.



Having a problem with drill geometries? Circle the area where the problem exists. Include a detailed explanation of the issue and fax to Attn: Technical Application Support 800-892-9522 / 563-386-7660 or email: maftech@maford.com

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Coatings

ALtima®

Aluminum Titanium Nitride (AlTiN). ALtima® is the original high performance coating. This coating allows tools to be run at higher speeds and feeds in a wide array of materials. Also, it allows the option of running tools dry due to the high oxidation temperature of the coating.

ALtima® Plus

This Aluminum Titanium Nitride (AlTiN) multi-layer coating has optimized coating structure, with pre and post treatment of the coating for optimized high performance drilling in any ferrous material.

ALtima® 52

Aluminum Titanium Nitride (AlTiN). ALtima® 52 is specially designed for milling hardened steels 52 Rc and above. It has very high hardness and the oxidation temperature of the coating makes this the absolute best choice for hardened steel milling. ALtima® 52 is designed to allow for dry machining.

ALtima® Blaze

Aluminum Chromium Nitride (AlCrN). ALtima® Blaze is designed to allow higher material removal rates. This coating has a higher oxidation temperature than a typical TiAlN coating. It has shown very good results in nickel alloys, titanium, and other difficult to machine materials. Tools coated with ALtima® Blaze can be used in dry machining.

ALtima® Micro

An ultra thin, nano structured, TiAlN coating developed specifically for micro tool applications.

ALtima® Xtreme

Designed for high speed and dry machining.

Fordlube

Titanium DiBoride (TiB₂) is a unique coating with low Aluminum affinity, smooth surface finish and high hardness. It is ideal for Aluminum and Magnesium alloys as it prevents build-up on cutting edge, provides superior chip flow along with extended wear resistance.

Gem+

Recommended for aluminium and aluminium alloys up to 12% Si, non-ferrous metals and composites. Gem+ provides excellent wear resistance and maintains sharp cutting edges.

GemX

A CVD diamond coating for composites and aluminum that offers the maximum hardness and wear resistance of any of our coatings.

TiN

Titanium Nitride (TiN). TiN coating has shown good results in low carbon steels and many iron-based applications. It is a very popular coating used in the industry today.

TiCN

Titanium Carbonitride (TiCN). TiCN is a multi-layer coating. Because of the multi-layer composition, TiCN is tougher than TiN, even though TiCN is harder. The added toughness of the TiCN coating makes it a good choice for mechanically stressed edges like in end mill applications. The higher hardness makes TiCN a good choice for abrasive applications where higher wear resistance is required.

CERAedge®

CERAedge® is a unique coating that provides excellent performance in titanium, aluminium, and composites.









Special Coatings

Upon request, M.A. Ford® can provide any commercially available coating. **Any standard uncoated M.A. Ford® cutting tool can be provided with coating if requested.**

Coating Properties









M.A. Ford® Coating	M.A. Ford® Tool Number Designation	Microhardness (HV)	Maximum Service Temp.	Friction Coefficient
ALtima®	A	3100	1100° C / 2012° F	0.42
ALtima® Plus	AP	3200	1100° C / 2012° F	0.25
ALtima® 52	A or AH	3600	1200° C / 2192° F	0.40
ALtima® Blaze	B	3200	1100° C / 2012° F	0.35
ALtima® Micro	AM	3300	900° C / 1652° F	0.30-0.35
ALtima® Xtreme	AX	3800	1100° C / 2012° F	0.30-0.50
Fordlube	F	4000	700° C / 1292° F	0.30
Gem+	GP	4710	500° C / 932° F	0.30
GemX	GX	10000	600° C / 1100° F	0.10
TiN	T	2300	600° C / 1112° F	0.40
TiCN	C	3000	400° C / 752° F	0.40
CERAedge®	CE	3400	1100° C / 2012° F	0.25

Material Conversion Chart

								
	USA	France	Brazil	German W-nr	German DIN	UK	Spain	Japan JIS
FREE MACHINING STEEL	12L13	S250Pb		1.0718	9SMnPb28		F.2112 -	
	1108	10F1		1.0721	10S20	210M15	F.2121 -	
	11L08	10PbF2		1.0722	10SPb20		F.2122 -	
				1.0723	15S20	210A15	F.210F.	
	1215	S300	1215	1.0736	9SMn36	240M07 EN 1B	F.2113-	
12L14	S300Pb		1.0737	9MnPb36		F.2114 -		
LOW CARBON STEEL	1010	AF34C10/XC10	1010	1.0301	C10	045M10		
	1015	AF37C12/XC18	1015	1.0401	C15	080M15;040A15	F.111	
	1020	AF42C20/XC25	1020	1.0402	C22	055M15 EN2C	F.112	
	1025	AF50C30		1.0406	C25	070M26	F.221	
	1212			1.0711	9S20	220M07		
	1213	S250	1213	1.0715	9SMn28	230M07	F.2111 -	
	1010	XC10	1010	1.1121	Ck10	040A10	F.1510 -	
	1022/1518	20M5		1.1133	20Mn5	120M19	F.1515 -	
	1015	XC15 / C15E	1015	1.1141	Ck15	080M15 EN 32C	F.1511 -	
	10201023	XC25 / C22E	1020	1.1151	Ck22	050A20	F.1120 -	
	1025	XC25 / C25E		1.1158	Ck25	070M26	F.1120 -	
	A350-LF5	15N6 / 15Ni6		1.5622	14Ni6		F.2641 -	
	3310/9314	12NC15		1.5752	14NiCr14	655M13/A12 EN 36A		
	MEDIUM CARBON STEEL	1035	AF56C35 /XC38	1035	1.0501	C35	060A35	F.113
1045		AF65C45 /C45	1045	1.0503	C45	080M46	F.114	
1040		AF60C40 /C40	1040	1.0511	C40		F.114.A	
1055		C55	1055	1.0535	C55	070M55		
1060		AF70C55 / C60	1060	1.0601	C60	080A62 EN 43D	F.115	
1140		35MF6	1140	1.0726	35S20	212M36 EN 8M	F.210G.	
1146		45MF4		1.0727	45S20	212M44		
9255		51S7		1.0903	51Si7	250A53 EN 45	F.1450 -	
9255		55S7	9254	1.0904	55Si7		F.1440-	
9260		60S7		1.0909	60Si7	250A58	F.1441 -	
9262		60SC7		1.0961	60SiCr7	250A61	F.1442 -	
1330/1536		35M5 / 30Mn5		1.1165/66	30Mn5/34Mn5	120M36/150M28	F.1203	
1335		40M5 / 36Mn5	1541	1.1167	36Mn5	150M36 EN 15	F.1203 -	
1330		20M5 / 28Mn6	1330	1.117	28Mn6	150M28 EN 14A		
1035		XC32 / C35R	1035	1.118	Cm35	080M36	F.1135 -	
1040		XC42H1 / C40E	1040	1.1186	Ck40	060A40/080A40		S 40 C
1045		XC42H1 / C45/XC45	1045	1.1191	Ck45	080M46/060A47	F.1140 -	S 45 C
1045		XC42H1 /C45R	1045	1.1201	Cm45	080M46	F.1145 -	
1055		XC55H1 / C55E	1055	1.1203	Ck55	060A57/070M55	F.1150 -	S55C
1050		XC48H1 / C50E	1050	1.1206	Ck50	080M50		
1050		XC48H1TS	1050	1.1213	Cf53	060A52		
1060	XC60 / C60E/2C60	1060	1.1221	Ck60	060A62	F.511/F.512	S58C	
1070	XC68	1070	1.1231	Ck67	060A67			
1080/1078/1086	XC75 / C75E/XC90	1074	1.1248/1269	Ck75	060A78	F.513/514/515		
1095	XC100	1095	1.1274	Ck101	060A96			
4135/4142	34CD4 /42CD4		1.233	35CrMo4/47CrMo4	708A37/M40		SCM435TK	
3135/3140	35NC6		1.5711/5711	36NiCr6/40NiCr6	640A35/M40 EN111A			
8620/8720	20NCD2	8620	1.6523/43	21NiCrMo2	805M20/A20 EN 362	F.1522 -	SNCM220(H)	
8740	40NCD2	8640	1.6546	40NiCrMo22	311-Type7	F.1204 -	SNCM240	
	18NCD6		1.6587	17CrNiMo8	820A16	F.1560 -		
5132	32C4 / 34Cr4		1.7033	34Cr4	530A32 EN18B	F.8221 /F.224	SCR430(H)	
5135	38C4 / 37Cr4	5135	1.7034	37Cr4	530A36	F.1201 -		
5140	42C4 / 41Cr4	5140	1.7035	41Cr4	530M40/A40 EN 18	F.1202 -	SCR440(H)	
5140	42C4TS	5140	1.7045	42Cr4	530A40	F.1202 -	SCR440	
5115	16MC5	5115	1.7131	16MnCr5	527M17	F.1515 -		
5155	55C3		1.7176	55Cr3	527A60 EN 48	F.1431 -	SUP9(A)	
4130	25CD4 / 25CrMo4	4130	1.7218	25CrMo4	1717CDS110	F.8330 -	SCM420/430	
4135/4137	35CD4 / 34CrMo4		1.722	34CrMo4	708A37 EN 19B	F.8231 -		
4140/4142	42CD4 / 42CrMo4	4140	1.7225	42CrMo4	708M40 EN 19A	F.8232 -		
4150	50CrMo4	4150	1.7228	50CrMo4	708A47			
6150	50CV4 / 51CrV4	6151	1.8159	50CrV4	735A50 EN 47	F.1430 -		

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Material Conversion Chart

								
	USA	France	Brazil	German W-nr	German DIN	UK	Spain	Japan JIS
HIGH STRENGTH ALLOY STEEL	A355Cl.D	30CAD6.12		1.8507	34CrAlMo5	905M31	F.1741 -	
	A355Cl.A	40CAD6.12		1.8509	41CrAlMo7	905M39 EN 41B	F.1740 -	
		18NC13		1.5755	31NiCr14	653M31	F.123	
	9840	40NCD3		1.6511	36CrNiMo4	816M40 EN 110	F.1280	
	4340		4340	1.6562	40NiCrMo73	817M40		SNCM 447
		30CND8		1.658	30CrNiMo8	823M30		
	4340	35NCD6	4340	1.6582	34CrNiMo8	817M40 EN 24	F.1272	SNCM 447
		35NCD14		1.6746	32NiCrMo145	830M31	F.1262	
	35NCD16		1.6747	30NiCrMo166	835M30	F.1260		
	30CD12		1.8515	31CrMoV139	722M24 EN 40B	F.1712		
			1.8523	39CrMoV139	897M39 EN 40C			
STRUCTURAL STEEL	A570 (36)	E24-2NE / S235JRG2	A36	1.0038	RS137-2	4360-40C		STKM 12A
	A570 (40)	E28-2 / S275JR		1.0044	SI44-2	4360-43A/B	A 430B	SM 400 A;B;C
	A570 (50)	A50-2 / E295		1.005	SI50-2	4360-50B		SS490
		A60-2 / E335-A70-2/E360		1.006/007	SI60-2/SI70-2	4360-55E		
	A284/A573/A611	E24-3;-4 / S235J2G3		1.0116	SI37-3	4360-40C/D-1449-37C	A360 C;D	
	A366/1012/A619	DC01		1.033/0333	SI12/13	1449 -2/3/4CR	AP 00/02	
	A620	DC04		1.0338	SI14	1449 1CR; 2CR	AP 04	
	A516Gr.65;-55;	A37CP;AP / P235GH		1.0345	H I	1501Gr.161-360/400	A 37 RC I;RA II	
		A42CP;AP / P265GH		1.0425	H II	161-400;	A42 RC I	
	A537	A52CP;AP / P335GH		1.0473	19Mn6		A 47 RB II	
	A516 (70)	A48CP;AP / P295GH		1.0481	17Mn4		A 47 RC I; RA II	
		E36-3/4 / S355J2G3		1.057	SI52-3	4360-50B;50C;50D	A 510 C;D	
	A204 (A)	15D3 / 15Mo3		1.5415	15Mo3	1501-240	F.2601 -	
	4520			1.5423	16Mo5	1503-245-420	F.2602 -	
	A350-LF3	12Ni14 / 12Ni14		1.5637	10Ni14	1501-503-690	F.152	
	3115	10NC6		1.5713	13NiCr6			
	3415	14NC11		1.5732	14NiCr10		F.1540	
	A182-F11;F12	15CD3.05		1.7335	13CrMo44	620Gr.27;31	F.2631	
	A387 (12)	15CD4.5		1.7337	16CrMo44	620Gr.27		
	A182F22	10CrMo9-10		1.738	10CrMo910	622Gr.31;45	TU.H	
A633Gr.E	E420RIFP / S420N		1.8902	SI420	4360-55E	AE 420 KG		
A633Gr.E	E460RIFP / S460N		1.8905	SI460		AE 460 KG		
HIGH TEMPERATURE ALLOYS	330	Z12NCS37.18		1.4864	X12NiCrSi3616	NA17	F.3313	
				1.4865	G-X40NiCrSi3818	330C40		
	B163	Z8NC3221		1.4876	X10NiCrAlTi3320	NA15(H)	F.3545	
	4544/SB127/164	NU30		2.436	NiCu30Fe	3072-76/NA13		
	4676			2.4375	NiCu30Al	3072-76/NA18/3146		
	5388 C	NC 17 DWY		2.4602	NiCr17Mo17FeW			
		NC 20 T		2.463	Ni-Cr20Ti	HR5/203-4/703-B		
		NC 20 TA		2.4631	NiCr20TiAl	HR 401HR601/736B		
		NCKD 20 ATV		2.4634	NiCo20Cr15MoAlTi	HR 3/5007		
	687	NCKD 20 AT		2.4636	NiCo15Cr15MoAlTi			
		NCK 20 D		2.465	NiCr20Co19MoTi	HR 10		
	5660C	Z8 NCDT 42		2.4662	NiCr15MoTi			
	5536E	Nc 22 FeD		2.4665	NiCr22Fe18Mo	HR 6/204		
		NC 19 FeNb		2.4668	NiCr19Fe19NbMo	HR 8		
	5542G	NC 15 Fe TNb		2.4669	NiCr16FeTi	HR 505		
	5391A	NC 13 AD		2.467	G-NiCr13Al6MoNb	HC 203		
		NK 15 CAT		2.4674	NiCo15Cr10MoAlTi	HC 204		
	5540	NC 15 Fe		2.4816	NiCr15Fe	3072-76		
	5581	NC 22 FeDNB		2.4856	NiCr22Mo9Nb			
		NC 21 FeDU		2.4858	NiCr21Mo	3072-76		
	NC 19 KDT		2.4973	NiCr19Co11MoTi				
684	NCK 19 DAT		2.4983	NiCr18Co18MoAlTi				
TITANIUM TITANIUM ALLOYS		T-35		3.7024/25	Ti 99.8	TA.1	Ti-PO1	
		T-U2		3.7124	TiCu2	TA.21-24/52-55/58	Ti-P11	
		T-A6ZD		3.7154	TiAl6Zr5Mo0.5Si0.2	TA.43/44	Ti-P67	
		T-A4DE		3.7184	TiAl4Mo4Sn2Si0.5	TA.45-51/57	Ti-P68	
	4941/42/51/4902	T-40		3.7034/35	Ti 99.7	TA.2/3/4/5	Ti-PO2	
	4901/21	T-60		3.7064/65	Ti99.5	TA.6/7/8/9	Ti-PO4	
	491128/35/54/65/67	T-A6V		3.7164/65	TiAl6V4	TA.10-13/28/56	Ti-P63	
	4900	T-50				DTD 5023/5283		

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Material Conversion Chart

								
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STAINLESS STEELS	410S	Z3014		1.4001	X7Cr14	403S17	F.8401	
	405	Z6CA13 / Z6CrAl13		1.4002	X8CrAl13	405S17	F.3111	
	416	Z12CF13 / Z12CrS13		1.4005	X12CrS13	416S21	F.3411	SUS 416
	410/CA-15	Z12C13 / Z12Cr13	410	1.4006	X10Cr13	410S21 ENEN 56A	F.3401	SUS 410
	430	Z8C17 / Z6Cr17		1.4016	X6Cr17	430S15 EN 60	F.3113	SUS 430
	420	Z20C13 / Z20Cr13	420	1.4021	X20Cr13	420S37	F.3402	SUS 420
		Z40C14 / Z40Cr14		1.4034	X46Cr13	420S45 EN 56D	F.3405	
	431	Z15CN16.02		1.4057	X20CrNi172	431S29 EN 57	F.3427	
	430F	Z10CF17		1.4104	X12CrMoS17		F.3117	
	434	Z8CD17.01		1.4113	X6CrMo17	434S17		
	440C	Z100CD17		1.4125	X105CrMo17			
	304/304H	Z6CN18.09	304	1.4301	X5CrNi1810	304S15 EN 58E	F.3451	SUS304
	308; 305	Z8CN18.12		1.4303	X5CrNi1812	305S19	F.3513	
	303	Z10CNF18.09	303	1.4305	X10CrNiS189	303S21 EN 58M	F.3508	SUS303
	304L	Z2CN18.10/Z3CN19.10M		1.4306	G-X2CrNi189/1911	304S12/S11/C12	F.3503	SCS19
	CF-8	Z6CN18.10M		1.4308	G-X6CrNi189	304C15		
	301	Z12CN17.07	302	1.431	X12CrNi177	301S21	F.3517	
	304LN	Z2CN18.10Az		1.4311	X2CrNi1810	304S62		
		Z10CN18.9M		1.4312	G-X10CrNi188	302C25		
	CA6-NM	Z4CND13.4M		1.4313	G-X5CrNi134	425C11		
	316/316L	Z6CND17.11	316	1.4401	X5CrNiMo17122	316S16/S31 EN 58J	F.3543	SUS316
	316L	Z2CND 18.13	316L	1.4404	X2CrNiMo17132	316S11/S12	F.3533	SUS316 L
	316LN	Z2CND 17.12Az		1.4406	2CrNiMo17122	316S61		SUS316LN
	CF-8M			1.4408	G-X6CrNiMo1810	316C16	F.8414	
	316LN	Z2CND17.13Az		1.4429	X2CrNiMo17133	316S62		SUS316LN
	316L	Z2CND17.13		1.4435	X2CrNiMo18143	316S11/S12	F.3533	SUS316LN
	316	Z6CND17.12		1.4436	X5CrNiMo17133	316S16	F.3534	SUS316
	317L	Z2CND19.15		1.4438	X2CrNiMo18164	317S12		SUS317L
	329		329 (DUPLEX)	1.446	X8CrNiMo275		F.3309	SUS329
	XM8/430Ti	Z8CT17		1.451	X6CrTi17		F.3114	
	409	Z6CT12		1.4512	X5CrTi12	409S19		
	321	Z6CNT18.10	321	1.4541	X6CrNiTi1810	321S12/S31 EN 58B	F.3523	SUS321
	630	Z6CNU17.04		1.4542	X5CrNiCuNb1714			SUS630
	347	Z6CNNb18.10		1.455	X6CrNiNb1810	347S17/S31 EN 58F	F.3552	SUS347
	316Ti	Z6CNDT17.12		1.4571	X6CrNiMoTi17122	320S31/S17 EN 58J	F.3552	
	316Ti			1.4573	X10CrNiMoTi1812	320S33		
	316Cb	Z6CNDNb17.12/19.13		1.458	X6CrNiMoNb17122	318S17		
	HNV3	Z45CS9		1.4718	X45CrSi93	401S45 EN52	F.3220	
		Z10C13		1.4724	X10CrAl13	403S17	F.13152	
		Z40CSD10		1.4731	X40CrSiMo102		F.3221	
	430	Z10CAS18		1.4742	X10CrAl18	430S15	F.3153	SUS430
	HNV6	Z80CSN20.02		1.4747	X80CrNiSi20	443S65 EN 59	F.3222	
	446	Z10CAS24		1.4762	X10CrAl24		F.3154	SUH446
	309	Z15CNS20.12		1.4828	X15CrNiSi2012	309S24		
	309S	Z15CN24.13		1.4833	X7CrNi2314	309S24		
	314/310	Z15CNS25.20	314	1.4841	X15CrNiSi2520		F.3310	
	310S	Z12CN25.20	310	1.4845	X12CrNi2521	310S24	F.331	
	HK			1.4848	G-X40CrNiSi2520	310C40	F.8452	
EV8	Z52CMN21.09		1.4871	X53CrMnNiN219	349S54	F.3217		
	Z35CNWS14.14		1.4873	X45CrNiW189	331S40	F.3211		
321	T6CNT18.12(B)		1.4878	X12CrNiTi189	321S20	F.3523	SUS321	
A353	Z8N9		1.5662	X8Ni9	1501-509;510	F.2645		
2515	Z18N5		1.568	12Ni19				

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Material Conversion Chart

								
	USA	France	Brazil	German W-nr	German DIN	UK	Spain	Japan JIS
TOOL STEELS	A532IBNiCr-LC			0.962	G-X260NiCr42	Grade2A		
	A532IANiCr-HC			0.9625	G-X330NiCr42	Grade2B		
	A532IDNi-HiCr			0.963	G-X300CrNiSi952	Grade2C,D,E		
	A532IID20%CrMo-LC			0.9645	G-X260CrMoNi2021	Grade3C		
	A532IIIA25%Cr			0.965	G-X260Cr27	Grade3D		
	A532IIIA25%Cr			0.9655	G-X300CrMo271	Grade3E		
	W108	Y190;Y180		1.1525	C80W1			
	W110	Y1105		1.1545	C105W1			SK3
	W112	Y2120		1.1663	C125W		F.5123	
	W1			1.175/.1625	C75W/C80W1	BW1A/BW1B	F.1507	
	L3	Y100C6	52100	1.2067	100Cr6	BL3	F.5230	
	D3	Z200C12	420 (1.2083)	1.208	X210Cr12	BD3	F.5212	
	L2			1.221	115CrV3			
	H11	Z38CDV5	H11	1.2343	X38CrMoV51	BH11	F.5317	
	H13	Z40CDV5	H13	1.2344	X40CrMoV51	BH13	F.5318	SKD61
	A2	Z100CDV5	A2	1.2363	X100CrMoV51	BA2	F.5227	SKD12
	H10	32DCV28	H10	1.2365	X32CrMoV33	BH10	F.5313	
	D2	Z160CDV12	D2	1.2379	X155CrVMo121	BD2		
		105WC13		1.2419	105WCr6		F.5233	
			D6 (VC131)	1.2436	X210CrW12		F.5213	
	O1		O1 (VND)	1.251	100MnCrW4	BO1	F.5220	SKS 31
	S1		S1 (VW3)	1.2542	45WCrV7	BS1	F.5241	
		55WC20		1.255	60WCrV7			
	H21	Z30WCV9	H20/H21	1.2581	X30WCrV93	BH21	F.5323	SKD5
				1.2601	X165CrMoV12		F.5211	
	H12	Z35CWDV5	H12	1.2606	X37CrMoW51	BH12		
	L6	55NCDV7	(VMO)	1.2713	55NiCrMoV6		F.528	
	W210	Y1105V		1.2833	100V1	BW2		
	2	90MV8		1.2842	90MnCrV8	BO2		
	T15			1.3202	S12-1-4-5	BT15	F.5563	
		Z130WKCDV10-10-04-03		1.3207	S10-4-3-10		F.553	
		Z85WDKCV06-05-05-04-02	M35	1.3243	S6-5-2-5		F.5613	
	M41	Z110WKCDV07-05-04-04-02		1.3246	S7-4-2-5		F.5613	
	M42	Z110DKCWW09-08-04-02-01	M42	1.3247	S2-10-1-8	BT42	F.5615	
	M33/M34			1.3249	S2-9-2-8	BM34	F.5611	
	T4	Z80WKCV18-05-04-01		1.3255	S18-1-2-5	BT4	F.5530	
	T5			1.3265	S18-1-2-10	BT5	F.5540	
	M3	Z90WDCV06-05-04-03		1.3342	SC6-5-2			
	M2	Z85WDCV06-05-04-02	M2	1.3343	S6-5-2	BM2	F.5603	
	M3Class2	Z130WDCV06-05-04-04	M3:2	1.3344	S6-5-3		F.5605	
H41/M1	Z85DCVW08-04-02-01		1.3346	S2-9-1	BM1			
M7	Z100DCVW09-04-02-02	M7	1.3348	S2-9-2		F.5607		
T1	Z80WCV18-04-01		1.3355	S18-0-1	BT1	F.5520		
A128(A)	Z120M12 / Z120Mn12		1.3401	X120Mn12		F.82551		
52100	100C6	52100	1.3505	100Cr6	534A99	F.1310		
HARDENED STEEL								
CAST ALUMINIUM	319,2	A-S5U		3.2151	G-AISI6Cu4	LM4/LM22	L-2660	
	380,1	A-S9U3		3.2161	G-AISI8Cu3	LM24	L-2630	
		A-S4G		3.2341	G-AISI5Mg	DTD716B		
	A356.2	A-S7G0,3		3.2371	G-AISI7Mg	2L99/LM25		
		A7-S10G		3.2373	G-AISI9Mg			
	A360	A-S10G		3.2381	G-AISI10Mg	LM9	L-2560	
	413,1	A-S12U		3.2583	G-AISI12Cu	LM20	L-2530	
	514.1	A-G6		3.3561	G-AIMg5	LM5		
	A413	A-S13		3.3581	G-AISI12	LM6	L-2520	
	520	A-G10-Y4		3.3591	G-AIMg10	LM10	L-2310	
	390				AISI17Cu4			
	393				AISI18-25CuNiMg	LM28/LM29		

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Material Conversion Chart

								
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WROUGHT ALUMINIUM	1200	A4		3.0205	Al99	1C	L-3001	
	1050A	A5		3.0255	Al99,5	1B	L-3051	
	1350A	A5/L		3.0257	E-Al	1E	L-3052	
	1080A	A8		3.0285	Al99,8	1A	L-3081	
	1199	A99		3.0385	Al99,98R	1		
	3004	A-M1G		3.0526	AlMnMg1	N4	L-3820	
	2014	A-U4SG		3.1255	AlCuSiMn	H15	L-3130	
	2117	A-U2G		3.1305	AlCu2,5Mg0,5	3L86/HR13	L-3180	
	2017A	A-U4G		3.1325	AlCuMg1	H14	L-3120	
	2024	A-U4G1		3.1355	AlCuMg2	2L98	L3140	
	2003	A-U4Pb		3.1645	AlCuMgPb		L-3121	
	2011	A-U5PbBi		3.1655	AlCuBiPb	FC1	L-3182	
	6101B			3.2305	E-AlMgSi	91E	L-3431	
	6463	A85-GS		3.2307	Al99,85MGSi	BTR6		
	6181	A-SGMO,7		3.2315	Al-Si1 Mg	H30	L-3451	
	6060			3.3206	AlMGSi0,5	H9	L-3441	
	6101C	A-GS/L		3.3207	E-AlMgSi0,5	BTR6		
	5005A	A-G0,6		3.3315	AlMg1	N41	L-3350	
	5050B	A-G1,5		3.3316	AlMg1,5	3L44	L-3380	
	5052	A-G2,5C		3.3523	AlMg2,5	N5Mg3,5	L-3360	
	5251	A-G2M		3.3525	AlMg2Mn0,3	N4		
	5754	A-G3M		3.3535	AlMg3		L-3390	
	5454	A-G2,5MC		3.3537	AlMg2,7Mn	N51		
	5083	5083		3.3547	AlMg4,5Mn	N8	L-3321	
	5056A			3.3555	AlMg5	N6	L-3320	
7020	A-Z5G		3.4335	AlZn4,5Mg1	H17	L-3741		
7075	A-Z5GU		3.4365	AlZnMgCu1,5	2L95	L-3710		
SG / NODULAR CAST IRON	60-40-18	FGS-400-12		0.704	GGG-40	420/12		
		FGS370-17		0.7043	GGG-40.3	370/17		
	65-45-12	FGS500-7		0.705	GGG-50	500/7		FDC500
	80-55-06	FGS 600-3		0.706	GGG-60	600/3		
	100-70-03	FGS 700-2		0.707	GGG-70	700/2		FDC700
	120-90-02	FGS 800-2		0.708	GGG-80	800/2		
		MB 35-7		0.8035	GTW-35-04	W 340/3		
		MB 40-10		0.804	GTW-40-05	W 410/4		
				0.8045	GTW-45-07			
	32 510	MN 35-10		0.8135	GTS-35-10	B 340/12		
		MP 50-5		0.8145	GTS-45-06	P 440/7		
		MP 60-3		0.8155	GTS-55-04	P 540/5		
				0.8165	GTS 65-02			
70 003	MP 70-2		0.817	GTS 70-02	P 690/2			
GREY / WHITE CAST IRON	A48-40B	Ft25D / FGL250		0.6025	GG25	Grade 260	FG 25	
	A48-20B	Ft10D / FGL100		0.601	GG10		FG 10	
	A48-25B	Ft15D / FGL150		0.6015	GG15	Grade 150	FG 15	
	A48-30B	Ft20D / FGL200		0.602	GG20	Grade 220	FG20	
	A48-45B	Ft30D / FGL300		0.603	GG30	Grade 300	FG 30	
	A48-50B	Ft35D / FGL350		0.6035	GG35	Grade 350	FG35	
	A48-60B	Ft40D / FGL400		0.604	GG40	Grade 400		
BRONZE ALUMINIUM-BRONZE TIN BRONZE	C 60 800	CuAl6		2.0918	CuAl5As			
	C 61 000	CuAl8		2.092	CuAl8			
	C 61 400	CuAl7Fe2		2.0932	CuAl8Fe3	CA 106		
	C 62 300	CuAl9Fe3Mn2		2.0936	CuAl10Fe3Mn2	CA 105		
	C 95 200	CuAl9Fe3		2.094	CuAl10Fe	AB 1		
	B 505	CuAl9Fe3		2.094	G-FeAlBzF50	AB 1		
		CuAl9Mn2		2.096	CuAl9Mn2			
	C 63 200	CuAl9Ni5Fe3Mn		2.0966	CuAl10Ni5Fe4	CA 104		
	C 95 800	CuAl9Ni5Fe		2.097	G-NiAlBzF50	AB 2		
		CuAl11Ni5Fe5		2.0978	CuAl11Ni6Fe5			
	C 94100	CuPb20Sn5		2.1188	G-CuPb20Sn	LB5		

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Material Conversion Chart

								
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BRASS	C 21000/34500	CuZn5		2.022/2.032	CuZn5	CZ 125/101		
	C 85700	CuZn40-Y30		2.034	G-CuZn37Pb	PCB 3		
	C 28000/38500	CuZn40/44Pb2		2.036/2.041	CuZn40/44Pb2	CZ 109/CZ130		
	C 68700	CuZn22Al2		2.046	CuZn20Al2	CZ 110		
	C 44300			2.047	CuZn28Sn1	CZ 111		
	C 46400			2.053	CuZn38Sn1	CZ 112		
	C 67400			2.055	CuZn40Al2	CZ 114		
	C 86400			2.0591	G-CuZn38Al	PCB1, DCB 3		
	C 86400	CuZn40-Y30		2.0592	G-CuZn35Al1	HTB 1		
	C 86300			2.0598	G-CuZn25Al5	HTB 3		
	C 90500			2.105	G-CuSn10Zn	G1		
	C 90800	CuSn12		2.1052	G-CuSn12	Pb2		
	C 91700			2.106	G-CuSn12Ni	CT2		
	C 90250			2.1086	G-CuSn10	CT1		
	C 93200	CuSn7Pb6Zn4		2.109	G-CuSn7ZnPb			
	C 92410			2.1093	G-CuSn6ZnNi	LG4		
	C 83600	CuPb5Sn5Zn5		2.1096	G-CuSn5ZnPb/RG5	LG2		
	C 93700	CuPb10Sn10		2.1176	G-CuPb10Sn	LB2		
	C 93800			2.1182	G-CuPb15Sn	LB1		
COPPER COPPER/NICKEL ALLOYS	C 96200			2.0815	G-CuNi10			
	C 71300	CiNi25		2.083	CuNi25	CN 105		
	C 96400			2.0835	G-CuNi30	CN 2		
	C 72150	CuNi44		2.0842	CuNi44Mn1			
	C 70600	CuNi10Fe1Mn		2.0872	CuNi10Fe1Mn	CN 102		
	C 71500	CuNi30Mn1Fe		2.0882	CuNi30Mn1Fe	CN 107		
	C 17000	CuBe1,7		2.1245	CuBe1,7	CB 101		
	C 17200	CuBe1,9		2.1247	CuBe2			
	C 17500			2.1285	CuCo2Be	C 112		
	C 71640	CuNi30Fe2Mn2			CuNi30Fe2Mn2	CN 108		
	OF	Cu-c1/C2		2.004	OF-Cu	Cu-OF C 103/110		
	C 11000	Cu-a1/A2		2.006	E-Cu57	Cu-ETP-2 C 101		
	C 11000	Cu-a1		2.0065	E-Cu58	Cu-ETP-2 C 101		
	C 1200	Cu-b2		2.0076	SW-Cu			
	C 12200	Cu-b1		2.009	SF-Cu	Cu-DHP C 106		

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