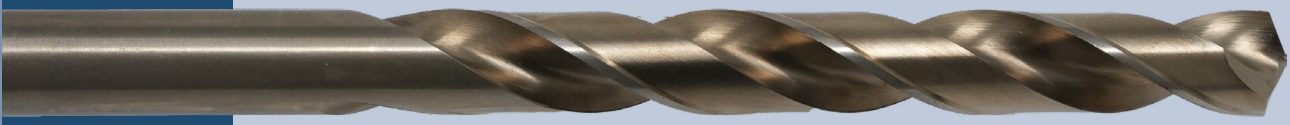
Chicago-Latrobe®



Holemaking
Reamers
Countersinks
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GREENFIELD INDUSTRIES

Drills - Contents

Style	Tool Material: HSS	Cobalt	Carbide	Point: 118°	118° Split	118° K Notch	135° Split	135° K Notch	135° Mod	Surface Treatment: Bright	Straw	Black Oxide	TiN	TiCN	TiAlN		Page
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** Some or all items are only available until inventory is depleted, see specific page.

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CHECK OUT THESE TECH TIPS
Helpful Product & Application Information

Drills - Contents

Technical Information

Metal Cutting Safety *Information to read before using Greenfield Threading products*

Modern metalcutting operations involve high energy, high spindle or cutter speeds, and high temperatures and cutting forces. Hot, flying chips may be projected from the workpiece during metalcutting. Although advanced cutting tool materials are designed and manufactured to withstand the high cutting forces and temperatures that normally occur in these operations, they are susceptible to fragmenting in service, particularly if they are subjected to over-stress, severe impact, or otherwise abused. Therefore, precautions should be taken to adequately protect workers, observers, and equipment against hot, flying chips, fragmented cutting tools, broken workpieces, or other similar projectiles. Machines should be fully guarded and personal protective equipment should be used at all times. When grinding advanced cutting tool materials, a suitable means for collection and disposal of dust, mist, or sludge should be provided. Overexposure to dust or mist containing metallic particles can be hazardous to health, particularly if exposure continues over an extended period of time, and may cause eye, skin, and mucous membrane irritation and temporary or permanent respiratory disease. Certain existing pulmonary and skin conditions may be aggravated by exposure to dust or mist. Adequate ventilation, respiratory protection, and eye protection should be provided when grinding, and workers should avoid breathing of and prolonged skin contact with dust or mist. General Industry Safety and Health Regulations, Part 1910, U.S. Department of Labor, published in Title 29 of the Code of Federal Regulations should be consulted. Obtain a copy from Greenfield and read the applicable Material Safety Data Sheet before grinding. Cutting tools are only one part of the worker /machine-tool system. Many variables exist in machining operations, including the metal removal rate; the workpiece size, shape, strength and rigidity; the chucking and fixturing; the load carrying capability of centers; the cutter and spindle speed and torque limitations; the holder and boring bar overhang; the available power; and the condition of the tooling and the machine. A safe metalcutting operation must take all of these variables, and others, into consideration. Greenfield has no control over the end use of its products or the environment into which those products are placed. Greenfield urges that its customers adhere to the recommended standards of use of their metalcutting machines and tools, and that they follow procedures that ensure safe metalcutting operations. The information included throughout this catalog under the heading "Technical Data" and other recommendations on machining practices referred to herein are only advisory in nature and do not constitute representations or warranties and are not necessarily appropriate for any particular work environment or application.

WARNING: This product contains Cobalt and/or Nickel and/or Lead a chemical known to the state of California to cause cancer or birth defects or other reproductive harm. For more information: **www.P65Warnings.ca.gov**

Drills - Jobber Length

General Purpose
Styles 150, 150D, 150-TN (150T)

Features/Benefits:
- General-purpose geometry for drilling in a wide range of operating conditions and materials.
- Manufactured from premium high-speed steel.
- 118° point.
- The most popular drill for general-purpose applications.
- Metric sizes are manufactured to DIN 338 specifications.
- Bright, black oxide and titanium nitride (TiN) finishes standard from stock; alternate coatings available as stock modifications.

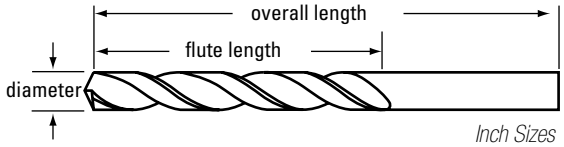
Application Information:
- carbon steel (TiN, black oxide)
- cast iron (TiN, black oxide)
- non-ferrous materials (bright)

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.
- Titanium nitride (TiN) PVD coating adds lubricity and hardness which enhances chip flow, finish hole quality, and drill life.

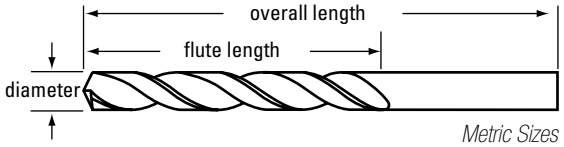
Style 150 Black Oxide

Style 150D Bright Finish

Style 150-TN TiN-Coated



Inch Sizes



Metric Sizes

INCH AND METRIC SIZES

Drill Diameter Fraction	Wire/Let	Metric	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	**Style 150** Black Oxide	**Style 150D** Bright*	**Style 150-TN** TiN
	80		.0135	0.34	.7500	19.05	.1250	3.18	44150	44350	70180
		0.35	.0138		.7480	19.00	.1575	4.00	—	47210	—
	79		.0145	0.37	.7500	19.05	.1250	3.18	44149	44349	70179
1/64			.0156	0.40	.7500	19.05	.1875	4.76	44001	44201	70201
		0.40	.0157		.7874	20.00	.1969	5.00	—	47211	—
	78		.0160	0.41	.8750	22.23	.1875	4.76	44148	44348	70178
		0.45	.0177		.7874	20.00	.1969	5.00	—	47212	—
	77		.0180	0.46	.8750	22.23	.1875	4.76	44147	44347	70177
		0.50	.0197		.8661	22.00	.2362	6.00	—	47213	—
	76		.0200	0.51	.8750	22.23	.1875	4.76	44146	44346	70176
	75		.0210	0.53	1.0000	25.40	.2500	6.35	44145	44345	70175
		0.55	.0217		.9449	24.00	.2756	7.00	—	47214	—
	74		.0225	0.57	1.0000	25.40	.2500	6.35	44144	44344	70174
		0.60	.0236		.9449	24.00	.2756	7.00	—	47215	—
	73		.0240	0.61	1.1250	28.58	.3125	7.94	44143	44343	70173
	72		.0250	0.64	1.1250	28.58	.3125	7.94	44142	44342	70172

continued on next page

General Purpose (continued)
Styles 150, 150D, 150-TN (150T)

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 150	Style 150D	Style 150-TN
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Black Oxide	Bright*	TiN
		0.65	.0256		1.0236	26.00	.3150	8.00	—	47216	—
	71		.0260	0.66	1.2500	31.75	.3750	9.53	44141	44341	70171
		0.70	.0276		1.1024	28.00	.3543	9.00	—	47217	—
	70		.0280	0.71	1.2500	31.75	.3750	9.53	44140	44340	70170
	69		.0292	0.74	1.3750	34.93	.5000	12.70	44139	44339	70169
		0.75	.0295		1.1024	28.00	.3543	9.00	—	47218	—
	68		.0310	0.79	1.3750	34.93	.5000	12.70	44138	44338	70168
1/32			.0312	0.79	1.3750	34.93	.5000	12.70	44002	44202	70202
		0.80	.0315		1.1811	30.00	.3937	10.00	—	47219	—
	67		.0320	0.81	1.3750	34.93	.5000	12.70	44137	44337	70167
	66		.0330	0.84	1.3750	34.93	.5000	12.70	44136	44336	70166
		0.85	.0335		1.1811	30.00	.3937	10.00	—	47220	—
	65		.0350	0.89	1.5000	38.10	.6250	15.88	44135	44335	70165
		0.90	.0354		1.2598	32.00	.4331	11.00	—	47221	—
	64		.0360	0.91	1.5000	38.10	.6250	15.88	44134	44334	70164
	63		.0370	0.94	1.5000	38.10	.6250	15.88	44133	44333	70163
		0.95	.0374		1.2598	32.00	.4331	11.00	—	47222	—
	62		.0380	0.97	1.5000	38.10	.6250	15.88	44132	44332	70162
	61		.0390	0.99	1.6250	41.28	.6875	17.46	44131	44331	70161
		1.00	.0394		1.3386	34.00	.4724	12.00	47223	45223	70331
	60		.0400	1.02	1.6250	41.28	.6875	17.46	44130	44330	70160
	59		.0410	1.04	1.6250	41.28	.6875	17.46	44129	44329	70159
		1.05	.0413		1.3386	34.00	.4724	12.00	47224	45224	—
	58		.0420	1.07	1.6250	41.28	.6875	17.46	44128	44328	70158
	57		.0430	1.09	1.7500	44.45	.7500	19.05	44127	44327	70157
		1.10	.0433		1.4173	36.00	.5512	14.00	47225	45225	—
		1.15	.0453		1.4173	36.00	.5512	14.00	47226	45226	—
	56		.0465	1.18	1.7500	44.45	.7500	19.05	44126	44326	70156
3/64			.0469	1.19	1.7500	44.45	.7500	19.05	44003	44203	70203
		1.20	.0472		1.4961	38.00	.6299	16.00	47227	45227	—
		1.25	.0492		1.4961	38.00	.6299	16.00	47228	45228	70344
		1.30	.0512		1.4961	38.00	.6299	16.00	47229	45229	70345
	55		.0520	1.32	1.8750	47.63	.8750	22.23	44125	44325	70155
		1.35	.0531		1.5748	40.00	.7087	18.00	47230	45230	—
	54		.0550	1.40	1.8750	47.63	.8750	22.23	44124	44324	70154
		1.40	.0551		1.5748	40.00	.7087	18.00	47231	45231	—
		1.45	.0571		1.5748	40.00	.7087	18.00	47232	45232	70346
		1.50	.0591		1.5748	40.00	.7087	18.00	47233	45233	70347
	53		.0595	1.51	1.8750	47.63	.8750	22.23	44123	44323	70153
		1.55	.0610		1.6929	43.00	.7874	20.00	47234	45234	70348
1/16			.0625	1.59	1.8750	47.63	.8750	22.23	44004	44204	70204
		1.60	.0630		1.6929	43.00	.7874	20.00	47235	45235	—
	52		.0635	1.61	1.8750	47.63	.8750	22.23	44122	44322	70152
		1.65	.0650		1.6929	43.00	.7874	20.00	47236	45236	70349
		1.70	.0669		1.6929	43.00	.7874	20.00	47237	45237	—
	51		.0670	1.70	2.0000	50.80	1.0000	25.40	44121	44321	70151
		1.75	.0689		1.8110	46.00	.8661	22.00	47238	45238	70364
	50		.0700	1.78	2.0000	50.80	1.0000	25.40	44120	44320	70150

continued on next page

Drills - Jobber Length

General Purpose (continued)
Styles 150, 150D, 150-TN (150T)

INCH AND METRIC SIZES

Drill Diameter Fraction	Wire/Let	Metric	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 150** Black Oxide	**Style 150D** Bright*	**Style 150-TN** TiN
		1.80	.0709		1.8110	46.00	.8661	22.00	47239	45239	—
		1.85	.0728		1.8110	46.00	.8661	22.00	47240	45240	—
	49		.0730	1.85	2.0000	50.80	1.0000	25.40	44119	44319	70149
		1.90	.0748		1.8110	46.00	.8661	22.00	47241	45241	—
	48		.0760	1.93	2.0000	50.80	1.0000	25.40	44118	44318	70148
		1.95	.0768		1.9291	49.00	.9449	24.00	47242	45242	—
5/64			.0781	1.98	2.0000	50.80	1.0000	25.40	44005	44205	70205
	47		.0785	1.99	2.0000	50.80	1.0000	25.40	44117	44317	70147
		2.00	.0787		1.9291	49.00	.9449	24.00	47243	45243	70332
		2.05	.0807		1.9291	49.00	.9449	24.00	47244	45244	70365
	46		.0810	2.06	2.1250	53.98	1.1250	28.58	44116	44316	70146
	45		.0820	2.08	2.1250	53.98	1.1250	28.58	44115	44315	70145
		2.10	.0827		1.9291	49.00	.9449	24.00	47245	45245	70366
		2.15	.0846		2.0866	53.00	1.0630	27.00	47246	45246	—
	44		.0860	2.18	2.1250	53.98	1.1250	28.58	44114	44314	70144
		2.20	.0866		2.0866	53.00	1.0630	27.00	47247	45247	70367
		2.25	.0886		2.0866	53.00	1.0630	27.00	47248	45248	—
	43		.0890	2.26	2.2500	57.15	1.2500	31.75	44113	44313	70143
		2.30	.0906		2.0866	53.00	1.0630	27.00	47249	45249	70368
		2.35	.0925		2.0866	53.00	1.0630	27.00	47250	45250	—
	42		.0935	2.37	2.2500	57.15	1.2500	31.75	44112	44312	70142
3/32			.0938	2.38	2.2500	57.15	1.2500	31.75	44006	44206	70206
		2.40	.0945		2.2441	57.00	1.1811	30.00	47251	45251	—
	41		.0960	2.44	2.3750	60.33	1.3750	34.93	44111	44311	70141
		2.45	.0965		2.2441	57.00	1.1811	30.00	47252	45252	—
	40		.0980	2.49	2.3750	60.33	1.3750	34.93	44110	44310	70140
		2.50	.0984		2.2441	57.00	1.1811	30.00	47253	45253	70369
	39		.0995	2.53	2.3750	60.33	1.3750	34.93	44109	44309	70139
	38		.1015	2.58	2.5000	63.50	1.4375	36.51	44108	44308	70138
		2.60	.1024		2.2441	57.00	1.1811	30.00	47254	45254	—
	37		.1040	2.64	2.5000	63.50	1.4375	36.51	44107	44307	70137
		2.70	.1063		2.4016	61.00	1.2992	33.00	47255	45255	—
	36		.1065	2.71	2.5000	63.50	1.4375	36.51	44106	44306	70136
7/64			.1094	2.78	2.6250	66.68	1.5000	38.10	44007	44207	70207
	35		.1100	2.79	2.6250	66.68	1.5000	38.10	44105	44305	70135
		2.80	.1102		2.4016	61.00	1.2992	33.00	47257	45257	70370
	34		.1110	2.82	2.6250	66.68	1.5000	38.10	44104	44304	70134
	33		.1130	2.87	2.6250	66.68	1.5000	38.10	44103	44303	70133
		2.90	.1142		2.4016	61.00	1.2992	33.00	47258	45258	70371
	32		.1160	2.95	2.7500	69.85	1.6250	41.28	44102	44302	70132
		3.00	.1181		2.4016	61.00	1.2992	33.00	47259	45259	70333
	31		.1200	3.05	2.7500	69.85	1.6250	41.28	44101	44301	70131
		3.10	.1220		2.5591	65.00	1.4173	36.00	47260	45260	70372
1/8			.1250	3.18	2.7500	69.85	1.6250	41.28	44008	44208	70208
		3.20	.1260		2.5591	65.00	1.4173	36.00	47261	45261	70373
	30		.1285	3.26	2.7500	69.85	1.6250	41.28	44100	44300	70130
		3.30	.1299		2.5591	65.00	1.4173	36.00	47263	45263	70374
		3.40	.1339		2.7559	70.00	1.5354	39.00	47264	45264	70375

continued on next page

General Purpose (continued)
Styles 150, 150D, 150-TN (150T)

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 150	Style 150D	Style 150-TN
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Black Oxide	Bright*	TiN
	29		.1360	3.45	2.8750	73.03	1.7500	44.45	44099	44299	70129
		3.50	.1378		2.7559	70.00	1.5354	39.00	47265	45265	70376
	28		.1405	3.57	2.8750	73.03	1.7500	44.45	44098	44298	70128
9/64			.1406	3.57	2.8750	73.03	1.7500	44.45	44009	44209	70209
		3.60	.1417		2.7559	70.00	1.5354	39.00	47266	45266	—
	27		.1440	3.66	3.0000	76.20	1.8750	47.63	44097	44297	70127
		3.70	.1457		2.7559	70.00	1.5354	39.00	47267	45267	70377
	26		.1470	3.73	3.0000	76.20	1.8750	47.63	44096	44296	70126
	25		.1495	3.80	3.0000	76.20	1.8750	47.63	44095	44295	70125
		3.80	.1496		2.9528	75.00	1.6929	43.00	47269	45269	—
	24		.1520	3.86	3.1250	79.38	2.0000	50.80	44094	44294	70124
		3.90	.1535		2.9528	75.00	1.6929	43.00	47270	45270	—
	23		.1540	3.91	3.1250	79.38	2.0000	50.80	44093	44293	70123
5/32			.1562	3.97	3.1250	79.38	2.0000	50.80	44010	44210	70210
	22		.1570	3.99	3.1250	79.38	2.0000	50.80	44092	44292	70122
		4.00	.1575		2.9528	75.00	1.6929	43.00	47271	45271	70334
	21		.1590	4.04	3.2500	82.55	2.1250	53.98	44091	44291	70121
	20		.1610	4.09	3.2500	82.55	2.1250	53.98	44090	44290	70120
		4.10	.1614		2.9528	75.00	1.6929	43.00	47272	45272	—
		4.20	.1654		2.9528	75.00	1.6929	43.00	47273	45273	70378
	19		.1660	4.22	3.2500	82.55	2.1250	53.98	44089	44289	70119
		4.30	.1693		3.1496	80.00	1.8504	47.00	47275	45275	—
	18		.1695	4.31	3.2500	82.55	2.1250	53.98	44088	44288	70118
11/64			.1719	4.37	3.2500	82.55	2.1250	53.98	44011	44211	70211
	17		.1730	4.39	3.3750	85.73	2.1875	55.56	44087	44287	70117
		4.40	.1732		3.1496	80.00	1.8504	47.00	47276	45276	—
	16		.1770	4.50	3.3750	85.73	2.1875	55.56	44086	44286	70116
		4.50	.1772		3.1496	80.00	1.8504	47.00	47277	45277	70379
	15		.1800	4.57	3.3750	85.73	2.1875	55.56	44085	44285	70115
		4.60	.1811		3.1496	80.00	1.8504	47.00	47278	45278	—
	14		.1820	4.62	3.3750	85.73	2.1875	55.56	44084	44284	70114
	13		.1850	4.70	3.5000	88.90	2.3125	58.74	44083	44283	70113
		4.70	.1850		3.1496	80.00	1.8504	47.00	47279	45279	—
3/16			.1875	4.76	3.5000	88.90	2.3125	58.74	44012	44212	70212
	12		.1890	4.80	3.5000	88.90	2.3125	58.74	44082	44282	70112
		4.80	.1890		3.3858	86.00	2.0472	52.00	47281	45281	—
	11		.1910	4.85	3.5000	88.90	2.3125	58.74	44081	44281	70111
		4.90	.1929		3.3858	86.00	2.0472	52.00	47282	45282	70380
	10		.1935	4.91	3.6250	92.08	2.4375	61.91	44080	44280	70110
	9		.1960	4.98	3.6250	92.08	2.4375	61.91	44079	44279	70109
		5.00	.1969		3.3858	86.00	2.0472	52.00	47283	45283	70335
	8		.1990	5.05	3.6250	92.08	2.4375	61.91	44078	44278	70108
		5.10	.2008		3.3858	86.00	2.0472	52.00	47284	45284	—
	7		.2010	5.11	3.6250	92.08	2.4375	61.91	44077	44277	70107
13/64			.2031	5.16	3.6250	92.08	2.4375	61.91	44013	44213	70213
	6		.2040	5.18	3.7500	95.25	2.5000	63.50	44076	44276	70106
		5.20	.2047		3.3858	86.00	2.0472	52.00	47285	45285	—
	5		.2055	5.22	3.7500	95.25	2.5000	63.50	44075	44275	70105

continued on next page

General Purpose (continued)
Styles 150, 150D, 150-TN (150T)

INCH AND METRIC SIZES

Drill Diameter Fraction	Wire/Let	Metric	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 150 Black Oxide	Style 150D Bright*	Style 150-TN TiN
		5.30	.2087		3.3858	86.00	2.0472	52.00	47287	45287	—
	4		.2090	5.31	3.7500	95.25	2.5000	63.50	44074	44274	70104
		5.40	.2126		3.6614	93.00	2.2441	57.00	47288	45288	—
	3		.2130	5.41	3.7500	95.25	2.5000	63.50	44073	44273	70103
		5.50	.2165		3.6614	93.00	2.2441	57.00	47289	45289	70381
7/32			.2188	5.56	3.7500	95.25	2.5000	63.50	44014	44214	70214
		5.60	.2205		3.6614	93.00	2.2441	57.00	47290	45290	—
	2		.2210	5.61	3.8750	98.43	2.6250	66.68	44072	44272	70102
		5.70	.2244		3.6614	93.00	2.2441	57.00	47291	45291	70382
	1		.2280	5.79	3.8750	98.43	2.6250	66.68	44071	44271	70101
		5.80	.2283		3.6614	93.00	2.2441	57.00	47293	45293	—
		5.90	.2323		3.6614	93.00	2.2441	57.00	47294	45294	—
	A		.2340	5.94	3.8750	98.43	2.6250	66.68	44171	44371	70301
15/64			.2344	5.95	3.8750	98.43	2.6250	66.68	44015	44215	70215
		6.00	.2362		3.6614	93.00	2.2441	57.00	47295	45295	70336
	B		.2380	6.05	4.0000	101.60	2.7500	69.85	44172	44372	70302
		6.10	.2402		3.9764	101.00	2.4803	63.00	47296	45296	—
	C		.2420	6.15	4.0000	101.60	2.7500	69.85	44173	44373	70303
		6.20	.2441		3.9764	101.00	2.4803	63.00	47297	45297	—
	D		.2460	6.25	4.0000	101.60	2.7500	69.85	44174	44374	70304
		6.30	.2480		3.9764	101.00	2.4803	63.00	47299	45299	—
1/4	E		.2500	6.35	4.0000	101.60	2.7500	69.85	44016	44216	70216
		6.40	.2520		3.9764	101.00	2.4803	63.00	47300	45300	70383
		6.50	.2559		3.9764	101.00	2.4803	63.00	47301	45301	70384
	F		.2570	6.53	4.1250	104.78	2.8750	73.03	44176	44376	70306
		6.60	.2598		3.9764	101.00	2.4803	63.00	47302	45302	—
	G		.2610	6.63	4.1250	104.78	2.8750	73.03	44177	44377	70307
		6.70	.2638		3.9764	101.00	2.4803	63.00	47303	45303	70385
17/64			.2656	6.75	4.1250	104.78	2.8750	73.03	44017	44217	70217
	H		.2660	6.76	4.1250	104.78	2.8750	73.03	44178	44378	70308
		6.80	.2677		4.2913	109.00	2.7165	69.00	47305	45305	70386
		6.90	.2717		4.2913	109.00	2.7165	69.00	47306	45306	—
	I		.2720	6.91	4.1250	104.78	2.8750	73.03	44179	44379	70309
		7.00	.2756		4.2913	109.00	2.7165	69.00	47307	45307	70337
	J		.2770	7.04	4.1250	104.78	2.8750	73.03	44180	44380	70310
		7.10	.2795		4.2913	109.00	2.7165	69.00	47308	45308	—
	K		.2810	7.14	4.2500	107.95	2.9375	74.61	44181	44381	70311
9/32			.2812	7.14	4.2500	107.95	2.9375	74.61	44018	44218	70218
		7.20	.2835		4.2913	109.00	2.7165	69.00	47309	45309	70387
		7.30	.2874		4.2913	109.00	2.7165	69.00	47311	45311	—
	L		.2900	7.37	4.2500	107.95	2.9375	74.61	44182	44382	70312
		7.40	.2913		4.2913	109.00	2.7165	69.00	47312	45312	—
	M		.2950	7.49	4.3750	111.13	3.0625	77.79	44183	44383	70313
		7.50	.2953		4.2913	109.00	2.7165	69.00	47313	45313	70388
19/64			.2969	7.54	4.3750	111.13	3.0625	77.79	44019	44219	70219
		7.60	.2992		4.6063	117.00	2.9528	75.00	47314	45314	—
	N		.3020	7.67	4.3750	111.13	3.0625	77.79	44184	44384	70314
		7.70	.3031		4.6063	117.00	2.9528	75.00	47315	45315	—

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General Purpose (continued)
Styles 150, 150D, 150-TN (150T)

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 150	Style 150D	Style 150-TN
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Black Oxide	Bright*	TiN
		7.80	.3071		4.6063	117.00	2.9528	75.00	47317	45317	—
		7.90	.3110		4.6063	117.00	2.9528	75.00	47318	45318	—
5/16			.3125	7.94	4.5000	114.30	3.1875	80.96	44020	44220	70220
		8.00	.3150		4.6063	117.00	2.9528	75.00	47319	45319	70338
	O		.3160	8.03	4.5000	114.30	3.1875	80.96	44185	44385	70315
		8.10	.3189		4.6063	117.00	2.9528	75.00	47320	45320	—
		8.20	.3228		4.6063	117.00	2.9528	75.00	47321	45321	—
	P		.3230	8.20	4.6250	117.48	3.3125	84.14	44186	44386	70316
		8.30	.3268		4.6063	117.00	2.9528	75.00	47323	45323	—
21/64			.3281	8.33	4.6250	117.48	3.3125	84.14	44021	44221	70221
		8.40	.3307		4.6063	117.00	2.9528	75.00	47324	45324	—
	Q		.3320	8.43	4.7500	120.65	3.4375	87.31	44187	44387	70317
		8.50	.3346		4.6063	117.00	2.9528	75.00	47325	45325	70389
		8.60	.3386		4.9213	125.00	3.1890	81.00	47326	45326	—
	R		.3390	8.61	4.7500	120.65	3.4375	87.31	44188	44388	70318
		8.70	.3425		4.9213	125.00	3.1890	81.00	47327	45327	70390
11/32			.3438	8.73	4.7500	120.65	3.4375	87.31	44022	44222	70222
		8.80	.3465		4.9213	125.00	3.1890	81.00	47329	45329	—
	S		.3480	8.84	4.8750	123.83	3.5000	88.90	44189	44389	70319
		8.90	.3504		4.9213	125.00	3.1890	81.00	47330	45330	—
		9.00	.3543		4.9213	125.00	3.1890	81.00	47331	45331	70339
	T		.3580	9.09	4.8750	123.83	3.5000	88.90	44190	44390	70320
		9.10	.3583		4.9213	125.00	3.1890	81.00	47332	45332	—
23/64			.3594	9.13	4.8750	123.83	3.5000	88.90	44023	44223	70223
		9.20	.3622		4.9213	125.00	3.1890	81.00	47333	45333	—
		9.30	.3661		4.9213	125.00	3.1890	81.00	47335	45335	—
	U		.3680	9.35	5.0000	127.00	3.6250	92.08	44191	44391	70321
		9.40	.3701		4.9213	125.00	3.1890	81.00	47336	45336	—
		9.50	.3740		4.9213	125.00	3.1890	81.00	47337	45337	70391
3/8			.3750	9.53	5.0000	127.00	3.6250	92.08	44024	44224	70224
	V		.3770	9.58	5.0000	127.00	3.6250	92.08	44192	44392	70322
		9.60	.3780		5.2362	133.00	3.4252	87.00	47338	45338	—
		9.70	.3819		5.2362	133.00	3.4252	87.00	47339	45339	—
		9.80	.3858		5.2362	133.00	3.4252	87.00	47341	45341	—
	W		.3860	9.80	5.1250	130.18	3.7500	95.25	44193	44393	70323
		9.90	.3898		5.2362	133.00	3.4252	87.00	47342	45342	—
25/64			.3906	9.92	5.1250	130.18	3.7500	95.25	44025	44225	70225
		10.00	.3937		5.2362	133.00	3.4252	87.00	47343	45343	70340
	X		.3970	10.08	5.1250	130.18	3.7500	95.25	44194	44394	70324
		10.20	.4016		5.2362	133.00	3.4252	87.00	47354	45354	70392
	Y		.4040	10.26	5.2500	133.35	3.8750	98.43	44195	44395	70325
13/32			.4062	10.32	5.2500	133.35	3.8750	98.43	44026	44226	70226
	Z		.4130	10.49	5.2500	133.35	3.8750	98.43	44196	44396	70326
		10.50	.4134		5.2362	133.00	3.4252	87.00	47344	45344	70393
27/64			.4219	10.72	5.3750	136.53	3.9375	100.01	44027	44227	70227
		10.80	.4252		5.5905	142.00	3.7008	94.00	47356	45356	—
		11.00	.4331		5.5905	142.00	3.7008	94.00	47345	45345	70341
7/16			.4375	11.11	5.5000	139.70	4.0625	103.19	44028	44228	70228

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General Purpose (continued)
Styles 150, 150D, 150-TN (150T)

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 150	Style 150D	Style 150-TN
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Black Oxide	Bright*	TiN
		11.20	.4409		5.5905	142.00	3.7008	94.00	47357	45357	70394
		11.50	.4528		5.5905	142.00	3.7008	94.00	47346	45346	70395
29/64			.4531	11.51	5.6250	142.88	4.1875	106.36	44029	44229	70229
		11.80	.4646		5.5905	142.00	3.7008	94.00	47358	45358	—
15/32			.4688	11.91	5.7500	146.05	4.3125	109.54	44030	44230	70230
		12.00	.4724		5.9449	151.00	3.9764	101.00	47347	45347	70342
		12.20	.4803		5.9449	151.00	3.9764	101.00	47359	45359	70396
31/64			.4844	12.30	5.8750	149.23	4.3750	111.13	44031	44231	70231
		12.50	.4921		5.9449	151.00	3.9764	101.00	47348	45348	70397
1/2			.5000	12.70	6.0000	152.40	4.5000	114.30	44032	44232	70232
		12.80	.5039		5.9449	151.00	3.9764	101.00	47360	45360	—
		13.00	.5118		5.9449	151.00	3.9764	101.00	47349	45349	70343
33/64			.5156	13.10	6.6250	168.28	4.8125	122.24	44033	44233	70233
		13.20	.5197		5.9449	151.00	3.9764	101.00	47361	45361	—
17/32			.5312	13.49	6.6250	168.28	4.8125	122.24	44034	44234	70234
		13.50	.5315		6.2992	160.00	4.2520	108.00	47363	45363	—
		13.80	.5433		6.2992	160.00	4.2520	108.00	47364	45364	—
35/64			.5469	13.89	6.6250	168.28	4.8125	122.24	44035	44235	70235
		14.00	.5512		6.2992	160.00	4.2520	108.00	47362	45362	—
		14.25	.5610		6.2992	160.00	4.2520	108.00	47365	45365	—
9/16			.5625	14.29	6.6250	168.28	4.8125	122.24	44036	44236	70236
		14.50	.5709		6.6535	169.00	4.4882	114.00	47366	45366	—
37/64			.5781	14.68	6.6250	168.28	4.8125	122.24	44037	44237	70237
		14.75	.5807		6.6535	169.00	4.4882	114.00	47367	45367	—
		15.00	.5906		6.6535	169.00	4.4882	114.00	47369	45369	—
19/32			.5938	15.08	7.1250	180.98	5.1875	131.76	44038	44238	70238
		15.25	.6004		6.6535	169.00	4.4882	114.00	47370	45370	—
39/64			.6094	15.48	7.1250	180.98	5.1875	131.76	44039	44239	70239
		15.50	.6102		7.0079	178.00	4.7244	120.00	47368	45368	—
		15.75	.6201		7.0079	178.00	4.7244	120.00	47371	45371	—
5/8			.6250	15.88	7.1250	180.98	5.1875	131.76	44040	44240	70240
		16.00	.6299		7.0079	178.00	4.7244	120.00	47372	45372	—
		16.25	.6398		7.0079	178.00	4.7244	120.00	47373	45373	—
41/64			.6406	16.27	7.1250	180.98	5.1875	131.76	44041	44241	70241
		16.50	.6496		7.2441	184.00	4.9213	125.00	47374	45374	—
21/32			.6562	16.67	7.1250	180.98	5.1875	131.76	44042	44242	70242
		16.75	.6594		7.2441	184.00	4.9213	125.00	47376	45376	—
		17.00	.6693		7.2441	184.00	4.9213	125.00	47377	45377	—
43/64			.6719	17.07	7.1250	180.98	5.1875	131.76	44043	44243	70243
		17.25	.6791		7.2441	184.00	4.9213	125.00	47378	45378	—
11/16			.6875	17.46	7.6250	180.98	5.6250	131.76	44044	44244	70244
		17.50	.6890		7.5197	191.00	5.1181	130.00	47375	45375	—

sets listed on next page

General Purpose (continued)
Styles 150, 150D, 150-TN (150T)

INCH AND METRIC SETS

Sets in Metal Index Cases

Number of Tools	Size Range	Style 150 Black Oxide	Style 150D Bright	Style 150-TN TiN
13	1/16 - 1/4 X 1/64	57711	49911	—
15	1/16 - 1/2 X 1/32	57713	49913	69862
21	1/16 - 3/8 X 1/64	57712	49912	—
29	1/16 - 1/2 X 1/64	57714	49914	69861
26	Letters A - Z	57718	49918	69883
60	#1 - #60 wire gauge	57716	49916	69863
80	#1 - #80 wire gauge	57717	—	—
20	#61 - #80 wire gauge	57720	57715	69897
115	1/16 - 1/2 X 1/64, A - Z, #1 - #60	57728	49928	—
114	1/16 - 1/2 X 1/64, #1 - #60, 1mm - 13mm X 0.5mm	57726	—	—
11	1mm - 6mm X 0.5mm	57723	—	—
13	1mm - 7mm X 0.5mm	57729	—	—
25	1mm - 13mm X 0.5mm	57725	—	—
118	1mm - 13mm X 0.1mm	57727	—	—


Set 49914


Set 57714


Set 69861

TECH TIP

DRILL REGRINDING

Good tool management is knowing how to recognize drill wear in preparation for re-sharpening. Signs of wear start as soon as the drill starts to cut. All tool regrinding should be done by machine.

1. Removal of Worn Section: Wear on the outer corners will appear as a slight rounding. You will see wear on the cutting lips and on the chisel-edge. If the drill is used at this point, it will only rub in the hole rather than cut.

With this condition of wear on the point, the horsepower and thrust increases, which in turn increases wear at a faster rate. Wear will appear along the margins. This could result in loss of size. To resharpen a tool in this condition, you will have to remove all of this worn section. Assuming that you are cutting off 1/4" to1/2" of worn material with an abrasive cutoff wheel, care is needed not to burn the high-speed steel. If this happens you will lower the hardness by about 5Rc points, softening the steel and resulting in a dramatic loss of performance.

2. Web Thinning: Most standard drills have webs, which increase in diameter all the way to the shank end. As the drill is resharpened, the web will get thicker, and web thinning is necessary. Web thinning is done on a tool and cutter grinder or CNC for accurate control. The same amount of stock should be removed from both sides to ensure web centrality. If web centrality is incorrect you can cause rapid wear failure and an out-of-round hole. Free cutting wheels should be used to not burn the cutting edges. The contour of the flute should be blended in with the original web shape to not hinder chip flow.

3. Drill Pointing: This is the most critical operation in drill re-sharpening. The two cutting lips of a drill should be accurately ground to equal angles and equal length. If your drill point has lips of equal length but at unequal angles, or vise versa, one cutting edge will do most of the cutting and will cause an oversize condition, excessive wear, and short tool life.

4. Lip Relief Angles: The lip relief angle is the angle measured across the margin at the periphery of the drill. This angle has a bearing on the amount of clearance to obtain the correct chisel edge angle. When grinding the lip relief angle, both sides should be on the same plane. In general, the diameter of the tool dictates what that angle should be. Fragile, small diameter tools require larger clearance angles to help them penetrate. For instance, a #80-#61 would have an angle of 24°, a 3/4" tool would be about 8° to 10°. Material hardness also plays here. If drilling harder materials, reduce angles by 2° and increase for softer materials by 2°.

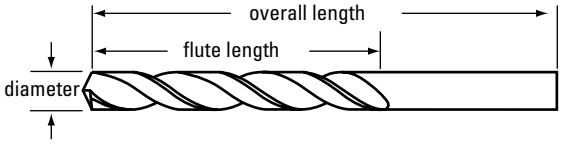
For more information, see the USCTI brochure, "Tolerances for Twist Drills and Reamers."

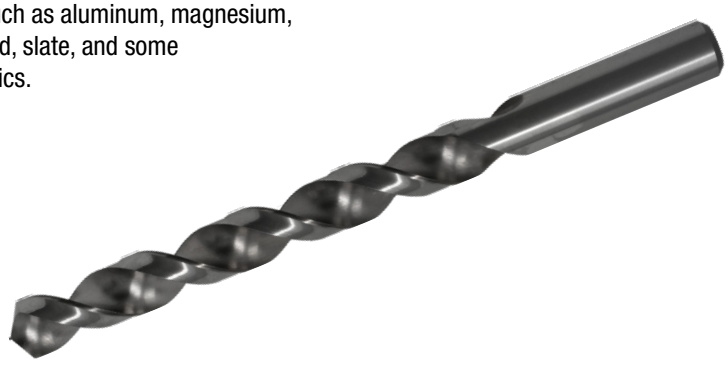
Drills - Jobber Length

Fast Spiral
Style 150B

Features/Benefits:
- Fast helix and wide flutes provide excellent chip ejection by lifting chips up and out of the workpiece more efficiently.
- Manufactured from premium high-speed steel.
- 118° point.
- Bright, finish standard from stock; alternate coatings available as stock modifications.

Application Information:
- carbon steel
- mild steel
- Recommended for drilling low-tensile materials such as aluminum, magnesium, copper, wood, slate, and some thermoplastics.





INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 150B
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright
	80	.0135	0.34	.7500	19.05	.1250	3.18	46150
	79	.0145	0.37	.7500	19.05	.1250	3.18	46149
	78	.0160	0.41	.8750	22.23	.1875	4.76	46148
	77	.0180	0.46	.8750	22.23	.1875	4.76	46147
	76	.0200	0.51	.8750	22.23	.1875	4.76	46146
	75	.0210	0.53	1.0000	25.40	.2500	6.35	46145
	74	.0225	0.57	1.0000	25.40	.2500	6.35	46144
	73	.0240	0.61	1.1250	28.58	.3125	7.94	46143
	72	.0250	0.64	1.1250	28.58	.3125	7.94	46142
	71	.0260	0.66	1.2500	31.75	.3750	9.53	46141
	70	.0280	0.71	1.2500	31.75	.3750	9.53	46140
	69	.0292	0.74	1.3750	34.93	.5000	12.70	46139
	68	.0310	0.79	1.3750	34.93	.5000	12.70	46138
1/32		.0312	0.79	1.3750	34.93	.5000	12.70	46002
	67	.0320	0.81	1.3750	34.93	.5000	12.70	46137
	66	.0330	0.84	1.3750	34.93	.5000	12.70	46136
	65	.0350	0.89	1.5000	38.10	.6250	15.88	46135
	64	.0360	0.91	1.5000	38.10	.6250	15.88	46134
	63	.0370	0.94	1.5000	38.10	.6250	15.88	46133
	62	.0380	0.97	1.5000	38.10	.6250	15.88	46132
	61	.0390	0.99	1.6250	41.28	.6875	17.46	46131
	60	.0400	1.02	1.6250	41.28	.6875	17.46	46130
	59	.0410	1.04	1.6250	41.28	.6875	17.46	46129
	58	.0420	1.07	1.6250	41.28	.6875	17.46	46128
	57	.0430	1.09	1.7500	44.45	.7500	19.05	46127
	56	.0465	1.18	1.7500	44.45	.7500	19.05	46126
3/64		.0469	1.19	1.7500	44.45	.7500	19.05	46003

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Fast Spiral (continued)
Style 150B

INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 150B Bright
	55	.0520	1.32	1.8750	47.63	.8750	22.23	46125
	54	.0550	1.40	1.8750	47.63	.8750	22.23	46124
	53	.0595	1.51	1.8750	47.63	.8750	22.23	46123
1/16		.0625	1.59	1.8750	47.63	.8750	22.23	46004
	52	.0635	1.61	1.8750	47.63	.8750	22.23	46122
	51	.0670	1.70	2.0000	50.80	1.0000	25.40	46121
	50	.0700	1.78	2.0000	50.80	1.0000	25.40	46120
	49	.0730	1.85	2.0000	50.80	1.0000	25.40	46119
	48	.0760	1.93	2.0000	50.80	1.0000	25.40	46118
5/64		.0781	1.98	2.0000	50.80	1.0000	25.40	46005
	47	.0785	1.99	2.0000	50.80	1.0000	25.40	46117
	46	.0810	2.06	2.1250	53.98	1.1250	28.58	46116
	45	.0820	2.08	2.1250	53.98	1.1250	28.58	46115
	44	.0860	2.18	2.1250	53.98	1.1250	28.58	46114
	43	.0890	2.26	2.2500	57.15	1.2500	31.75	46113
	42	.0935	2.37	2.2500	57.15	1.2500	31.75	46112
3/32		.0938	2.38	2.2500	57.15	1.2500	31.75	46006
	41	.0960	2.44	2.3750	60.33	1.3750	34.93	46111
	40	.0980	2.49	2.3750	60.33	1.3750	34.93	46110
	39	.0995	2.53	2.3750	60.33	1.3750	34.93	46109
	38	.1015	2.58	2.5000	63.50	1.4375	36.51	46108
	37	.1040	2.64	2.5000	63.50	1.4375	36.51	46107
	36	.1065	2.71	2.5000	63.50	1.4375	36.51	46106
7/64		.1094	2.78	2.6250	66.68	1.5000	38.10	46007
	35	.1100	2.79	2.6250	66.68	1.5000	38.10	46105
	34	.1110	2.82	2.6250	66.68	1.5000	38.10	46104
	33	.1130	2.87	2.6250	66.68	1.5000	38.10	46103
	32	.1160	2.95	2.7500	69.85	1.6250	41.28	46102
	31	.1200	3.05	2.7500	69.85	1.6250	41.28	46101
1/8		.1250	3.18	2.7500	69.85	1.6250	41.28	46008
	30	.1285	3.26	2.7500	69.85	1.6250	41.28	46100
	29	.1360	3.45	2.8750	73.03	1.7500	44.45	46099
	28	.1405	3.57	2.8750	73.03	1.7500	44.45	46098
9/64		.1406	3.57	2.8750	73.03	1.7500	44.45	46009
	27	.1440	3.66	3.0000	76.20	1.8750	47.63	46097
	26	.1470	3.73	3.0000	76.20	1.8750	47.63	46096
	25	.1495	3.80	3.0000	76.20	1.8750	47.63	46095
	24	.1520	3.86	3.1250	79.38	2.0000	50.80	46094
	23	.1540	3.91	3.1250	79.38	2.0000	50.80	46093
5/32		.1562	3.97	3.1250	79.38	2.0000	50.80	46010
	22	.1570	3.99	3.1250	79.38	2.0000	50.80	46092
	21	.1590	4.04	3.2500	82.55	2.1250	53.98	46091
	20	.1610	4.09	3.2500	82.55	2.1250	53.98	46090
	19	.1660	4.22	3.2500	82.55	2.1250	53.98	46089
	18	.1695	4.31	3.2500	82.55	2.1250	53.98	46088
11/64		.1719	4.37	3.2500	82.55	2.1250	53.98	46011

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Drills - Jobber Length

Fast Spiral (continued)
Style 150B

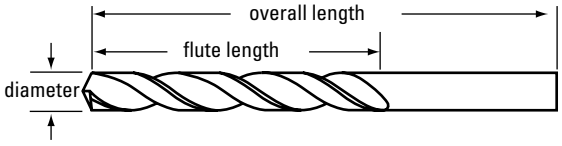
INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 150B Bright
	17	.1730	4.39	3.3750	85.73	2.1875	55.56	46087
	16	.1770	4.50	3.3750	85.73	2.1875	55.56	46086
	15	.1800	4.57	3.3750	85.73	2.1875	55.56	46085
	14	.1820	4.62	3.3750	85.73	2.1875	55.56	46084
	13	.1850	4.70	3.5000	88.90	2.3125	58.74	46083
3/16		.1875	4.76	3.5000	88.90	2.3125	58.74	46012
	12	.1890	4.80	3.5000	88.90	2.3125	58.74	46082
	11	.1910	4.85	3.5000	88.90	2.3125	58.74	46081
	10	.1935	4.91	3.6250	92.08	2.4375	61.91	46080
	9	.1960	4.98	3.6250	92.08	2.4375	61.91	46079
	8	.1990	5.05	3.6250	92.08	2.4375	61.91	46078
	7	.2010	5.11	3.6250	92.08	2.4375	61.91	46077
13/64		.2031	5.16	3.6250	92.08	2.4375	61.91	46013
	6	.2040	5.18	3.7500	95.25	2.5000	63.50	46076
	5	.2055	5.22	3.7500	95.25	2.5000	63.50	46075
	4	.2090	5.31	3.7500	95.25	2.5000	63.50	46074
	3	.2130	5.41	3.7500	95.25	2.5000	63.50	46073
7/32		.2188	5.56	3.7500	95.25	2.5000	63.50	46014
	2	.2210	5.61	3.8750	98.43	2.6250	66.68	46072
	1	.2280	5.79	3.8750	98.43	2.6250	66.68	46071
15/64		.2344	5.95	3.8750	98.43	2.6250	66.68	46015
1/4	E	.2500	6.35	4.0000	101.60	2.7500	69.85	46016
	F	.2570	6.53	4.1250	104.78	2.8750	73.03	46176
17/64		.2656	6.75	4.1250	104.78	2.8750	73.03	46017
	I	.2720	6.91	4.1250	104.78	2.8750	73.03	46179
9/32		.2812	7.14	4.2500	107.95	2.9375	74.61	46018
19/64		.2969	7.54	4.3750	111.13	3.0625	77.79	46019
5/16		.3125	7.94	4.5000	114.30	3.1875	80.96	46020
21/64		.3281	8.33	4.6250	117.48	3.3125	84.14	46021
	Q	.3320	8.43	4.7500	120.65	3.4375	87.31	46187
11/32		.3438	8.73	4.7500	120.65	3.4375	87.31	46022
23/64		.3594	9.13	4.8750	123.83	3.5000	88.90	46023
	U	.3680	9.35	5.0000	127.00	3.6250	92.08	46191
3/8		.3750	9.53	5.0000	127.00	3.6250	92.08	46024
25/64		.3906	9.92	5.1250	130.18	3.7500	95.25	46025
13/32		.4062	10.32	5.2500	133.35	3.8750	98.43	46026
27/64		.4219	10.72	5.3750	136.53	3.9375	100.01	46027
7/16		.4375	11.11	5.5000	139.70	4.0625	103.19	46028
29/64		.4531	11.51	5.6250	142.88	4.1875	106.36	46029
15/32		.4688	11.91	5.7500	146.05	4.3125	109.54	46030
31/64		.4844	12.30	5.8750	149.23	4.3750	111.13	46031
1/2		.5000	12.70	6.0000	152.40	4.5000	114.30	46032

Slow Spiral
Style 150C

Features/Benefits:
- Slow helix, wide flutes, and bright finish offer excellent chip ejection performance in non-ferrous materials.
- Manufactured from premium high-speed steel.
- 118° point.
- Bright, finish standard from stock; alternate coatings available as stock modifications.

Application Information:
- brass, bronze
- non-ferrous materials
- Recommended for drilling hard rubber, fiber, dura-plastics, and thermoplastics.



INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 150C Bright
	80	.0135	0.34	.7500	19.05	.1250	3.18	** 46350
	79	.0145	0.37	.7500	19.05	.1250	3.18	** 46349
	78	.0160	0.41	.8750	22.23	.1875	4.76	** 46348
	77	.0180	0.46	.8750	22.23	.1875	4.76	** 46347
	76	.0200	0.51	.8750	22.23	.1875	4.76	** 46346
	75	.0210	0.53	1.0000	25.40	.2500	6.35	** 46345
	74	.0225	0.57	1.0000	25.40	.2500	6.35	** 46344
	73	.0240	0.61	1.1250	28.58	.3125	7.94	** 46343
	72	.0250	0.64	1.1250	28.58	.3125	7.94	** 46342
	71	.0260	0.66	1.2500	31.75	.3750	9.53	** 46341
	70	.0280	0.71	1.2500	31.75	.3750	9.53	** 46340
	69	.0292	0.74	1.3750	34.93	.5000	12.70	** 46339
	68	.0310	0.79	1.3750	34.93	.5000	12.70	** 46338
	67	.0320	0.81	1.3750	34.93	.5000	12.70	** 46337
	66	.0330	0.84	1.3750	34.93	.5000	12.70	** 46336
	65	.0350	0.89	1.5000	38.10	.6250	15.88	** 46335
	64	.0360	0.91	1.5000	38.10	.6250	15.88	** 46334
	63	.0370	0.94	1.5000	38.10	.6250	15.88	** 46333
	62	.0380	0.97	1.5000	38.10	.6250	15.88	** 46332
	61	.0390	0.99	1.6250	41.28	.6875	17.46	** 46331
	60	.0400	1.02	1.6250	41.28	.6875	17.46	** 46330
	59	.0410	1.04	1.6250	41.28	.6875	17.46	** 46329
	57	.0430	1.09	1.7500	44.45	.7500	19.05	** 46327
	56	.0465	1.18	1.7500	44.45	.7500	19.05	** 46326
	54	.0550	1.40	1.8750	47.63	.8750	22.23	** 46324
1/16		.0625	1.59	1.8750	47.63	.8750	22.23	46204
	51	.0670	1.70	2.0000	50.80	1.0000	25.40	** 46321
	49	.0730	1.85	2.0000	50.80	1.0000	25.40	** 46319

** Only available until inventory is depleted.

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Drills - Jobber Length

Slow Spiral (continued)
Style 150C

INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 150C Bright
5/64		.0781	1.98	2.0000	50.80	1.0000	25.40	46205
	47	.0785	1.99	2.0000	50.80	1.0000	25.40	** 46317
	46	.0810	2.06	2.1250	53.98	1.1250	28.58	** 46316
	43	.0890	2.26	2.2500	57.15	1.2500	31.75	** 46313
	42	.0935	2.37	2.2500	57.15	1.2500	31.75	** 46312
3/32		.0938	2.38	2.2500	57.15	1.2500	31.75	46206
	40	.0980	2.49	2.3750	60.33	1.3750	34.93	** 46310
	39	.0995	2.53	2.3750	60.33	1.3750	34.93	** 46309
	38	.1015	2.58	2.5000	63.50	1.4375	36.51	** 46308
	37	.1040	2.64	2.5000	63.50	1.4375	36.51	** 46307
7/64		.1094	2.78	2.6250	66.68	1.5000	38.10	46207
	35	.1100	2.79	2.6250	66.68	1.5000	38.10	** 46305
	32	.1160	2.95	2.7500	69.85	1.6250	41.28	** 46302
1/8		.1250	3.18	2.7500	69.85	1.6250	41.28	46208
	30	.1285	3.26	2.7500	69.85	1.6250	41.28	** 46300
	28	.1405	3.57	2.8750	73.03	1.7500	44.45	** 46298
9/64		.1406	3.57	2.8750	73.03	1.7500	44.45	46209
	27	.1440	3.66	3.0000	76.20	1.8750	47.63	** 46297
	26	.1470	3.73	3.0000	76.20	1.8750	47.63	** 46296
	25	.1495	3.80	3.0000	76.20	1.8750	47.63	** 46295
	24	.1520	3.86	3.1250	79.38	2.0000	50.80	** 46294
	23	.1540	3.91	3.1250	79.38	2.0000	50.80	** 46293
5/32		.1562	3.97	3.1250	79.38	2.0000	50.80	46210
	22	.1570	3.99	3.1250	79.38	2.0000	50.80	** 46292
	21	.1590	4.04	3.2500	82.55	2.1250	53.98	** 46291
	20	.1610	4.09	3.2500	82.55	2.1250	53.98	** 46290
	19	.1660	4.22	3.2500	82.55	2.1250	53.98	** 46289
	18	.1695	4.31	3.2500	82.55	2.1250	53.98	** 46288
11/64		.1719	4.37	3.2500	82.55	2.1250	53.98	46211
	17	.1730	4.39	3.3750	85.73	2.1875	55.56	** 46287
	15	.1800	4.57	3.3750	85.73	2.1875	55.56	** 46285
	13	.1850	4.70	3.5000	88.90	2.3125	58.74	** 46283
3/16		.1875	4.76	3.5000	88.90	2.3125	58.74	46212
	12	.1890	4.80	3.5000	88.90	2.3125	58.74	** 46282
	11	.1910	4.85	3.5000	88.90	2.3125	58.74	** 46281
	10	.1935	4.91	3.6250	92.08	2.4375	61.91	** 46280
	9	.1960	4.98	3.6250	92.08	2.4375	61.91	** 46279
	8	.1990	5.05	3.6250	92.08	2.4375	61.91	** 46278
13/64		.2031	5.16	3.6250	92.08	2.4375	61.91	46213
	6	.2040	5.18	3.7500	95.25	2.5000	63.50	** 46276
	5	.2055	5.22	3.7500	95.25	2.5000	63.50	** 46275
	4	.2090	5.31	3.7500	95.25	2.5000	63.50	** 46274
7/32		.2188	5.56	3.7500	95.25	2.5000	63.50	46214
	1	.2280	5.79	3.8750	98.43	2.6250	66.68	** 46271
15/64		.2344	5.95	3.8750	98.43	2.6250	66.68	46215

** Only available until inventory is depleted.

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Slow Spiral (continued)
Style 150C

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 150C
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright
1/4		.2500	6.35	4.0000	101.60	2.7500	69.85	46216
17/64		.2656	6.75	4.1250	104.78	2.8750	73.03	46217
9/32		.2812	7.14	4.2500	107.95	2.9375	74.61	46218
19/64		.2969	7.54	4.3750	111.13	3.0625	77.79	46219
5/16		.3125	7.94	4.5000	114.30	3.1875	80.96	46220
21/64		.3281	8.33	4.6250	117.48	3.3125	84.14	46221
11/32		.3438	8.73	4.7500	120.65	3.4375	87.31	46222
23/64		.3594	9.13	4.8750	123.83	3.5000	88.90	46223
3/8		.3750	9.53	5.0000	127.00	3.6250	92.08	46224
25/64		.3906	9.92	5.1250	130.18	3.7500	95.25	46225
13/32		.4062	10.32	5.2500	133.35	3.8750	98.43	46226
27/64		.4219	10.72	5.3750	136.53	3.9375	100.01	46227
7/16		.4375	11.11	5.5000	139.70	4.0625	103.19	46228
29/64		.4531	11.51	5.6250	142.88	4.1875	106.36	46229
15/32		.4688	11.91	5.7500	146.05	4.3125	109.54	46230
31/64		.4844	12.30	5.8750	149.23	4.3750	111.13	46231
1/2		.5000	12.70	6.0000	152.40	4.5000	114.30	46232

** Only available until inventory is depleted.

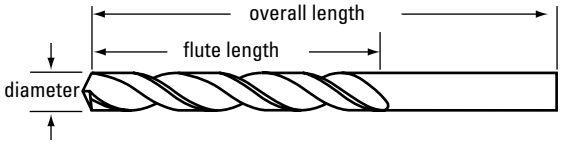
Drills - Jobber Length

118° Split Point
Style 150K

Features/Benefits:
- General-purpose geometry with split point for drilling in a wide range of operating conditions and materials.
- Manufactured from premium high-speed steel.
- 118° split point is self-centering for reduced thrust and easier penetration.
- Black oxide finish standard from stock.

Application Information:
- medium steel
- soft steel
- magnesium and magnesium alloys
- Ideal for use in sheet metal and portable drilling.

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.



INCH SIZES

Drill Diameter			Overall Length		Flute Length		**Style 150K**
Fraction	Decimal	mm	Inch	mm	Inch	mm	Black Oxide
1/16	.0625	1.59	1.8750	47.63	.8750	22.23	57204
5/64	.0781	1.98	2.0000	50.80	1.0000	25.40	57205
3/32	.0938	2.38	2.2500	57.15	1.2500	31.75	57206
7/64	.1094	2.78	2.6250	66.68	1.5000	38.10	57207
1/8	.1250	3.18	2.7500	69.85	1.6250	41.28	57208
9/64	.1406	3.57	2.8750	73.03	1.7500	44.45	57209
5/32	.1562	3.97	3.1250	79.38	2.0000	50.80	57210
11/64	.1719	4.37	3.2500	82.55	2.1250	53.98	57211
3/16	.1875	4.76	3.5000	88.90	2.3125	58.74	57212
13/64	.2031	5.16	3.6250	92.08	2.4375	61.91	57213
7/32	.2188	5.56	3.7500	95.25	2.5000	63.50	57214
15/64	.2344	5.95	3.8750	98.43	2.6250	66.68	57215
1/4	.2500	6.35	4.0000	101.60	2.7500	69.85	57216
17/64	.2656	6.75	4.1250	104.78	2.8750	73.03	57217
9/32	.2812	7.14	4.2500	107.95	2.9375	74.61	57218
19/64	.2969	7.54	4.3750	111.13	3.0625	77.79	57219
5/16	.3125	7.94	4.5000	114.30	3.1875	80.96	57220
21/64	.3281	8.33	4.6250	117.48	3.3125	84.14	57221
11/32	.3438	8.73	4.7500	120.65	3.4375	87.31	57222
23/64	.3594	9.13	4.8750	123.83	3.5000	88.90	57223
3/8	.3750	9.53	5.0000	127.00	3.6250	92.08	57224
25/64	.3906	9.92	5.1250	130.18	3.7500	95.25	57225
13/32	.4062	10.32	5.2500	133.35	3.8750	98.43	57226
27/64	.4219	10.72	5.3750	136.53	3.9375	100.01	57227
7/16	.4375	11.11	5.5000	139.70	4.0625	103.19	57228
29/64	.4531	11.51	5.6250	142.88	4.1875	106.36	57229
15/32	.4688	11.91	5.7500	146.05	4.3125	109.54	57230
31/64	.4844	12.30	5.8750	149.23	4.3750	111.13	57231
1/2	.5000	12.70	6.0000	152.40	4.5000	114.30	57232

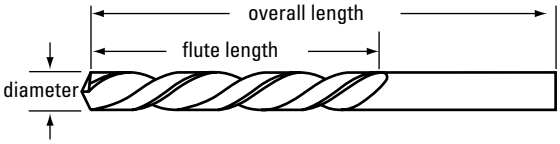
Left-Hand Helix
Style 150L

Features/Benefits:

- General-purpose geometry for drilling in a wide range of operating conditions and materials.
- Manufactured from premium high-speed steel.
- 118° point.
- Left-hand helix is ideal for use in screw machines where machine spindle rotation is counter-clockwise.
- Can substitute for screw extractors to remove broken parts without damaging threaded holes.
- Bright finish standard from stock; alternate coatings available as stock modifications.

Application Information:

- carbon steel
- alloy steel
- cast iron



INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 150L
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright
	69	.0292	0.74	1.3750	34.93	.5000	12.70	44539
	68	.0310	0.79	1.3750	34.93	.5000	12.70	44538
1/32		.0312	0.79	1.3750	34.93	.5000	12.70	44402
	67	.0320	0.81	1.3750	34.93	.5000	12.70	44537
	66	.0330	0.84	1.3750	34.93	.5000	12.70	44536
	65	.0350	0.89	1.5000	38.10	.6250	15.88	44535
	64	.0360	0.91	1.5000	38.10	.6250	15.88	44534
	63	.0370	0.94	1.5000	38.10	.6250	15.88	44533
	62	.0380	0.97	1.5000	38.10	.6250	15.88	44532
	61	.0390	0.99	1.6250	41.28	.6875	17.46	44531
	60	.0400	1.02	1.6250	41.28	.6875	17.46	44530
	59	.0410	1.04	1.6250	41.28	.6875	17.46	44529
	58	.0420	1.07	1.6250	41.28	.6875	17.46	44528
	57	.0430	1.09	1.7500	44.45	.7500	19.05	44527
	56	.0465	1.18	1.7500	44.45	.7500	19.05	44526
3/64		.0469	1.19	1.7500	44.45	.7500	19.05	44403
	55	.0520	1.32	1.8750	47.63	.8750	22.23	44525
	54	.0550	1.40	1.8750	47.63	.8750	22.23	44524
	53	.0595	1.51	1.8750	47.63	.8750	22.23	44523
1/16		.0625	1.59	1.8750	47.63	.8750	22.23	44404
	52	.0635	1.61	1.8750	47.63	.8750	22.23	44522
	51	.0670	1.70	2.0000	50.80	1.0000	25.40	44521
	50	.0700	1.78	2.0000	50.80	1.0000	25.40	44520
	49	.0730	1.85	2.0000	50.80	1.0000	25.40	44519
	48	.0760	1.93	2.0000	50.80	1.0000	25.40	44518
5/64		.0781	1.98	2.0000	50.80	1.0000	25.40	44405
	47	.0785	1.99	2.0000	50.80	1.0000	25.40	44517
	46	.0810	2.06	2.1250	53.98	1.1250	28.58	44516
	45	.0820	2.08	2.1250	53.98	1.1250	28.58	44515
	44	.0860	2.18	2.1250	53.98	1.1250	28.58	44514
	43	.0890	2.26	2.2500	57.15	1.2500	31.75	44513

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Drills - Jobber Length

Left-Hand Helix (continued)
Style 150L

INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 150L Bright
	42	.0935	2.37	2.2500	57.15	1.2500	31.75	44512
3/32		.0938	2.38	2.2500	57.15	1.2500	31.75	44406
	41	.0960	2.44	2.3750	60.33	1.3750	34.93	44511
	40	.0980	2.49	2.3750	60.33	1.3750	34.93	44510
	39	.0995	2.53	2.3750	60.33	1.3750	34.93	44509
	38	.1015	2.58	2.5000	63.50	1.4375	36.51	44508
	37	.1040	2.64	2.5000	63.50	1.4375	36.51	44507
	36	.1065	2.71	2.5000	63.50	1.4375	36.51	44506
7/64		.1094	2.78	2.6250	66.68	1.5000	38.10	44407
	35	.1100	2.79	2.6250	66.68	1.5000	38.10	44505
	34	.1110	2.82	2.6250	66.68	1.5000	38.10	44504
	33	.1130	2.87	2.6250	66.68	1.5000	38.10	44503
	32	.1160	2.95	2.7500	69.85	1.6250	41.28	44502
	31	.1200	3.05	2.7500	69.85	1.6250	41.28	44501
1/8		.1250	3.18	2.7500	69.85	1.6250	41.28	44408
	30	.1285	3.26	2.7500	69.85	1.6250	41.28	44500
	29	.1360	3.45	2.8750	73.03	1.7500	44.45	44499
	28	.1405	3.57	2.8750	73.03	1.7500	44.45	44498
9/64		.1406	3.57	2.8750	73.03	1.7500	44.45	44409
	27	.1440	3.66	3.0000	76.20	1.8750	47.63	44497
	26	.1470	3.73	3.0000	76.20	1.8750	47.63	44496
	25	.1495	3.80	3.0000	76.20	1.8750	47.63	44495
	24	.1520	3.86	3.1250	79.38	2.0000	50.80	44494
	23	.1540	3.91	3.1250	79.38	2.0000	50.80	44493
5/32		.1562	3.97	3.1250	79.38	2.0000	50.80	44410
	22	.1570	3.99	3.1250	79.38	2.0000	50.80	44492
	21	.1590	4.04	3.2500	82.55	2.1250	53.98	44491
	20	.1610	4.09	3.2500	82.55	2.1250	53.98	44490
	19	.1660	4.22	3.2500	82.55	2.1250	53.98	44489
	18	.1695	4.31	3.2500	82.55	2.1250	53.98	44488
11/64		.1719	4.37	3.2500	82.55	2.1250	53.98	44411
	17	.1730	4.39	3.3750	85.73	2.1875	55.56	44487
	16	.1770	4.50	3.3750	85.73	2.1875	55.56	44486
	15	.1800	4.57	3.3750	85.73	2.1875	55.56	44485
	14	.1820	4.62	3.3750	85.73	2.1875	55.56	44484
	13	.1850	4.70	3.5000	88.90	2.3125	58.74	44483
3/16		.1875	4.76	3.5000	88.90	2.3125	58.74	44412
	12	.1890	4.80	3.5000	88.90	2.3125	58.74	44482
	11	.1910	4.85	3.5000	88.90	2.3125	58.74	44481
	10	.1935	4.91	3.6250	92.08	2.4375	61.91	44480
	9	.1960	4.98	3.6250	92.08	2.4375	61.91	44479
	8	.1990	5.05	3.6250	92.08	2.4375	61.91	44478
	7	.2010	5.11	3.6250	92.08	2.4375	61.91	44477
13/64		.2031	5.16	3.6250	92.08	2.4375	61.91	44413
	6	.2040	5.18	3.7500	95.25	2.5000	63.50	44476
	5	.2055	5.22	3.7500	95.25	2.5000	63.50	44475
	4	.2090	5.31	3.7500	95.25	2.5000	63.50	44474
	3	.2130	5.41	3.7500	95.25	2.5000	63.50	44473
7/32		.2188	5.56	3.7500	95.25	2.5000	63.50	44414
	2	.2210	5.61	3.8750	98.43	2.6250	66.68	44472

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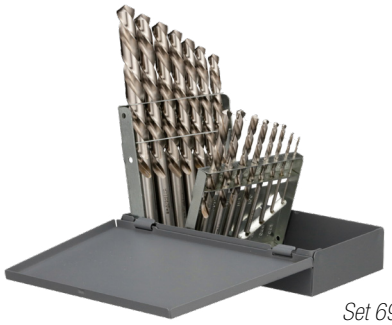
Left-Hand Helix (continued)
Style 150L

INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 150L Bright
	1	.2280	5.79	3.8750	98.43	2.6250	66.68	44471
15/64		.2344	5.95	3.8750	98.43	2.6250	66.68	44415
1/4		.2500	6.35	4.0000	101.60	2.7500	69.85	44416
17/64		.2656	6.75	4.1250	104.78	2.8750	73.03	44417
9/32		.2812	7.14	4.2500	107.95	2.9375	74.61	44418
19/64		.2969	7.54	4.3750	111.13	3.0625	77.79	44419
5/16		.3125	7.94	4.5000	114.30	3.1875	80.96	44420
21/64		.3281	8.33	4.6250	117.48	3.3125	84.14	44421
11/32		.3438	8.73	4.7500	120.65	3.4375	87.31	44422
23/64		.3594	9.13	4.8750	123.83	3.5000	88.90	44423
3/8		.3750	9.53	5.0000	127.00	3.6250	92.08	44424
25/64		.3906	9.92	5.1250	130.18	3.7500	95.25	44425
13/32		.4062	10.32	5.2500	133.35	3.8750	98.43	44426
27/64		.4219	10.72	5.3750	136.53	3.9375	100.01	44427
7/16		.4375	11.11	5.5000	139.70	4.0625	103.19	44428
29/64		.4531	11.51	5.6250	142.88	4.1875	106.36	44429
15/32		.4688	11.91	5.7500	146.05	4.3125	109.54	44430
31/64		.4844	12.30	5.8750	149.23	4.3750	111.13	44431
1/2		.5000	12.70	6.0000	152.40	4.5000	114.30	44432

INCH SETS
Sets in Metal Index Cases

Number of Tools	Size Range	Style 150L Bright
15	1/16 - 1/2 X 1/32	69881
21	1/16 - 3/8 X 1/64	69882
29	1/16 - 1/2 X 1/64	69876



Set 69881

TECH TIP

WHY LEFT-HAND DRILLS?

Obviously because some people are left-handed! But actually, drills are also made with a left-hand flute spiral as opposed to the customary right hand spiral. Normally, these are seen in the jobbers and screw machine style and have the same flute and overall dimensions as their right- handed mirror image. They are normally in the general-purpose design to drill a wide range of materials and are available in other styles as specials.

Initially, left hand drills were primarily made for multi spindle (two or more) gear driven drilling heads, where the spindles rotated in opposite directions. They also are used in screw machines whose spindle may be rotated counterclockwise. Screw machines are used to manufacture smaller parts made from bar stock or tubing. Screw machines are multi-tasking and may turn, cut-off, drill and tap using multiple cutting tools with different holders.

Left hand drills are often used today to help extract a broken bolt or screw from a threaded hole. In some cases a left hand drill can be used counterclockwise to bring the right hand threaded fastener without damaging the part. This is sometimes done when a preferred screw extractor is not available.

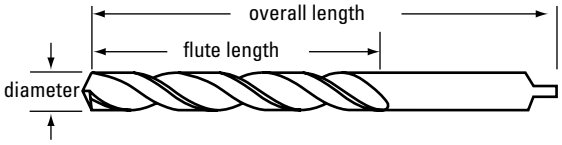
Drills - Jobber Length

Automotive Tanged Shank
Style 250AN

Features/Benefits:
- General-purpose geometry conforming to automotive industry standards.
- Manufactured from premium high-speed steel.
- 118° point.
- Tanged shank for use with positive split sleeve drivers.
- Black oxide surface standard from stock.

Application Information:
- carbon steel
- alloy steel
- cast iron

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.



Tang specifications listed on page 30.

INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 250AN** Black Oxide
1/8		.1250	3.18	2.7500	69.85	1.6250	41.28	47458
	28	.1405	3.57	2.8750	73.03	1.7500	44.45	** 47550
9/64		.1406	3.57	2.8750	73.03	1.7500	44.45	** 47464
	27	.1440	3.66	3.0000	76.20	1.8750	47.63	** 47465
	26	.1470	3.73	3.0000	76.20	1.8750	47.63	** 47466
	24	.1520	3.86	3.1250	79.38	2.0000	50.80	** 47467
5/32		.1562	3.97	3.1250	79.38	2.0000	50.80	47468
	22	.1570	3.99	3.1250	79.38	2.0000	50.80	** 47552
	21	.1590	4.04	3.2500	82.55	2.1250	53.98	** 47553
	19	.1660	4.22	3.2500	82.55	2.1250	53.98	** 47470
	18	.1695	4.31	3.2500	82.55	2.1250	53.98	** 47471
11/64		.1719	4.37	3.2500	82.55	2.1250	53.98	** 47472
	17	.1730	4.39	3.3750	85.73	2.1875	55.56	** 47473
	16	.1770	4.50	3.3750	85.73	2.1875	55.56	** 47474
	15	.1800	4.57	3.3750	85.73	2.1875	55.56	** 47475
	13	.1850	4.70	3.5000	88.90	2.3125	58.74	** 47476
3/16		.1875	4.76	3.5000	88.90	2.3125	58.74	47477
	9	.1960	4.98	3.6250	92.08	2.4375	61.91	** 47480
	8	.1990	5.05	3.6250	92.08	2.4375	61.91	** 47481
	7	.2010	5.11	3.6250	92.08	2.4375	61.91	** 47554
13/64		.2031	5.16	3.6250	92.08	2.4375	61.91	47482
	6	.2040	5.18	3.7500	95.25	2.5000	63.50	** 47555
	5	.2055	5.22	3.7500	95.25	2.5000	63.50	** 47556
	4	.2090	5.31	3.7500	95.25	2.5000	63.50	** 47483
	3	.2130	5.41	3.7500	95.25	2.5000	63.50	** 47484

** Only available until inventory is depleted.

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Automotive Tanged Shank (continued)
Style 250AN

INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	**Style 250AN** Black Oxide
	A	.2340	5.94	3.8750	98.43	2.6250	66.68	** 47560
15/64		.2344	5.95	3.8750	98.43	2.6250	66.68	** 47488
	B	.2380	6.05	4.0000	101.60	2.7500	69.85	** 47561
	C	.2420	6.15	4.0000	101.60	2.7500	69.85	** 47562
1/4	E	.2500	6.35	4.0000	101.60	2.7500	69.85	47491
	G	.2610	6.63	4.1250	104.78	2.8750	73.03	** 47494
17/64		.2656	6.75	4.1250	104.78	2.8750	73.03	47495
	H	.2660	6.76	4.1250	104.78	2.8750	73.03	** 47563
	I	.2720	6.91	4.1250	104.78	2.8750	73.03	** 47496
	J	.2770	7.04	4.1250	104.78	2.8750	73.03	** 47497
9/32	K	.2812	7.14	4.2500	107.95	2.9375	74.61	47498
	L	.2900	7.37	4.2500	107.95	2.9375	74.61	** 47564
19/64		.2969	7.54	4.3750	111.13	3.0625	77.79	** 47501
	N	.3020	7.67	4.3750	111.13	3.0625	77.79	** 47502
5/16		.3125	7.94	4.5000	114.30	3.1875	80.96	47504
	P	.3230	8.20	4.6250	117.48	3.3125	84.14	** 47506
21/64		.3281	8.33	4.6250	117.48	3.3125	84.14	** 47507
	R	.3390	8.61	4.7500	120.65	3.4375	87.31	** 47509
11/32		.3438	8.73	4.7500	120.65	3.4375	87.31	47510

** Only available until inventory is depleted.

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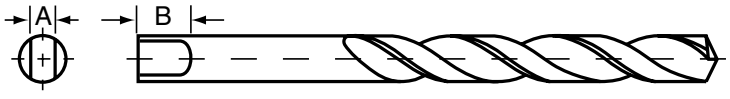
Tang Specifications

Shank Diameter (inches)	Tang Dimensions (inches) Width **(A)**	Length **(B)**
1/8 through 3/16	.092	9/32
Over 3/16 through 1/4	.120	5/16
Over 1/4 through 5/16	.160	11/32
Over 5/16 through 3/8	.201	3/8
Over 3/8 through 15/32	.241	7/16
Over 15/32 through 9/16	.300	1/2
Over 9/16 through 21/32	.370	9/16
Over 21/32 through 3/4	.440	5/8
Over 3/4 through 7/8	.511	11/16
Over 7/8 through 1	.605	3/4
Over 1 through 1-3/16	.696	13/16
Over 1-3/16 through 1-3/8	.813	7/8



Automotive Tanged Shank (continued)
Style 250AN

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 250AN
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Black Oxide
	S	.3480	8.84	4.8750	123.83	3.5000	88.90	** 47511
23/64		.3594	9.13	4.8750	123.83	3.5000	88.90	** 47513
	U	.3680	9.35	5.0000	127.00	3.6250	92.08	** 47514
3/8		.3750	9.53	5.0000	127.00	3.6250	92.08	47515
	V	.3770	9.58	5.0000	127.00	3.6250	92.08	** 47565
	W	.3860	9.80	5.1250	130.18	3.7500	95.25	** 47516
27/64		.4219	10.72	5.3750	136.53	3.9375	100.01	** 47520
7/16		.4375	11.11	5.5000	139.70	4.0625	103.19	47521
29/64		.4531	11.51	5.6250	142.88	4.1875	106.36	** 47522
31/64		.4844	12.30	5.8750	149.23	4.3750	111.13	** 47524
1/2		.5000	12.70	6.0000	152.40	4.5000	114.30	47525
33/64		.5156	13.10	6.6250	168.28	4.8125	122.24	** 47526
35/64		.5469	13.89	6.6250	168.28	4.8125	122.24	** 47528
9/16		.5625	14.29	6.6250	168.28	4.8125	122.24	** 47529
37/64		.5781	14.68	6.6250	168.28	4.8125	122.24	** 47530
19/32		.5938	15.08	7.1250	180.98	5.1875	131.76	** 47531
5/8		.6250	15.88	7.1250	180.98	5.1875	131.76	** 47533
41/64		.6406	16.27	7.1250	180.98	5.1875	131.76	** 47534
21/32		.6562	16.67	7.1250	180.98	5.1875	131.76	** 47535
11/16		.6875	17.46	7.6250	193.68	5.6250	142.88	** 47537

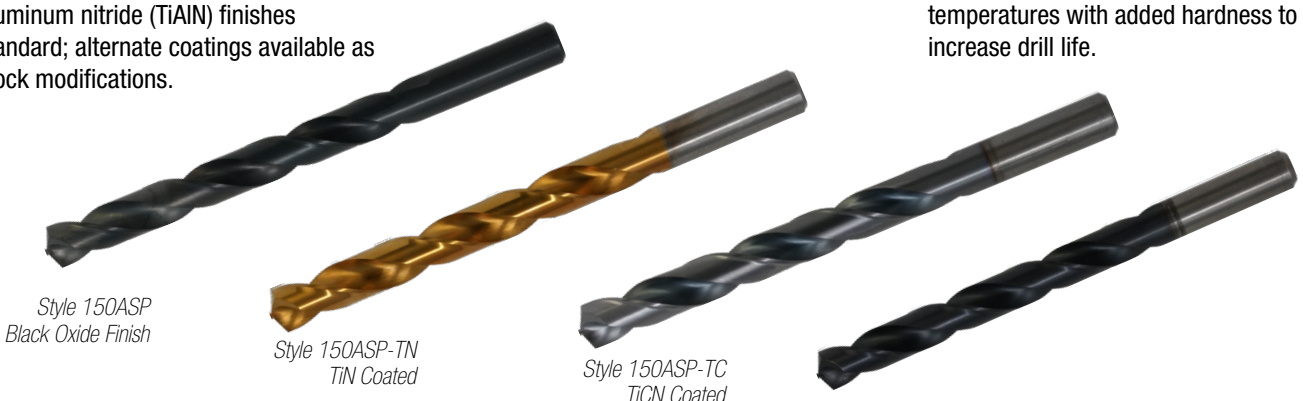
** Only available until inventory is depleted.

NAS-Type Heavy-Duty
Styles 150ASP, 150ASP-TN, 150ASP-TC, 150ASP-TA

Features/Benefits:
- Manufactured to NAS 907 Type B geometry aerospace specifications.
- Heavy-duty construction for drilling in tougher materials.
- Manufactured from premium high-speed steel.
- 135° P3 split point is self-centering for reduced thrust and easier penetration. Sizes smaller than .0625" do not have split point.
- Black oxide, titanium nitride (TiN), titanium carbonitirde (TiCN), and titanium aluminum nitride (TiAlN) finishes standard; alternate coatings available as stock modifications.

Application Information:
- stainless steel (TiAlN, TiCN, TiN, black oxide)
- tool steel (TiAlN, TiCN, TiN, black oxide)
- alloy steel (TiAlN, TiCN, TiN, black oxide)
- titanium (TiAlN)
- cast iron (TiAlN, TiCN, TiN, black oxide)

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity to improve chip flow.
- Titanium nitride (TiN) coating adds lubricity and hardness, enhancing chip flow, finish hole quality, and drill life.
- Titanium carbonitride (TiCN) coating increases cutting surface hardness, making the tool highly resistant to abrasive wear.
- Titanium aluminum nitride (TiAlN) coating combines the ability to work in high temperatures with added hardness to increase drill life.

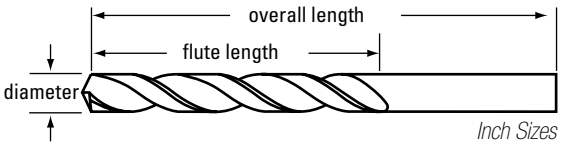


Style 150ASP Black Oxide Finish

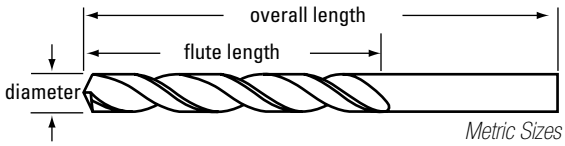
Style 150ASP-TN TiN Coated

Style 150ASP-TC TiCN Coated

Style 150ASP-TA TiAlN Coated



Inch Sizes



Metric Sizes

INCH AND METRIC SIZES

Drill Diameter Fraction	Wire/Let	Metric	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style **150ASP** Black Oxide	Style **150ASP-TN** TiN	Style **150ASP-TC** TiCN	Style **150ASP-TA** TiAlN
	80*		.0135	0.34	.7500	19.05	.1250	3.18	44750	41750	—	—
	79*		.0145	0.37	.7500	19.05	.1250	3.18	44749	41749	—	—
1/64*			.0156	0.40	.7500	19.05	.1875	4.76	44601	—	—	—
	78*		.0160	0.41	.8750	22.23	.1875	4.76	44748	41748	—	—
	77*		.0180	0.46	.8750	22.23	.1875	4.76	44747	41747	—	—
	76*		.0200	0.51	.8750	22.23	.1875	4.76	44746	41746	—	—
	75*		.0210	0.53	1.0000	25.40	.2500	6.35	44745	41745	—	—
	74*		.0225	0.57	1.0000	25.40	.2500	6.35	44744	41744	—	—
	73*		.0240	0.61	1.1250	28.58	.3125	7.94	44743	41743	—	—
	72*		.0250	0.64	1.1250	28.58	.3125	7.94	44742	41742	—	—
	71*		.0260	0.66	1.2500	31.75	.3750	9.53	44741	41741	—	—
	70*		.0280	0.71	1.2500	31.75	.3750	9.53	44740	41740	—	—
	69*		.0292	0.74	1.3750	34.93	.5000	12.70	44739	41739	—	—
	68*		.0310	0.79	1.3750	34.93	.5000	12.70	44738	41738	—	—

**Sizes smaller than .0625 do not have split point.*

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Drills - Jobber Length

NAS-Type Heavy-Duty (continued)
Styles 150ASP, 150ASP-TN, 150ASP-TC, 150ASP-TA

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style **150ASP**	Style **150ASP-TN**	Style **150ASP-TC**	Style **150ASP-TA**
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Black Oxide	TiN	TiCN	TiAlN
1/32*			.0312	0.79	1.3750	34.93	.5000	12.70	44602	41602	43602	42602
	67*		.0320	0.81	1.3750	34.93	.5000	12.70	44737	41737	—	—
	66*		.0330	0.84	1.3750	34.93	.5000	12.70	44736	41736	—	—
	65*		.0350	0.89	1.5000	38.10	.6250	15.88	44735	41735	—	—
	64*		.0360	0.91	1.5000	38.10	.6250	15.88	44734	41734	—	—
	63*		.0370	0.94	1.5000	38.10	.6250	15.88	44733	41733	—	—
	62*		.0380	0.97	1.5000	38.10	.6250	15.88	44732	41732	—	—
	61*		.0390	0.99	1.6250	41.28	.6875	17.46	44731	41731	—	—
		1.00*	.0394		1.3386	34.00	.4724	12.00	45800	—	—	—
	60*		.0400	1.02	1.6250	41.28	.6875	17.46	44730	41730	—	—
	59*		.0410	1.04	1.6250	41.28	.6875	17.46	44729	41729	—	—
	58*		.0420	1.07	1.6250	41.28	.6875	17.46	44728	41728	—	—
	57*		.0430	1.09	1.7500	44.45	.7500	19.05	44727	41727	—	—
		1.10*	.0433		1.4173	36.00	.5512	14.00	45801	—	—	—
	56*		.0465	1.18	1.7500	44.45	.7500	19.05	44726	41726	—	—
3/64*			.0469	1.19	1.7500	44.45	.7500	19.05	44603	41603	43603	42603
		1.20*	.0472		1.4961	38.00	.6299	16.00	45802	—	—	—
	55*		.0520	1.32	1.8750	47.63	.8750	22.23	44725	41725	—	—
	54*		.0550	1.40	1.8750	47.63	.8750	22.23	44724	41724	—	—
		1.40*	.0551		1.5748	40.00	.7087	18.00	45804	—	—	—
		1.50*	.0591		1.5748	40.00	.7087	18.00	45805	—	—	—
	53*		.0595	1.51	1.8750	47.63	.8750	22.23	44723	41723	—	—
1/16			.0625	1.59	1.8750	47.63	.8750	22.23	45604	41604	43604	42604
		1.60	.0630		1.6929	43.00	.7874	20.00	45806	—	—	—
	52		.0635	1.61	1.8750	47.63	.8750	22.23	45722	41722	43722	42722
		1.70	.0669		1.6929	43.00	.7874	20.00	45807	—	—	—
	51		.0670	1.70	2.0000	50.80	1.0000	25.40	45721	41721	43721	42721
	50		.0700	1.78	2.0000	50.80	1.0000	25.40	45720	41720	43720	42720
	49		.0730	1.85	2.0000	50.80	1.0000	25.40	45719	41719	43719	42719
		1.90	.0748		1.8110	46.00	.8661	22.00	45810	—	—	—
	48		.0760	1.93	2.0000	50.80	1.0000	25.40	45718	41718	43718	42718
5/64			.0781	1.98	2.0000	50.80	1.0000	25.40	45605	41605	43605	42605
	47		.0785	1.99	2.0000	50.80	1.0000	25.40	45717	41717	43717	42717
		2.00	.0787		1.9291	49.00	.9449	24.00	45811	—	—	—
	46		.0810	2.06	2.1250	53.98	1.1250	28.58	45716	41716	43716	42716
	45		.0820	2.08	2.1250	53.98	1.1250	28.58	45715	41715	43715	42715
		2.10	.0827		1.9291	49.00	.9449	24.00	45812	—	—	—
	44		.0860	2.18	2.1250	53.98	1.1250	28.58	45714	41714	43714	42714
		2.20	.0866		2.0866	53.00	1.0630	27.00	45813	—	—	—
	43		.0890	2.26	2.2500	57.15	1.2500	31.75	45713	41713	43713	42713
	42		.0935	2.37	2.2500	57.15	1.2500	31.75	45712	41712	43712	42712
3/32			.0938	2.38	2.2500	57.15	1.2500	31.75	45606	41606	43606	42606
		2.40	.0945		2.2441	57.00	1.1811	30.00	45816	—	—	—
	41		.0960	2.44	2.3750	60.33	1.3750	34.93	45711	41711	43711	42711
	40		.0980	2.49	2.3750	60.33	1.3750	34.93	45710	41710	43710	42710
		2.50	.0984		2.2441	57.00	1.1811	30.00	45817	—	—	—
	39		.0995	2.53	2.3750	60.33	1.3750	34.93	45709	41709	43709	42709
	38		.1015	2.58	2.5000	63.50	1.4375	36.51	45708	41708	43708	42708
		2.60	.1024		2.2441	57.00	1.1811	30.00	45818	—	—	—
	37		.1040	2.64	2.5000	63.50	1.4375	36.51	45707	41707	43707	42707
		2.70	.1062		2.4016	61.00	1.2992	33.00	45819	—	—	—
	36		.1065	2.71	2.5000	63.50	1.4375	36.51	45706	41706	43706	42706

Sizes smaller than .0625 do not have split point.

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NAS-Type Heavy-Duty (continued)
Styles 150ASP, 150ASP-TN, 150ASP-TC, 150ASP-TA

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 150ASP	Style 150ASP-TN	Style 150ASP-TC	Style 150ASP-TA
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Black Oxide	TiN	TiCN	TiAlN
7/64			.1094	2.78	2.6250	66.68	1.5000	38.10	45607	41607	43607	42607
	35		.1100	2.79	2.6250	66.68	1.5000	38.10	45705	41705	43705	42705
		2.80	.1102		2.4016	61.00	1.2992	33.00	45820	—	—	—
	34		.1110	2.82	2.6250	66.68	1.5000	38.10	45704	41704	43704	42704
	33		.1130	2.87	2.6250	66.68	1.5000	38.10	45703	41703	43703	42703
		2.90	.1142		2.4016	61.00	1.2992	33.00	45821	—	—	—
	32		.1160	2.95	2.7500	69.85	1.6250	41.28	45702	41702	43702	42702
		3.00	.1181		2.4016	61.00	1.2992	33.00	45822	—	—	—
	31		.1200	3.05	2.7500	69.85	1.6250	41.28	45701	41701	43701	42701
		3.10	.1220		2.5591	65.00	1.4173	36.00	45823	—	—	—
1/8			.1250	3.18	2.7500	69.85	1.6250	41.28	45608	41608	43608	42608
		3.20	.1260		2.5591	65.00	1.4173	36.00	45824	—	—	—
		3.25	.1279		2.5591	65.00	1.4173	36.00	45825	—	—	—
	30		.1285	3.26	2.7500	69.85	1.6250	41.28	45700	41700	43700	42700
		3.30	.1299		2.5591	65.00	1.4173	36.00	45826	—	—	—
	29		.1360	3.45	2.8750	73.03	1.7500	44.45	45699	41699	43699	42699
		3.50	.1378		2.7559	70.00	1.5354	39.00	45828	—	—	—
	28		.1405	3.57	2.8750	73.03	1.7500	44.45	45698	41698	43698	42698
9/64			.1406	3.57	2.8750	73.03	1.7500	44.45	45609	41609	43609	42609
		3.60	.1417		2.7559	70.00	1.5354	39.00	45829	—	—	—
	27		.1440	3.66	3.0000	76.20	1.8750	47.63	45697	41697	43697	42697
		3.70	.1457		2.7559	70.00	1.5354	39.00	45830	—	—	—
	26		.1470	3.73	3.0000	76.20	1.8750	47.63	45696	41696	43696	42696
	25		.1495	3.80	3.0000	76.20	1.8750	47.63	45695	41695	43695	42695
		3.80	.1496		2.9528	75.00	1.6929	43.00	45831	—	—	—
	24		.1520	3.86	3.1250	79.38	2.0000	50.80	45694	41694	43694	42694
		3.90	.1535		2.9528	75.00	1.6929	43.00	45832	—	—	—
	23		.1540	3.91	3.1250	79.38	2.0000	50.80	45693	41693	43693	42693
5/32			.1562	3.97	3.1250	79.38	2.0000	50.80	45610	41610	43610	42610
	22		.1570	3.99	3.1250	79.38	2.0000	50.80	45692	41692	43692	42692
		4.00	.1575		2.9528	75.00	1.6929	43.00	45833	—	—	—
	21		.1590	4.04	3.2500	82.55	2.1250	53.98	45691	41691	43691	42691
	20		.1610	4.09	3.2500	82.55	2.1250	53.98	45690	41690	43690	42690
		4.10	.1614		2.9528	75.00	1.6929	43.00	45834	—	—	—
		4.20	.1654		2.9528	75.00	1.6929	43.00	45835	—	—	—
	19		.1660	4.22	3.2500	82.55	2.1250	53.98	45689	41689	43689	42689
		4.30	.1692		3.1496	80.00	1.8504	47.00	45836	—	—	—
	18		.1695	4.31	3.2500	82.55	2.1250	53.98	45688	41688	43688	42688
11/64			.1719	4.37	3.2500	82.55	2.1250	53.98	45611	41611	43611	42611
	17		.1730	4.39	3.3750	85.73	2.1875	55.56	45687	41687	43687	42687
	16		.1770	4.50	3.3750	85.73	2.1875	55.56	45686	41686	43686	42686
		4.50	.1772		3.1496	80.00	1.8504	47.00	45838	—	—	—
	15		.1800	4.57	3.3750	85.73	2.1875	55.56	45685	41685	43685	42685
		4.60	.1811		3.1496	80.00	1.8504	47.00	45839	—	—	—
	14		.1820	4.62	3.3750	85.73	2.1875	55.56	45684	41684	43684	42684
	13		.1850	4.70	3.5000	88.90	2.3125	58.74	45683	41683	43683	42683
3/16			.1875	4.76	3.5000	88.90	2.3125	58.74	45612	41612	43612	42612
	12		.1890	4.80	3.5000	88.90	2.3125	58.74	45682	41682	43682	42682
		4.80	.1890		3.3858	86.00	2.0472	52.00	45841	—	—	—
	11		.1910	4.85	3.5000	88.90	2.3125	58.74	45681	41681	43681	42681
		4.90	.1929		3.3858	86.00	2.0472	52.00	45842	—	—	—

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NAS-Type Heavy-Duty (continued)
Styles 150ASP, 150ASP-TN, 150ASP-TC, 150ASP-TA

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style **150ASP**	Style **150ASP-TN**	Style **150ASP-TC**	Style **150ASP-TA**
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Black Oxide	TiN	TiCN	TiAlN
	10		.1935	4.91	3.6250	92.08	2.4375	61.91	45680	41680	43680	42680
	9		.1960	4.98	3.6250	92.08	2.4375	61.91	45679	41679	43679	42679
		5.00	.1969		3.3858	86.00	2.0472	52.00	45843	—	—	—
	8		.1990	5.05	3.6250	92.08	2.4375	61.91	45678	41678	43678	42678
		5.10	.2008		3.3858	86.00	2.0472	52.00	45845	—	—	—
	7		.2010	5.11	3.6250	92.08	2.4375	61.91	45677	41677	43677	42677
13/64			.2031	5.16	3.6250	92.08	2.4375	61.91	45613	41613	43613	42613
	6		.2040	5.18	3.7500	95.25	2.5000	63.50	45676	41676	43676	42676
		5.20	.2047		3.3858	86.00	2.0472	52.00	45846	—	—	—
	5		.2055	5.22	3.7500	95.25	2.5000	63.50	45675	41675	43675	42675
	4		.2090	5.31	3.7500	95.25	2.5000	63.50	45674	41674	43674	42674
		5.40	.2125		3.6614	93.00	2.2441	57.00	45849	—	—	—
	3		.2130	5.41	3.7500	95.25	2.5000	63.50	45673	41673	43673	42673
		5.50	.2165		3.6614	93.00	2.2441	57.00	45850	—	—	—
7/32			.2188	5.56	3.7500	95.25	2.5000	63.50	45614	41614	43614	42614
		5.60	.2205		3.6614	93.00	2.2441	57.00	45851	—	—	—
	2		.2210	5.61	3.8750	98.43	2.6250	66.68	45672	41672	43672	42672
		5.70	.2244		3.6614	93.00	2.2441	57.00	45852	—	—	—
	1		.2280	5.79	3.8750	98.43	2.6250	66.68	45671	41671	43671	42671
	A		.2340	5.94	3.8750	98.43	2.6250	66.68	45771	41771	43771	42771
15/64			.2344	5.95	3.8750	98.43	2.6250	66.68	45615	41615	43615	42615
		6.00	.2362		3.6614	93.00	2.2441	57.00	45855	—	—	—
	B		.2380	6.05	4.0000	101.60	2.7500	69.85	45772	41772	43772	42772
		6.10	.2401		3.9764	101.00	2.4803	63.00	45856	—	—	—
	C		.2420	6.15	4.0000	101.60	2.7500	69.85	45773	41773	43773	42773
		6.20	.2440		3.9764	101.00	2.4803	63.00	45857	—	—	—
	D		.2460	6.25	4.0000	101.60	2.7500	69.85	45774	41774	43774	42774
1/4	E		.2500	6.35	4.0000	101.60	2.7500	69.85	45616	41616	43616	42616
		6.40	.2520		3.9764	101.00	2.4803	63.00	45859	—	—	—
		6.50	.2559		3.9764	101.00	2.4803	63.00	45860	—	—	—
	F		.2570	6.53	4.1250	104.78	2.8750	73.03	45776	41776	43776	42776
		6.60	.2598		3.9764	101.00	2.4803	63.00	45861	—	—	—
	G		.2610	6.63	4.1250	104.78	2.8750	73.03	45777	41777	43777	42777
		6.70	.2638		3.9764	101.00	2.4803	63.00	45862	—	—	—
17/64			.2656	6.75	4.1250	104.78	2.8750	73.03	45617	41617	43617	42617
	H		.2660	6.76	4.1250	104.78	2.8750	73.03	45778	41778	43778	42778
		6.80	.2677		4.2913	109.00	2.7165	69.00	45863	—	—	—
		6.90	.2717		4.2913	109.00	2.7165	69.00	45864	—	—	—
	I		.2720	6.91	4.1250	104.78	2.8750	73.03	45779	41779	43779	42779
		7.00	.2756		4.2913	109.00	2.7165	69.00	45865	—	—	—
	J		.2770	7.04	4.1250	104.78	2.8750	73.03	45780	41780	43780	42780
	K		.2810	7.14	4.2500	107.95	2.9375	74.61	45781	41781	43781	42781
9/32			.2812	7.14	4.2500	107.95	2.9375	74.61	45618	41618	43618	42618
	L		.2900	7.37	4.2500	107.95	2.9375	74.61	45782	41782	43782	42782
	M		.2950	7.49	4.3750	111.13	3.0625	77.79	45783	41783	43783	42783
		7.50	.2953		4.2913	109.00	2.7165	69.00	45870	—	—	—
19/64			.2969	7.54	4.3750	111.13	3.0625	77.79	45619	41619	43619	42619
	N		.3020	7.67	4.3750	111.13	3.0625	77.79	45784	41784	43784	42784
5/16			.3125	7.94	4.5000	114.30	3.1875	80.96	45620	41620	43620	42620
		8.00	.3150		4.6063	117.00	2.9528	75.00	45875	—	—	—
	O		.3160	8.03	4.5000	114.30	3.1875	80.96	45785	41785	43785	42785
	P		.3230	8.20	4.6250	117.48	3.3125	84.14	45786	41786	43786	42786
21/64			.3281	8.33	4.6250	117.48	3.3125	84.14	45621	41621	43621	42621

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NAS-Type Heavy-Duty (continued)
Styles 150ASP, 150ASP-TN, 150ASP-TC, 150ASP-TA

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style **150ASP**	Style **150ASP-TN**	Style **150ASP-TC**	Style **150ASP-TA**
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Black Oxide	TiN	TiCN	TiAlN
	Q		.3320	8.43	4.7500	120.65	3.4375	87.31	45787	41787	43787	42787
		8.50	.3346		4.6063	117.00	2.9528	75.00	45880	—	—	—
	R		.3390	8.61	4.7500	120.65	3.4375	87.31	45788	41788	43788	42788
11/32			.3438	8.73	4.7500	120.65	3.4375	87.31	45622	41622	43622	42622
	S		.3480	8.84	4.8750	123.83	3.5000	88.90	45789	41789	43789	42789
		9.00	.3543		4.9213	125.00	3.1890	81.00	45885	—	—	—
	T		.3580	9.09	4.8750	123.83	3.5000	88.90	45790	41790	43790	42790
23/64			.3594	9.13	4.8750	123.83	3.5000	88.90	45623	41623	43623	42623
	U		.3680	9.35	5.0000	127.00	3.6250	92.08	45791	41791	43791	42791
		9.50	.3740		4.9213	125.00	3.1890	81.00	45890	—	—	—
3/8			.3750	9.53	5.0000	127.00	3.6250	92.08	45624	41624	43624	42624
	V		.3770	9.58	5.0000	127.00	3.6250	92.08	45792	41792	43792	42792
	W		.3860	9.80	5.1250	130.18	3.7500	95.25	45793	41793	43793	42793
25/64			.3906	9.92	5.1250	130.18	3.7500	95.25	45625	41625	43625	42625
		10.00	.3937		5.2362	133.00	3.4252	87.00	45895	—	—	—
	X		.3970	10.08	5.1250	130.18	3.7500	95.25	45794	41794	43794	42794
		10.20	.4016		5.2362	133.00	3.4252	87.00	45896	—	—	—
	Y		.4040	10.26	5.2500	133.35	3.8750	98.43	45795	41795	43795	42795
13/32			.4062	10.32	5.2500	133.35	3.8750	98.43	45626	41626	43626	42626
	Z		.4130	10.49	5.2500	133.35	3.8750	98.43	45796	41796	43796	42796
		10.50	.4134		5.2362	133.00	3.4252	87.00	45897	—	—	—
27/64			.4219	10.72	5.3750	136.53	3.9375	100.01	45627	41627	43627	42627
		11.00	.4331		5.5905	142.00	3.7008	94.00	45899	—	—	—
7/16			.4375	11.11	5.5000	139.70	4.0625	103.19	45628	41628	43628	42628
		11.50	.4527		5.5905	142.00	3.7008	94.00	45900	—	—	—
29/64			.4531	11.51	5.6250	142.88	4.1875	106.36	45629	41629	43629	42629
15/32			.4688	11.91	5.7500	146.05	4.3125	109.54	45630	41630	43630	42630
		12.00	.4724		5.9449	151.00	3.9764	101.00	45902	—	—	—
31/64			.4844	12.30	5.8750	149.23	4.3750	111.13	45631	41631	43631	42631
		12.50	.4921		5.9449	151.00	3.9764	101.00	45904	—	—	—
1/2			.5000	12.70	6.0000	152.40	4.5000	114.30	45632	41632	43632	42632
		13.00	.5118		5.9449	151.00	3.9764	101.00	45905	—	—	—

INCH AND METRIC SETS

Sets in Metal Index Cases

Number of Tools	Size Range	Style **150ASP** Black Oxide	Style **150ASP-TN** TiN	Style **150ASP-TC** TiCN	Style **150ASP-TA** TiAlN
13	1/16 - 1/4 X 1/64	69847	41798	43638	42801
15	1/16 - 1/2 X 1/32	69850	41797	43637	42800
21	1/16 - 3/8 X 1/64	69851	41799	43639	49026
29	1/16 - 1/2 X 1/64	45640	41800	43640	49027
26	Letters A - Z	45638	41801	—	—
60	#1 - #60 wire gauge	45639	41802	—	—
20	#61 - #80 wire gauge	45656	41803	—	—
115	1/16 - 1/2 X 1/64, A - Z, #1 - #60	45650	41804	—	—
25	1mm - 13mm X 0.5mm	45925	—	—	—

Set 42800

Drills - Jobber Length

NAS-Type Cobalt Heavy-Duty
Styles 550, 550-TN (2550), 550-TA

Features/Benefits:
- Manufactured to NAS 907 Type J geometry aerospace specifications.
- Heavy-duty construction for drilling in tough, high-tensile, and work-hardening materials under extreme operating conditions.
- Manufactured from premium cobalt high-speed steel, increasing hot hardness and extending drill wear life.
- 135° P3 split point is self-centering for reduced thrust and easier penetration.
- 40% thicker web than 550ASP
- Metric drills are manufactured to DIN 338 OAL and flute length specifications.
- Straw, titanium nitride (TiN), and titanium aluminum nitride (TiAlN) finishes standard; alternate coatings available as stock modifications.

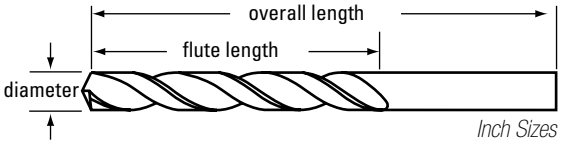
Application Information:
- stainless steel (TiAlN, TiN, straw)
- tool steel (TiAlN, TiCN, TiN, straw)
- alloy steel (TiAlN, TiCN, TiN, straw)
- titanium (TiAlN, straw)

Surface Treatment Information:
- Straw finish adds lubricity and easily identifies cobalt drills.
- Titanium nitride (TiN) coating adds lubricity and hardness, enhancing chip flow, finish hole quality, and drill life.
- Titanium aluminum nitride (TiAlN) coating combines the ability to work in high-temperatures with added hardness to increase drill life.

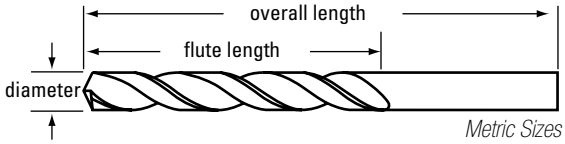
Style 550
Straw Finish

Style 550-TN
TiN Coated

Style 550-TA
TiAlN Coated



Inch Sizes



Metric Sizes

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style **550**	Style **550-TN**	Style **550-TA**
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN	TiAlN
	80		.0135	0.34	.7500	19.05	.1250	3.18	*46750	—	—
	79		.0145	0.37	.7500	19.05	.1250	3.18	*46749	—	—
1/64			.0156	0.40	.7500	19.05	.1875	4.76	*46601	—	—
	78		.0160	0.41	.8750	22.23	.1875	4.76	*46748	—	—
	77		.0180	0.46	.8750	22.23	.1875	4.76	*46747	—	—
	76		.0200	0.51	.8750	22.23	.1875	4.76	*46746	—	—
	75		.0210	0.53	1.0000	25.40	.2500	6.35	*46745	—	—
	74		.0225	0.57	1.0000	25.40	.2500	6.35	*46744	—	—
	73		.0240	0.61	1.1250	28.58	.3125	7.94	*46743	—	—
	72		.0250	0.64	1.1250	28.58	.3125	7.94	*46742	—	—
	71		.0260	0.66	1.2500	31.75	.3750	9.53	*46741	—	—
	70		.0280	0.71	1.2500	31.75	.3750	9.53	*46740	—	—
	69		.0292	0.74	1.3750	34.93	.5000	12.70	*46739	—	—
	68		.0310	0.79	1.3750	34.93	.5000	12.70	*46738	—	—
1/32			.0312	0.79	1.3750	34.93	.5000	12.70	*46602	—	*44902
	67		.0320	0.81	1.3750	34.93	.5000	12.70	*46737	—	—
	66		.0330	0.84	1.3750	34.93	.5000	12.70	*46736	—	—
	65		.0350	0.89	1.5000	38.10	.6250	15.88	*46735	—	—

**sizes smaller than 0.0625 do not have split point.*

continued on next page

NAS-Type Cobalt Heavy-Duty (continued)
Styles 550, 550-TN (2550), 550-TA

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 550	Style 550-TN	Style 550-TA
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN	TiAlN
	64		.0360	0.91	1.5000	38.10	.6250	15.88	*46734	—	—
	63		.0370	0.94	1.5000	38.10	.6250	15.88	*46733	—	—
	62		.0380	0.97	1.5000	38.10	.6250	15.88	*46732	—	—
	61		.0390	0.99	1.6250	41.28	.6875	17.46	*46731	—	—
		1.00	.0394		1.3386	34.00	.4724	12.00	*46430	—	—
	60		.0400	1.02	1.6250	41.28	.6875	17.46	*46730	—	—
	59		.0410	1.04	1.6250	41.28	.6875	17.46	*46729	—	—
	58		.0420	1.07	1.6250	41.28	.6875	17.46	*46728	—	—
	57		.0430	1.09	1.7500	44.45	.7500	19.05	*46727	—	—
	56		.0465	1.18	1.7500	44.45	.7500	19.05	*46726	—	—
3/64			.0469	1.19	1.7500	44.45	.7500	19.05	*46603	—	*44903
		1.20	.0472		1.4961	38.00	.6299	16.00	*46433	—	—
		1.25	.0492		1.4961	38.00	.6299	16.00	*46434	—	—
		1.30	.0512		1.4961	38.00	.6299	16.00	*46435	—	—
	55		.0520	1.32	1.8750	47.63	.8750	22.23	*46725	—	—
	54		.0550	1.40	1.8750	47.63	.8750	22.23	*46724	—	—
		1.45	.0571		1.5748	40.00	.7087	18.00	*46436	—	—
		1.50	.0591		1.5748	40.00	.7087	18.00	*46437	—	—
	53		.0595	1.51	1.8750	47.63	.8750	22.23	*46723	—	
		1.55	.0610		1.6929	43.00	.7874	20.00	*46438	—	—
1/16			.0625	1.59	1.8750	47.63	.8750	22.23	46604	54007	44904
	52		.0635	1.61	1.8750	47.63	.8750	22.23	46722	54092	45022
		1.65	.0650		1.6929	43.00	.7874	20.00	46440	—	—
	51		.0670	1.70	2.0000	50.80	1.0000	25.40	46721	54091	45021
	50		.0700	1.78	2.0000	50.80	1.0000	25.40	46720	54090	45020
		1.80	.0709		1.8110	46.00	.8661	22.00	46442	—	—
	49		.0730	1.85	2.0000	50.80	1.0000	25.40	46719	54089	45019
		1.90	.0748		1.8110	46.00	.8661	22.00	46443	—	—
	48		.0760	1.93	2.0000	50.80	1.0000	25.40	46718	54088	45018
5/64			.0781	1.98	2.0000	50.80	1.0000	25.40	46605	54008	44905
	47		.0785	1.99	2.0000	50.80	1.0000	25.40	46717	54087	45017
		2.00	.0787		1.9291	49.00	.9449	24.00	46444	—	—
		2.05	.0807		1.9291	49.00	.9449	24.00	46445	—	—
	46		.0810	2.06	2.1250	53.98	1.1250	28.58	46716	54081	45016
	45		.0820	2.08	2.1250	53.98	1.1250	28.58	46715	54080	45015
		2.10	.0827		1.9291	49.00	.9449	24.00	46446	—	—
	44		.0860	2.18	2.1250	53.98	1.1250	28.58	46714	54079	45014
		2.20	.0866		2.0866	53.00	1.0630	27.00	46448	—	—
	43		.0890	2.26	2.2500	57.15	1.2500	31.75	46713	54078	45013
		2.30	.0906		2.0866	53.00	1.0630	27.00	46450	—	—
	42		.0935	2.37	2.2500	57.15	1.2500	31.75	46712	54077	45012
3/32			.0938	2.38	2.2500	57.15	1.2500	31.75	46606	54009	44906
		2.40	.0945		2.2441	57.00	1.1811	30.00	46452	—	—
	41		.0960	2.44	2.3750	60.33	1.3750	34.93	46711	54076	45011
	40		.0980	2.49	2.3750	60.33	1.3750	34.93	46710	54075	45010
		2.50	.0984		2.2441	57.00	1.1811	30.00	46453	—	—
	39		.0995	2.53	2.3750	60.33	1.3750	34.93	46709	54049	45009
	38		.1015	2.58	2.5000	63.50	1.4375	36.51	46708	54048	45008
		2.60	.1024		2.2441	57.00	1.1811	30.00	46454	—	—
	37		.1040	2.64	2.5000	63.50	1.4375	36.51	46707	54047	45007
	36		.1065	2.71	2.5000	63.50	1.4375	36.51	46706	54046	45006
7/64			.1094	2.78	2.6250	66.68	1.5000	38.10	46607	54010	44907

**sizes smaller than 0.0625 do not have split point.*

continued on next page

Drills - Jobber Length

NAS-Type Cobalt Heavy-Duty (continued)
Styles 550, 550-TN (2550), 550-TA

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style **550**	Style **550-TN**	Style **550-TA**
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN	TiAlN
	35		.1100	2.79	2.6250	66.68	1.5000	38.10	46705	54045	45005
		2.80	.1102		2.4016	61.00	1.2992	33.00	46455	—	—
	34		.1110	2.82	2.6250	66.68	1.5000	38.10	46704	54044	45004
	33		.1130	2.87	2.6250	66.68	1.5000	38.10	46703	54043	45003
		2.90	.1142		2.4016	61.00	1.2992	33.00	46456	—	—
	32		.1160	2.95	2.7500	69.85	1.6250	41.28	46702	54042	45002
		3.00	.1181		2.4016	61.00	1.2992	33.00	46457	—	—
	31		.1200	3.05	2.7500	69.85	1.6250	41.28	46701	54041	45001
		3.10	.1220		2.5591	65.00	1.4173	36.00	46458	—	—
1/8			.1250	3.18	2.7500	69.85	1.6250	41.28	46608	54050	44908
		3.20	.1260		2.5591	65.00	1.4173	36.00	46459	—	—
	30		.1285	3.26	2.7500	69.85	1.6250	41.28	46700	54040	45000
		3.30	.1299		2.5591	65.00	1.4173	36.00	46460	—	—
		3.40	.1339		2.7559	70.00	1.5354	39.00	46461	—	—
	29		.1360	3.45	2.8750	73.03	1.7500	44.45	46699	54039	44999
		3.50	.1378		2.7559	70.00	1.5354	39.00	46462	—	—
	28		.1405	3.57	2.8750	73.03	1.7500	44.45	46698	54038	44998
9/64			.1406	3.57	2.8750	73.03	1.7500	44.45	46609	54051	44909
	27		.1440	3.66	3.0000	76.20	1.8750	47.63	46697	54037	44997
		3.70	.1457		2.7559	70.00	1.5354	39.00	46463	—	—
	26		.1470	3.73	3.0000	76.20	1.8750	47.63	46696	54036	44996
	25		.1495	3.80	3.0000	76.20	1.8750	47.63	46695	54035	44995
	24		.1520	3.86	3.1250	79.38	2.0000	50.80	46694	54034	44994
	23		.1540	3.91	3.1250	79.38	2.0000	50.80	46693	54033	44993
5/32			.1562	3.97	3.1250	79.38	2.0000	50.80	46610	54052	44910
	22		.1570	3.99	3.1250	79.38	2.0000	50.80	46692	54032	44992
		4.00	.1575		2.9528	75.00	1.6929	43.00	46464	—	—
	21		.1590	4.04	3.2500	82.55	2.1250	53.98	46691	54031	44991
	20		.1610	4.09	3.2500	82.55	2.1250	53.98	46690	54030	44990
		4.20	.1654		2.9528	75.00	1.6929	43.00	46466	—	—
	19		.1660	4.22	3.2500	82.55	2.1250	53.98	46689	54029	44989
	18		.1695	4.31	3.2500	82.55	2.1250	53.98	46688	54028	44988
11/64			.1719	4.37	3.2500	82.55	2.1250	53.98	46611	54053	44911
	17		.1730	4.39	3.3750	85.73	2.1875	55.56	46687	54027	44987
	16		.1770	4.50	3.3750	85.73	2.1875	55.56	46686	54026	44986
		4.50	.1772		3.1496	80.00	1.8504	47.00	46467	—	—
	15		.1800	4.57	3.3750	85.73	2.1875	55.56	46685	54025	44985
	14		.1820	4.62	3.3750	85.73	2.1875	55.56	46684	54024	44984
	13		.1850	4.70	3.5000	88.90	2.3125	58.74	46683	54023	44983
3/16			.1875	4.76	3.5000	88.90	2.3125	58.74	46612	54054	44912
	12		.1890	4.80	3.5000	88.90	2.3125	58.74	46682	54022	44982
		4.80	.1890		3.3858	86.00	2.0472	52.00	46468	—	—
	11		.1910	4.85	3.5000	88.90	2.3125	58.74	46681	54021	44981
	10		.1935	4.91	3.6250	92.08	2.4375	61.91	46680	54020	44980
	9		.1960	4.98	3.6250	92.08	2.4375	61.91	46679	54019	44979
		5.00	.1968		3.3858	86.00	2.0472	52.00	46469	—	—
	8		.1990	5.05	3.6250	92.08	2.4375	61.91	46678	54018	44978
	7		.2010	5.11	3.6250	92.08	2.4375	61.91	46677	54017	44977
13/64			.2031	5.16	3.6250	92.08	2.4375	61.91	46613	54055	44913
	6		.2040	5.18	3.7500	95.25	2.5000	63.50	46676	54016	44976
	5		.2055	5.22	3.7500	95.25	2.5000	63.50	46675	54015	44975
	4		.2090	5.31	3.7500	95.25	2.5000	63.50	46674	54014	44974

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NAS-Type Cobalt Heavy-Duty (continued)
Styles 550, 550-TN (2550), 550-TA

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 550	Style 550-TN	Style 550-TA
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN	TiAlN
	3		.2130	5.41	3.7500	95.25	2.5000	63.50	46673	54013	44973
		5.50	.2165		3.6614	93.00	2.2441	57.00	46471	—	—
7/32			.2188	5.56	3.7500	95.25	2.5000	63.50	46614	54056	44914
	2		.2210	5.61	3.8750	98.43	2.6250	66.68	46672	54012	44972
		5.70	.2244		3.6614	93.00	2.2441	57.00	46472	—	—
	1		.2280	5.79	3.8750	98.43	2.6250	66.68	46671	54011	44971
	A		.2340	5.94	3.8750	98.43	2.6250	66.68	46771	54101	44945
15/64			.2344	5.95	3.8750	98.43	2.6250	66.68	46615	54057	44915
		6.00	.2362		3.6614	93.00	2.2441	57.00	46473	—	—
	B		.2380	6.05	4.0000	101.60	2.7500	69.85	46772	54102	44946
	C		.2420	6.15	4.0000	101.60	2.7500	69.85	46773	54103	44947
	D		.2460	6.25	4.0000	101.60	2.7500	69.85	46774	54104	44948
1/4	E		.2500	6.35	4.0000	101.60	2.7500	69.85	46616	54058	44916
		6.40	.2520		3.9764	101.00	2.4803	63.00	46474	—	—
		6.50	.2559		3.9764	101.00	2.4803	63.00	46475	—	—
	F		.2570	6.53	4.1250	104.78	2.8750	73.03	46776	54105	44950
		6.60	.2598		3.9764	101.00	2.4803	63.00	46476	—	—
	G		.2610	6.63	4.1250	104.78	2.8750	73.03	46777	54106	44951
		6.70	.2638		3.9764	101.00	2.4803	63.00	46477	—	—
17/64			.2656	6.75	4.1250	104.78	2.8750	73.03	46617	54059	44917
	H		.2660	6.76	4.1250	104.78	2.8750	73.03	46778	54107	44952
		6.80	.2677		4.2913	109.00	2.7165	69.00	46478	—	—
	I		.2720	6.91	4.1250	104.78	2.8750	73.03	46779	54108	44953
		7.00	.2756		4.2913	109.00	2.7165	69.00	46479	—	—
	J		.2770	7.04	4.1250	104.78	2.8750	73.03	46780	54109	44954
	K		.2810	7.14	4.2500	107.95	2.9375	74.61	46781	54110	44955
9/32			.2812	7.14	4.2500	107.95	2.9375	74.61	46618	54060	44918
	L		.2900	7.37	4.2500	107.95	2.9375	74.61	46782	54111	44956
	M		.2950	7.49	4.3750	111.13	3.0625	77.79	46783	54112	44957
		7.50	.2953		4.2913	109.00	2.7165	69.00	46481	—	—
19/64			.2969	7.54	4.3750	111.13	3.0625	77.79	46619	54061	44919
	N		.3020	7.67	4.3750	111.13	3.0625	77.79	46784	54113	44958
5/16			.3125	7.94	4.5000	114.30	3.1875	80.96	46620	54062	44920
		8.00	.3150		4.6063	117.00	2.9528	75.00	46482	—	—
	O		.3160	8.03	4.5000	114.30	3.1875	80.96	46785	54114	44959
		8.10	.3189		4.6063	117.00	2.9528	75.00	46483	—	—
	P		.3230	8.20	4.6250	117.48	3.3125	84.14	46786	54115	44960
21/64			.3281	8.33	4.6250	117.48	3.3125	84.14	46621	54063	44921
	Q		.3320	8.43	4.7500	120.65	3.4375	87.31	46787	54116	44961
		8.50	.3346		4.6063	117.00	2.9528	75.00	46484	—	—
	R		.3390	8.61	4.7500	120.65	3.4375	87.31	46788	54117	44962
11/32			.3438	8.73	4.7500	120.65	3.4375	87.31	46622	54064	44922
	S		.3480	8.84	4.8750	123.83	3.5000	88.90	46789	54118	44963
		9.00	.3543		4.9213	125.00	3.1890	81.00	46486	—	—
	T		.3580	9.09	4.8750	123.83	3.5000	88.90	46790	54119	44964
23/64			.3594	9.13	4.8750	123.83	3.5000	88.90	46623	54065	44923
	U		.3680	9.35	5.0000	127.00	3.6250	92.08	46791	54120	44965
		9.50	.3740		4.9213	125.00	3.1890	81.00	46487	—	—
3/8			.3750	9.53	5.0000	127.00	3.6250	92.08	46624	54066	44924
	V		.3770	9.58	5.0000	127.00	3.6250	92.08	46792	54121	44966
	W		.3860	9.80	5.1250	130.18	3.7500	95.25	46793	54122	44967
25/64			.3906	9.92	5.1250	130.18	3.7500	95.25	46625	54070	44925

continued on next page

Drills - Jobber Length

NAS-Type Cobalt Heavy-Duty (continued)
Styles 550, 550-TN (2550), 550-TA

INCH AND METRIC SIZES

Drill Diameter Fraction	Wire/Let	Metric	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style **550** Straw	Style **550-TN** TiN	Style **550-TA** TiAlN
		10.00	.3937		5.2362	133.00	3.4252	87.00	46488	—	—
	X		.3970	10.08	5.1250	130.18	3.7500	95.25	46794	54123	44968
		10.20	.4016		5.2362	133.00	3.4252	87.00	46489	—	—
	Y		.4040	10.26	5.2500	133.35	3.8750	98.43	46795	54124	44969
13/32			.4062	10.32	5.2500	133.35	3.8750	98.43	46626	54067	44926
	Z		.4130	10.49	5.2500	133.35	3.8750	98.43	46796	54125	44970
		10.50	.4134		5.2362	133.00	3.4252	87.00	46490	—	—
27/64			.4219	10.72	5.3750	136.53	3.9375	100.01	46627	54071	44927
		10.80	.4252		5.5905	142.00	3.7008	94.00	46491	—	—
		11.00	.4331		5.5905	142.00	3.7008	94.00	46492	—	—
7/16			.4375	11.11	5.5000	139.70	4.0625	103.19	46628	54068	44928
		11.20	.4409		5.5905	142.00	3.7008	94.00	46493	—	—
		11.50	.4528		5.5905	142.00	3.7008	94.00	46495	—	—
29/64			.4531	11.51	5.6250	142.88	4.1875	106.36	46629	54072	44929
15/32			.4688	11.91	5.7500	146.05	4.3125	109.54	46630	54073	44930
		12.00	.4724		5.9449	151.00	3.9764	101.00	46496	—	—
31/64			.4844	12.30	5.8750	149.23	4.3750	111.13	46631	54074	44931
		12.50	.4921		5.9449	151.00	3.9764	101.00	46498	—	—
1/2			.5000	12.70	6.0000	152.40	4.5000	114.30	46632	54069	44932
		13.00	.5118		5.9449	151.00	3.9764	101.00	46499	—	—
33/64			.5156	13.10	6.6250	168.28	4.8125	122.24	50075	—	—
17/32			.5312	13.49	6.6250	168.28	4.8125	122.24	50076	—	—
35/64			.5469	13.89	6.6250	168.28	4.8125	122.24	50077	—	—
9/16			.5625	14.29	6.6250	168.28	4.8125	122.24	50078	—	—
37/64			.5781	14.68	6.6250	168.28	4.8125	122.24	50079	—	—
19/32			.5938	15.08	7.1250	180.98	5.1875	131.76	50080	—	—
39/64			.6094	15.48	7.1250	180.98	5.1875	131.76	50081	—	—
5/8			.6250	15.88	7.1250	180.98	5.1875	131.76	50082	—	—
41/64			.6406	16.27	7.1250	180.98	5.1875	131.76	50083	—	—
21/32			.6562	16.67	7.1250	180.98	5.1875	131.76	50084	—	—
43/64			.6719	17.07	7.1250	180.98	5.1875	131.76	50085	—	—
11/16			.6875	17.46	7.1250	180.98	5.1875	131.76	50086	—	—

INCH AND METRIC SETS

Sets in Metal Index Cases

Number of Tools	Size Range	**Style 550** Straw	**Style 550-TN** TiN
13	1/16 - 1/4 X 1/64	57851	69891
15	1/16 - 1/2 X 1/32	57852	69871
21	1/16 - 3/8 X 1/64	69887	69892
29	1/16 - 1/2 X 1/64	57850	69870
26	Letters A - Z	69886	—
60	#1 - #60 wire gauge	57853	—
20	#61 - #80 wire gauge	45657	—
115	1/16 - 1/2 X 1/64, A - Z, #1 - #60	46650	—
11	1mm - 6mm X 0.5mm	54126	—
25	1mm - 13mm X 0.5mm	54127	—

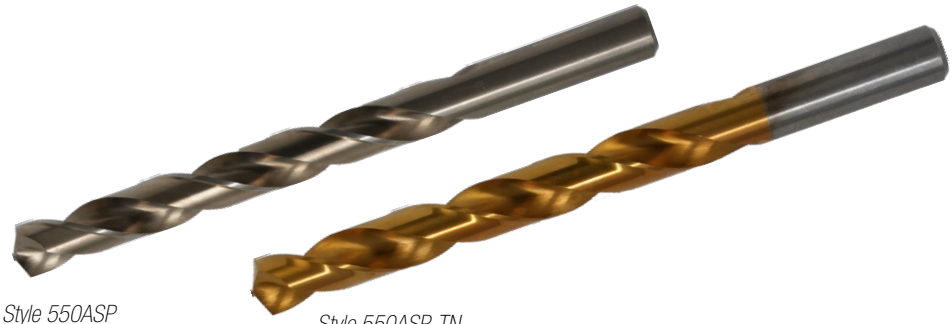
Set 57850

Cobalt Heavy-Duty
Styles 550ASP, 550ASP-TN

Features/Benefits:
- Manufactured to NAS 907 Type B geometry aerospace specifications
- Heavy-duty construction for drilling in tough, high-tensile, and work-hardening materials.
- Manufactured from cobalt high-speed steel for increased abrasion resistance.
- 135° P3 split point is self-centering for reduced thrust and easier penetration.
- Straw finish and selected sizes of titanium nitride (TiN), finish standard from stock; alternate coatings available as stock modifications.

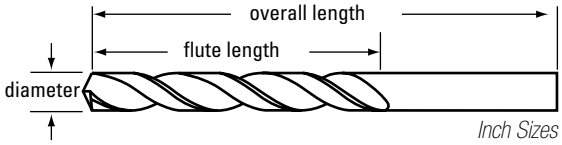
Application Information:
- stainless steel
- alloy steel
- titanium

Surface Treatment Information:
- Straw finish adds lubricity and easily identifies cobalt drills.
- Titanium nitride (TiN) coating adds lubricity and hardness, enhancing chip flow, finish hole quality, and drill life.

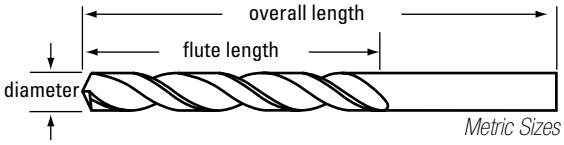


Style 550ASP
Straw Finish

Style 550ASP-TN
TiN-Coated



Inch Sizes



Metric Sizes

INCH AND METRIC SIZES

Fraction	Wire/Let	Drill Diameter Metric	Drill Diameter Decimal	Drill Diameter mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style **550ASP** Straw	Style **550ASP-TN** TiN
		1.00	.0394		1.3386	34.00	.4724	12.00	*47820	*47930
		1.10	.0433		1.4173	36.00	.5512	14.00	*47821	—
		1.20	.0472		1.4961	38.00	.6299	16.00	*47822	—
		1.30	.0512		1.4961	38.00	.6299	16.00	*47823	—
		1.40	.0551		1.5748	40.00	.7087	18.00	*47824	*47934
		1.50	.0591		1.5748	40.00	.7087	18.00	*47825	*47935
1/16			.0625	1.59	1.8750	47.63	.8750	22.23	47704	47630
		1.60	.0630		1.6929	43.00	.7874	20.00	47826	—
	52		.0635	1.61	1.8750	47.63	.8750	22.23	47786	—
		1.70	.0669		1.6929	43.00	.7874	20.00	47827	—
	51		.0670	1.70	2.0000	50.80	1.0000	25.40	47785	—
	50		.0700	1.78	2.0000	50.80	1.0000	25.40	47784	—
		1.80	.0709		1.8110	46.00	.8661	22.00	47828	—
	49		.0730	1.85	2.0000	50.80	1.0000	25.40	47783	—
		1.90	.0748		1.8110	46.00	.8661	22.00	47829	—
	48		.0760	1.93	2.0000	50.80	1.0000	25.40	47782	—
5/64			.0781	1.98	2.0000	50.80	1.0000	25.40	47705	47631
	47		.0785	1.99	2.0000	50.80	1.0000	25.40	47781	—
		2.00	.0787		1.9291	49.00	.9449	24.00	47830	47940
	46		.0810	2.06	2.1250	53.98	1.1250	28.58	47780	—
	45		.0820	2.08	2.1250	53.98	1.1250	28.58	47779	—
		2.10	.0827		1.9291	49.00	.9449	24.00	47831	—
	44		.0860	2.18	2.1250	53.98	1.1250	28.58	47778	—
		2.20	.0866		2.0866	53.00	1.0630	27.00	47832	—
	43		.0890	2.26	2.2500	57.15	1.2500	31.75	47777	—

**sizes smaller than 0.0625 do not have split point.*

continued on next page

Drills - Jobber Length

Heavy-Duty Cobalt (continued)
Styles 550ASP, 550ASP-TN

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 550ASP	Style 550ASP-TN
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN
		2.3	.0906		2.0866	53.00	1.0630	27.00	47833	—
	42		.0935	2.37	2.2500	57.15	1.2500	31.75	47776	—
3/32			.0938	2.38	2.2500	57.15	1.2500	31.75	47706	47632
		2.40	.0945		2.2441	57.00	1.1811	30.00	47834	47944
	41		.0960	2.44	2.3750	60.33	1.3750	34.93	47775	—
	40		.0980	2.49	2.3750	60.33	1.3750	34.93	47774	—
		2.50	.0984		2.2441	57.00	1.1811	30.00	47835	47945
	39		.0995	2.53	2.3750	60.33	1.3750	34.93	47773	—
	38		.1015	2.58	2.5000	63.50	1.4375	36.51	47772	—
		2.60	.1024		2.2441	57.00	1.1811	30.00	47836	—
	37		.1040	2.64	2.5000	63.50	1.4375	36.51	47771	—
		2.70	.1062		2.4016	61.00	1.2992	33.00	47837	—
	36		.1065	2.71	2.5000	63.50	1.4375	36.51	47770	—
7/64			.1094	2.78	2.6250	66.68	1.5000	38.10	47707	47633
	35		.1100	2.79	2.6250	66.68	1.5000	38.10	47769	—
		2.80	.1102		2.4016	61.00	1.2992	33.00	47838	47948
	34		.1110	2.82	2.6250	66.68	1.5000	38.10	47768	—
	33		.1130	2.87	2.6250	66.68	1.5000	38.10	47767	—
		2.90	.1142		2.4016	61.00	1.2992	33.00	47839	—
	32		.1160	2.95	2.7500	69.85	1.6250	41.28	47766	—
		3.00	.1181		2.4016	61.00	1.2992	33.00	47840	47950
	31		.1200	3.05	2.7500	69.85	1.6250	41.28	47765	—
		3.10	.1220		2.5591	65.00	1.4173	36.00	47841	—
1/8			.1250	3.18	2.7500	69.85	1.6250	41.28	47708	47634
		3.20	.1260		2.5591	65.00	1.4173	36.00	47842	47952
	30		.1285	3.26	2.7500	69.85	1.6250	41.28	47764	—
		3.30	.1299		2.5591	65.00	1.4173	36.00	47843	47953
		3.4	.1339		2.7559	70.00	1.5354	39.00	47844	—
	29		.1360	3.45	2.8750	73.03	1.7500	44.45	47763	—
		3.50	.1378		2.7559	70.00	1.5354	39.00	47845	47955
	28		.1405	3.57	2.8750	73.03	1.7500	44.45	47762	—
9/64			.1406	3.57	2.8750	73.03	1.7500	44.45	47709	47635
		3.60	.1417		2.7559	70.00	1.5354	39.00	47846	47956
	27		.1440	3.66	3.0000	76.20	1.8750	47.63	47761	—
		3.70	.1457		2.7559	70.00	1.5354	39.00	47847	47957
	26		.1470	3.73	3.0000	76.20	1.8750	47.63	47760	—
	25		.1495	3.80	3.0000	76.20	1.8750	47.63	47759	—
		3.80	.1496		2.9528	75.00	1.6929	43.00	47848	—
	24		.1520	3.86	3.1250	79.38	2.0000	50.80	47758	—
		3.90	.1535		2.9528	75.00	1.6929	43.00	47849	47959
	23		.1540	3.91	3.1250	79.38	2.0000	50.80	47757	—
5/32			.1562	3.97	3.1250	79.38	2.0000	50.80	47710	47636
	22		.1570	3.99	3.1250	79.38	2.0000	50.80	47756	—
		4.00	.1575		2.9528	75.00	1.6929	43.00	47850	47960
	21		.1590	4.04	3.2500	82.55	2.1250	53.98	47755	—
	20		.1610	4.09	3.2500	82.55	2.1250	53.98	47754	—
		4.10	.1614		2.9528	75.00	1.6929	43.00	47851	47961
		4.20	.1654		2.9528	75.00	1.6929	43.00	47852	47962
	19		.1660	4.22	3.2500	82.55	2.1250	53.98	47753	—
		4.30	.1692		3.1496	80.00	1.8504	47.00	47853	47963
	18		.1695	4.31	3.2500	82.55	2.1250	53.98	47752	—
11/64			.1719	4.37	3.2500	82.55	2.1250	53.98	47711	47637
	17		.1730	4.39	3.3750	85.73	2.1875	55.56	47751	—

continued on next page

Heavy-Duty Cobalt (continued)
Styles 550ASP, 550ASP-TN

INCH AND METRIC SIZES

Fraction	Drill Diameter Wire/Let	Metric	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 550ASP Straw	Style 550ASP-TN TiN
		4.40	.1732		3.1496	80.00	1.8504	47.00	47854	—
	16		.1770	4.50	3.3750	85.73	2.1875	55.56	47750	—
		4.50	.1772		3.1496	80.00	1.8504	47.00	47855	47965
	15		.1800	4.57	3.3750	85.73	2.1875	55.56	47749	—
		4.60	.1811		3.1496	80.00	1.8504	47.00	47856	47966
	14		.1820	4.62	3.3750	85.73	2.1875	55.56	47748	—
	13		.1850	4.70	3.5000	88.90	2.3125	58.74	47747	—
		4.70	.1850		3.1496	80.00	1.8504	47.00	47857	47967
3/16			.1875	4.76	3.5000	88.90	2.3125	58.74	47712	47638
	12		.1890	4.80	3.5000	88.90	2.3125	58.74	47746	—
		4.80	.1890		3.3858	86.00	2.0472	52.00	47858	47968
	11		.1910	4.85	3.5000	88.90	2.3125	58.74	47745	—
		4.90	.1929		3.3858	86.00	2.0472	52.00	47859	47969
	10		.1935	4.91	3.6250	92.08	2.4375	61.91	47744	—
	9		.1960	4.98	3.6250	92.08	2.4375	61.91	47743	—
		5.00	.1969		3.3858	86.00	2.0472	52.00	47860	47970
	8		.1990	5.05	3.6250	92.08	2.4375	61.91	47742	—
		5.10	.2008		3.3858	86.00	2.0472	52.00	47861	47971
	7		.2010	5.11	3.6250	92.08	2.4375	61.91	47741	—
13/64			.2031	5.16	3.6250	92.08	2.4375	61.91	47713	47600
	6		.2040	5.18	3.7500	95.25	2.5000	63.50	47740	—
		5.20	.2047		3.3858	86.00	2.0472	52.00	47862	47972
	5		.2055	5.22	3.7500	95.25	2.5000	63.50	47739	—
		5.30	.2087		3.3858	86.00	2.0472	52.00	47863	—
	4		.2090	5.31	3.7500	95.25	2.5000	63.50	47738	—
		5.40	.2125		3.6614	93.00	2.2441	57.00	47864	—
	3		.2130	5.41	3.7500	95.25	2.5000	63.50	47737	—
		5.50	.2165		3.6614	93.00	2.2441	57.00	47865	47975
7/32			.2188	5.56	3.7500	95.25	2.5000	63.50	47714	47640
		5.60	.2205		3.6614	93.00	2.2441	57.00	47866	—
	2		.2210	5.61	3.8750	98.43	2.6250	66.68	47736	—
		5.70	.2244		3.6614	93.00	2.2441	57.00	47867	47977
	1		.2280	5.79	3.8750	98.43	2.6250	66.68	47735	—
		5.80	.2283		3.6614	93.00	2.2441	57.00	47868	47978
		5.90	.2323		3.6614	93.00	2.2441	57.00	47869	—
15/64			.2344	5.95	3.8750	98.43	2.6250	66.68	47715	47601
		6.00	.2362		3.6614	93.00	2.2441	57.00	47870	47980
		6.10	.2401		3.9764	101.00	2.4803	63.00	47871	47981
		6.20	.2440		3.9764	101.00	2.4803	63.00	47872	47982
		6.30	.2480		3.9764	101.00	2.4803	63.00	47873	—
1/4			.2500	6.35	4.0000	101.60	2.7500	69.85	47716	47642
		6.40	.2520		3.9764	101.00	2.4803	63.00	47874	—
		6.50	.2559		3.9764	101.00	2.4803	63.00	47875	47985
		6.60	.2598		3.9764	101.00	2.4803	63.00	47876	—
		6.70	.2638		3.9764	101.00	2.4803	63.00	47877	47987
17/64			.2656	6.75	4.1250	104.78	2.8750	73.03	47717	47602
	H		.2660	6.76	4.1250	104.78	2.8750	73.03	47807	47907
		6.80	.2677		4.2913	109.00	2.7165	69.00	47878	47988
		6.90	.2717		4.2913	109.00	2.7165	69.00	47879	—
		7.00	.2756		4.2913	109.00	2.7165	69.00	47880	47990
	J		.2770	7.04	4.1250	104.78	2.8750	73.03	47809	—
		7.10	.2795		4.2913	109.00	2.7165	69.00	47881	—
9/32			.2812	7.14	4.2500	107.95	2.9375	74.61	47718	47644

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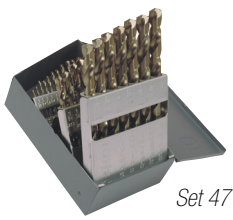
Heavy-Duty Cobalt (continued)
Styles 550ASP, 550ASP-TN

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style **550ASP**	Style **550ASP-TN**
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN
		7.20	.2835		4.2913	109.00	2.7165	69.00	47882	—
		7.40	.2913		4.2913	109.00	2.7165	69.00	47884	—
		7.50	.2953		4.2913	109.00	2.7165	69.00	47885	47994
19/64			.2969	7.54	4.3750	111.13	3.0625	77.79	47719	47603
		7.80	.3071		4.6063	117.00	2.9528	75.00	47888	—
		7.90	.3110		4.6063	117.00	2.9528	75.00	47889	—
5/16			.3125	7.94	4.5000	114.30	3.1875	80.96	47720	47646
		8.00	.3150		4.6063	117.00	2.9528	75.00	47890	47997
		8.10	.3189		4.6063	117.00	2.9528	75.00	47891	—
		8.20	.3228		4.6063	117.00	2.9528	75.00	47892	—
		8.30	.3268		4.6063	117.00	2.9528	75.00	47893	—
21/64			.3281	8.33	4.6250	117.48	3.3125	84.14	47721	47604
		8.40	.3307		4.6063	117.00	2.9528	75.00	47894	—
		8.50	.3346		4.6063	117.00	2.9528	75.00	47895	48001
		8.60	.3386		4.9213	125.00	3.1890	81.00	47896	—
		8.70	.3425		4.9213	125.00	3.1890	81.00	47897	48002
11/32			.3438	8.73	4.7500	120.65	3.4375	87.31	47722	47648
		8.80	.3465		4.9213	125.00	3.1890	81.00	47898	—
		8.90	.3504		4.9213	125.00	3.1890	81.00	47899	—
		9.00	.3543		4.9213	125.00	3.1890	81.00	47900	48005
23/64			.3594	9.13	4.8750	123.83	3.5000	88.90	47723	47605
		9.30	.3661		4.9213	125.00	3.1890	81.00	47903	—
		9.40	.3701		4.9213	125.00	3.1890	81.00	47904	—
		9.50	.3740		4.9213	125.00	3.1890	81.00	47905	48006
3/8			.3750	9.53	5.0000	127.00	3.6250	92.08	47724	47650
		9.60	.3780		5.2362	133.00	3.1890	81.00	47906	—
		9.80	.3858		5.2362	133.00	3.1890	81.00	47908	—
25/64			.3906	9.92	5.1250	130.18	3.7500	95.25	47725	47606
		10.00	.3937		5.2362	133.00	3.4252	87.00	47910	48009
		10.20	.4016		5.2362	133.00	3.4252	87.00	47911	48010
13/32			.4062	10.32	5.2500	133.35	3.8750	98.43	47726	47652
		10.50	.4134		5.2362	133.00	3.4252	87.00	47912	48011
27/64			.4219	10.72	5.3750	136.53	3.9375	100.01	47727	47607
		11.00	.4331		5.5905	142.00	3.7008	94.00	47913	48012
7/16			.4375	11.11	5.5000	139.70	4.0625	103.19	47728	47654
		11.50	.4527		5.5905	142.00	3.7008	94.00	47914	48013
29/64			.4531	11.51	5.6250	142.88	4.1875	106.36	47729	47608
15/32			.4688	11.91	5.7500	146.05	4.3125	109.54	47730	47656
		12.00	.4724		5.9449	151.00	3.9764	101.00	47915	48014
31/64			.4844	12.30	5.8750	149.23	4.3750	111.13	47731	47657
		12.50	.4921		5.9449	151.00	3.9764	101.00	47916	48015
1/2			.5000	12.70	6.0000	152.40	4.5000	114.30	47732	47658
		13.00	.5118		5.9449	151.00	3.9764	101.00	47917	48016

INCH AND METRIC SETS
Sets in Metal Index Cases

Number of Tools	Size Range	**Style 550ASP** Straw
15	1/16 - 1/2 x 1/32	47795
29	1/16 - 1/2 X 1/64	47796
19	1mm - 10mm x 0.5mm	47924
25	1mm - 13mm X 0.5mm	47925



Set 47796

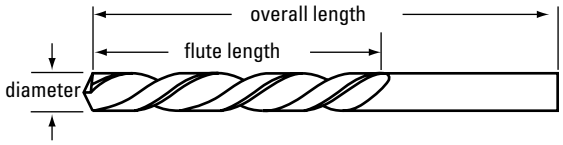
Cobalt
Style 550L

Features/Benefits:

- Heavy-duty construction for drilling in tough, high-tensile, and work-hardening materials under extreme operating conditions.
- Manufactured from premium cobalt high-speed steel, increasing hot hardness and extending drill wear life.
- 135° split point is self-centering for reduced thrust and easier penetration
- Can substitute for screw extractors to remove broken parts without damaging threaded holes.
- Left-hand helix is ideal for use in screw machines where machine spindle rotation is counter-clockwise.

Application Information:

- carbon steel
- alloy steel
- cast iron



Drill Diameter			Overall Length		Flute Length		**Style 550L**
Fraction	Decimal	mm	Inch	mm	Inch	mm	Straw
1/16	.0625	1.59	1.8750	47.63	.8750	22.23	46504
5/64	.0781	1.98	2.0000	50.80	1.0000	25.40	46505
3/32	.0938	2.38	2.2500	57.15	1.2500	31.75	46506
7/64	.1094	2.78	2.6250	66.68	1.5000	38.10	46507
1/8	.1250	3.18	2.7500	69.85	1.6250	41.28	46508
9/64	.1406	3.57	2.8750	73.03	1.7500	44.45	46509
5/32	.1562	3.97	3.1250	79.38	2.0000	50.80	46510
11/64	.1719	4.37	3.2500	82.55	2.1250	53.98	46511
3/16	.1875	4.76	3.5000	88.90	2.3125	58.74	46512
13/64	.2031	5.16	3.6250	92.08	2.4375	61.91	46513
7/32	.2188	5.56	3.7500	95.25	2.5000	63.50	46514
15/64	.2344	5.95	3.8750	98.43	2.6250	66.68	46515
1/4	.2500	6.35	4.0000	101.60	2.7500	69.85	46516
17/64	.2656	6.75	4.1250	104.78	2.8750	73.03	46517
9/32	.2812	7.14	4.2500	107.95	2.9375	74.61	46518
19/64	.2969	7.54	4.3750	111.13	3.0625	77.79	46519
5/16	.3125	7.94	4.5000	114.30	3.1875	80.96	46520
21/64	.3281	8.33	4.6250	117.48	3.3125	84.14	46521
11/32	.3438	8.73	4.7500	120.65	3.4375	87.31	46522
23/64	.3594	9.13	4.8750	123.83	3.5000	88.90	46523
3/8	.3750	9.53	5.0000	127.00	3.6250	92.08	46524
25/64	.3906	9.92	5.1250	130.18	3.7500	95.25	46525
13/32	.4062	10.32	5.2500	133.35	3.8750	98.43	46526
27/64	.4219	10.72	5.3750	136.53	3.9375	100.01	46527
7/16	.4375	11.11	5.5000	139.70	4.0625	103.19	46528
29/64	.4531	11.51	5.6250	142.88	4.1875	106.36	46529
15/32	.4688	11.91	5.7500	146.05	4.3125	109.54	46530
31/64	.4844	12.30	5.8750	149.23	4.3750	111.13	46531
1/2	.5000	12.70	6.0000	152.40	4.5000	114.30	46532

Drills - Jobber Length

Wide Land Parabolic
Styles 150WLP, 150WLP-TC (150WLPN)

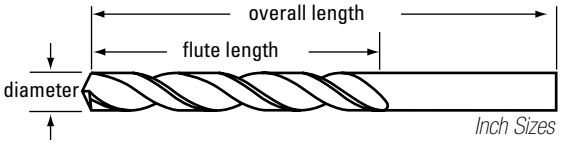
Features/Benefits:
- Combination of parabolic flute form and point design produces tighter hole tolerances, heightened chip-breaking action, and improved coolant flow for deep-hole drilling.
- Wide flute spacing disperses chips away from the cutting edge more rapidly than conventional parabolic drills, resulting in tighter, more manageable chips and less chip packing.
- Manufactured from high-speed steel.
- 135° split point is self-centering, and uses reduced thrust for easier penetration.
- TiCN and bright finishes standard from stock; alternate coatings available as stock modifications.

Application Information:
- carbon steel (TiCN, bright)
- tool steel (TiCN, bright)
- alloy steel (TiCN, bright)
- free-machining steel (TiCN, bright)

Surface Treatment Information
- Titanium-carbonitride (TiCN) coating increases cutting surface hardness, making the tool highly resistant to abrasive wear.

150WLP Bright Finish

150WLP-TC TiCN-Coated



Inch Sizes

INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style **150WLP** Bright	Style **150WLP-TC** TiCN
1/16		.0625	1.59	1.8750	47.63	.8750	22.23	41004	42004
	52	.0635	1.61	1.8750	47.63	.8750	22.23	41122	Δ 42122
	51	.0670	1.70	2.0000	50.80	1.0000	25.40	41121	Δ 42121
	50	.0700	1.78	2.0000	50.80	1.0000	25.40	41120	Δ 42120
	49	.0730	1.85	2.0000	50.80	1.0000	25.40	41119	Δ 42119
	48	.0760	1.93	2.0000	50.80	1.0000	25.40	41118	Δ 42118
5/64		.0781	1.98	2.0000	50.80	1.0000	25.40	41005	42005
	47	.0785	1.99	2.0000	50.80	1.0000	25.40	41117	Δ 42117
	46	.0810	2.06	2.1250	53.98	1.1250	28.58	41116	Δ 42116
	45	.0820	2.08	2.1250	53.98	1.1250	28.58	41115	Δ 42115
	44	.0860	2.18	2.1250	53.98	1.1250	28.58	41114	Δ 42114
	43	.0890	2.26	2.2500	57.15	1.2500	31.75	41113	Δ 42113
	42	.0935	2.37	2.2500	57.15	1.2500	31.75	41112	Δ 42112
3/32		.0938	2.38	2.2500	57.15	1.2500	31.75	41006	42006
	41	.0960	2.44	2.3750	60.33	1.3750	34.93	41111	Δ 42111
	40	.0980	2.49	2.3750	60.33	1.3750	34.93	41110	Δ 42110
	39	.0995	2.53	2.3750	60.33	1.3750	34.93	41109	Δ 42109
	38	.1015	2.58	2.5000	63.50	1.4375	36.51	41108	Δ 42108
	37	.1040	2.64	2.5000	63.50	1.4375	36.51	41107	Δ 42107
	36	.1065	2.71	2.5000	63.50	1.4375	36.51	41106	Δ 42106
7/64		.1094	2.78	2.6250	66.68	1.5000	38.10	41007	42007
	35	.1100	2.79	2.6250	66.68	1.5000	38.10	41105	Δ 42105

** Only available until inventory is depleted.

Δ Call to confirm delivery.

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Wide Land Parabolic (continued)
Styles 150WLP, 150WLP-TC (150WLPN)

INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 150WLP Bright	Style 150WLP-TC TiCN
	34	.1110	2.82	2.6250	66.68	1.5000	38.10	41104	Δ 42104
	33	.1130	2.87	2.6250	66.68	1.5000	38.10	41103	Δ 42103
	32	.1160	2.95	2.7500	69.85	1.6250	41.28	41102	Δ 42102
	31	.1200	3.05	2.7500	69.85	1.6250	41.28	41101	Δ 42101
1/8		.1250	3.18	2.7500	69.85	1.6250	41.28	41008	42008
	30	.1285	3.26	2.7500	69.85	1.6250	41.28	41100	Δ 42100
	29	.1360	3.45	2.8750	73.03	1.7500	44.45	41099	Δ 42099
	28	.1405	3.57	2.8750	73.03	1.7500	44.45	41098	Δ 42098
9/64		.1406	3.57	2.8750	73.03	1.7500	44.45	41009	42009
	27	.1440	3.66	3.0000	76.20	1.8750	47.63	41097	Δ 42097
	26	.1470	3.73	3.0000	76.20	1.8750	47.63	41096	Δ 42096
	25	.1495	3.80	3.0000	76.20	1.8750	47.63	41095	Δ 42095
	24	.1520	3.86	3.1250	79.38	2.0000	50.80	41094	Δ 42094
	23	.1540	3.91	3.1250	79.38	2.0000	50.80	41093	Δ 42093
5/32		.1562	3.97	3.1250	79.38	2.0000	50.80	41010	42010
	22	.1570	3.99	3.1250	79.38	2.0000	50.80	41092	Δ 42092
	21	.1590	4.04	3.2500	82.55	2.1250	53.98	41091	Δ 42091
	20	.1610	4.09	3.2500	82.55	2.1250	53.98	41090	Δ 42090
	19	.1660	4.22	3.2500	82.55	2.1250	53.98	41089	Δ 42089
	18	.1695	4.31	3.2500	82.55	2.1250	53.98	41088	Δ 42088
11/64		.1719	4.37	3.2500	82.55	2.1250	53.98	41011	42011
	17	.1730	4.39	3.3750	85.73	2.1875	55.56	41087	Δ 42087
	16	.1770	4.50	3.3750	85.73	2.1875	55.56	41086	Δ 42086
	15	.1800	4.57	3.3750	85.73	2.1875	55.56	41085	Δ 42085
	14	.1820	4.62	3.3750	85.73	2.1875	55.56	41084	Δ 42084
	13	.1850	4.70	3.5000	88.90	2.3125	58.74	41083	Δ 42083
3/16		.1875	4.76	3.5000	88.90	2.3125	58.74	41012	42012
	12	.1890	4.80	3.5000	88.90	2.3125	58.74	41082	Δ 42082
	11	.1910	4.85	3.5000	88.90	2.3125	58.74	41081	Δ 42081
	10	.1935	4.91	3.6250	92.08	2.4375	61.91	41080	Δ 42080
	9	.1960	4.98	3.6250	92.08	2.4375	61.91	41079	Δ 42079
	8	.1990	5.05	3.6250	92.08	2.4375	61.91	41078	Δ 42078
	7	.2010	5.11	3.6250	92.08	2.4375	61.91	41077	Δ 42077
13/64		.2031	5.16	3.6250	92.08	2.4375	61.91	41013	42013
	6	.2040	5.18	3.7500	95.25	2.5000	63.50	41076	Δ 42076
	5	.2055	5.22	3.7500	95.25	2.5000	63.50	41075	Δ 42075
	4	.2090	5.31	3.7500	95.25	2.5000	63.50	41074	Δ 42074
	3	.2130	5.41	3.7500	95.25	2.5000	63.50	41073	Δ 42073
7/32		.2188	5.56	3.7500	95.25	2.5000	63.50	41014	42014
	2	.2210	5.61	3.8750	98.43	2.6250	66.68	41072	Δ 42072
	1	.2280	5.79	3.8750	98.43	2.6250	66.68	41071	Δ 42071
	A	.2340	5.94	3.8750	98.43	2.6250	66.68	—	** 42171
15/64		.2344	5.95	3.8750	98.43	2.6250	66.68	41015	42015
	C	.2420	6.15	4.0000	101.60	2.7500	69.85	** 41173	** 42173
	D	.2460	6.25	4.0000	101.60	2.7500	69.85	** 41174	** 42174
1/4	E	.2500	6.35	4.0000	101.60	2.7500	69.85	41016	42016
	F	.2570	6.53	4.1250	104.78	2.8750	73.03	** 41176	** 42176
	G	.2610	6.63	4.1250	104.78	2.8750	73.03	—	** 42177
17/64		.2656	6.75	4.1250	104.78	2.8750	73.03	41017	42017
	H	.2660	6.76	4.1250	104.78	2.8750	73.03	** 41178	** 42178
	I	.2720	6.91	4.1250	104.78	2.8750	73.03	** 41179	** 42179

** Only available until inventory is depleted.

Δ Call to confirm delivery.

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Drills - Jobber Length

Wide Land Parabolic (continued)
Styles 150WLP, 150WLP-TC (150WLPN)

INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style **150WLP** Bright	Style **150WLP-TC** TiCN
	J	.2770	7.04	4.1250	104.78	2.8750	73.03	** 41180	** 42180
	K	.2810	7.14	4.2500	107.95	2.9375	74.61	** 41181	** 42181
9/32		.2812	7.14	4.2500	107.95	2.9375	74.61	41018	42018
	L	.2900	7.37	4.2500	107.95	2.9375	74.61	** 41182	** 42182
	M	.2950	7.49	4.3750	111.13	3.0625	77.79	** 41183	** 42183
19/64		.2969	7.54	4.3750	111.13	3.0625	77.79	41019	42019
	N	.3020	7.67	4.3750	111.13	3.0625	77.79	** 41184	** 42184
5/16		.3125	7.94	4.5000	114.30	3.1875	80.96	41020	42020
	O	.3160	8.03	4.5000	114.30	3.1875	80.96	** 41185	** 42185
	P	.3230	8.20	4.6250	117.48	3.3125	84.14	** 41186	** 42186
21/64		.3281	8.33	4.6250	117.48	3.3125	84.14	41021	42021
	Q	.3320	8.43	4.7500	120.65	3.4375	87.31	** 41187	** 42187
	R	.3390	8.61	4.7500	120.65	3.4375	87.31	** 41188	** 42188
11/32		.3438	8.73	4.7500	120.65	3.4375	87.31	41022	42022
	S	.3480	8.84	4.8750	123.83	3.5000	88.90	** 41189	** 42189
	T	.3580	9.09	4.8750	123.83	3.5000	88.90	** 41190	** 42190
23/64		.3594	9.13	4.8750	123.83	3.5000	88.90	41023	42023
	U	.3680	9.35	5.0000	127.00	3.6250	92.08	** 41191	—
3/8		.3750	9.53	5.0000	127.00	3.6250	92.08	41024	42024
	V	.3770	9.58	5.0000	127.00	3.6250	92.08	** 41192	** 42192
	W	.3860	9.80	5.1250	130.18	3.7500	95.25	** 41193	** 42193
25/64		.3906	9.92	5.1250	130.18	3.7500	95.25	41025	42025
	X	.3970	10.08	5.1250	130.18	3.7500	95.25	** 41194	—
	Y	.4040	10.26	5.2500	133.35	3.8750	98.43	** 41195	—
13/32		.4062	10.32	5.2500	133.35	3.8750	98.43	41026	42026
	Z	.4130	10.49	5.2500	133.35	3.8750	98.43	** 41196	** 42196
27/64		.4219	10.72	5.3750	136.53	3.9375	100.01	41027	42027
7/16		.4375	11.11	5.5000	139.70	4.0625	103.19	41028	42028
29/64		.4531	11.51	5.6250	142.88	4.1875	106.36	41029	42029
15/32		.4688	11.91	5.7500	146.05	4.3125	109.54	41030	42030
31/64		.4844	12.30	5.8750	149.23	4.3750	111.13	41031	42031
1/2		.5000	12.70	6.0000	152.40	4.5000	114.30	41032	42032

** Only available until inventory is depleted.

Δ Call to confirm delivery.

Deep Hole Drilling

TECH TIP

There are several factors to look at when drilling a deep hole. (defined as 4 or more times drill diameter). Those factors include the type of workpiece material and it's hardness. Softer materials are best drilled with a deep hole parabolic (narrow lands, wide flutes for extra chip space) design. These drills are normally used to 14 diameters without peck drilling and are available with 118 or 135° split or notched points.

Harder materials require a wide land (wider lands, narrow flutes) design. Used to 8 diameters without pecking, these drills are 135° split pointed for hard materials, are made of cobalt material and are available as standards bright or with TiAlN coatings.

Speeds and feeds can also play a big part in deep-hole drilling. The deeper the hole, the more likely the chips will pack and clog the flutes, not allowing for ample coolant. This increases the amount of heat generated and could result in early failure. Follow the manufacturers recommended operating ranges.

Deep-Hole Parabolic
Styles 150DH, 150DH-TN (150DHT)

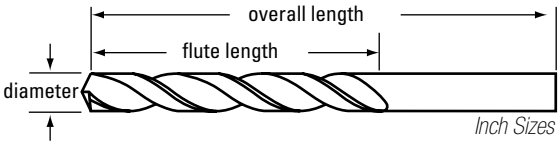
Features/Benefits:
- Parabolic flute configuration with proprietary Convoflute flute design offers wider flute space, dispersing chips away from the cutting edges more rapidly and increasing coolant flow.
- Engineered for deep-hole drilling up to 8 to 12 X diameter depth, depending on drill diameter.
- Manufactured from premium high-speed steel.
- 135° split point is self-centering, and uses reduced thrust for easier penetration.
- TiN and bright finishes standard from stock; alternate coatings available as stock modifications.

Application Information:
- low carbon steel (TiN, bright)
- soft alloy steel (TiN, bright)
- aluminum (TiCN as a modification)
- non-ferrous materials (bright)

Surface Treatment Information
- Titanium-nitride (TiN) coating adds lubricity and hardness, enhancing chip flow, finished hole quality, and drill life.

Style 150DH
Bright Finish

Style 150DH-TN
TiN-Coated



Inch Sizes

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style **150DH**	Style **150DH-TN**
Fract	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright	TiN
1/16		.0625	1.59	1.8750	47.63	.8750	22.23	68904	54083
	52	.0635	1.61	1.8750	47.63	.8750	22.23	69052	53981
	51	.0670	1.70	2.0000	50.80	1.0000	25.40	69051	53980
	50	.0700	1.78	2.0000	50.80	1.0000	25.40	69050	53979
	49	.0730	1.85	2.0000	50.80	1.0000	25.40	69049	53978
	48	.0760	1.93	2.0000	50.80	1.0000	25.40	69048	53977
5/64		.0781	1.98	2.0000	50.80	1.0000	25.40	68905	54084
	47	.0785	1.99	2.0000	50.80	1.0000	25.40	69047	53976
	46	.0810	2.06	2.1250	53.98	1.1250	28.58	69046	53975
	45	.0820	2.08	2.1250	53.98	1.1250	28.58	69045	53974
	44	.0860	2.18	2.1250	53.98	1.1250	28.58	69044	53973
	43	.0890	2.26	2.2500	57.15	1.2500	31.75	69043	53972
	42	.0935	2.37	2.2500	57.15	1.2500	31.75	69042	53971
3/32		.0938	2.38	2.2500	57.15	1.2500	31.75	68906	54085
	41	.0960	2.44	2.3750	60.33	1.3750	34.93	69041	53970
	40	.0980	2.49	2.3750	60.33	1.3750	34.93	69040	53969
	39	.0995	2.53	2.3750	60.33	1.3750	34.93	69039	53968
	38	.1015	2.58	2.5000	63.50	1.4375	36.51	69038	53967
	37	.1040	2.64	2.5000	63.50	1.4375	36.51	69037	53966
	36	.1065	2.71	2.5000	63.50	1.4375	36.51	69036	53965
7/64		.1094	2.78	2.6250	66.68	1.5000	38.10	68907	54086
	35	.1100	2.79	2.6250	66.68	1.5000	38.10	69035	53964

** Only available until inventory is depleted.

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Deep-Hole Parabolic (continued)
Styles 150DH, 150DH-TN (150DHT)

INCH SIZES

Fract	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style **150DH** Bright	Style **150DH-TN** TiN
	34	.1110	2.82	2.6250	66.68	1.5000	38.10	69034	53963
	33	.1130	2.87	2.6250	66.68	1.5000	38.10	69033	53962
	32	.1160	2.95	2.7500	69.85	1.6250	41.28	69032	53961
	31	.1200	3.05	2.7500	69.85	1.6250	41.28	69031	53960
1/8		.1250	3.18	2.7500	69.85	1.6250	41.28	68908	53901
	30	.1285	3.26	2.7500	69.85	1.6250	41.28	69030	53959
	29	.1360	3.45	2.8750	73.03	1.7500	44.45	69029	53958
	28	.1405	3.57	2.8750	73.03	1.7500	44.45	69028	53957
9/64		.1406	3.57	2.8750	73.03	1.7500	44.45	68909	53902
	27	.1440	3.66	3.0000	76.20	1.8750	47.63	69027	53956
	26	.1470	3.73	3.0000	76.20	1.8750	47.63	69026	53955
	25	.1495	3.80	3.0000	76.20	1.8750	47.63	69025	53954
	24	.1520	3.86	3.1250	79.38	2.0000	50.80	69024	53953
	23	.1540	3.91	3.1250	79.38	2.0000	50.80	69023	53952
5/32		.1562	3.97	3.1250	79.38	2.0000	50.80	68910	53903
	22	.1570	3.99	3.1250	79.38	2.0000	50.80	69022	53951
	21	.1590	4.04	3.2500	82.55	2.1250	53.98	69021	53950
	20	.1610	4.09	3.2500	82.55	2.1250	53.98	69020	53949
	19	.1660	4.22	3.2500	82.55	2.1250	53.98	69019	53948
	18	.1695	4.31	3.2500	82.55	2.1250	53.98	69018	53947
11/64		.1719	4.37	3.2500	82.55	2.1250	53.98	68911	53904
	17	.1730	4.39	3.3750	85.73	2.1875	55.56	69017	53946
	16	.1770	4.50	3.3750	85.73	2.1875	55.56	69016	53945
	15	.1800	4.57	3.3750	85.73	2.1875	55.56	69015	53944
	14	.1820	4.62	3.3750	85.73	2.1875	55.56	69014	53943
	13	.1850	4.70	3.5000	88.90	2.3125	58.74	69013	53942
3/16		.1875	4.76	3.5000	88.90	2.3125	58.74	68912	53905
	12	.1890	4.80	3.5000	88.90	2.3125	58.74	69012	53941
	11	.1910	4.85	3.5000	88.90	2.3125	58.74	69011	53940
	10	.1935	4.91	3.6250	92.08	2.4375	61.91	69010	53939
	9	.1960	4.98	3.6250	92.08	2.4375	61.91	69009	53938
	8	.1990	5.05	3.6250	92.08	2.4375	61.91	69008	53937
	7	.2010	5.11	3.6250	92.08	2.4375	61.91	69007	53936
13/64		.2031	5.16	3.6250	92.08	2.4375	61.91	68913	53906
	6	.2040	5.18	3.7500	95.25	2.5000	63.50	69006	53935
	5	.2055	5.22	3.7500	95.25	2.5000	63.50	69005	53934
	4	.2090	5.31	3.7500	95.25	2.5000	63.50	69004	53933
	3	.2130	5.41	3.7500	95.25	2.5000	63.50	69003	53932
7/32		.2188	5.56	3.7500	95.25	2.5000	63.50	68914	53907
	2	.2210	5.61	3.8750	98.43	2.6250	66.68	69002	53931
	1	.2280	5.79	3.8750	98.43	2.6250	66.68	69001	53930
	A	.2340	5.94	3.8750	98.43	2.6250	66.68	** 68970	** 53869
15/64		.2344	5.95	3.8750	98.43	2.6250	66.68	68915	53908
	B	.2380	6.05	4.0000	101.60	2.7500	69.85	** 68971	** 53870
	C	.2420	6.15	4.0000	101.60	2.7500	69.85	68972	53871
1/4	E	.2500	6.35	4.0000	101.60	2.7500	69.85	68916	53909
	F	.2570	6.53	4.1250	104.78	2.8750	73.03	68975	53873
	G	.2610	6.63	4.1250	104.78	2.8750	73.03	68976	53874
17/64		.2656	6.75	4.1250	104.78	2.8750	73.03	68917	53910

** Only available until inventory is depleted.

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Deep-Hole Parabolic (continued)
Styles 150DH, 150DH-TN (150DHT)

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style **150DH**	Style **150DH-TN**
Fract	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright	TiN
	H	.2660	6.76	4.1250	104.78	2.8750	73.03	68977	53875
	I	.2720	6.91	4.1250	104.78	2.8750	73.03	68978	53876
	J	.2770	7.04	4.1250	104.78	2.8750	73.03	** 68979	** 53877
9/32	K	.2812	7.14	4.2500	107.95	2.9375	74.61	68918	53911
	L	.2900	7.37	4.2500	107.95	2.9375	74.61	68980	53879
	M	.2950	7.49	4.3750	111.13	3.0625	77.79	68981	53880
19/64		.2969	7.54	4.3750	111.13	3.0625	77.79	68919	53912
	N	.3020	7.67	4.3750	111.13	3.0625	77.79	68982	53881
5/16		.3125	7.94	4.5000	114.30	3.1875	80.96	68920	53913
	O	.3160	8.03	4.5000	114.30	3.1875	80.96	68983	53882
	P	.3230	8.20	4.6250	117.48	3.3125	84.14	68984	53883
21/64		.3281	8.33	4.6250	117.48	3.3125	84.14	68921	53914
	Q	.3320	8.43	4.7500	120.65	3.4375	87.31	68985	53884
	R	.3390	8.61	4.7500	120.65	3.4375	87.31	68986	53885
11/32		.3438	8.73	4.7500	120.65	3.4375	87.31	68922	53915
	S	.3480	8.84	4.8750	123.83	3.5000	88.90	68987	53886
23/64		.3594	9.13	4.8750	123.83	3.5000	88.90	68923	53916
	U	.3680	9.35	5.0000	127.00	3.6250	92.08	68989	53888
3/8		.3750	9.53	5.0000	127.00	3.6250	92.08	68924	53917
	W	.3860	9.80	5.1250	130.18	3.7500	95.25	68991	53890
25/64		.3906	9.92	5.1250	130.18	3.7500	95.25	68925	53918
	X	.3970	10.08	5.1250	130.18	3.7500	95.25	—	** 53891
13/32		.4062	10.32	5.2500	133.35	3.8750	98.43	68926	53919
	Z	.4130	10.49	5.2500	133.35	3.8750	98.43	** 68994	** 53893
27/64		.4219	10.72	5.3750	136.53	3.9375	100.01	68927	53920
7/16		.4375	11.11	5.5000	139.70	4.0625	103.19	68928	53921
29/64		.4531	11.51	5.6250	142.88	4.1875	106.36	68929	53922
15/32		.4688	11.91	5.7500	146.05	4.3125	109.54	68930	53923
31/64		.4844	12.30	5.8750	149.23	4.3750	111.13	68931	53924
1/2		.5000	12.70	6.0000	152.40	4.5000	114.30	68932	53925

** Only available until inventory is depleted.

INCH SET

Sets in Metal Index Cases

Number of Tools	Size Range	**Style 150DH-TN** TiN
29	1/16 - 1/2 X 1/64	57734

Drills - Jobber Length

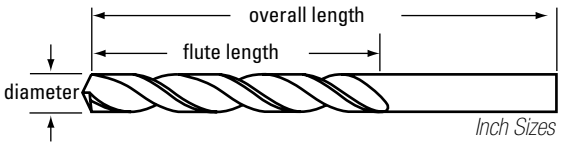
Carbide-Tipped
Styles CTD

Features/Benefits:

- General-purpose geometry for drilling in a wide range of operating conditions and materials.
- Manufactured from high-speed steel with brazed carbide tip.
- 118° point.
- Can be run at speeds and feeds equivalent to general-purpose carbide drills.
- Bright finish provides good chip ejection; alternate coatings available as stock modifications.

Application Information:

- non-ferrous materials
- cast iron
- Effective in abrasive materials.



INCH SIZES

Drill Diameter			Overall Length		Flute Length		Style **CTD**
Fraction	Decimal	mm	Inch	mm	Inch	mm	Bright
1/8	.1250	3.18	2.7500	69.85	1.6250	41.28	77645
5/32	.1562	3.97	3.1250	79.38	2.0000	50.80	77647
3/16	.1875	4.76	3.5000	88.90	2.3125	58.74	77649
7/32	.2188	5.56	3.7500	95.25	2.5000	63.50	77651
1/4	.2500	6.35	4.0000	101.60	2.7500	69.85	77653
9/32	.2812	7.14	4.2500	107.95	2.9375	74.61	77655
5/16	.3125	7.94	4.5000	114.30	3.1875	80.96	77657
11/32	.3438	8.73	4.7500	120.65	3.4375	87.31	77659
3/8	.3750	9.53	5.0000	127.00	3.6250	92.08	77661
13/32	.4062	10.32	5.2500	133.35	3.8750	98.43	77663
7/16	.4375	11.11	5.5000	139.70	4.0625	103.19	77665
15/32	.4688	11.91	5.7500	146.05	4.3125	109.54	77667
1/2	.5000	12.70	6.0000	152.40	4.5000	114.30	77669

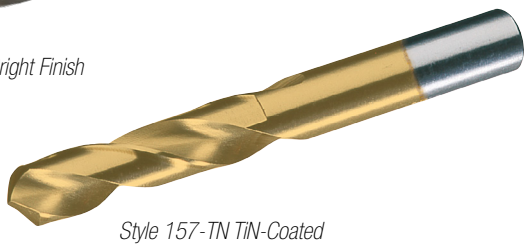
General Purpose
Styles 157, 157-TN

Features/Benefits:
- General-purpose geometry for drilling in a wide range of operating conditions and materials.
- Manufactured from premium high-speed steel.
- 118° point.
- Shorter flute and overall length provide superior rigidity to minimize deflection when using heavy fee rates.
- Extra rigidity is ideal for portable drilling.

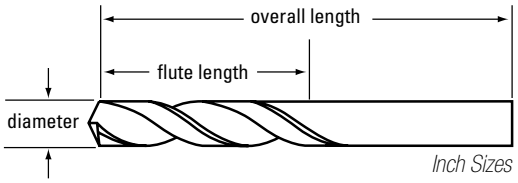
Application Information:
- carbon steel (bright/TiN)
- alloy steel (bright)
- cast iron (bright)
- non-ferrous materials (bright)

Surface Treatment Information:
- Titanium nitride (TiN) PVD coating adds lubricity and hardness which enhances chip flow, finish hole quality, and drill life.

Style 157 Bright Finish



Style 157-TN TiN-Coated



Inch Sizes

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 157	Style 157-TN
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright	TiN
	60	.0400	1.02	1.3750	34.93	.5000	12.70	48760	—
	59	.0410	1.04	1.3750	34.93	.5000	12.70	48759	—
	58	.0420	1.07	1.3750	34.93	.5000	12.70	48758	—
	57	.0430	1.09	1.3750	34.93	.5000	12.70	48757	—
	56	.0465	1.18	1.3750	34.93	.5000	12.70	48756	—
3/64		.0469	1.19	1.3750	34.93	.5000	12.70	48503	—
	55	.0520	1.32	1.6250	41.28	.6250	15.88	48755	—
	54	.0550	1.40	1.6250	41.28	.6250	15.88	48754	—
	53	.0595	1.51	1.6250	41.28	.6250	15.88	48753	—
1/16		.0625	1.59	1.6250	41.28	.6250	15.88	48504	55096
	52	.0635	1.61	1.6875	42.86	.6875	17.46	48752	—
	51	.0670	1.70	1.6875	42.86	.6875	17.46	48751	—
	50	.0700	1.78	1.6875	42.86	.6875	17.46	48750	—
	49	.0730	1.85	1.6875	42.86	.6875	17.46	48749	—
	48	.0760	1.93	1.6875	42.86	.6875	17.46	48748	—
5/64		.0781	1.98	1.6875	42.86	.6875	17.46	48505	55097
	47	.0785	1.99	1.7500	44.45	.7500	19.05	48747	—
	46	.0810	2.06	1.7500	44.45	.7500	19.05	48746	—
	45	.0820	2.08	1.7500	44.45	.7500	19.05	48745	—
	44	.0860	2.18	1.7500	44.45	.7500	19.05	48744	—
	43	.0890	2.26	1.7500	44.45	.7500	19.05	48743	—
	42	.0935	2.37	1.7500	44.45	.7500	19.05	48742	—
3/32		.0938	2.38	1.7500	44.45	.7500	19.05	48506	55098

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Drills - Screw Machine Length

General Purpose (continued)
Styles 157, 157-TN (2157)

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 157	Style 157-TN
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright	TiN
	41	.0960	2.44	1.8125	46.04	.8125	20.64	48741	—
	40	.0980	2.49	1.8125	46.04	.8125	20.64	48740	—
	39	.0995	2.53	1.8125	46.04	.8125	20.64	48739	—
	38	.1015	2.58	1.8125	46.04	.8125	20.64	48738	—
	37	.1040	2.64	1.8125	46.04	.8125	20.64	48737	—
	36	.1065	2.71	1.8125	46.04	.8125	20.64	48736	—
7/64		.1094	2.78	1.8125	46.04	.8125	20.64	48507	55099
	35	.1100	2.79	1.8750	47.63	.8750	22.23	48735	—
	34	.1110	2.82	1.8750	47.63	.8750	22.23	48734	—
	33	.1130	2.87	1.8750	47.63	.8750	22.23	48733	—
	32	.1160	2.95	1.8750	47.63	.8750	22.23	48732	—
	31	.1200	3.05	1.8750	47.63	.8750	22.23	48731	—
1/8		.1250	3.18	1.8750	47.63	.8750	22.23	48508	55100
	30	.1285	3.26	1.9375	49.21	.9375	23.81	48730	—
	29	.1360	3.45	1.9375	49.21	.9375	23.81	48729	—
	28	.1405	3.57	1.9375	49.21	.9375	23.81	48728	—
9/64		.1406	3.57	1.9375	49.21	.9375	23.81	48509	55101
	27	.1440	3.66	2.0625	52.39	1.0000	25.40	48727	—
	26	.1470	3.73	2.0625	52.39	1.0000	25.40	48726	—
	25	.1495	3.80	2.0625	52.39	1.0000	25.40	48725	—
	24	.1520	3.86	2.0625	52.39	1.0000	25.40	48724	—
	23	.1540	3.91	2.0625	52.39	1.0000	25.40	48723	—
5/32		.1562	3.97	2.0625	52.39	1.0000	25.40	48510	55102
	22	.1570	3.99	2.1250	53.98	1.0625	26.99	48722	—
	21	.1590	4.04	2.1250	53.98	1.0625	26.99	48721	—
	20	.1610	4.09	2.1250	53.98	1.0625	26.99	48720	—
	19	.1660	4.22	2.1250	53.98	1.0625	26.99	48719	—
	18	.1695	4.31	2.1250	53.98	1.0625	26.99	48718	—
11/64		.1719	4.37	2.1250	53.98	1.0625	26.99	48511	55103
	17	.1730	4.39	2.1875	55.56	1.2500	31.75	48717	—
	16	.1770	4.50	2.1875	55.56	1.2500	31.75	48716	—
	15	.1800	4.57	2.1875	55.56	1.2500	31.75	48715	—
	14	.1820	4.62	2.1875	55.56	1.2500	31.75	48714	—
	13	.1850	4.70	2.1875	55.56	1.2500	31.75	48713	—
3/16		.1875	4.76	2.1875	55.56	1.2500	31.75	48512	55104
	12	.1890	4.80	2.2500	57.15	1.1875	30.16	48712	—
	11	.1910	4.85	2.2500	57.15	1.1875	30.16	48711	—
	10	.1935	4.91	2.2500	57.15	1.1875	30.16	48710	—
	9	.1960	4.98	2.2500	57.15	1.1875	30.16	48709	—
	8	.1990	5.05	2.2500	57.15	1.1875	30.16	48708	—
	7	.2010	5.11	2.2500	57.15	1.1875	30.16	48707	—
13/64		.2031	5.16	2.2500	57.15	1.1875	30.16	48513	55105
	6	.2040	5.18	2.3750	60.33	1.2500	31.75	48706	—
	5	.2055	5.22	2.3750	60.33	1.2500	31.75	48705	—
	4	.2090	5.31	2.3750	60.33	1.2500	31.75	48704	—
	3	.2130	5.41	2.3750	60.33	1.2500	31.75	48703	—
7/32		.2188	5.56	2.3750	60.33	1.2500	31.75	48514	55106

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General Purpose (continued)
Styles 157, 157-TN (2157)

INCH SIZES

Drill Diameter Fraction	Wire/Let	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 157 Bright	Style 157-TN TiN
	2	.2210	5.61	2.4375	61.91	1.3125	33.34	48702	—
	1	.2280	5.79	2.4375	61.91	1.3125	33.34	48701	—
	A	.2340	5.94	2.4375	61.91	1.3125	33.34	48801	—
15/64		.2344	5.95	2.4375	61.91	1.3125	33.34	48515	55107
	B	.2380	6.05	2.5000	63.50	1.3750	34.93	48802	—
	C	.2420	6.15	2.5000	63.50	1.3750	34.93	48803	—
	D	.2460	6.25	2.5000	63.50	1.3750	34.93	48804	—
1/4	E	.2500	6.35	2.5000	63.50	1.3750	34.93	48516	55108
	F	.2570	6.53	2.6250	66.68	1.4375	36.51	48806	—
	G	.2610	6.63	2.6250	66.68	1.4375	36.51	48807	—
17/64		.2656	6.75	2.6250	66.68	1.4375	36.51	48517	55109
	H	.2660	6.76	2.6875	68.26	1.5000	38.10	48808	—
	I	.2720	6.91	2.6875	68.26	1.5000	38.10	48809	—
	J	.2770	7.04	2.6875	68.26	1.5000	38.10	48810	—
	K	.2812	7.14	2.6875	68.26	1.5000	38.10	48811	—
9/32		.2812	7.14	2.6875	68.26	1.5000	38.10	48518	55110
	L	.2900	7.37	2.7500	69.85	1.5625	39.69	48812	—
	M	.2950	7.49	2.7500	69.85	1.5625	39.69	48813	—
19/64		.2969	7.54	2.7500	69.85	1.5625	39.69	48519	55111
	N	.3020	7.67	2.8125	71.44	1.6250	41.28	48814	—
5/16		.3125	7.94	2.8125	71.44	1.6250	41.28	48520	55112
	O	.3160	8.03	2.9375	74.61	1.6875	42.86	48815	—
	P	.3230	8.20	2.9375	74.61	1.6875	42.86	48816	—
21/64		.3281	8.33	2.9375	74.61	1.6875	42.86	48521	55113
	Q	.3320	8.43	3.0000	76.20	1.6875	42.86	48817	—
	R	.3390	8.61	3.0000	76.20	1.6875	42.86	48818	—
11/32		.3438	8.73	3.0000	76.20	1.6875	42.86	48522	55114
	S	.3480	8.84	3.0625	77.79	1.7500	44.45	48819	—
	T	.3580	9.09	3.0625	77.79	1.7500	44.45	48820	—
23/64		.3594	9.13	3.0625	77.79	1.7500	44.45	48523	55115
	U	.3680	9.35	3.1250	79.38	1.8125	46.04	48821	—
3/8		.3750	9.53	3.1250	79.38	1.8125	46.04	48524	55116
	V	.3770	9.58	3.2500	82.55	1.8750	47.63	48822	—
	W	.3860	9.80	3.2500	82.55	1.8750	47.63	48823	—
25/64		.3906	9.92	3.2500	82.55	1.8750	47.63	48525	55117
	X	.3970	10.08	3.3125	84.14	1.9375	49.21	48824	—
	Y	.4040	10.26	3.3125	84.14	1.9375	49.21	48825	—
13/32		.4062	10.32	3.3125	84.14	1.9375	49.21	48526	55118
	Z	.4130	10.49	3.3750	85.73	2.0000	50.80	48826	—
27/64		.4219	10.72	3.3750	85.73	2.0000	50.80	48527	55119
7/16		.4375	11.11	3.4375	87.31	2.0625	52.39	48528	55120
29/64		.4531	11.51	3.5625	90.49	2.1250	53.98	48529	55121
15/32		.4688	11.91	3.6250	92.08	2.1250	53.98	48530	55122
31/64		.4844	12.30	3.6875	93.66	2.1875	55.56	48531	55123
1/2		.5000	12.70	3.7500	95.25	2.2500	57.15	48532	55124
33/64		.5156	13.10	3.8750	98.43	2.3750	60.33	48533	—
17/32		.5312	13.49	3.8750	98.43	2.3750	60.33	48534	—

drills over 1/2" diameter are black oxide finish

continued on next page

Drills - Screw Machine Length

General Purpose (continued)
Styles 157, 157-TN (2157)

INCH SIZES

Drill Diameter Fraction	Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 157 Bright	Style 157-TN TiN
35/64		.5469	13.89	4.0000	101.60	2.5000	63.50	48535	—
9/16		.5625	14.29	4.0000	101.60	2.5000	63.50	48536	—
37/64		.5781	14.68	4.1250	104.78	2.6250	66.68	48537	—
19/32		.5938	15.08	4.1250	104.78	2.6250	66.68	48538	—
39/64		.6094	15.48	4.2500	107.95	2.7500	69.85	48539	—
5/8		.6250	15.88	4.2500	107.95	2.7500	69.85	48540	—
41/64		.6406	16.27	4.5000	114.30	2.8750	73.03	48541	—
21/32		.6562	16.67	4.5000	114.30	2.8750	73.03	48542	—
43/64		.6719	17.07	4.6250	117.48	2.8750	73.03	48543	—
11/16		.6875	17.46	4.6250	117.48	2.8750	73.03	48544	—
45/64		.7031	17.86	4.7500	120.65	3.0000	76.20	48545	—
23/32		.7188	18.26	4.7500	120.65	3.0000	76.20	48546	—
47/64		.7344	18.65	5.0000	127.00	3.1250	79.38	48547	—
3/4		.7500	19.05	5.0000	127.00	3.1250	79.38	48548	—
49/64		.7656	19.45	5.1250	130.18	3.2500	82.55	48549	—
25/32		.7812	19.84	5.1250	130.18	3.2500	82.55	48550	—
51/64		.7969	20.24	5.2500	133.35	3.3750	85.73	48551	—
13/16		.8125	20.64	5.2500	133.35	3.3750	85.73	48552	—
53/64		.8281	21.03	5.3750	136.53	3.5000	88.90	48553	—
27/32		.8438	21.43	5.3750	136.53	3.5000	88.90	48554	—
55/64		.8594	21.83	5.5000	139.70	3.5000	88.90	48555	—
7/8		.8750	22.23	5.5000	139.70	3.5000	88.90	48556	—
57/64		.8906	22.62	5.6250	142.88	3.6250	92.08	48557	—
29/32		.9062	23.02	5.6250	142.88	3.6250	92.08	48558	—
59/64		.9219	23.42	5.7500	146.05	3.7500	95.25	48559	—
15/16		.9375	23.81	5.7500	146.05	3.7500	95.25	48560	—
61/64		.9531	24.21	5.8750	149.23	3.8750	98.43	48561	—
31/32		.9688	24.61	5.8750	149.23	3.8750	98.43	48562	—
63/64		.9844	25.00	6.0000	152.40	4.0000	101.60	48563	—
1		1.0000	25.40	6.0000	152.40	4.0000	101.60	48564	—
1-1/16*		1.0625	26.99	6.2500	158.75	4.0000	101.60	48568	—
1-1/8*		1.1250	28.58	6.3750	161.93	4.0000	101.60	48572	—
1-3/16*		1.1875	30.16	6.6250	168.28	4.2500	107.95	48576	—
1-1/4*		1.2500	31.75	6.7500	171.45	4.3750	111.13	48580	—

**Shank diameter for these sizes is 1.0000" (25.4mm).*

INCH SETS

Sets in Metal Index Cases

Number of Tools	Size Range	Style 157 Bright
29	1/16 - 1/2 X 1/64	69900
26	Letters A - Z	69901
60	#1 - #60 wire gauge	69902

Set 69901

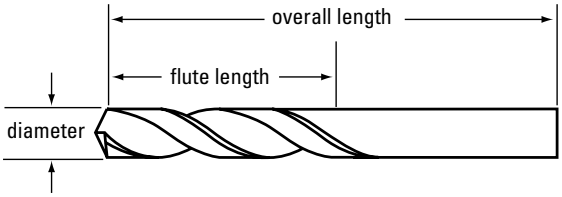
Left-Hand Helix
Style 157L

Features/Benefits:

- Left-hand flute configuration provides excellent chip ejection by lifting chips up and out of the workpiece more efficiently.
- Manufactured from premium high-speed steel.
- 118° point.
- Bright, finish standard from stock; alternate coatings available as stock modifications.

- carbon steel
- mild steel
- non-ferrous materials
- Recommended for drilling low-tensile materials such as aluminum, magnesium, copper, wood, slate, and some thermoplastics.

Application Information:



INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 157L
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright
	60	.0400	1.02	1.3750	34.93	.5000	12.70	49130
	59	.0410	1.04	1.3750	34.93	.5000	12.70	49129
	58	.0420	1.07	1.3750	34.93	.5000	12.70	49128
	57	.0430	1.09	1.3750	34.93	.5000	12.70	49127
	56	.0465	1.18	1.3750	34.93	.5000	12.70	49126
3/64		.0469	1.19	1.3750	34.93	.5000	12.70	48903
	55	.0520	1.32	1.6250	41.28	.6250	15.88	49125
	54	.0550	1.40	1.6250	41.28	.6250	15.88	49124
	53	.0595	1.51	1.6250	41.28	.6250	15.88	49123
1/16		.0625	1.59	1.6250	41.28	.6250	15.88	48904
	52	.0635	1.61	1.6875	42.86	.6875	17.46	49122
	51	.0670	1.70	1.6875	42.86	.6875	17.46	49121
	50	.0700	1.78	1.6875	42.86	.6875	17.46	49120
	49	.0730	1.85	1.6875	42.86	.6875	17.46	49119
	48	.0760	1.93	1.6875	42.86	.6875	17.46	49118
5/64		.0781	1.98	1.6875	42.86	.6875	17.46	48905
	47	.0785	1.99	1.7500	44.45	.7500	19.05	49117
	46	.0810	2.06	1.7500	44.45	.7500	19.05	49116
	45	.0820	2.08	1.7500	44.45	.7500	19.05	49115
	44	.0860	2.18	1.7500	44.45	.7500	19.05	49114
	43	.0890	2.26	1.7500	44.45	.7500	19.05	49113
	42	.0935	2.37	1.7500	44.45	.7500	19.05	49112
3/32		.0938	2.38	1.7500	44.45	.7500	19.05	48906
	41	.0960	2.44	1.8125	46.04	.8125	20.64	49111
	40	.0980	2.49	1.8125	46.04	.8125	20.64	49110
	39	.0995	2.53	1.8125	46.04	.8125	20.64	49109
	38	.1015	2.58	1.8125	46.04	.8125	20.64	49108
	37	.1040	2.64	1.8125	46.04	.8125	20.64	49107
	36	.1065	2.71	1.8125	46.04	.8125	20.64	49106

continued on next page

Drills - Screw Machine Length

Left-Hand Helix (continued)
Style 157L

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 157L
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright
7/64		.1094	2.78	1.8125	46.04	.8125	20.64	48907
	35	.1100	2.79	1.8750	47.63	.8750	22.23	49105
	34	.1110	2.82	1.8750	47.63	.8750	22.23	49104
	33	.1130	2.87	1.8750	47.63	.8750	22.23	49103
	32	.1160	2.95	1.8750	47.63	.8750	22.23	49102
	31	.1200	3.05	1.8750	47.63	.8750	22.23	49101
1/8		.1250	3.18	1.8750	47.63	.8750	22.23	48908
	30	.1285	3.26	1.9375	49.21	.9375	23.81	49100
	29	.1360	3.45	1.9375	49.21	.9375	23.81	49099
	28	.1405	3.57	1.9375	49.21	.9375	23.81	49098
9/64		.1406	3.57	1.9375	49.21	.9375	23.81	48909
	27	.1440	3.66	2.0625	52.39	1.0000	25.40	49097
	26	.1470	3.73	2.0625	52.39	1.0000	25.40	49096
	25	.1495	3.80	2.0625	52.39	1.0000	25.40	49095
	24	.1520	3.86	2.0625	52.39	1.0000	25.40	49094
	23	.1540	3.91	2.0625	52.39	1.0000	25.40	49093
5/32		.1562	3.97	2.0625	52.39	1.0000	25.40	48910
	22	.1570	3.99	2.1250	53.98	1.0625	26.99	49092
	21	.1590	4.04	2.1250	53.98	1.0625	26.99	49091
	20	.1610	4.09	2.1250	53.98	1.0625	26.99	49090
	19	.1660	4.22	2.1250	53.98	1.0625	26.99	49089
	18	.1695	4.31	2.1250	53.98	1.0625	26.99	49088
11/64		.1719	4.37	2.1250	53.98	1.0625	26.99	48911
	17	.1730	4.39	2.1875	55.56	1.2500	31.75	49087
	16	.1770	4.50	2.1875	55.56	1.2500	31.75	49086
	15	.1800	4.57	2.1875	55.56	1.2500	31.75	49085
	14	.1820	4.62	2.1875	55.56	1.2500	31.75	49084
	13	.1850	4.70	2.1875	55.56	1.2500	31.75	49083
3/16		.1875	4.76	2.1875	55.56	1.2500	31.75	48912
	12	.1890	4.80	2.2500	57.15	1.1875	30.16	49082
	11	.1910	4.85	2.2500	57.15	1.1875	30.16	49081
	10	.1935	4.91	2.2500	57.15	1.1875	30.16	49080
	9	.1960	4.98	2.2500	57.15	1.1875	30.16	49079
	8	.1990	5.05	2.2500	57.15	1.1875	30.16	49078
	7	.2010	5.11	2.2500	57.15	1.1875	30.16	49077
13/64		.2031	5.16	2.2500	57.15	1.1875	30.16	48913
	6	.2040	5.18	2.3750	60.33	1.2500	31.75	49076
	5	.2055	5.22	2.3750	60.33	1.2500	31.75	49075
	4	.2090	5.31	2.3750	60.33	1.2500	31.75	49074
	3	.2130	5.41	2.3750	60.33	1.2500	31.75	49073
7/32		.2188	5.56	2.3750	60.33	1.2500	31.75	48914
	2	.2210	5.61	2.4375	61.91	1.3125	33.34	49072
	1	.2280	5.79	2.4375	61.91	1.3125	33.34	49071
15/64		.2344	5.95	2.4375	61.91	1.3125	33.34	48915
1/4	E	.2500	6.35	2.5000	63.50	1.3750	34.93	48916
17/64		.2656	6.75	2.6250	66.68	1.4375	36.51	48917
9/32		.2812	7.14	2.6875	68.26	1.5000	38.10	48918

continued on next page

Left-Hand Helix (continued)
Style 157L

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 157L
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright
19/64		.2969	7.54	2.7500	69.85	1.5625	39.69	48919
5/16		.3125	7.94	2.8125	71.44	1.6250	41.28	48920
21/64		.3281	8.33	2.9375	74.61	1.6875	42.86	48921
11/32		.3438	8.73	3.0000	76.20	1.6875	42.86	48922
23/64		.3594	9.13	3.0625	77.79	1.7500	44.45	48923
3/8		.3750	9.53	3.1250	79.38	1.8125	46.04	48924
25/64		.3906	9.92	3.2500	82.55	1.8750	47.63	48925
13/32		.4062	10.32	3.3125	84.14	1.9375	49.21	48926
27/64		.4219	10.72	3.3750	85.73	2.0000	50.80	48927
7/16		.4375	11.11	3.4375	87.31	2.0625	52.39	48928
29/64		.4531	11.51	3.5625	90.49	2.1250	53.98	48929
15/32		.4688	11.91	3.6250	92.08	2.1250	53.98	48930
31/64		.4844	12.30	3.6875	93.66	2.1875	55.56	48931
1/2		.5000	12.70	3.7500	95.25	2.2500	57.15	48932

TECH TIP

"OFFHAND" HSS DRILLING VS. RIGID SETUPS

Many operations require the ability to take the drill to the workpiece as opposed to bringing the workpiece to a stationary machine with a rigid set-up. At this point many variables come into play, perhaps the lack of control over speeds and feeds is the most challenging. Obviously the workpiece material dictates a range of proper speeds and feeds based upon hardness, thickness, and even curved surfaces may come into play. Additionally, the lack of lubrication or coolant will alter the effectiveness of offhand drilling.

Consider these general guidelines:

- Support your workpiece as best you can.
- The tendency with offhand drilling is to overspeed and under feed, creating heat and premature drill wear and failure. Drills must be fed relatively hard to take a chip.
- If your tool is variable speed, do your best to keep the speed constant.
- Proper alignment is also important. Allow the drill to cut evenly on both cutting lips without deflection.
- Split points will stop the tendency of the point to "walk" and not center properly.
- Shorter style drills such as screw machine or stub lengths will work better than longer jobbers length drills.
- Drills containing cobalt and 135° split points are valuable over 32 Rc hardness.

Drills - Screw Machine Length

Heavy-Duty
Style 159, 159-TN (2159)

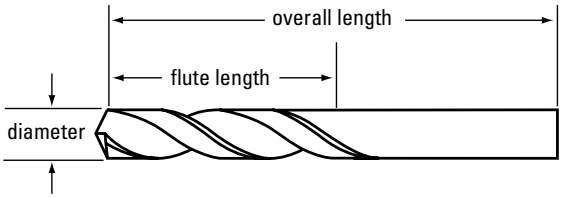
Features/Benefits:
- Manufactured to NAS 907 Type C geometry aerospace specifications.
- Heavy-duty geometry for drilling tougher materials by hand or machine.
- Shorter flute and overall length provide superior rigidity to minimize deflection when using heavy feed rates.
- Manufactured from premium high-speed steel.
- 135° P3 split point is self-centering for reduced thrust and easier penetration. Sizes under .0625" do not have split points.
- Black oxide and titanium nitride (TiN) finishes standard from stock; alternate coatings available as stock modifications.

Application Information:
- tool steel (black oxide, TiN)
- alloy steel (black oxide, TiN)
- carbon steel (black oxide, TiN)
- cast iron (black oxide, TiN)

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.
- Titanium nitride (TiN) PVD coating adds lubricity and hardness which enhances chip flow, finish hole quality, and drill life.

Style 159 Black Oxide

Style 159-TN TiN-Coated



INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 159** Black Oxide	**Style 159-TN** TiN
1/32		.0312	0.79	1.3750	34.93	.5000	12.70	49202	48202
	60	.0400	1.02	1.3750	34.93	.5000	12.70	49430	48430
	59	.0410	1.04	1.3750	34.93	.5000	12.70	49429	48429
	58	.0420	1.07	1.3750	34.93	.5000	12.70	49428	48428
	57	.0430	1.09	1.3750	34.93	.5000	12.70	49427	48427
	56	.0465	1.18	1.3750	34.93	.5000	12.70	49426	48426
3/64		.0469	1.19	1.3750	34.93	.5000	12.70	49203	48203
	55	.0520	1.32	1.6250	41.28	.6250	15.88	49425	48425
	54	.0550	1.40	1.6250	41.28	.6250	15.88	49424	48424
	53	.0595	1.51	1.6250	41.28	.6250	15.88	49423	48423
1/16		.0625	1.59	1.6250	41.28	.6250	15.88	49204	48204
	52	.0635	1.61	1.6875	42.86	.6875	17.46	49422	48422
	51	.0670	1.70	1.6875	42.86	.6875	17.46	49421	48421
	50	.0700	1.78	1.6875	42.86	.6875	17.46	49420	48420
	49	.0730	1.85	1.6875	42.86	.6875	17.46	49419	48419
	48	.0760	1.93	1.6875	42.86	.6875	17.46	49418	48418
5/64		.0781	1.98	1.6875	42.86	.6875	17.46	49205	48205
	47	.0785	1.99	1.7500	44.45	.7500	19.05	49417	48417
	46	.0810	2.06	1.7500	44.45	.7500	19.05	49416	48416
	45	.0820	2.08	1.7500	44.45	.7500	19.05	49415	48415
	44	.0860	2.18	1.7500	44.45	.7500	19.05	49414	48414
	43	.0890	2.26	1.7500	44.45	.7500	19.05	49413	48413
	42	.0935	2.37	1.7500	44.45	.7500	19.05	49412	48412
3/32		.0938	2.38	1.7500	44.45	.7500	19.05	49206	48206
	41	.0960	2.44	1.8125	46.04	.8125	20.64	49411	48411

Sizes smaller than .0625" do not have split points.

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Heavy-Duty (continued)
Style 159, 159-TN (2159)

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 159 Black Oxide	Style 159-TN TiN
	40	.0980	2.49	1.8125	46.04	.8125	20.64	49410	48410
	39	.0995	2.53	1.8125	46.04	.8125	20.64	49409	48409
	38	.1015	2.58	1.8125	46.04	.8125	20.64	49408	48408
	37	.1040	2.64	1.8125	46.04	.8125	20.64	49407	48407
	36	.1065	2.71	1.8125	46.04	.8125	20.64	49406	48406
7/64		.1094	2.78	1.8125	46.04	.8125	20.64	49207	48207
	35	.1100	2.79	1.8750	47.63	.8750	22.23	49405	48405
	34	.1110	2.82	1.8750	47.63	.8750	22.23	49404	48404
	33	.1130	2.87	1.8750	47.63	.8750	22.23	49403	48403
	32	.1160	2.95	1.8750	47.63	.8750	22.23	49402	48402
	31	.1200	3.05	1.8750	47.63	.8750	22.23	49401	48401
1/8		.1250	3.18	1.8750	47.63	.8750	22.23	49208	48208
	30	.1285	3.26	1.9375	49.21	.9375	23.81	49400	48400
	29	.1360	3.45	1.9375	49.21	.9375	23.81	49399	48399
	28	.1405	3.57	1.9375	49.21	.9375	23.81	49398	48398
9/64		.1406	3.57	1.9375	49.21	.9375	23.81	49209	48209
	27	.1440	3.66	2.0625	52.39	1.0000	25.40	49397	48397
	26	.1470	3.73	2.0625	52.39	1.0000	25.40	49396	48396
	25	.1495	3.80	2.0625	52.39	1.0000	25.40	49395	48395
	24	.1520	3.86	2.0625	52.39	1.0000	25.40	49394	48394
	23	.1540	3.91	2.0625	52.39	1.0000	25.40	49393	48393
5/32		.1562	3.97	2.0625	52.39	1.0000	25.40	49210	48210
	22	.1570	3.99	2.1250	53.98	1.0625	26.99	49392	48392
	21	.1590	4.04	2.1250	53.98	1.0625	26.99	49391	48391
	20	.1610	4.09	2.1250	53.98	1.0625	26.99	49390	48390
	19	.1660	4.22	2.1250	53.98	1.0625	26.99	49389	48389
	18	.1695	4.31	2.1250	53.98	1.0625	26.99	49388	48388
11/64		.1719	4.37	2.1250	53.98	1.0625	26.99	49211	48211
	17	.1730	4.39	2.1875	55.56	1.2500	31.75	49387	48387
	16	.1770	4.50	2.1875	55.56	1.2500	31.75	49386	48386
	15	.1800	4.57	2.1875	55.56	1.2500	31.75	49385	48385
	14	.1820	4.62	2.1875	55.56	1.2500	31.75	49384	48384
	13	.1850	4.70	2.1875	55.56	1.2500	31.75	49383	48383
3/16		.1875	4.76	2.1875	55.56	1.2500	31.75	49212	48212
	12	.1890	4.80	2.2500	57.15	1.1875	30.16	49382	48382
	11	.1910	4.85	2.2500	57.15	1.1875	30.16	49381	48381
	10	.1935	4.91	2.2500	57.15	1.1875	30.16	49380	48380
	9	.1960	4.98	2.2500	57.15	1.1875	30.16	49379	48379
	8	.1990	5.05	2.2500	57.15	1.1875	30.16	49378	48378
	7	.2010	5.11	2.2500	57.15	1.1875	30.16	49377	48377
13/64		.2031	5.16	2.2500	57.15	1.1875	30.16	49213	48213
	6	.2040	5.18	2.3750	60.33	1.2500	31.75	49376	48376
	5	.2055	5.22	2.3750	60.33	1.2500	31.75	49375	48375
	4	.2090	5.31	2.3750	60.33	1.2500	31.75	49374	48374
	3	.2130	5.41	2.3750	60.33	1.2500	31.75	49373	48373
7/32		.2188	5.56	2.3750	60.33	1.2500	31.75	49214	48214
	2	.2210	5.61	2.4375	61.91	1.3125	33.34	49372	48372
	1	.2280	5.79	2.4375	61.91	1.3125	33.34	49371	48371
	A	.2340	5.94	2.4375	61.91	1.3125	33.34	49233	48233
15/64		.2344	5.95	2.4375	61.91	1.3125	33.34	49215	48215
	B	.2380	6.05	2.5000	63.50	1.3750	34.93	49234	48234
	C	.2420	6.15	2.5000	63.50	1.3750	34.93	49235	48235
	D	.2460	6.25	2.5000	63.50	1.3750	34.93	49236	48236

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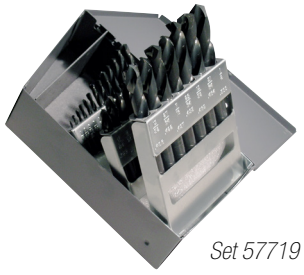
Drills - Screw Machine Length

Heavy-Duty (continued)
Style 159, 159-TN (2159)

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 159 Black Oxide	Style 159-TN TiN
1/4	E	.2500	6.35	2.5000	63.50	1.3750	34.93	49216	48216
	F	.2570	6.53	2.6250	66.68	1.4375	36.51	49237	48237
	G	.2610	6.63	2.6250	66.68	1.4375	36.51	49238	48238
17/64		.2656	6.75	2.6250	66.68	1.4375	36.51	49217	48217
	H	.2660	6.76	2.6875	68.26	1.5000	38.10	49239	48239
	I	.2720	6.91	2.6875	68.26	1.5000	38.10	49240	48240
	J	.2770	7.04	2.6875	68.26	1.5000	38.10	49241	48241
	K	.2812	7.14	2.6875	68.26	1.5000	38.10	49242	48242
9/32		.2812	7.14	2.6875	68.26	1.5000	38.10	49218	48218
	L	.2900	7.37	2.7500	69.85	1.5625	39.69	49243	48243
	M	.2950	7.49	2.7500	69.85	1.5625	39.69	49244	48244
19/64		.2969	7.54	2.7500	69.85	1.5625	39.69	49219	48219
	N	.3020	7.67	2.8125	71.44	1.6250	41.28	49245	48245
5/16		.3125	7.94	2.8125	71.44	1.6250	41.28	49220	48220
	O	.3160	8.03	2.9375	74.61	1.6875	42.86	49246	48246
	P	.3230	8.20	2.9375	74.61	1.6875	42.86	49247	48247
21/64		.3281	8.33	2.9375	74.61	1.6875	42.86	49221	48221
	Q	.3320	8.43	3.0000	76.20	1.6875	42.86	49248	48248
	R	.3390	8.61	3.0000	76.20	1.6875	42.86	49249	48249
11/32		.3438	8.73	3.0000	76.20	1.6875	42.86	49222	48222
	S	.3480	8.84	3.0625	77.79	1.7500	44.45	49250	48250
	T	.3580	9.09	3.0625	77.79	1.7500	44.45	49251	48251
23/64		.3594	9.13	3.0625	77.79	1.7500	44.45	49223	48223
	U	.3680	9.35	3.1250	79.38	1.8125	46.04	49252	48252
3/8		.3750	9.53	3.1250	79.38	1.8125	46.04	49224	48224
	V	.3770	9.58	3.2500	82.55	1.8750	47.63	49253	48253
	W	.3860	9.80	3.2500	82.55	1.8750	47.63	49254	48254
25/64		.3906	9.92	3.2500	82.55	1.8750	47.63	49225	48225
	X	.3970	10.08	3.3125	84.14	1.9375	49.21	49255	48255
	Y	.4040	10.26	3.3125	84.14	1.9375	49.21	49256	48256
13/32		.4062	10.32	3.3125	84.14	1.9375	49.21	49226	48226
	Z	.4130	10.49	3.3750	85.73	2.0000	50.80	49257	48257
27/64		.4219	10.72	3.3750	85.73	2.0000	50.80	49227	48227
7/16		.4375	11.11	3.4375	87.31	2.0625	52.39	49228	48228
29/64		.4531	11.51	3.5625	90.49	2.1250	53.98	49229	48229
15/32		.4688	11.91	3.6250	92.08	2.1250	53.98	49230	48230
31/64		.4844	12.30	3.6875	93.66	2.1875	55.56	49231	48231
1/2		.5000	12.70	3.7500	95.25	2.2500	57.15	49232	48232

INCH SETS
Sets in Metal Index Cases

Number of Tools	Size Range	Style 159 Black Oxide	Style 159-TN TiN
15	1/16 - 1/2 X 1/32	69889	—
21	1/16 - 3/8 X 1/64	69852	—
29	1/16 - 1/2 X 1/64	57719	54128
60	#1 - #60 wire gauge	69885	—



Set 57719

Cobalt Heavy-Duty
Style 559, 559-TN (2559), 559-TA

Features/Benefits:
- Heavy-duty geometry for drilling tougher materials by hand or machine.
- Shorter flute and overall length provide superior rigidity to minimize deflection when using heavy feed rates.
- Manufactured from premium cobalt high-speed steel.
- 135° P3 split point is self-centering for reduced thrust and easier penetration. Sizes under .0625" do not have split points.
- Straw and titanium nitride (TiN) finishes standard from stock; titanium aluminum nitride (TiAlN) is a non-stocked standard; alternate coatings available as stock modifications.

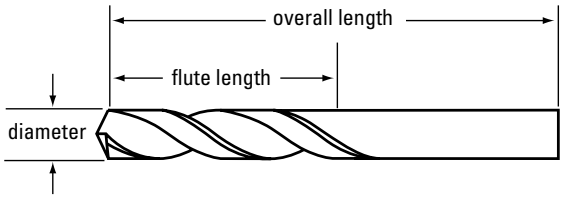
Application Information:
- tool steel (TiAlN, TiN, straw)
- alloy steel (TiAlN, straw)
- carbon steel (TiAlN, TiN, straw)
- cast iron (TiAlN, TiN, straw)

Surface Treatment Information:
- Straw finish allows for easy identification of cobalt tools.
- Titanium nitride (TiN) PVD coating adds lubricity and hardness which enhances chip flow, finish hole quality, and drill life.
- Titanium aluminum nitride (TiAlN) PVD coating combines the ability to work in high temperatures with added hardness to increase drill life.

Style 559 Straw Finish

Style 559-TN TiN-Coated

Style 559-TA TiAlN-Coated



INCH SIZES AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 559	Style 559-TN	Style 559-TA
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN	TiAlN
	60		.0400	1.02	1.3750	34.93	.5000	12.70	50915	—	—
	59		.0410	1.04	1.3750	34.93	.5000	12.70	50914	—	—
	58		.0420	1.07	1.3750	34.93	.5000	12.70	50913	—	—
	57		.0430	1.09	1.3750	34.93	.5000	12.70	50912	—	—
	56		.0465	1.18	1.3750	34.93	.5000	12.70	50911	—	—
		1.0	.0472		1.1811	30	.3150	8	49000	—	—
	55		.0520	1.32	1.6250	41.28	.6250	15.88	50910	—	—
	54		.0550	1.40	1.6250	41.28	.6250	15.88	50909	—	—
		1.5	.0591		1.2598	32	.3543	9	49001	—	—
	53		.0595	1.51	1.6250	41.28	.6250	15.88	50908	—	—
1/16			.0625	1.59	1.6250	41.28	.6250	15.88	50801	51801	52804
		1.6	.0630		1.3386	34	.3937	10	49002	—	—
	52		.0635	1.61	1.6875	42.86	.6875	17.46	50907	—	—
	51		.0670	1.70	1.6875	42.86	.6875	17.46	50906	—	—
	50		.0700	1.78	1.6875	42.86	.6875	17.46	50905	—	—
	49		.0730	1.85	1.6875	42.86	.6875	17.46	50904	—	—
	48		.0760	1.93	1.6875	42.86	.6875	17.46	50903	—	—
5/64			.0781	1.98	1.6875	42.86	.6875	17.46	50802	51802	52805
	47		.0785	1.99	1.7500	44.45	.7500	19.05	50902	—	—
		2	.0787		1.4961	38	.4724	12	49003	—	—
		2.05	.0807		1.4961	38	.4724	12	49004	—	—

Sizes smaller than .0625" do not have split points.

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Drills - Screw Machine Length

Cobalt Heavy-Duty (continued)
Style 559, 559-TN (2559), 559-TA

INCH SIZES AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 559	Style 559-TN	Style 559-TA
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN	TiAlN
	46		.0810	2.06	1.7500	44.45	.7500	19.05	50901	—	—
	45		.0820	2.08	1.7500	44.45	.7500	19.05	50900	—	—
	44		.0860	2.18	1.7500	44.45	.7500	19.05	50899	—	—
	43		.0890	2.26	1.7500	44.45	.7500	19.05	50898	—	—
	42		.0935	2.37	1.7500	44.45	.7500	19.05	50897	—	—
3/32			.0938	2.38	1.7500	44.45	.7500	19.05	50803	51803	52806
	41		.0960	2.44	1.8125	46.04	.8125	20.64	50896	—	—
	40		.0980	2.49	1.8125	46.04	.8125	20.64	50895	—	—
		2.5	.0984		1.6929	43	.5512	14	49005	—	—
	39		.0995	2.53	1.8125	46.04	.8125	20.64	50894	—	—
	38		.1015	2.58	1.8125	46.04	.8125	20.64	50893	—	—
		2.6	.1024	2.6	1.6929	43	.5512	14	49006	—	—
	37		.1040	2.64	1.8125	46.04	.8125	20.64	50892	—	—
	36		.1065	2.71	1.8125	46.04	.8125	20.64	50891	—	—
7/64			.1094	2.78	1.8125	46.04	.8125	20.64	50804	51804	52807
	35		.1100	2.79	1.8750	47.63	.8750	22.23	50890	—	—
	34		.1110	2.82	1.8750	47.63	.8750	22.23	50889	—	—
	33		.1130	2.87	1.8750	47.63	.8750	22.23	50888	—	—
	32		.1160	2.95	1.8750	47.63	.8750	22.23	50887	—	—
	31		.1200	3.05	1.8750	47.63	.8750	22.23	50886	—	—
1/8			.1250	3.18	1.8750	47.63	.8750	22.23	50805	51805	52808
	30		.1285	3.26	1.9375	49.21	.9375	23.81	50885	—	—
		3.3	.1299		1.9291	49	.7087	18	49007	—	—
	29		.1360	3.45	1.9375	49.21	.9375	23.81	50884	—	—
		3.5	.1378	3.5	2.0472	52	.7874	20	49008	—	—
	28		.1405	3.57	1.9375	49.21	.9375	23.81	50883	—	—
9/64			.1406	3.57	1.9375	49.21	.9375	23.81	50806	51806	52809
	27		.1440	3.66	2.0625	52.39	1.0000	25.40	50882	—	—
	26		.1470	3.73	2.0625	52.39	1.0000	25.40	50881	—	—
	25		.1495	3.80	2.0625	52.39	1.0000	25.40	50880	—	—
	24		.1520	3.86	2.0625	52.39	1.0000	25.40	50879	—	—
	23		.1540	3.91	2.0625	52.39	1.0000	25.40	50878	—	—
5/32			.1562	3.97	2.0625	52.39	1.0000	25.40	50807	51807	52810
	22		.1570	3.99	2.1250	53.98	1.0625	26.99	50877	—	—
		4	.1575		2.1654	55	.8661	22	49009	—	—
	21		.1590	4.04	2.1250	53.98	1.0625	26.99	50876	—	—
	20		.1610	4.09	2.1250	53.98	1.0625	26.99	50875	—	—
		4.2	.1654		2.1654	55	.8661	22	49010	—	—
	19		.1660	4.22	2.1250	53.98	1.0625	26.99	50874	—	—
	18		.1695	4.31	2.1250	53.98	1.0625	26.99	50873	—	—
11/64			.1719	4.37	2.1250	53.98	1.0625	26.99	50808	51808	52811
	17		.1730	4.39	2.1875	55.56	1.1250	31.75	50872	—	—
	16		.1770	4.50	2.1875	55.56	1.1250	31.75	50871	—	—
		4.5	.1772		2.2835	58	.9449	24	49011	—	—
	15		.1800	4.57	2.1875	55.56	1.1250	31.75	50870	—	—
	14		.1820	4.62	2.1875	55.56	1.1250	31.75	50869	—	—
	13		.1850	4.70	2.1875	55.56	1.1250	31.75	50868	—	—
3/16			.1875	4.76	2.1875	55.56	1.1250	31.75	50809	51809	52812
	12		.1890	4.80	2.2500	57.15	1.1875	30.16	50867	—	—
	11		.1910	4.85	2.2500	57.15	1.1875	30.16	50866	—	—
	10		.1935	4.91	2.2500	57.15	1.1875	30.16	50865	—	—

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Cobalt Heavy-Duty (continued)
Style 559, 559-TN (2559), 559-TA

INCH SIZES AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 559	Style 559-TN	Style 559-TA
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN	TiAlN
	9		.1960	4.98	2.2500	57.15	1.1875	30.16	50864	—	—
		5	.1969		2.4409	62	1.0236	26	49012	—	—
	8		.1990	5.05	2.2500	57.15	1.1875	30.16	50863	—	—
	7		.2010	5.11	2.2500	57.15	1.1875	30.16	50862	—	—
13/64			.2031	5.16	2.2500	57.15	1.1875	30.16	50810	51810	52813
	6		.2040	5.18	2.3750	60.33	1.2500	31.75	50861	—	—
	5		.2055	5.22	2.3750	60.33	1.2500	31.75	50860	—	—
	4		.2090	5.31	2.3750	60.33	1.2500	31.75	50859	—	—
	3		.2130	5.41	2.3750	60.33	1.2500	31.75	50858	—	—
		5.5	.2165		2.5984	66	1.1024	28	49013	—	—
7/32			.2188	5.56	2.3750	60.33	1.2500	31.75	50811	51811	52814
	2		.2210	5.61	2.4375	61.91	1.3125	33.34	50857	—	—
	1		.2280	5.79	2.4375	61.91	1.3125	33.34	50856	—	—
	A		.2340	5.94	2.4375	61.91	1.3125	33.34	50830	—	—
15/64			.2344	5.95	2.4375	61.91	1.3125	33.34	50812	51812	52815
		6	.2362		2.5984	66	1.1024	28	49014	—	—
	B		.2380	6.05	2.5000	63.50	1.3750	34.93	50831	—	—
	C		.2420	6.15	2.5000	63.50	1.3750	34.93	50832	—	—
	D		.2460	6.25	2.5000	63.50	1.3750	34.93	50833	—	—
1/4	E		.2500	6.35	2.5000	63.50	1.3750	34.93	50813	51813	52816
		6.4	.2520		2.7559	70	1.2205	31	49015	—	—
	F		.2570	6.53	2.6250	66.68	1.4375	36.51	50835	—	—
	G		.2610	6.63	2.6250	66.68	1.4375	36.51	50836	—	—
		6.7	.2638		2.9134	74	1.3386	34	49016	—	—
17/64			.2656	6.75	2.6250	66.68	1.4375	36.51	50814	51814	52817
	H		.2660	6.76	2.6875	68.26	1.5000	38.10	50837	—	—
	I		.2720	6.91	2.6875	68.26	1.5000	38.10	50838	—	—
		7	.2756		2.9134	74	1.3386	34	49017	—	—
	J		.2770	7.04	2.6875	68.26	1.5000	38.10	50839	—	—
	K		.2812	7.14	2.6875	68.26	1.5000	38.10	50840	—	—
9/32			.2812	7.14	2.6875	68.26	1.5000	38.10	50815	51815	52818
	L		.2900	7.37	2.7500	69.85	1.5625	39.69	50841	—	—
	M		.2950	7.49	2.7500	69.85	1.5625	39.69	50842	—	—
19/64			.2969	7.54	2.7500	69.85	1.5625	39.69	50816	51816	52819
	N		.3020	7.67	2.8125	71.44	1.6250	41.28	50843	—	—
5/16			.3125	7.94	2.8125	71.44	1.6250	41.28	50817	51817	52820
		8	.3150		3.1102	79	1.4567	37	49018	—	—
	O		.3160	8.03	2.9375	74.61	1.6875	42.86	50844	—	—
	P		.3230	8.20	2.9375	74.61	1.6875	42.86	50845	—	—
21/64			.3281	8.33	2.9375	74.61	1.6875	42.86	50818	51818	52821
	Q		.3320	8.43	3.0000	76.20	1.6875	42.86	50846	—	—
		8.5	.3346		3.1102	79	1.4567	37	49019	—	—
	R		.3390	8.61	3.0000	76.20	1.6875	42.86	50847	—	—
11/32			.3438	8.73	3.0000	76.20	1.6875	42.86	50819	51819	52822
	S		.3480	8.84	3.0625	77.79	1.7500	44.45	50848	—	—
		9	.3543		3.3071	84	1.5748	40	49020	—	—
	T		.3580	9.09	3.0625	77.79	1.7500	44.45	50849	—	—
23/64			.3594	9.13	3.0625	77.79	1.7500	44.45	50820	51820	52823
	U		.3680	9.35	3.1250	79.38	1.8125	46.04	50850	—	—
3/8			.3750	9.53	3.1250	79.38	1.8125	46.04	50821	51821	52824
	V		.3770	9.58	3.2500	82.55	1.8750	47.63	50851	—	—
	W		.3860	9.80	3.2500	82.55	1.8750	47.63	50852	—	—

continued on next page

Drills - Screw Machine Length

Cobalt Heavy-Duty (continued)
Style 559, 559-TN (2559), 559-TA

INCH SIZES AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 559	Style 559-TN	Style 559-TA
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw	TiN	TiAlN
25/64			.3906	9.92	3.2500	82.55	1.8750	47.63	50822	51822	52825
		10	.3937		3.5039	89	1.6929	43	49021	—	—
	X		.3970	10.08	3.3125	84.14	1.9375	49.21	50853	—	—
		10.2	.4016		3.5039	89	1.6929	43	49022	—	—
	Y		.4040	10.26	3.3125	84.14	1.9375	49.21	50854	—	—
13/32			.4062	10.32	3.3125	84.14	1.9375	49.21	50823	51823	52826
	Z		.4130	10.49	3.3750	85.73	2.0000	50.80	50855	—	—
27/64			.4219	10.72	3.3750	85.73	2.0000	50.80	50824	51824	52827
		11	.4331		3.7402	95	1.8504	47	49023	—	—
7/16			.4375	11.11	3.4375	87.31	2.0625	52.39	50825	51825	52828
29/64			.4531	11.51	3.5625	90.49	2.1250	53.98	50826	51826	52829
15/32			.4688	11.91	3.6250	92.08	2.1250	53.98	50827	51827	52830
		12	.4724		4.0157	102	2.0079	51	49024	—	—
31/64			.4844	12.30	3.6875	93.66	2.1875	55.56	50828	51828	52831
1/2			.5000	12.70	3.7500	95.25	2.2500	57.15	50829	51829	52832
		13	.5118		4.0157	102	2.0079	51	49025	—	—

INCH SETS

Sets in Metal Index Cases

Number of Tools	Size Range	Style 559 Straw
15	1/16 - 1/2 X 1/32	69856
29	1/16 - 1/2 X 1/64	69853
26	Letter A - Z	69855
60	#1 - #60 wire gauge	69854

Set 69855

TECH TIP

DRILL POINT ANGLES

118° point angles are used primarily in softer materials such as mild steels and cast irons. The advantages of a 118° point in these materials include control over chips, which are wide and thin.

135° split points should be engaged to cut harder steel materials, especially in deep holes over 4 times drill diameter. A 135° point cutting harder materials will produce narrower chips.

The length of the lips on a 135° point measured from the axis to the outer corners is relativity short and thus penetrates much quicker into the work piece reducing thrust and abrasion along the cutting edges.

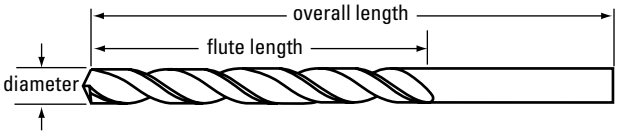
If re-pointing a standard 118° point to 135° you must make a lip correction to reduce the hook of the cutting face. In drills, the cutting rake angles are generated by the flute shape. Reducing the hook adjusts the rake cutting angles for a 135° point.

General Purpose
Style 120

Features/Benefits:
- General-purpose geometry for drilling in a wide range of operating conditions and materials.
- Taper length provides longer overall length and flute length for deeper drilling.
- Peck cycles may be appropriate for deep-hole drilling.
- Manufactured from premium high-speed steel.
- 118° point.
- Black oxide standard from stock; bright drills and alternate coatings available as stock modifications.

Application Information:
- carbon steel
- alloy steel
- cast iron

Surface Treatment Information:
- Black oxide finish provides increased wear resistance and added lubricity



INCH SIZES

Drill Diameter				Overall Length		Flute Length		**Style 120**
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Black Oxide
	80	.0135	0.34	1.5000	38.10	.3125	7.94	50370
	79	.0145	0.37	1.5000	38.10	.3125	7.94	50369
1/64		.0156	0.40	1.5000	38.10	.3125	7.94	49701
	78	.0160	0.41	1.5000	38.10	.3125	7.94	50368
	77	.0180	0.46	1.5000	38.10	.3125	7.94	50367
	76	.0200	0.51	1.5000	38.10	.3125	7.94	50366
	75	.0210	0.53	1.5000	38.10	.3125	7.94	50365
	74	.0225	0.57	1.5000	38.10	.3125	7.94	50364
	73	.0240	0.61	1.5000	38.10	.3125	7.94	50363
	72	.0250	0.64	1.5000	38.10	.3125	7.94	50362
	71	.0260	0.66	2.0000	50.80	.7500	19.05	50361
	70	.0280	0.71	2.0000	50.80	.7500	19.05	50360
	69	.0292	0.74	2.0000	50.80	.7500	19.05	50359
	68	.0310	0.79	2.0000	50.80	.7500	19.05	50358
1/32		.0312	0.79	2.0000	50.80	.7500	19.05	49702
	67	.0320	0.81	2.0000	50.80	.7500	19.05	50357
	66	.0330	0.84	2.0000	50.80	.7500	19.05	50356
	65	.0350	0.89	2.0000	50.80	.7500	19.05	50355
	64	.0360	0.91	2.0000	50.80	.7500	19.05	50354
	63	.0370	0.94	2.0000	50.80	.7500	19.05	50353
	62	.0380	0.97	2.0000	50.80	.7500	19.05	50352
	61	.0390	0.99	2.2500	57.15	1.1250	28.58	50351
	60	.0400	1.02	2.2500	57.15	1.1250	28.58	50350
	59	.0410	1.04	2.2500	57.15	1.1250	28.58	50349
	58	.0420	1.07	2.2500	57.15	1.1250	28.58	50348

continued on next page

Drills - Taper Length

General Purpose (continued)
Style 120

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 120
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Black Oxide
	57	.0430	1.09	2.2500	57.15	1.1250	28.58	50347
	56	.0465	1.18	2.2500	57.15	1.1250	28.58	50346
3/64		.0469	1.19	2.2500	57.15	1.1250	28.58	49703
	55	.0520	1.32	3.0000	76.20	1.7500	44.45	50345
	54	.0550	1.40	3.0000	76.20	1.7500	44.45	50344
	53	.0595	1.51	3.0000	76.20	1.7500	44.45	50343
1/16		.0625	1.59	3.0000	76.20	1.7500	44.45	49704
	52	.0635	1.61	3.7500	95.25	2.0000	50.80	50342
	51	.0670	1.70	3.7500	95.25	2.0000	50.80	50341
	50	.0700	1.78	3.7500	95.25	2.0000	50.80	50340
	49	.0730	1.85	3.7500	95.25	2.0000	50.80	50339
	48	.0760	1.93	3.7500	95.25	2.0000	50.80	50338
5/64		.0781	1.98	3.7500	95.25	2.0000	50.80	49705
	47	.0785	1.99	4.2500	107.95	2.2500	57.15	50337
	46	.0810	2.06	4.2500	107.95	2.2500	57.15	50336
	45	.0820	2.08	4.2500	107.95	2.2500	57.15	50335
	44	.0860	2.18	4.2500	107.95	2.2500	57.15	50334
	43	.0890	2.26	4.2500	107.95	2.2500	57.15	50333
	42	.0935	2.37	4.2500	107.95	2.2500	57.15	50332
3/32		.0938	2.38	4.2500	107.95	2.2500	57.15	49706
	41	.0960	2.44	4.6250	117.48	2.5000	63.50	50331
	40	.0980	2.49	4.6250	117.48	2.5000	63.50	50330
	39	.0995	2.53	4.6250	117.48	2.5000	63.50	50329
	38	.1015	2.58	4.6250	117.48	2.5000	63.50	50328
	37	.1040	2.64	4.6250	117.48	2.5000	63.50	50327
	36	.1065	2.71	4.6250	117.48	2.5000	63.50	50326
7/64		.1094	2.78	4.6250	117.48	2.5000	63.50	49707
	35	.1100	2.79	5.1250	130.18	2.7500	69.85	50325
	34	.1110	2.82	5.1250	130.18	2.7500	69.85	50324
	33	.1130	2.87	5.1250	130.18	2.7500	69.85	50323
	32	.1160	2.95	5.1250	130.18	2.7500	69.85	50322
	31	.1200	3.05	5.1250	130.18	2.7500	69.85	50321
1/8		.1250	3.18	5.1250	130.18	2.7500	69.85	49708
	30	.1285	3.26	5.3750	136.53	3.0000	76.20	50320
	29	.1360	3.45	5.3750	136.53	3.0000	76.20	50319
	28	.1405	3.57	5.3750	136.53	3.0000	76.20	50318
9/64		.1406	3.57	5.3750	136.53	3.0000	76.20	49709
	27	.1440	3.66	5.3750	136.53	3.0000	76.20	50317
	26	.1470	3.73	5.3750	136.53	3.0000	76.20	50316
	25	.1495	3.80	5.3750	136.53	3.0000	76.20	50315
	24	.1520	3.86	5.3750	136.53	3.0000	76.20	50314
	23	.1540	3.91	5.3750	136.53	3.0000	76.20	50313
5/32		.1562	3.97	5.3750	136.53	3.0000	76.20	49710
	22	.1570	3.99	5.7500	146.05	3.3750	85.73	50312
	21	.1590	4.04	5.7500	146.05	3.3750	85.73	50311
	20	.1610	4.09	5.7500	146.05	3.3750	85.73	50310
	19	.1660	4.22	5.7500	146.05	3.3750	85.73	50309
	18	.1695	4.31	5.7500	146.05	3.3750	85.73	50308
11/64		.1719	4.37	5.7500	146.05	3.3750	85.73	49711
	17	.1730	4.39	5.7500	146.05	3.3750	85.73	50307
	16	.1770	4.50	5.7500	146.05	3.3750	85.73	50306
	15	.1800	4.57	5.7500	146.05	3.3750	85.73	50305

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General Purpose (continued)
Style 120

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 120
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Black Oxide
	14	.1820	4.62	5.7500	146.05	3.3750	85.73	50304
	13	.1850	4.70	5.7500	146.05	3.3750	85.73	50303
3/16		.1875	4.76	5.7500	146.05	3.3750	85.73	49712
	12	.1890	4.80	6.0000	152.40	3.6250	92.08	50302
	11	.1910	4.85	6.0000	152.40	3.6250	92.08	50301
	10	.1935	4.91	6.0000	152.40	3.6250	92.08	50300
	9	.1960	4.98	6.0000	152.40	3.6250	92.08	50299
	8	.1990	5.05	6.0000	152.40	3.6250	92.08	50298
	7	.2010	5.11	6.0000	152.40	3.6250	92.08	50297
13/64		.2031	5.16	6.0000	152.40	3.6250	92.08	49713
	6	.2040	5.18	6.0000	152.40	3.6250	92.08	50296
	5	.2055	5.22	6.0000	152.40	3.6250	92.08	50295
	4	.2090	5.31	6.0000	152.40	3.6250	92.08	50294
	3	.2130	5.41	6.0000	152.40	3.6250	92.08	50293
7/32		.2188	5.56	6.0000	152.40	3.6250	92.08	49714
	2	.2210	5.61	6.1250	155.58	3.7500	95.25	50292
	1	.2280	5.79	6.1250	155.58	3.7500	95.25	50291
	A	.2340	5.94	6.1250	155.58	3.7500	95.25	50401
15/64		.2344	5.95	6.1250	155.58	3.7500	95.25	49715
	B	.2380	6.05	6.1250	155.58	3.7500	95.25	50402
	C	.2420	6.15	6.1250	155.58	3.7500	95.25	50403
	D	.2460	6.25	6.1250	155.58	3.7500	95.25	50404
1/4	E	.2500	6.35	6.1250	155.58	3.7500	95.25	49716
	F	.2570	6.53	6.1250	155.58	3.7500	95.25	50406
	G	.2610	6.63	6.1250	155.58	3.7500	95.25	50407
17/64		.2656	6.75	6.2500	158.75	3.8750	98.43	49717
	H	.2660	6.76	6.2500	158.75	3.8750	98.43	50408
	I	.2720	6.91	6.2500	158.75	3.8750	98.43	50409
	J	.2770	7.04	6.2500	158.75	3.8750	98.43	50410
	K	.2812	7.14	6.2500	158.75	3.8750	98.43	50411
9/32		.2812	7.14	6.2500	158.75	3.8750	98.43	49718
	L	.2900	7.37	6.2500	158.75	3.8750	98.43	50412
	M	.2950	7.49	6.3750	161.93	4.0000	101.60	50413
19/64		.2969	7.54	6.3750	161.93	4.0000	101.60	49719
	N	.3020	7.67	6.3750	161.93	4.0000	101.60	50414
5/16		.3125	7.94	6.3750	161.93	4.0000	101.60	49720
	O	.3160	8.03	6.3750	161.93	4.0000	101.60	50415
	P	.3230	8.20	6.3750	161.93	4.0000	101.60	50416
21/64		.3281	8.33	6.5000	165.10	4.1250	104.78	49721
	Q	.3320	8.43	6.5000	165.10	4.1250	104.78	50417
	R	.3390	8.61	6.5000	165.10	4.1250	104.78	50418
11/32		.3438	8.73	6.5000	165.10	4.1250	104.78	49722
	S	.3480	8.84	6.7500	171.45	4.2500	107.95	50419
	T	.3580	9.09	6.7500	171.45	4.2500	107.95	50420
23/64		.3594	9.13	6.7500	171.45	4.2500	107.95	49723
	U	.3680	9.35	6.7500	171.45	4.2500	107.95	50421
3/8		.3750	9.53	6.7500	171.45	4.2500	107.95	49724
	V	.3770	9.58	6.7500	171.45	4.2500	107.95	50422
	W	.3860	9.80	6.7500	171.45	4.2500	107.95	50423
25/64		.3906	9.92	7.0000	177.80	4.3750	111.13	49725
	X	.3970	10.08	7.0000	177.80	4.3750	111.13	50424
	Y	.4040	10.26	7.0000	177.80	4.3750	111.13	50425

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Drills - Taper Length

General Purpose (continued)
Style 120

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 120
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Black Oxide
13/32		.4062	10.32	7.0000	177.80	4.3750	111.13	49726
	Z	.4130	10.49	7.2500	184.15	4.6250	117.48	50426
27/64		.4219	10.72	7.2500	184.15	4.6250	117.48	49727
7/16		.4375	11.11	7.2500	184.15	4.6250	117.48	49728
29/64		.4531	11.51	7.5000	190.50	4.7500	120.65	49729
15/32		.4688	11.91	7.5000	190.50	4.7500	120.65	49730
31/64		.4844	12.30	7.7500	196.85	4.7500	120.65	49731
1/2		.5000	12.70	7.7500	196.85	4.7500	120.65	49732
33/64		.5156	13.10	8.0000	203.20	4.7500	120.65	49733
17/32		.5312	13.49	8.0000	203.20	4.7500	120.65	49734
35/64		.5469	13.89	8.2500	209.55	4.8750	123.83	49735
9/16		.5625	14.29	8.2500	209.55	4.8750	123.83	49736
37/64		.5781	14.68	8.7500	222.25	4.8750	123.83	49737
19/32		.5938	15.08	8.7500	222.25	4.8750	123.83	49738
39/64		.6094	15.48	8.7500	222.25	4.8750	123.83	49739
5/8		.6250	15.88	8.7500	222.25	4.8750	123.83	49740
41/64		.6406	16.27	9.0000	228.60	5.1250	130.18	49741
21/32		.6562	16.67	9.0000	228.60	5.1250	130.18	49742
43/64		.6719	17.07	9.2500	234.95	5.3750	136.53	49743
11/16		.6875	17.46	9.2500	234.95	5.3750	136.53	49744
45/64		.7031	17.86	9.5000	241.30	5.6250	142.88	49745
23/32		.7188	18.26	9.5000	241.30	5.6250	142.88	49746
47/64		.7344	18.65	9.7500	247.65	5.8750	149.23	49747
3/4		.7500	19.05	9.7500	247.65	5.8750	149.23	49748
49/64		.7656	19.45	9.8750	250.83	6.0000	152.40	49749
25/32		.7812	19.84	9.8750	250.83	6.0000	152.40	49750
51/64		.7969	20.24	10.0000	254.00	6.1250	155.58	49751
13/16		.8125	20.64	10.0000	254.00	6.1250	155.58	49752
53/64		.8281	21.03	10.0000	254.00	6.1250	155.58	49753
27/32		.8438	21.43	10.0000	254.00	6.1250	155.58	49754
55/64		.8594	21.83	10.0000	254.00	6.1250	155.58	49755
7/8		.8750	22.23	10.0000	254.00	6.1250	155.58	49756
57/64		.8906	22.62	10.0000	254.00	6.1250	155.58	49757
29/32		.9062	23.02	10.0000	254.00	6.1250	155.58	49758
59/64		.9219	23.42	10.7500	273.05	6.1250	155.58	49759
15/16		.9375	23.81	10.7500	273.05	6.1250	155.58	49760
61/64		.9531	24.21	11.0000	279.40	6.3750	161.93	49761
31/32		.9688	24.61	11.0000	279.40	6.3750	161.93	49762
63/64		.9844	25.00	11.0000	279.40	6.3750	161.93	49763
1		1.0000	25.40	11.0000	279.40	6.3750	161.93	49764

INCH SETS

Sets in Metal Index Cases

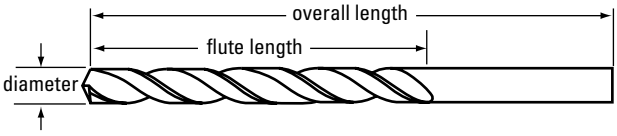
Number of Tools	Size Range	Style 120 Black Oxide
15	1/16 - 1/2 X 1/32	69884
29	1/16 - 1/2 X 1/64	69864
60	#1 - #60 wire gauge	69865

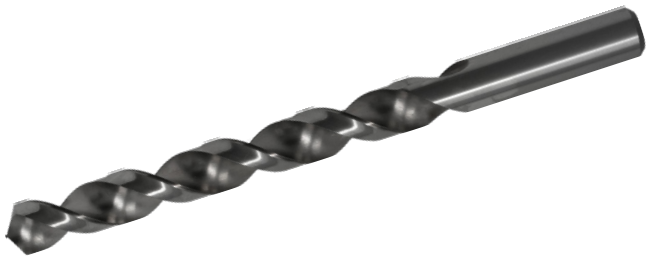
Set 69884

Fast Spiral
Style 120B

Features/Benefits:
- Fast helix and wide flutes provide excellent chip ejection.
- Taper length provides longer overall length and flute length for deeper drilling.
- Peck cycles may be appropriate for deep-hole drilling.
- Manufactured from premium high-speed steel.
- 118° point.
- Bright finish standard from stock; alternate coatings available as stock modifications.

Application Information:
- carbon steel
- alloy steel
- non-ferrous materials including aluminum, copper, and plastics





INCH SIZES

Drill Diameter Fraction	Wire/Let	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 120B Bright
	57	.0430	1.09	2.2500	57.15	1.1250	28.58	** 50267
3/64		.0469	1.19	2.2500	57.15	1.1250	28.58	** 50103
	55	.0520	1.32	3.0000	76.20	1.7500	44.45	** 50265
	53	.0595	1.51	3.0000	76.20	1.7500	44.45	** 50263
	50	.0700	1.78	3.7500	95.25	2.0000	50.80	** 50260
	49	.0730	1.85	3.7500	95.25	2.0000	50.80	** 50259
5/64		.0781	1.98	3.7500	95.25	2.0000	50.80	** 50105
	47	.0785	1.99	4.2500	107.95	2.2500	57.15	** 50257
	46	.0810	2.06	4.2500	107.95	2.2500	57.15	** 50256
	45	.0820	2.08	4.2500	107.95	2.2500	57.15	** 50255
	41	.0960	2.44	4.6250	117.48	2.5000	63.50	** 50251
	40	.0980	2.49	4.6250	117.48	2.5000	63.50	** 50250
	39	.0995	2.53	4.6250	117.48	2.5000	63.50	** 50249
	38	.1015	2.58	4.6250	117.48	2.5000	63.50	** 50248
	37	.1040	2.64	4.6250	117.48	2.5000	63.50	** 50247
	36	.1065	2.71	4.6250	117.48	2.5000	63.50	** 50246
	33	.1130	2.87	5.1250	130.18	2.7500	69.85	** 50243
	32	.1160	2.95	5.1250	130.18	2.7500	69.85	** 50242
	31	.1200	3.05	5.1250	130.18	2.7500	69.85	** 50241
1/8		.1250	3.18	5.1250	130.18	2.7500	69.85	** 50108
	29	.1360	3.45	5.3750	136.53	3.0000	76.20	** 50239
9/64		.1406	3.57	5.3750	136.53	3.0000	76.20	** 50109
	27	.1440	3.66	5.3750	136.53	3.0000	76.20	** 50237
	26	.1470	3.73	5.3750	136.53	3.0000	76.20	** 50236
	20	.1610	4.09	5.7500	146.05	3.3750	85.73	** 50230
11/64		.1719	4.37	5.7500	146.05	3.3750	85.73	** 50111
	15	.1800	4.57	5.7500	146.05	3.3750	85.73	** 50225
	8	.1990	5.05	6.0000	152.40	3.6250	92.08	** 50218

** Only available until inventory is depleted.

continued on next page

Drills - Taper Length

Fast Spiral (continued)
Style 120B

INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 120B
Fraction	Wire/Let	Decimal	mm	Inch	mm	Inch	mm	Bright
	7	.2010	5.11	6.0000	152.40	3.6250	92.08	** 50217
13/64		.2031	5.16	6.0000	152.40	3.6250	92.08	** 50113
7/32		.2188	5.56	6.0000	152.40	3.6250	92.08	** 50114
	1	.2280	5.79	6.1250	155.58	3.7500	95.25	** 50211
15/64		.2344	5.95	6.1250	155.58	3.7500	95.25	** 50115
5/16		.3125	7.94	6.3750	161.93	4.0000	101.60	** 50120
3/8		.3750	9.53	6.7500	171.45	4.2500	107.95	** 50124
7/16		.4375	11.11	7.2500	184.15	4.6250	117.48	** 50128

** Only available until inventory is depleted.

TECH TIP

Peck Feeding

Drilling of holes 2 to 3 diameters deep can usually be accomplished with one step. When the need arises to drill 4, 5, or more diameters deep, it becomes much more difficult to evacuate chips, especially with non-coolant hole drills. The deeper the hole, the greater the tendency of the chips to becomes jammed in the flutes preventing coolant from reaching the drill tip. This buildup of heat at the drill tip will eventually result in premature failure.

This problem can be overcome by introducing a peck cycle. In a peck cycle, the entire drill is periodically withdrawn from the hole to remove chips, and then re-inserted in the hole to drill a small distance and withdrawn drill again until the full hole depth is reached. The first 2 diameters can usually be drilled before initiating a peck drilling cycle. Obviously, peck feeding would not be very efficient for any kind of production work.

The use of coolant hole drills and high-pressure coolant systems will in most cases eliminate the need for peck drilling. Special purpose drills, including parabolic flute forms can also be used to drill deeper holes without peck drilling.

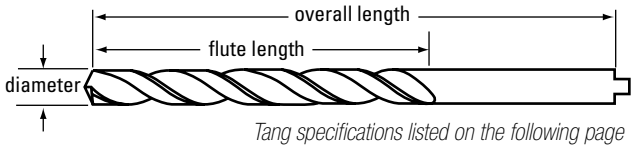
Automotive Tanged Shank
Style 255AN

Features/Benefits:
- General-purpose geometry conforming to automotive industry standards.
- Tanged shank for use with positive split sleeve drivers.
- Taper length provides longer overall length and flute length for deeper drilling
- Manufactured from premium high-speed steel.
- 118° point.
- Black oxide finish standard from stock excpt sizes over 1/2" are non-stock standards.

Application Information:
- carbon steel
- alloy steel
- cast iron

Surface Treatment Information:
- Black oxide surface treatment increases wear resistance and improves chip flow.

Tang specifications listed on page 73.



Tang specifications listed on the following page

INCH SIZES

Drill Diameter			Overall Length		Flute Length		**Style 255AN**
Fraction	Decimal	mm	Inch	mm	Inch	mm	Black Oxide
1/8	.1250	3.18	5.1250	130.18	2.7500	69.85	49508
9/64	.1406	3.57	5.3750	136.53	3.0000	76.20	49509
5/32	.1562	3.97	5.3750	136.53	3.0000	76.20	49510
11/64	.1719	4.37	5.7500	146.05	3.3750	85.73	49511
3/16	.1875	4.76	5.7500	146.05	3.3750	85.73	49512
13/64	.2031	5.16	6.0000	152.40	3.6250	92.08	49513
7/32	.2188	5.56	6.0000	152.40	3.6250	92.08	49514
15/64	.2344	5.95	6.1250	155.58	3.7500	95.25	49515
1/4	.2500	6.35	6.1250	155.58	3.7500	95.25	49516
17/64	.2656	6.75	6.2500	158.75	3.8750	98.43	49517
9/32	.2812	7.14	6.2500	158.75	3.8750	98.43	49518
19/64	.2969	7.54	6.3750	161.93	4.0000	101.60	49519
5/16	.3125	7.94	6.3750	161.93	4.0000	101.60	49520
21/64	.3281	8.33	6.5000	165.10	4.1250	104.78	49521
11/32	.3438	8.73	6.5000	165.10	4.1250	104.78	49522
23/64	.3594	9.13	6.7500	171.45	4.2500	107.95	49523
3/8	.3750	9.53	6.7500	171.45	4.2500	107.95	49524
25/64	.3906	9.92	7.0000	177.80	4.3750	111.13	49525
13/32	.4062	10.32	7.0000	177.80	4.3750	111.13	49526
27/64	.4219	10.72	z7.2500	184.15	4.6250	117.48	49527
7/16	.4375	11.11	7.2500	184.15	4.6250	117.48	49528
29/64	.4531	11.51	7.5000	190.50	4.7500	120.65	49529
15/32	.4688	11.91	7.5000	190.50	4.7500	120.65	49530
31/64	.4844	12.30	7.7500	196.85	4.7500	120.65	49531
1/2	.5000	12.70	7.7500	196.85	4.7500	120.65	49532

continued on next page

Drills - Taper Length

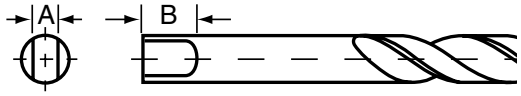
Automotive Tanged Shank (continued)
Style 255AN

INCH SIZES

Drill Diameter Fraction	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 255AN Black Oxide
33/64	.5156	13.10	8.0000	203.20	4.7500	120.65	49533
17/32	.5312	13.49	8.0000	203.20	4.7500	120.65	49534
35/64	.5469	13.89	8.2500	209.55	4.8750	123.83	49535
9/16	.5625	14.29	8.2500	209.55	4.8750	123.83	49536
37/64	.5781	14.68	8.7500	222.25	4.8750	123.83	49537
19/32	.5938	15.08	8.7500	222.25	4.8750	123.83	49538
39/64	.6094	15.48	8.7500	222.25	4.8750	123.83	49539
5/8	.6250	15.88	8.7500	222.25	4.8750	123.83	49540
21/32	.6562	16.67	9.0000	228.60	5.1250	130.18	49542
43/64	.6719	17.07	9.2500	234.95	5.3750	136.53	49543
11/16	.6875	17.46	9.2500	234.95	5.3750	136.53	49544

**Sizes over 1/2" are non-stock standards.*

Tang Specifications



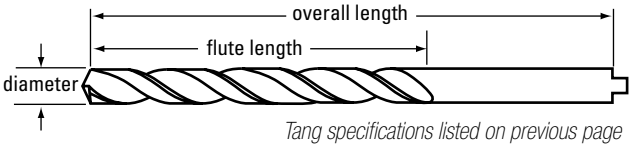
Shank Diameter (inches)	Tang Dimensions (inches) Width (A)	Length (B)
1/8 through 3/16	.092	9/32
Over 3/16 through 1/4	.120	5/16
Over 1/4 through 5/16	.160	11/32
Over 5/16 through 3/8	.201	3/8
Over 3/8 through 15/32	.241	7/16
Over 15/32 through 9/16	.300	1/2
Over 9/16 through 21/32	.370	9/16
Over 21/32 through 3/4	.440	5/8
Over 3/4 through 7/8	.511	11/16
Over 7/8 through 1	.605	3/4
Over 1 through 1-3/16	.696	13/16
Over 1-3/16 through 1-3/8	.813	7/8

Heavy-Duty Long Flute
Style 120F

Features/Benefits:
- Heavy-duty geometry conforms to automotive industry standards.
- 20% longer flutes offer more regrinds and deeper holes than conventional taper length drills.
- Taper length provides longer overall length for deeper drilling.
- Reduced 1/2" shank on drills over 1/2" diameter for use in 1/2" drill chucks.
- Tanged shanks for use with split-sleeve drivers.
- Manufactured from premium high-speed steel.
- 118° K-notch point.
- Black oxide finish standard from stock.

Application Information:
- carbon steel
- alloy steel
- tool steel
- cast iron
- Recommended for drilling steel forgings, castings, and tough alloy steels.
- Recommended for use with bushings.

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity to improve chip flow.



Tang specifications listed on previous page

INCH SIZES

Drill Diameter Fraction	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 120F** Black Oxide
9/64	.1406	3.57	5.3750	136.53	3.6250	92.08	** 49609
5/32	.1562	3.97	5.3750	136.53	3.7500	95.25	** 49610
3/16	.1875	4.76	5.7500	146.05	4.1250	104.78	** 49612
13/64	.2031	5.16	6.0000	152.40	4.3750	111.13	** 49613
15/64	.2344	5.95	6.1250	155.58	4.8125	122.24	** 49615
1/4	.2500	6.35	6.1250	155.58	4.8125	122.24	** 49616
9/32	.2812	7.14	6.2500	158.75	5.0000	127.00	** 49618
5/16	.3125	7.94	6.3750	161.93	5.1250	130.18	** 49620
11/32	.3438	8.73	6.5000	165.10	5.2500	133.35	** 49622
3/8	.3750	9.53	6.7500	171.45	5.3750	136.53	** 49624
13/32	.4062	10.32	7.0000	177.80	5.6250	142.88	** 49626
7/16	.4375	11.11	7.2500	184.15	5.6875	144.46	** 49628
15/32	.4688	11.91	7.5000	190.50	5.7500	146.05	** 49630
33/64	.5156	13.10	8.0000	203.20	6.0000	152.40	** 49633

Size 33/64 has 1/2" reduced shank.

** Only available until inventory is depleted.

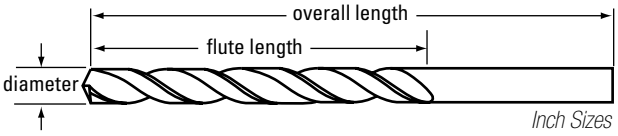
Drills - Taper Length

Cobalt Heavy-Duty
Style 520

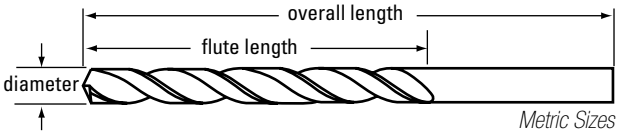
Features/Benefits:
- Heavy-duty geometry for drilling in tough, high-tensile, and work-hardening materials under extreme operating conditions.
- Manufactured from premium cobalt high-speed steel for increased red hardness.
- 135° split point is self-centering for reduced thrust and easier penetration. Sizes smaller than .0625" do not have split point.
- Straw finish standard from stock; alternate coatings available as stock modifications.

Application Information:
- high-tensile steels
- titanium
- manganese steel
- armour plate
- inconel
- cast iron

Surface Treatment Information:
- Straw finish easily identifies cobalt tooling.



Inch Sizes



Metric Sizes

INCH AND METRIC SIZES

Drill Diameter Fraction	Wire/Let	Metric	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 520** Straw
		1.00	.0394		2.2047	56.00	1.2992	33.00	** 45050
		1.20	.0472		2.5591	65.00	1.6142	41.00	** 45052
		1.50	.0591		2.7559	70.00	1.7717	45.00	** 45055
1/16			.0625	1.59	3.0000	76.20	1.7500	44.45	44804
		1.60	.0630		2.9921	76.00	1.9685	50.00	** 45056
		1.70	.0669		2.9921	76.00	1.9685	50.00	** 45057
		1.80	.0709		3.1496	80.00	2.0866	53.00	**45058
5/64			.0781	1.98	3.7500	95.25	2.0000	50.80	44805
		2.00	.0787		3.3465	85.00	2.2047	56.00	** 45060
3/32			.0938	2.38	4.2500	107.95	2.2500	57.15	44807
	40		.0980	2.49	4.6250	117.48	2.5000	63.50	44890
	38		.1015	2.58	4.6250	117.48	2.5000	63.50	44888
	37		.1040	2.64	4.6250	117.48	2.5000	63.50	44887
	36		.1065	2.71	4.6250	117.48	2.5000	63.50	44886
7/64			.1094	2.78	4.6250	117.48	2.5000	63.50	44806
	33		.1130	2.87	5.1250	130.18	2.7500	69.85	44883
		3.00	.1181		3.9370	100.00	2.5984	66.00	** 45070
1/8			.1250	3.18	5.1250	130.18	2.7500	69.85	44808
		3.20	.1260		4.1732	106.00	2.7165	69.00	** 45072
	30		.1285	3.26	5.3750	136.53	3.0000	76.20	44880
	29		.1360	3.45	5.3750	136.53	3.0000	76.20	44879
		3.50	.1378		4.4094	112.00	2.8740	73.00	** 45075

Sizes smaller than .0625 do not have split point.

** Only available until inventory is depleted.

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Cobalt Heavy-Duty (continued)
Style 520

INCH AND METRIC SIZES

Drill Diameter					Overall Length		Flute Length		Style 520
Fraction	Wire/Let	Metric	Decimal	mm	Inch	mm	Inch	mm	Straw
9/64			.1406	3.57	5.3750	136.53	3.0000	76.20	44809
		3.60	.1417		4.4094	112.00	2.8740	73.00	** 45076
	27		.1440	3.66	5.3750	136.53	3.0000	76.20	44877
	26		.1470	3.73	5.3750	136.53	3.0000	76.20	44876
5/32			.1562	3.97	5.3750	136.53	3.0000	76.20	44810
	21		.1590	4.04	5.7500	146.05	3.3750	85.73	44871
	20		.1610	4.09	5.7500	146.05	3.3750	85.73	44870
		4.10	.1614		4.6850	119.00	3.0709	78.00	** 45081
		4.20	.1654		4.6850	119.00	3.0709	78.00	** 45082
11/64			.1719	4.37	5.7500	146.05	3.3750	85.73	44811
		4.40	.1732		4.9606	126.00	3.2283	82.00	** 45084
	16		.1770	4.50	5.7500	146.05	3.3750	85.73	44866
		4.50	.1772		4.9606	126.00	3.2283	82.00	** 45085
	15		.1800	4.57	5.7500	146.05	3.3750	85.73	44865
3/16			.1875	4.76	5.7500	146.05	3.3750	85.73	44812
		4.80	.1890		5.1968	132.00	2.2441	57.00	** 45088
	7		.2010	5.11	6.0000	152.40	3.6250	92.08	44857
13/64			.2031	5.16	6.0000	152.40	3.6250	92.08	44813
		5.30	.2087		5.1968	132.00	3.4252	87.00	** 45093
	3		.2130	5.41	6.0000	152.40	3.6250	92.08	44853
		5.50	.2165		5.4724	139.00	3.5827	91.00	** 45095
7/32			.2188	5.56	6.0000	152.40	3.6250	92.08	44814
	1		.2280	5.79	6.1250	155.58	3.7500	95.25	44851
15/64			.2344	5.95	6.1250	155.58	3.7500	95.25	44815
1/4	E		.2500	6.35	6.1250	155.58	3.7500	95.25	44816
17/64			.2656	6.75	6.2500	158.75	3.8750	98.43	44817
		6.80	.2677		6.1417	156.00	4.0157	102.00	** 45108
	J	7.04	.2770		6.2500	158.75	3.8750	98.43	45155
		7.00	.2756		6.1417	156.00	4.0157	102.00	** 45110
9/32			.2812	7.14	6.2500	158.75	3.8750	98.43	44818
		7.50	.2953		6.1417	156.00	4.0157	102.00	** 45115
19/64			.2969	7.54	6.3750	161.93	4.0000	101.60	44819
5/16			.3125	7.94	6.3750	161.93	4.0000	101.60	44820
		8.00	.3150		6.4961	165.00	4.2913	109.00	** 45120
21/64			.3281	8.33	6.5000	165.10	4.1250	104.78	44821
		8.50	.3346		6.4961	165.00	4.2913	109.00	** 45125
11/32			.3438	8.73	6.5000	165.10	4.1250	104.78	44822
23/64			.3594	9.13	6.7500	171.45	4.2500	107.95	44823
		9.50	.3740		6.8898	175.00	4.5276	115.00	** 45135
3/8			.3750	9.53	6.7500	171.45	4.2500	107.95	44824
25/64			.3906	9.92	7.0000	177.80	4.3750	111.13	44825
		10.00	.3937		7.2441	184.00	4.7638	121.00	** 45140
13/32			.4062	10.32	7.0000	177.80	4.3750	111.13	44826

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** Only available until inventory is depleted.

Cobalt Heavy-Duty (continued)
Style 520

INCH AND METRIC SIZES

Drill Diameter Fraction	Wire/Let	Metric	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 520** Straw
		10.50	.4134		7.2441	184.00	4.7638	121.00	** 45143
27/64			.4219	10.72	7.2500	184.15	4.6250	117.48	44827
7/16			.4375	11.11	7.2500	184.15	4.6250	117.48	44828
		11.50	.4528		7.6772	195.00	5.0394	128.00	** 45147
29/64			.4531	11.51	7.5000	190.50	4.7500	120.65	44829
15/32			.4688	11.91	7.5000	190.50	4.7500	120.65	44830
		12.00	.4724		8.0709	205.00	5.2756	134.00	** 45149
31/64			.4844	12.30	7.7500	196.85	4.7500	120.65	44831
1/2			.5000	12.70	7.7500	196.85	4.7500	120.65	44832

** Only available until inventory is depleted.

TECH TIP

Deep Hole Tips

Drilling deep holes in some cases requires drilling to depths of 20 times drill diameter. Drilling to these depths causes concern for chip evacuation and heat build up on the tool, generating excessive wear at the point. Consider the following factors when drilling to these depths.

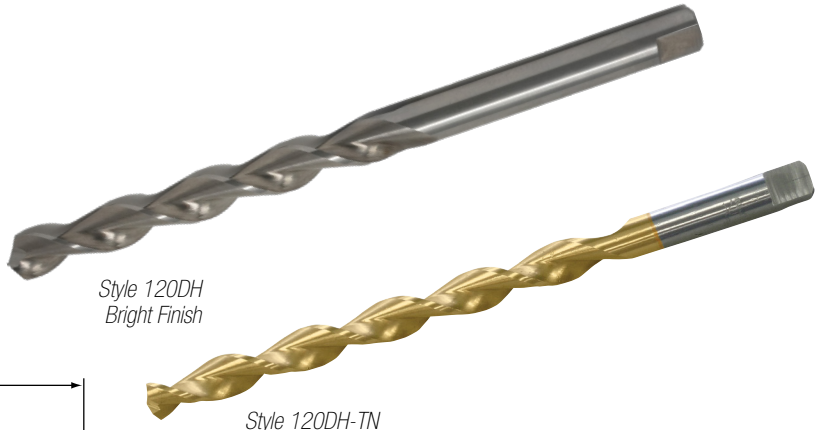
- Material to be cut and its hardness will determine whether to use high-speed steel M-2 or the cobalt grade M-42. Although M-2 is the most frequently used HSS, M- 42 is the choice when machining in the Brinell range 296 and above.
- Tool construction must be of a heavy-duty style, with typical web thickness of 40% to 45% of the drill diameter to maintain rigidity over the long flute length.
- Helix angles of 36° to 38° are common to efficiently evacuate chips up the flutes.
- Points are generally 135° heavy-duty and split, sometimes referred to as crankshaft drill points.
- Consider other flute styles including parabolic.
- When calculating OAL consider the reach length, amount of re-sharpening required, bushing or fixture length and part thickness.
- Minimize excessive overhang.
- Drill points should always be kept sharp.
- Proper lubrication is critical and coolant should be well filtered.
- The most critical machining function is the evacuation of chips, drilling depth and the critical path of chip evacuation as well as knowing when to withdraw the tool before the chips get hot and anneal the tool.
- For controlling the chip, chose the right feeds and speeds. In general, 50 to 65 SFM is standard. The feed will depend on the tool diameter. If the chip is long and stringy, increase feeds until chip is broken into smaller pieces.

Deep Hole Parabolic
Styles 120DH, 120DH-TN (120DHT)

Features/Benefits:
- Parabolic flute configuration with proprietary Convovlute flute design offers wider flute space, dispersing chips away from the cutting edges more rapidly and increasing coolant flow.
- Engineered for deep-hole drilling up to 8 to 12 X diameter depth, depending on drill diameter.
- Manufactured from premium high-speed steel.
- 135° split point is self-centering, and uses reduced thrust for easier penetration.
- Tanged shank; see page 73 for tang specifications.
- TiN and bright finishes standard from stock; alternate coatings available as stock modifications.

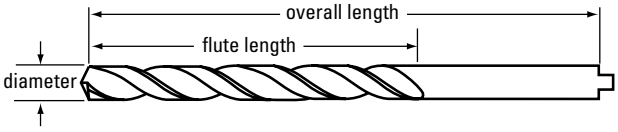
Application Information:
- low carbon steel (TiN, bright)
- soft alloy steel (TiN, bright)
- aluminum (TiCN as a modification)
- non-ferrous materials (bright)

Surface Treatment Information
- Bright finish provides good chip ejection.
- Titanium-nitride (TiN) coating adds lubricity and hardness, enhancing chip flow, finished hole quality, and drill life.



Style 120DH
Bright Finish

Style 120DH-TN
TiN-Coated



INCH SIZES

Drill Diameter Fraction	Wire/Let	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 120DH Bright	Style 120DH-TN TiN
1/16		.0625	1.59	3.0000	76.20	2.0000	50.80	68804	55236
5/64		.0781	1.98	3.7500	95.25	2.2500	57.15	68805	55237
3/32		.0938	2.38	4.2500	107.95	2.2500	57.15	68806	55238
	41	.0960	2.44	4.6250	117.48	3.1250	79.38	** 68881	—
	40	.0980	2.49	4.6250	117.48	3.1250	79.38	** 68880	—
	38	.1015	2.58	4.6250	117.48	3.1250	79.38	** 68878	—
	37	.1040	2.64	4.6250	117.48	3.1250	79.38	** 68877	—
	36	.1065	2.71	4.6250	117.48	3.1250	79.38	** 68876	—
7/64		.1094	2.78	4.6250	117.48	3.1250	79.38	68807	55239
	33	.1130	2.87	5.1250	130.18	3.6250	92.08	** 68873	—
1/8		.1250	3.18	5.1250	130.18	3.3750	85.73	68808	55240
	30	.1285	3.26	5.3750	136.53	3.6250	92.08	68870	—
	29	.1360	3.45	5.3750	136.53	3.6250	92.08	68869	—
9/64		.1406	3.57	5.3750	136.53	3.6250	92.08	68809	55241
	26	.1470	3.73	5.3750	136.53	3.7500	95.25	68866	—
	25	.1495	3.80	5.3750	136.53	3.7500	95.25	68865	—
5/32		.1562	3.97	5.3750	136.53	3.7500	95.25	68810	55242

** Only available until inventory is depleted.

continued on next page

Drills - Taper Length

Deep Hole Parabolic (continued)
Styles 120DH, 120DH-TN (120DHT)

INCH SIZES

Drill Diameter Fraction	Wire/Let	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 120DH Bright	Style 120DH-TN TiN
	21	.1590	4.04	5.7500	146.05	4.1250	104.78	68861	—
	20	.1610	4.09	5.7500	146.05	4.1250	104.78	68860	—
11/64		.1719	4.37	5.7500	146.05	4.1250	104.78	68811	55243
	16	.1770	4.50	5.7500	146.05	4.1250	104.78	** 68856	—
3/16		.1875	4.76	5.7500	146.05	4.1250	104.78	68812	55244
	9	.1960	4.98	6.0000	152.40	4.3750	111.13	68849	—
	7	.2010	5.11	6.0000	152.40	4.3750	111.13	** 68847	—
13/64		.2031	5.16	6.0000	152.40	4.3750	111.13	68813	55245
	3	.2130	5.41	6.0000	152.40	4.3750	111.13	** 68843	—
7/32		.2188	5.56	6.0000	152.40	4.3750	111.13	68814	55246
15/64		.2344	5.95	6.1250	155.58	4.8125	122.24	68815	55247
1/4	E	.2500	6.35	6.1250	155.58	4.8125	122.24	68816	55248
17/64		.2656	6.75	6.2500	158.75	5.0000	127.00	68817	55249
9/32		.2812	7.14	6.2500	158.75	5.0000	127.00	68818	55250
19/64		.2969	7.54	6.3750	161.93	5.1250	130.18	68819	55251
5/16		.3125	7.94	6.3750	161.93	5.1250	130.18	68820	55252
21/64		.3281	8.33	6.5000	165.10	5.2500	133.35	68821	55253
11/32		.3438	8.73	6.5000	165.10	5.2500	133.35	68822	55254
23/64		.3594	9.13	6.7500	171.45	5.3750	136.53	68823	55255
3/8		.3750	9.53	6.7500	171.45	5.3750	136.53	68824	55256
25/64		.3906	9.92	7.0000	177.80	5.6250	142.88	68825	55257
13/32		.4062	10.32	7.0000	177.80	5.6250	142.88	68826	55258
27/64		.4219	10.72	7.2500	184.15	5.6875	144.46	68827	55259
7/16		.4375	11.11	7.2500	184.15	5.6875	144.46	68828	55260
29/64		.4531	11.51	7.5000	190.50	5.7500	146.05	68829	55261
15/32		.4688	11.91	7.5000	190.50	5.7500	146.05	68830	55262
31/64		.4844	12.30	7.7500	196.85	5.7500	146.05	68831	55263
1/2		.5000	12.70	7.7500	196.85	5.7500	146.05	68832	55264
33/64		.5156	13.10	8.0000	203.20	6.0000	152.40	68833	55265
17/32		.5312	13.49	8.0000	203.20	6.0000	152.40	68834	55266
35/64		.5469	13.89	8.2500	209.55	6.2500	158.75	68835	55267
9/16		.5625	14.29	8.2500	209.55	6.2500	158.75	68836	55268
37/64		.5781	14.68	8.7500	222.25	6.5000	165.10	68837	55269
19/32		.5938	15.08	8.7500	222.25	6.5000	165.10	68838	55270
5/8		.6250	15.88	8.7500	222.25	6.5000	165.10	68840	55272

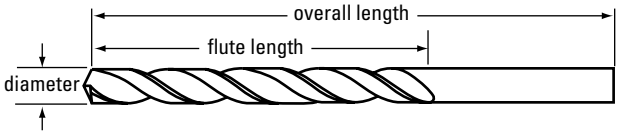
** Only available until inventory is depleted.

Heavy-Duty Extra-Long Style 120X

Features/Benefits:
- Heavy-duty construction and extra length to drill in a wide range of applications where extra reach is needed.
- Multiple lengths offered for popular drill diameters.
- Manufactured from premium high-speed steel.
- 118° K-notch point.
- Black oxide finish standard from stock.

Application Information:
- carbon steel
- alloy steel
- cast iron
- Designed for long reach applications.

Surface Treatment Information
- Black oxide finish provides increased wear resistance and added lubricity in ferrous materials.



INCH SIZES

Drill Diameter Fraction	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 120X** Black Oxide
3/32	.0938	2.38	8.0000	203.20	5.5000	139.70	50448
7/64	.1094	2.78	8.0000	203.20	5.5000	139.70	50455
1/8	.1250	3.18	8.0000	203.20	5.5000	139.70	50458
1/8	.1250	3.18	10.0000	254.00	7.5000	190.50	50460
1/8	.1250	3.18	12.0000	304.80	9.0000	228.60	50461
9/64	.1406	3.57	8.0000	203.20	5.5000	139.70	50463
9/64	.1406	3.57	10.0000	254.00	7.5000	190.50	50465
9/64	.1406	3.57	12.0000	304.80	9.0000	228.60	50466
5/32	.1562	3.97	8.0000	203.20	5.5000	139.70	50468
5/32	.1562	3.97	10.0000	254.00	7.5000	190.50	50717
5/32	.1562	3.97	12.0000	304.80	9.0000	228.60	50718
11/64	.1719	4.37	8.0000	203.20	5.5000	139.70	50471
11/64	.1719	4.37	10.0000	254.00	7.5000	190.50	50473
11/64	.1719	4.37	12.0000	304.80	9.0000	228.60	50719
3/16	.1875	4.76	8.0000	203.20	5.5000	139.70	50720
3/16	.1875	4.76	10.0000	254.00	7.5000	190.50	50722
3/16	.1875	4.76	12.0000	304.80	9.0000	228.60	50723
13/64	.2031	5.16	8.0000	203.20	5.5000	139.70	50476
13/64	.2031	5.16	10.0000	254.00	7.5000	190.50	50725
13/64	.2031	5.16	12.0000	304.80	9.0000	228.60	50726
7/32	.2188	5.56	8.0000	203.20	5.5000	139.70	50479
7/32	.2188	5.56	10.0000	254.00	7.5000	190.50	50728

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Drills - Extra Length

Heavy-Duty Extra-Long (continued)
Style 120X

INCH SIZES

Drill Diameter Fraction	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 120X** Black Oxide
7/32	.2188	5.56	12.0000	304.80	9.0000	228.60	50729
15/64	.2344	5.95	8.0000	203.20	5.5000	139.70	50730
15/64	.2344	5.95	10.0000	254.00	7.5000	190.50	50731
15/64	.2344	5.95	12.0000	304.80	9.0000	228.60	50732
1/4	.2500	6.35	8.0000	203.20	5.5000	139.70	50485
1/4	.2500	6.35	10.0000	254.00	7.5000	190.50	50734
1/4	.2500	6.35	12.0000	304.80	9.0000	228.60	50735
17/64	.2656	6.75	8.0000	203.20	5.5000	139.70	50489
17/64	.2656	6.75	10.0000	254.00	7.5000	190.50	50736
17/64	.2656	6.75	12.0000	304.80	9.0000	228.60	50737
9/32	.2812	7.14	8.0000	203.20	5.5000	139.70	50493
9/32	.2812	7.14	10.0000	254.00	7.5000	190.50	50495
9/32	.2812	7.14	12.0000	304.80	9.0000	228.60	50738
19/64	.2969	7.54	8.0000	203.20	5.5000	139.70	50498
19/64	.2969	7.54	10.0000	254.00	7.5000	190.50	50500
19/64	.2969	7.54	12.0000	304.80	9.0000	228.60	50739
5/16	.3125	7.94	8.0000	203.20	5.5000	139.70	50503
5/16	.3125	7.94	10.0000	254.00	7.5000	190.50	50505
5/16	.3125	7.94	12.0000	304.80	9.0000	228.60	50740
21/64	.3281	8.33	8.0000	203.20	5.5000	139.70	50509
21/64	.3281	8.33	10.0000	254.00	7.5000	190.50	50511
21/64	.3281	8.33	12.0000	304.80	9.0000	228.60	50741
11/32	.3438	8.73	8.0000	203.20	5.5000	139.70	50514
11/32	.3438	8.73	10.0000	254.00	7.5000	190.50	50516
11/32	.3438	8.73	12.0000	304.80	9.0000	228.60	50742
23/64	.3594	9.13	8.0000	203.20	5.5000	139.70	50520
23/64	.3594	9.13	10.0000	254.00	7.5000	190.50	50522
23/64	.3594	9.13	12.0000	304.80	9.0000	228.60	50523
3/8	.3750	9.53	8.0000	203.20	5.5000	139.70	50527
3/8	.3750	9.53	10.0000	254.00	7.5000	190.50	50529
3/8	.3750	9.53	12.0000	304.80	9.0000	228.60	50743
25/64	.3906	9.92	8.0000	203.20	5.5000	139.70	50534
25/64	.3906	9.92	10.0000	254.00	7.5000	190.50	50536
25/64	.3906	9.92	12.0000	304.80	9.0000	228.60	50745
13/32	.4062	10.32	8.0000	203.20	5.5000	139.70	50540
13/32	.4062	10.32	10.0000	254.00	7.5000	190.50	50746
13/32	.4062	10.32	12.0000	304.80	9.0000	228.60	50747
27/64	.4219	10.72	10.0000	254.00	7.5000	190.50	50546
27/64	.4219	10.72	12.0000	304.80	9.0000	228.60	50749
7/16	.4375	11.11	8.0000	203.20	5.5000	139.70	50550
7/16	.4375	11.11	10.0000	254.00	7.5000	190.50	50552
7/16	.4375	11.11	12.0000	304.80	9.0000	228.60	50750
29/64	.4531	11.51	10.0000	254.00	7.5000	190.50	50557

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Heavy-Duty Extra-Long (continued)
Style 120X

INCH SIZES

Drill Diameter Fraction	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Style 120X Black Oxide
29/64	.4531	11.51	12.0000	304.80	9.0000	228.60	50558
15/32	.4688	11.91	8.0000	203.20	5.5000	139.70	50561
15/32	.4688	11.91	10.0000	254.00	7.5000	190.50	50563
15/32	.4688	11.91	12.0000	304.80	9.0000	228.60	50751
31/64	.4844	12.30	10.0000	254.00	7.5000	190.50	50568
31/64	.4844	12.30	12.0000	304.80	9.0000	228.60	50752
1/2	.5000	12.70	8.0000	203.20	5.5000	139.70	50570
1/2	.5000	12.70	10.0000	254.00	7.5000	190.50	50571
1/2	.5000	12.70	12.0000	304.80	9.0000	228.60	50572
33/64	.5156	13.10	10.0000	254.00	7.5000	190.50	50580
33/64	.5156	13.10	12.0000	304.80	9.0000	228.60	50581
17/32	.5312	13.49	10.0000	254.00	7.5000	190.50	50585
17/32	.5312	13.49	12.0000	304.80	9.0000	228.60	50586
35/64	.5469	13.89	12.0000	304.80	9.0000	228.60	50591
9/16	.5625	14.29	12.0000	304.80	9.0000	228.60	50596
37/64	.5781	14.68	12.0000	304.80	9.0000	228.60	50602
19/32	.5938	15.08	12.0000	304.80	9.0000	228.60	50608
39/64	.6094	15.48	12.0000	304.80	9.0000	228.60	50613
5/8	.6250	15.88	12.0000	304.80	9.0000	228.60	50619
41/64	.6406	16.27	12.0000	304.80	9.0000	228.60	50624
21/32	.6562	16.67	12.0000	304.80	9.0000	228.60	50629
43/64	.6719	17.07	12.0000	304.80	9.0000	228.60	50634
11/16	.6875	17.46	12.0000	304.80	9.0000	228.60	50639
45/64	.7031	17.86	12.0000	304.80	9.0000	228.60	50644
23/32	.7188	18.26	12.0000	304.80	9.0000	228.60	50648
47/64	.7344	18.65	12.0000	304.80	9.0000	228.60	50654
3/4	.7500	19.05	12.0000	304.80	9.0000	228.60	50659

INCH SETS

Set in Plastic Pouch

Number of Tools	Size Range	Style 120X Black Oxide
25	1/8 - 1/2 X 1/64 (12" length)	69869

Drills - Extra Length

NAS-Type Aircraft Extension
Styles 906, 912

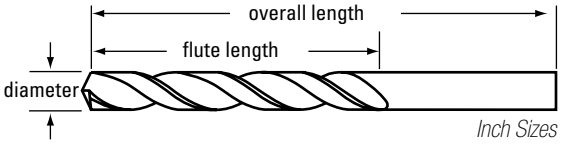
Features/Benefits:
- Manufactured to NAS 907 Type B geometry aerospace specifications.
- 6" and 12" extended shanks for long-reach applications.
- Jobber drill flute lengths.
- Manufactured premium high-speed steel.
- 135° P3 split point is self-centering for reduced thrust and easier penetration. Sizes smaller than .0625 do not have split points.
- Black oxide finish standard from stock.

Application Information:
- carbon steel
- alloy steel
- cast iron

Surface Treatment Information:
- Black oxide finish provides increased wear resistance and added lubricity in ferrous materials.

Style 906
6" Overall Length Black Oxide

Style 912
12" Overall Length Black Oxide



Inch Sizes

INCH SIZES

Drill Diameter				Flute Length		Style 906 6" OAL	Style 912 12" OAL
Fraction	Wire/Let	Decimal	mm	Inch	mm	Black Oxide	Black Oxide
	60	.0400	1.02	.6875	17.46	11090	11184
	59	.0410	1.04	.6875	17.46	11089	11183
	58	.0420	1.07	.6875	17.46	11088	11182
	57	.0430	1.09	.7500	19.05	11087	11181
	56	.0465	1.18	.7500	19.05	11086	11180
3/64		.0469	1.19	.7500	19.05	11000	11095
	55	.0520	1.32	.8750	22.23	11085	11179
	54	.0550	1.40	.8750	22.23	11084	11178
	53	.0595	1.51	.8750	22.23	11083	11177
1/16		.0625	1.59	.8750	22.23	11001	11096
	52	.0635	1.61	.8750	22.23	11082	11176
	51	.0670	1.70	1.0000	25.40	11081	11175
	50	.0700	1.78	1.0000	25.40	11080	11174
	49	.0730	1.85	1.0000	25.40	11079	11173
	48	.0760	1.93	1.0000	25.40	11078	11172
5/64		.0781	1.98	1.0000	25.40	11002	11097
	47	.0785	1.99	1.0000	25.40	11077	11171
	46	.0810	2.06	1.1250	28.58	11076	11170
	45	.0820	2.08	1.1250	28.58	11075	11169
	44	.0860	2.18	1.1250	28.58	11074	11168
	43	.0890	2.26	1.2500	31.75	11073	11167
	42	.0935	2.37	1.2500	31.75	11072	11166
3/32		.0938	2.38	1.2500	31.75	11003	11098
	41	.0960	2.44	1.3750	34.93	11071	11165

Sizes smaller than .0625 do not have split points.

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NAS-Type Aircraft Extension (continued)
Styles 906, 912

INCH SIZES

Drill Diameter				Flute Length		Style 906 6" OAL	Style 912 12" OAL
Fraction	Wire/Let	Decimal	mm	Inch	mm	Black Oxide	Black Oxide
	40	.0980	2.49	1.3750	34.93	11070	11164
	39	.0995	2.53	1.3750	34.93	11069	11163
	38	.1015	2.58	1.4375	36.51	11068	11162
	37	.1040	2.64	1.4375	36.51	11067	11161
	36	.1065	2.71	1.4375	36.51	11066	11160
7/64		.1094	2.78	1.5000	38.10	11004	11099
	35	.1100	2.79	1.5000	38.10	11065	11159
	34	.1110	2.82	1.5000	38.10	11064	11158
	33	.1130	2.87	1.5000	38.10	11063	11157
	32	.1160	2.95	1.6250	41.28	11062	11156
	31	.1200	3.05	1.6250	41.28	11061	11155
1/8		.1250	3.18	1.6250	41.28	11005	11100
	30	.1285	3.26	1.6250	41.28	11060	11154
	29	.1360	3.45	1.7500	44.45	11059	11153
	28	.1405	3.57	1.7500	44.45	11058	11152
9/64		.1406	3.57	1.7500	44.45	11006	11101
	27	.1440	3.66	1.8750	47.63	11057	11151
	26	.1470	3.73	1.8750	47.63	11056	11150
	25	.1495	3.80	1.8750	47.63	11055	11149
	24	.1520	3.86	2.0000	50.80	11054	11148
	23	.1540	3.91	2.0000	50.80	11053	11147
5/32		.1562	3.97	2.0000	50.80	11007	11102
	22	.1570	3.99	2.0000	50.80	11052	11146
	21	.1590	4.04	2.1250	53.98	11051	11145
	20	.1610	4.09	2.1250	53.98	11050	11144
	19	.1660	4.22	2.1250	53.98	11049	11143
	18	.1695	4.31	2.1250	53.98	11048	11142
11/64		.1719	4.37	2.1250	53.98	11008	11103
	17	.1730	4.39	2.1875	55.56	11047	11141
	16	.1770	4.50	2.1875	55.56	11046	11140
	15	.1800	4.57	2.1875	55.56	11045	11139
	14	.1820	4.62	2.1875	55.56	11044	11138
	13	.1850	4.70	2.3125	58.74	11043	11137
3/16		.1875	4.76	2.3125	58.74	11009	11104
	12	.1890	4.80	2.3125	58.74	11042	11136
	11	.1910	4.85	2.3125	58.74	11041	11135
	10	.1935	4.91	2.4375	61.91	11040	11134
	9	.1960	4.98	2.4375	61.91	11039	11133
	8	.1990	5.05	2.4375	61.91	11038	11132
	7	.2010	5.11	2.4375	61.91	11037	11131
13/64		.2031	5.16	2.4375	61.91	11010	11105
	6	.2040	5.18	2.5000	63.50	11036	11130
	5	.2055	5.22	2.5000	63.50	11035	11129
	4	.2090	5.31	2.5000	63.50	11034	11128
	3	.2130	5.41	2.5000	63.50	11033	11127
7/32		.2188	5.56	2.5000	63.50	11011	11106
	2	.2210	5.61	2.6250	66.68	11032	11126
	1	.2280	5.79	2.6250	66.68	11031	11125
15/64		.2344	5.95	2.6250	66.68	11012	11107
1/4	E	.2500	6.35	2.7500	69.85	11013	11108
	F	.2570	6.53	2.8750	73.03	11255	11225

continued on next page

NAS-Type Aircraft Extension (continued)
Styles 906, 912

INCH SIZES

Drill Diameter Fraction	Wire/Let	Decimal	mm	Flute Length Inch	mm	Style 906 6" OAL Black Oxide	Style 912 12" OAL Black Oxide
17/64		.2656	6.75	2.8750	73.03	11014	11109
	I	.2720	6.91	2.8750	73.03	—	11228
9/32		.2812	7.14	2.9375	74.61	11016	11110
19/64		.2969	7.54	3.0625	77.79	11017	11111
5/16		.3125	7.94	3.1875	80.96	11018	11112
	O	.3160	8.03	3.1875	80.96	—	11234
21/64		.3281	8.33	3.3125	84.14	11019	11113
11/32		.3438	8.73	3.4375	87.31	11020	11114
23/64		.3594	9.13	3.5000	88.90	11021	11115
3/8		.3750	9.53	3.6250	92.08	11022	11116
	V	.3770	9.58	3.6250	92.08	—	11241
25/64		.3906	9.92	3.7500	95.25	11023	11117
13/32		.4062	10.32	3.8750	98.43	11024	11118
27/64		.4219	10.72	3.9375	100.01	11025	11119
7/16		.4375	11.11	4.0625	103.19	11026	11120
29/64		.4531	11.51	4.1875	106.36	11027	11121
15/32		.4688	11.91	4.3125	109.54	11028	11122
31/64		.4844	12.30	4.3750	111.13	11029	11123
1/2		.5000	12.70	4.5000	114.30	11030	11124

TECH TIP

Drill Specifications

More different specifications are showing up in manufacturing prints in the USA. To help clarify abbreviations see the explanations below.

•ASME/USCTI
USA tool standards. American Society of Mechanical Engineering / United States Cutting Tool Institute, all standards are specified in the imperial measurement (inches).

•DIN
German standard. Deutsches Institut Fur Normung / German Institute for Standard, all measurements are to the metric system.

• JIS
Japanese standard. Japanese Industrial Standard, all measurements are to the metric system

• ISO
Global standard. International Standardization Organization, all measurements are to the metric system.

Other countries have their own standards that would relate to specific products such as aircraft and automotive. In the USA other standards, including NAS (National Aero Space) and SAE (Society of Automotive Engineers), are related to those types of industries.

Here are some examples of differences in metric jobber drills versus inch jobber drills.

1) A metric drill OAL is measured from back of shank to point tip; an inch drill is measured from back of shank to point shoulder.

2) OAL and flute length of a standard DIN 338 jobber drill can be shorter than an inch jobber drill. The flute length in particular should be noted when using an inch drill bushing. The shorter flutes could end inside the bushing, preventing chip evacuation.

3) Metric drill OD tolerances are measured in lower case letters such as h8; inch sizes would be +. 0 to a minus tolerance.

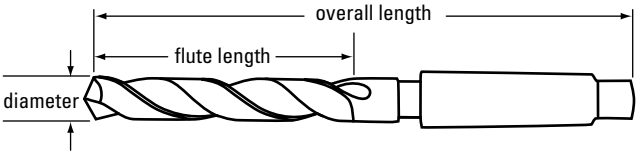
4) Metric tangs are sized differently and will not fit into an inch collet.

General Purpose
Styles 110, 110S

Features/Benefits:
- General-purpose geometry for drilling in a wide range of operating conditions and materials.
- Taper shank made to American National Standard (Morse) dimensions for use in corresponding Morse taper holders. Standard Morse dimensions listed on page 88.
- Alternate shanks (Style 110S) available in selected sizes.
- Manufactured from premium high-speed steel.
- 118° point.
- Black oxide finish standard from stock.

Application Information:
- carbon steel
- tool steel
- alloy steel
- cast iron

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.



INCH SIZES

Fraction	Drill Diameter Decimal	mm	Morse Taper Shank Number	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 110** Black Oxide	**Style 110S** Black Oxide
1/8	.1250	3.18	1	5.1250	130.18	1.8750	47.63	53108	—
5/32	.1562	3.97	1	5.3750	136.53	2.1250	53.98	53310	—
3/16	.1875	4.76	1	5.7500	146.05	2.5000	63.50	53112	—
13/64	.2031	5.16	1	6.0000	152.40	2.7500	69.85	53113	—
7/32	.2188	5.56	1	6.0000	152.40	2.7500	69.85	53114	—
15/64	.2344	5.95	1	6.1250	155.58	2.8750	73.03	53115	—
1/4-E	.2500	6.35	1	6.1250	155.58	2.8750	73.03	53116	—
17/64	.2656	6.75	1	6.2500	158.75	3.0000	76.20	53117	—
9/32	.2812	7.14	1	6.2500	158.75	3.0000	76.20	53118	—
19/64	.2969	7.54	1	6.3750	161.93	3.1250	79.38	53119	—
5/16	.3125	7.94	1	6.3750	161.93	3.1250	79.38	53120	—
21/64	.3281	8.33	1	6.5000	165.10	3.2500	82.55	53121	—
11/32	.3438	8.73	1	6.5000	165.10	3.2500	82.55	53122	—
23/64	.3594	9.13	1	6.7500	171.45	3.5000	88.90	53123	—
3/8	.3750	9.53	1	6.7500	171.45	3.5000	88.90	53124	—
25/64	.3906	9.92	1	7.0000	177.80	3.6250	92.08	53125	—
13/32	.4062	10.32	1	7.0000	177.80	3.6250	92.08	53126	—
27/64	.4219	10.72	1	7.2500	184.15	3.8750	98.43	53127	—
7/16	.4375	11.11	1	7.2500	184.15	3.8750	98.43	53128	—
29/64	.4531	11.51	1	7.5000	190.50	4.1250	104.78	53129	—
15/32	.4688	11.91	1	7.5000	190.50	4.1250	104.78	53130	—
31/64	.4844	12.30	2	8.2500	209.55	4.3750	111.13	53131	—
1/2	.5000	12.70	2	8.2500	209.55	4.3750	111.13	53132	—
33/64	.5156	13.10	2	8.5000	215.90	4.6250	117.48	53133	—

continued on next page

General Purpose (continued)
Styles 110, 110S

INCH SIZES

Drill Diameter			Morse Taper	Overall Length		Flute Length		Style 110	Style 110S
Fraction	Decimal	mm	Shank Number	Inch	mm	Inch	mm	Black Oxide	Black Oxide
17/32	.5312	13.49	2	8.5000	215.90	4.6250	117.48	53134	—
35/64	.5469	13.89	2	8.7500	222.25	4.8750	123.83	53135	—
9/16	.5625	14.29	2	8.7500	222.25	4.8750	123.83	53136	—
37/64	.5781	14.68	2	8.7500	222.25	4.8750	123.83	53137	—
19/32	.5938	15.08	2	8.7500	222.25	4.8750	123.83	53138	—
39/64	.6094	15.48	2	8.7500	222.25	4.8750	123.83	53139	—
5/8	.6250	15.88	2	8.7500	222.25	4.8750	123.83	53140	—
41/64	.6406	16.27	2	9.0000	228.60	5.1250	130.18	53141	—
21/32	.6562	16.67	2	9.0000	228.60	5.1250	130.18	53142	—
43/64	.6719	17.07	2	9.2500	234.95	5.3750	136.53	53143	—
11/16	.6875	17.46	2	9.2500	234.95	5.3750	136.53	53144	—
11/16	.6875	17.46	3	10.0000	254.00	5.3750	136.53	—	53844
45/64	.7031	17.86	2	9.5000	241.30	5.6250	142.88	53145	—
23/32	.7188	18.26	2	9.5000	241.30	5.6250	142.88	53146	—
47/64	.7344	18.65	2	9.7500	247.65	5.8750	149.23	53147	—
3/4	.7500	19.05	2	9.7500	247.65	5.8750	149.23	53148	—
3/4	.7500	19.05	3	10.5000	266.70	5.8750	149.23	—	53848
49/64	.7656	19.45	2	9.8750	250.83	6.0000	152.40	53149	—
25/32	.7812	19.84	2	9.8750	250.83	6.0000	152.40	53150	—
51/64	.7969	20.24	3	10.7500	273.05	6.1250	155.58	53151	—
13/16	.8125	20.64	3	10.7500	273.05	6.1250	155.58	53152	—
53/64	.8281	21.03	3	10.7500	273.05	6.1250	155.58	53153	—
27/32	.8438	21.43	3	10.7500	273.05	6.1250	155.58	53154	—
55/64	.8594	21.83	3	10.7500	273.05	6.1250	155.58	53155	—
7/8	.8750	22.23	2	10.0000	254.00	6.1250	155.58	—	53556
7/8	.8750	22.23	3	10.7500	273.05	6.1250	155.58	53156	—
57/64	.8906	22.62	3	10.7500	273.05	6.1250	155.58	53157	—
29/32	.9062	23.02	3	10.7500	273.05	6.1250	155.58	53158	—
59/64	.9219	23.42	3	10.7500	273.05	6.1250	155.58	53159	—
15/16	.9375	23.81	3	10.7500	273.05	6.1250	155.58	53160	—
61/64	.9531	24.21	3	11.0000	279.40	6.3750	161.93	53161	—
31/32	.9688	24.61	3	11.0000	279.40	6.3750	161.93	53162	—
63/64	.9844	25.00	3	11.0000	279.40	6.3750	161.93	53163	—
1	1.0000	25.40	2	12.0000	304.80	6.3750	161.93	—	53559
1	1.0000	25.40	3	11.0000	279.40	6.3750	161.93	53164	—
1-1/64	1.0156	25.80	3	11.1250	282.58	6.5000	165.10	53165	—
1-1/32	1.0312	26.19	3	11.1250	282.58	6.5000	165.10	53166	—
1-1/16	1.0625	26.99	3	11.2500	285.75	6.6250	168.28	53168	—
1-7/64	1.1094	28.18	4	12.7500	323.85	7.1250	180.98	53171	—
1-1/8	1.1250	28.58	3	11.7500	298.45	7.1250	180.98	—	53572
1-1/8	1.1250	28.58	4	12.7500	323.85	7.1250	180.98	53172	—
1-3/16	1.1875	30.16	4	13.0000	330.20	7.3750	187.33	53176	—
1-1/4	1.2500	31.75	3	12.5000	317.50	7.8750	200.03	—	53580
1-1/4	1.2500	31.75	4	13.5000	342.90	7.8750	200.03	53180	—
1-5/16	1.3125	33.34	4	14.2500	361.95	8.6250	219.08	53184	—
1-11/32	1.3438	34.13	4	14.3750	365.13	8.7500	222.25	53186	—
1-3/8	1.3750	34.93	4	14.5000	368.30	8.8750	225.43	53188	—
1-7/16	1.4375	36.51	4	14.7500	374.65	9.1250	231.78	53192	—
1-15/32	1.4688	37.31	4	14.8750	377.83	9.2500	234.95	53194	—
1-1/2	1.5000	38.10	4	15.0000	381.00	9.3750	238.13	53196	—

continued on next page

General Purpose (continued)
Styles 110, 110S

INCH SIZES

Fraction	Drill Diameter Decimal	mm	Morse Taper Shank Number	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	**Style 110** Black Oxide	**Style 110S** Black Oxide
1-9/16	1.5625	39.69	5	16.6250	422.28	9.6250	244.48	53200	—
1-5/8	1.6250	41.28	5	17.0000	431.80	10.0000	254.00	53204	—
1-11/16	1.6875	42.86	5	17.1250	434.98	10.1250	257.18	53208	—
1-3/4	1.7500	44.45	4	16.2500	412.75	10.3750	263.53	—	53612
1-3/4	1.7500	44.45	5	17.1250	434.98	10.1250	257.18	53212	—
1-13/16	1.8125	46.04	5	17.1250	434.98	10.1250	257.18	53216	—
1-7/8	1.8750	47.63	5	17.3750	441.33	10.3750	263.53	53220	—
2	2.0000	50.80	4	16.6250	422.28	10.6250	269.88	—	53628
2	2.0000	50.80	5	17.3750	441.33	10.3750	263.53	53228	—

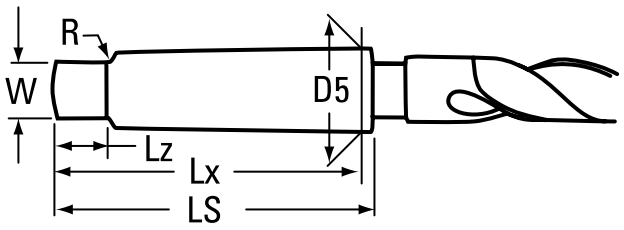
General Purpose (continued)
Styles 110

Set

Number of Tools	Size Range	Case Style	**Style 190** Black Oxide
16	49/64 - 1 x 1/64	metal	69867

Morse Taper Shank Specifications

All measurements in inches



Morse Taper Shank Number	Taper per Foot	Taper per Inch	**DS** Maximum Shank Diameter	**LS** Length of Shank	**Lx** Length of Shank to Gage Line	**Lz** Length of Tang	**W** Thickness of Tang	**R** Radius
1	.5985	.0498	.475	2.56	2.44	.37	.20	.19
2	.5994	.0499	.700	3.12	2.94	.44	.25	.25
3	.6023	.0501	.938	3.87	3.69	.56	.31	.28
4	.6232	.0519	1.231	4.87	4.62	.62	.47	.31
5	.6315	.0526	1.748	6.12	5.87	.75	.62	.37
6	.6256	.0521	2.494	8.56	8.25	1.12	.75	.50

1/2" Reduced Shank Silver & Deming
Styles 190, 190F

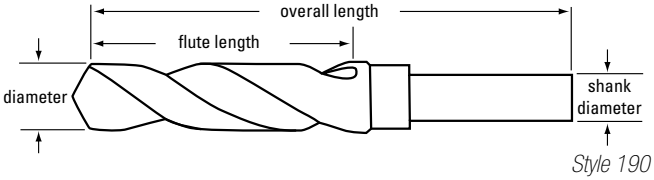
Features/Benefits:
- Larger size general-purpose drills with 1/2" reduced shank.
- Manufactured from premium high-speed steel.
- 118° point; style 190F features 118° split point through 1-1/4" size.
- Round shank or shank with three flats for a more positive grip in the drill chuck; flats reduce drill slippage under high load.
- Standard 6" overall length and 3-1/8" flute length for increased rigidity, less deflection, and better hole accuracy.
- Standardized lengths result in minimal adjustment during tool changes in screw machines and machining centers.
- Ideal for portable drilling due to increased rigidity.
- Black oxide finish standard from stock.

Application Information:
- carbon steel
- cast iron
- alloy steel
- wood
- Use wherever maximum chuck capacity is 1/2".

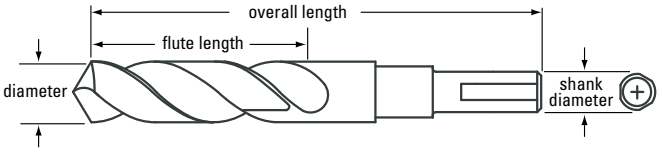
Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.

Style 190 Black Oxide with Round Shank

Style 190F Black Oxide with Flatted Shank



Style 190



Style 190F

INCH and METRIC SIZES

Drill Diameter			Shank Diameter		Overall Length		Flute Length		Style 190	Style 190F
Fraction	Decimal	mm	Inch	mm	Inch	mm	inch	mm	Round	Flatted
1/2	.5000	12.70	.5000	12.70	6.0000	152.40	3.1250	79.38	55432	52432
		13.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55500	52500
33/64	.5156	13.10	.5000	12.70	6.0000	152.40	3.1250	79.38	55433	52433
17/32	.5312	13.49	.5000	12.70	6.0000	152.40	3.1250	79.38	55434	52434
	.5315	13.5	.5000	12.70	6.0000	152.40	3.1250	79.38	55501	52501
35/64	.5469	13.89	.5000	12.70	6.0000	152.40	3.1250	79.38	55435	52435
	.5512	14.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55502	52502
9/16	.5625	14.29	.5000	12.70	6.0000	152.40	3.1250	79.38	55436	52436
	.5709	14.5	.5000	12.70	6.0000	152.40	3.1250	79.38	55503	52503
37/64	.5781	14.68	.5000	12.70	6.0000	152.40	3.1250	79.38	55437	52437
	.5906	15.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55504	52504
19/32	.5938	15.08	.5000	12.70	6.0000	152.40	3.1250	79.38	55438	52438
39/64	.6094	15.48	.5000	12.70	6.0000	152.40	3.1250	79.38	55439	52439
	.6102	15.50	.5000	12.70	6.0000	152.40	3.1250	79.38	55505	52505
5/8	.6250	15.88	.5000	12.70	6.0000	152.40	3.1250	79.38	55440	52440
	.6299	16.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55506	52506
41/64	.6406	16.27	.5000	12.70	6.0000	152.40	3.1250	79.38	55441	52441
	.6496	16.5	.5000	12.70	6.0000	152.40	3.1250	79.38	55507	52507
21/32	.6562	16.67	.5000	12.70	6.0000	152.40	3.1250	79.38	55442	52442
	.6693	17.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55508	52508
43/64	.6719	17.07	.5000	12.70	6.0000	152.40	3.1250	79.38	55443	52443
11/16	.6875	17.46	.5000	12.70	6.0000	152.40	3.1250	79.38	55444	52444
	.6890	17.5	.5000	12.70	6.0000	152.40	3.1250	79.38	55509	52509
45/64	.7031	17.86	.5000	12.70	6.0000	152.40	3.1250	79.38	55445	52445

continued on next page

1/2" Reduced Shank Silver & Deming (continued)
Styles 190, 190F

INCH and METRIC SIZES

Drill Diameter			Shank Diameter		Overall Length		Flute Length		Style 190	Style 190F
Fraction	Decimal	mm	Inch	mm	Inch	mm	inch	mm	Round	Flatted
	.7087	18.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55510	52510
23/32	.7188	18.26	.5000	12.70	6.0000	152.40	3.1250	79.38	55446	52446
	.7283	18.5	.5000	12.70	6.0000	152.40	3.1250	79.38	55511	52511
47/64	.7344	18.65	.5000	12.70	6.0000	152.40	3.1250	79.38	55447	52447
	.7480	19.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55512	52512
3/4	.7500	19.05	.5000	12.70	6.0000	152.40	3.1250	79.38	55448	52448
49/64	.7656	19.45	.5000	12.70	6.0000	152.40	3.1250	79.38	55449	52449
	.7677	19.5	.5000	12.70	6.0000	152.40	3.1250	79.38	55513	52513
25/32	.7812	19.84	.5000	12.70	6.0000	152.40	3.1250	79.38	55450	52450
	.7874	20.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55514	52514
51/64	.7969	20.24	.5000	12.70	6.0000	152.40	3.1250	79.38	55451	52451
13/16	.8125	20.64	.5000	12.70	6.0000	152.40	3.1250	79.38	55452	52452
	.8268	21.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55515	52515
53/64	.8281	21.03	.5000	12.70	6.0000	152.40	3.1250	79.38	55453	52453
27/32	.8438	21.43	.5000	12.70	6.0000	152.40	3.1250	79.38	55454	52454
55/64	.8594	21.83	.5000	12.70	6.0000	152.40	3.1250	79.38	55455	52455
	.8661	22.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55516	52516
7/8	.8750	22.23	.5000	12.70	6.0000	152.40	3.1250	79.38	55456	52456
57/64	.8906	22.62	.5000	12.70	6.0000	152.40	3.1250	79.38	55457	52457
	.9055	23.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55517	52517
29/32	.9062	23.02	.5000	12.70	6.0000	152.40	3.1250	79.38	55458	52458
59/64	.9219	23.42	.5000	12.70	6.0000	152.40	3.1250	79.38	55459	52459
15/16	.9375	23.81	.5000	12.70	6.0000	152.40	3.1250	79.38	55460	52460
	.9449	24.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55518	52518
61/64	.9531	24.21	.5000	12.70	6.0000	152.40	3.1250	79.38	55461	52461
31/32	.9688	24.61	.5000	12.70	6.0000	152.40	3.1250	79.38	55462	52462
	.9843	25.0	.5000	12.70	6.0000	152.40	3.1250	79.38	55519	52519
63/64	.9844	25.00	.5000	12.70	6.0000	152.40	3.1250	79.38	55463	52463
1	.0000	25.40	.5000	12.70	6.0000	152.40	3.1250	79.38	55464	52464
1-1/64	1.0156	25.80	.5000	12.70	6.0000	152.40	3.1250	79.38	55465	52465
1-1/32	1.0312	26.19	.5000	12.70	6.0000	152.40	3.1250	79.38	55466	52466
1-3/64	1.0469	26.59	.5000	12.70	6.0000	152.40	3.1250	79.38	55467	52467
1-1/16	1.0625	26.99	.5000	12.70	6.0000	152.40	3.1250	79.38	55468	52468
1-5/64	1.0781	27.38	.5000	12.70	6.0000	152.40	3.1250	79.38	55469	52469
1-3/32	1.0938	27.78	.5000	12.70	6.0000	152.40	3.1250	79.38	55470	52470
1-7/64	1.1094	28.18	.5000	12.70	6.0000	152.40	3.1250	79.38	55471	52471
1-1/8	1.1250	28.58	.5000	12.70	6.0000	152.40	3.1250	79.38	55472	52472
1-9/64	1.1406	28.97	.5000	12.70	6.0000	152.40	3.1250	79.38	55473	52473
1-5/32	1.1562	29.37	.5000	12.70	6.0000	152.40	3.1250	79.38	55474	52474
1-11/64	1.1719	29.77	.5000	12.70	6.0000	152.40	3.1250	79.38	55475	52475
1-3/16	1.1875	30.16	.5000	12.70	6.0000	152.40	3.1250	79.38	55476	52476
1-13/64	1.2031	30.56	.5000	12.70	6.0000	152.40	3.1250	79.38	55477	52477
1-7/32	1.2188	30.96	.5000	12.70	6.0000	152.40	3.1250	79.38	55478	52478
1-15/64	1.2344	31.35	.5000	12.70	6.0000	152.40	3.1250	79.38	55479	52479
1-1/4	1.2500	31.75	.5000	12.70	6.0000	152.40	3.1250	79.38	55480	52480
1-17/64	1.2656	32.15	.5000	12.70	6.0000	152.40	3.1250	79.38	55481	52481
1-9/32	1.2812	32.54	.5000	12.70	6.0000	152.40	3.1250	79.38	55482	52482
1-19/64	1.2969	32.94	.5000	12.70	6.0000	152.40	3.1250	79.38	55483	52483
1-5/16	1.3125	33.34	.5000	12.70	6.0000	152.40	3.1250	79.38	55484	52484

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1/2" Reduced Shank Silver & Deming (continued)
Styles 190, 190F

INCH and METRIC SIZES

Drill Diameter			Shank Diameter		Overall Length		Flute Length		**Style 190**	**Style 190F**
Fraction	Decimal	mm	Inch	mm	Inch	mm	inch	mm	Round	Flatted
1-21/64	1.3281	33.73	.5000	12.70	6.0000	152.40	3.1250	79.38	55485	52485
1-11/32	1.3438	34.13	.5000	12.70	6.0000	152.40	3.1250	79.38	55486	52486
1-23/64	1.3594	34.53	.5000	12.70	6.0000	152.40	3.1250	79.38	55487	52487
1-3/8	1.3750	34.93	.5000	12.70	6.0000	152.40	3.1250	79.38	55488	52488
1-25/64	1.3906	35.32	.5000	12.70	6.0000	152.40	3.1250	79.38	55489	52489
1-13/32	1.4062	35.72	.5000	12.70	6.0000	152.40	3.1250	79.38	55490	52490
1-27/64	1.4219	36.12	.5000	12.70	6.0000	152.40	3.1250	79.38	55491	52491
1-7/16	1.4375	36.51	.5000	12.70	6.0000	152.40	3.1250	79.38	55492	52492
1-29/64	1.4531	36.91	.5000	12.70	6.0000	152.40	3.1250	79.38	55493	52493
1-15/32	1.4688	37.31	.5000	12.70	6.0000	152.40	3.1250	79.38	55494	52494
1-31/64	1.4844	37.70	.5000	12.70	6.0000	152.40	3.1250	79.38	55495	52495
1-1/2	1.5000	38.10	.5000	12.70	6.0000	152.40	3.1250	79.38	55496	52496

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1/2" Reduced Shank Silver & Deming (continued)
Styles 190, 190F

INCH SETS

Sets in Various Cases

Number of Tools	Size Range	Case Style	**Style 190** Round	**Style 190F** Flatted
8	9/16 - 1 X 1/16	plastic	57840	69860
8	9/16 - 1 X 1/16	metal	69857	69859
16	17/32 - 1 X 1/32	pouch	69890	69849
33	1/2 - 1 X 1/64	metal stand	69858	69848

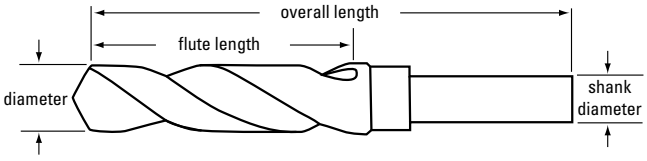
Set 69859

1/4" Reduced Shank Silver & Deming
Style 239

Features/Benefits:
- General-purpose drills with 1/4" reduced round shank.
- Manufactured from high-speed steel.
- 118° point.
- Ideal for portable drilling due to increased rigidity.
- Black oxide finish standard from stock.

Application Information:
- wood
- sheet metal
- aluminum
- mild steels
- Ideal for use in portable electric drills where chuck capacity is 1/4".

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.



INCH SIZES

Drill Diameter Fraction	Drill Diameter Decimal	Drill Diameter mm	Shank Diameter Inch	Shank Diameter mm	Overall Length Inch	Overall Length mm	Flute Length inch	Flute Length mm	**Style 239** black oxide
1/4	.2500	6.35	.2500	6.35	2.5000	63.50	1.3750	34.93	56316
5/16	.3125	7.94	.2500	6.35	2.8125	71.44	1.3750	34.93	56320
3/8	.3750	9.53	.2500	6.35	3.1250	79.38	1.6875	42.86	56324
7/16	.4375	11.11	.2500	6.35	3.4375	87.31	2.0000	50.80	56328
1/2	.5000	12.70	.2500	6.35	3.7500	95.25	2.2500	57.15	56332

INCH SETS

Sets in Metal Case

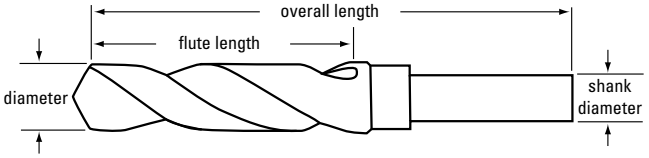
Number of Tools	Size Range	Case Style	**Style 239** black oxide
5	1/4 - 1/2 X 1/16	metal	56340

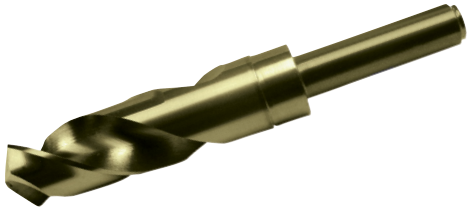
Cobalt Split Point 1/2" Reduced Shank Silver & Deming
Styles 190C, 190C-TN

Features/Benefits:
- Larger size general-purpose drills with 1/2" reduced shank.
- Manufactured from cobalt premium high-speed steel for use in highly abrasive applications.
- 118° split point for easier, more precise penetration.
- Standard 6" overall length and 3-1/8" flute length for increased rigidity, less deflection, and better hole accuracy.
- Standardized lengths result in minimal adjustment during tool changes in screw machines and machining centers.
- Ideal for portable drilling due to increased rigidity.
- Straw finish and TiN coating standard from stock.

Application Information:
- carbon steel
- alloy steel
- cast iron
- Use wherever maximum chuck capacity is 1/2".

Surface Treatment Information:
- Straw finish adds lubricity and easily identifies cobalt drills.
- Titanium nitride (TiN) coating adds lubricity and hardness, enhancing chip flow, finish hole quality, and drill life.





Style 190C Straw Finish

Style 190C-TN TiN-coated

INCH SIZES

Drill Diameter			Shank Diameter		Overall Length		Flute Length		Style 190C	Style 190C-TN
Fraction	Decimal	mm	Inch	mm	Inch	mm	inch	mm	Straw	TiN
1/2	.5000	12.70	.5000	12.70	6.0000	152.40	3.1250	79.38	53432	53400
33/64	.5156	13.10	.5000	12.70	6.0000	152.40	3.1250	79.38	53433	53401
17/32	.5312	13.49	.5000	12.70	6.0000	152.40	3.1250	79.38	53434	53634
35/64	.5469	13.89	.5000	12.70	6.0000	152.40	3.1250	79.38	53435	53402
9/16	.5625	14.29	.5000	12.70	6.0000	152.40	3.1250	79.38	53436	53636
37/64	.5781	14.68	.5000	12.70	6.0000	152.40	3.1250	79.38	53437	53403
19/32	.5938	15.08	.5000	12.70	6.0000	152.40	3.1250	79.38	53438	53638
39/64	.6094	15.48	.5000	12.70	6.0000	152.40	3.1250	79.38	53439	53404
5/8	.6250	15.88	.5000	12.70	6.0000	152.40	3.1250	79.38	53440	53640
41/64	.6406	16.27	.5000	12.70	6.0000	152.40	3.1250	79.38	53441	53405
21/32	.6562	16.67	.5000	12.70	6.0000	152.40	3.1250	79.38	53442	53642
43/64	.6719	17.07	.5000	12.70	6.0000	152.40	3.1250	79.38	53443	53406
11/16	.6875	17.46	.5000	12.70	6.0000	152.40	3.1250	79.38	53444	53644
45/64	.7031	17.86	.5000	12.70	6.0000	152.40	3.1250	79.38	53445	53407
23/32	.7188	18.26	.5000	12.70	6.0000	152.40	3.1250	79.38	53446	53646
47/64	.7344	18.65	.5000	12.70	6.0000	152.40	3.1250	79.38	53447	53408
3/4	.7500	19.05	.5000	12.70	6.0000	152.40	3.1250	79.38	53448	53648

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Cobalt Split Point 1/2" Reduced Shank Silver & Deming (continued) Styles 190C, 190C-TN

INCH SIZES

Drill Diameter			Shank Diameter		Overall Length		Flute Length		Style 190C	Style 190C-TN
Fraction	Decimal	mm	Inch	mm	Inch	mm	inch	mm	Straw	TiN
49/64	.7656	19.45	.5000	12.70	6.0000	152.40	3.1250	79.38	53449	53409
25/32	.7812	19.84	.5000	12.70	6.0000	152.40	3.1250	79.38	53450	53650
51/64	.7969	20.24	.5000	12.70	6.0000	152.40	3.1250	79.38	53451	53410
13/16	.8125	20.64	.5000	12.70	6.0000	152.40	3.1250	79.38	53452	53652
53/64	.8281	21.03	.5000	12.70	6.0000	152.40	3.1250	79.38	53453	53411
27/32	.8438	21.43	.5000	12.70	6.0000	152.40	3.1250	79.38	53454	53654
55/64	.8594	21.83	.5000	12.70	6.0000	152.40	3.1250	79.38	53455	53412
7/8	.8750	22.23	.5000	12.70	6.0000	152.40	3.1250	79.38	53456	53656
57/64	.8906	22.62	.5000	12.70	6.0000	152.40	3.1250	79.38	53457	53413
29/32	.9062	23.02	.5000	12.70	6.0000	152.40	3.1250	79.38	53458	53658
59/64	.9219	23.42	.5000	12.70	6.0000	152.40	3.1250	79.38	53459	53414
15/16	.9375	23.81	.5000	12.70	6.0000	152.40	3.1250	79.38	53460	53660
61/64	.9531	24.21	.5000	12.70	6.0000	152.40	3.1250	79.38	53461	53415
31/32	.9688	24.61	.5000	12.70	6.0000	152.40	3.1250	79.38	53462	53662
63/64	.9844	25.00	.5000	12.70	6.0000	152.40	3.1250	79.38	53463	53416
1	1.0000	25.40	.5000	12.70	6.0000	152.40	3.1250	79.38	53464	53664
1-1/16	1.0625	26.99	.5000	12.70	6.0000	152.40	3.1250	79.38	53468	53417
1-1/8	1.1250	28.58	.5000	12.70	6.0000	152.40	3.1250	79.38	53472	53418
1-3/16	1.1875	30.16	.5000	12.70	6.0000	152.40	3.1250	79.38	53475	53419
1-1/4	1.2500	31.75	.5000	12.70	6.0000	152.40	3.1250	79.38	53480	53420
1-3/8	1.3750	34.93	.5000	12.70	6.0000	152.40	3.1250	79.38	53488	53421
1-1/2	1.5000	38.10	.5000	12.70	6.0000	152.40	3.1250	79.38	53496	53422

INCH SETS

Sets in Metal Case

Number of Tools	Size Range	Case Style	Style 190C Straw
8	9/16 - 1 X 1/16	metal	69868

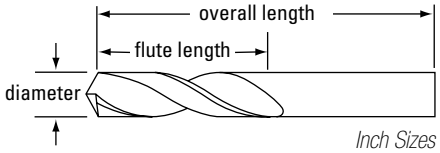
Set 69868

Drills - Solid Carbide

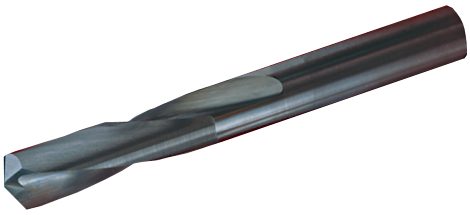
Solid Carbide Stub Length
Style 759

Features/Benefits:
- 2 flutes, right-hand spiral, right-hand cut.
- Manufactured from solid submicron grain carbide.
- 118° 4-facet point.
- Stub length for rigid setups.
- Uncoated drills standard from stock.

Application Information:
- cast iron
- stainless steel
- high-temp alloys
- hardened material



Inch Sizes



INCH SIZES

Drill Diameter				Overall Length		Flute Length		Style 759
Fraction	Wire	Decimal	mm	Inch	mm	Inch	mm	Uncoated
	53	.0595	1.51	1.5000	38.10	.3750	9.53	78692
1/16		.0625	1.59	1.5000	38.10	.3750	9.53	78700
	52	.0635	1.61	1.5000	38.10	.3750	9.53	78691
	51	.0670	1.70	1.5000	38.10	.3750	9.53	78690
	50	.0700	1.78	1.5000	38.10	.3750	9.53	78689
	49	.0730	1.85	1.5000	38.10	.3750	9.53	78688
	48	.0760	1.93	1.5000	38.10	.5000	12.70	78687
5/64		.0781	1.98	1.5000	38.10	.5000	12.70	78701
	47	.0785	1.99	1.5000	38.10	.5000	12.70	78686
	46	.0810	2.06	1.5000	38.10	.5000	12.70	78685
	45	.0820	2.08	1.5000	38.10	.5000	12.70	78684
	44	.0860	2.18	2.0000	50.80	.5000	12.70	78683
	43	.0890	2.26	2.0000	50.80	.5000	12.70	78682
	42	.0935	2.37	2.0000	50.80	.5000	12.70	78681
3/32		.0938	2.38	2.0000	50.80	.5000	12.70	78702
	41	.0960	2.44	2.0000	50.80	.5000	12.70	78680
	40	.0980	2.49	2.0000	50.80	.6250	15.88	78679
	39	.0995	2.53	2.0000	50.80	.6250	15.88	78678
	38	.1015	2.58	2.0000	50.80	.6250	15.88	78677
	37	.1040	2.64	2.0000	50.80	.6250	15.88	78676
	36	.1065	2.71	2.0000	50.80	.6250	15.88	78675
7/64		.1094	2.78	2.0000	50.80	.6250	15.88	78703
	35	.1100	2.79	2.0000	50.80	.6250	15.88	78674
	34	.1110	2.82	2.0000	50.80	.6250	15.88	78673
	33	.1130	2.87	2.0000	50.80	.6250	15.88	78672
	32	.1160	2.95	2.0000	50.80	.6250	15.88	78671
	31	.1200	3.05	2.0000	50.80	.6250	15.88	78670
1/8		.1250	3.18	2.0000	50.80	.6250	15.88	78704
	30	.1285	3.26	2.0000	50.80	.6250	15.88	78669
	29	.1360	3.45	2.0000	50.80	.6250	15.88	78668
	28	.1405	3.57	2.0000	50.80	.6250	15.88	78667
9/64		.1406	3.57	2.0000	50.80	.6250	15.88	78705
	27	.1440	3.66	2.0000	50.80	.6250	15.88	78666

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Solid Carbide Stub Length (continued)
Style 759

INCH AND METRIC SIZES

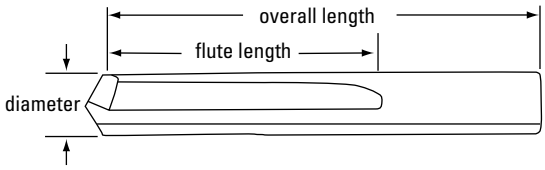
Fraction	Drill Diameter Wire	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 759 Uncoated
	26	.1470	3.73	2.0000	50.80	.6250	15.88	78665
	25	.1495	3.80	2.0000	50.80	.6250	15.88	78664
	24	.1520	3.86	2.0000	50.80	.6250	15.88	78663
	23	.1540	3.91	2.0000	50.80	.6250	15.88	78662
5/32		.1563	3.97	2.0000	50.80	.7500	19.05	78706
	22	.1570	3.99	2.0000	50.80	.7500	19.05	78661
	21	.1590	4.04	2.0000	50.80	.7500	19.05	78660
	20	.1610	4.09	2.0000	50.80	.7500	19.05	78659
	19	.1660	4.22	2.1250	53.98	.7500	19.05	78658
	18	.1695	4.31	2.1250	53.98	.7500	19.05	78657
11/64		.1719	4.37	2.1250	53.98	.7500	19.05	78707
	17	.1730	4.39	2.1250	53.98	.7500	19.05	78656
	16	.1770	4.50	2.1250	53.98	.7500	19.05	78655
	15	.1800	4.57	2.1875	55.56	.7500	19.05	78654
	14	.1820	4.62	2.1875	55.56	.7500	19.05	78653
	13	.1850	4.70	2.1875	55.56	.7500	19.05	78652
3/16		.1875	4.76	2.1875	55.56	.7500	19.05	78708
	12	.1890	4.80	2.1875	55.56	.7500	19.05	78651
	11	.1910	4.85	2.1875	55.56	.7500	19.05	78650
	10	.1935	4.91	2.1875	55.56	.7500	19.05	78649
	9	.1960	4.98	2.2500	57.15	.7500	19.05	78648
	8	.1990	5.05	2.2500	57.15	.7500	19.05	78647
	7	.2010	5.11	2.2500	57.15	.7500	19.05	78646
13/64		.2031	5.16	2.2500	57.15	.7500	19.05	78709
	6	.2040	5.18	2.2500	57.15	.7500	19.05	78645
	5	.2055	5.22	2.2500	57.15	.7500	19.05	78644
	4	.2090	5.31	2.2500	57.15	.7500	19.05	78643
	3	.2130	5.41	2.5000	63.50	1.0000	25.40	78642
7/32		.2188	5.56	2.5000	63.50	1.0000	25.40	78710
	2	.2210	5.61	2.5000	63.50	1.0000	25.40	78641
	1	.2280	5.79	2.5000	63.50	1.0000	25.40	78640
15/64		.2344	5.95	2.5000	63.50	1.0000	25.40	78711
1/4		.2500	6.35	2.5000	63.50	1.0000	25.40	78712
17/64		.2656	6.75	2.5000	63.50	1.0000	25.40	78713
9/32		.2813	7.14	2.5000	63.50	1.0000	25.40	78714
19/64		.2969	7.54	2.5000	63.50	1.2500	31.75	78715
5/16		.3125	7.94	2.5000	63.50	1.2500	31.75	78716
21/64		.3281	8.33	2.5000	63.50	1.2500	31.75	78717
11/32		.3438	8.73	2.5000	63.50	1.2500	31.75	78718
23/64		.3594	9.13	2.5000	63.50	1.2500	31.75	78719
3/8		.3750	9.53	2.7500	69.85	1.2500	31.75	78720
25/64		.3906	9.92	2.7500	69.85	1.2500	31.75	78721
13/32		.4063	10.32	2.7500	69.85	1.2500	31.75	78722
27/64		.4219	10.72	2.7500	69.85	1.2500	31.75	78723
7/16		.4375	11.11	2.7500	69.85	1.2500	31.75	78724
29/64		.4531	11.51	3.0000	76.20	1.2500	31.75	78725
15/32		.4688	11.91	3.0000	76.20	1.2500	31.75	78726
31/64		.4844	12.30	3.0000	76.20	1.2500	31.75	78727
1/2		.5000	12.70	3.0000	76.20	1.2500	31.75	78728

Drills - Solid Carbide

Solid Carbide Straight Flute
Style 769

Features/Benefits:
- 2 straight flutes, right-hand cut.
- Manufactured from solid submicron grain carbide.
- 140° point.
- Regular length.
- Uncoated drills standard from stock.

Application Information:
- non-ferrous materials
- hardened materials
- stainless steel
- Normally limited to 2 x diameter drilling depths.



INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 769 Uncoated
	60	.0400	1.02	1.5000	38.10	.5000	12.70	78560
	59	.0410	1.04	1.5000	38.10	.5000	12.70	78559
	58	.0420	1.07	1.5000	38.10	.5000	12.70	78558
	57	.0430	1.09	1.5000	38.10	.5000	12.70	78557
	56	.0465	1.18	1.5000	38.10	.5000	12.70	78556
3/64		.0469	1.19	1.5000	38.10	.5000	12.70	78587
	55	.0520	1.32	1.5000	38.10	.5000	12.70	78555
	54	.0550	1.40	1.5000	38.10	.5000	12.70	78554
	53	.0595	1.51	1.5000	38.10	.5000	12.70	78553
1/16		.0625	1.59	1.6250	41.28	.6250	15.88	78588
	52	.0635	1.61	1.6875	42.86	.6875	17.46	78552
	51	.0670	1.70	1.6875	42.86	.6875	17.46	78551
	50	.0700	1.78	1.6875	42.86	.6875	17.46	78550
	49	.0730	1.85	1.6875	42.86	.6875	17.46	78549
	48	.0760	1.93	1.6875	42.86	.6875	17.46	78548
5/64		.0781	1.98	1.6875	42.86	.6875	17.46	78589
	47	.0785	1.99	1.7500	44.45	.7500	19.05	78547
	46	.0810	2.06	1.7500	44.45	.7500	19.05	78546
	45	.0820	2.08	1.7500	44.45	.7500	19.05	78545
	44	.0860	2.18	1.7500	44.45	.7500	19.05	78544
	43	.0890	2.26	1.7500	44.45	.7500	19.05	78543
	42	.0935	2.37	1.7500	44.45	.7500	19.05	78542
3/32		.0938	2.38	1.7500	44.45	.7500	19.05	78590
	41	.0960	2.44	1.8125	46.04	.8125	20.64	78541
	40	.0980	2.49	1.8125	46.04	.8125	20.64	78540
	39	.0995	2.53	1.8125	46.04	.8125	20.64	78539
	38	.1015	2.58	1.8125	46.04	.8125	20.64	78538
	37	.1040	2.64	1.8125	46.04	.8125	20.64	78537
	36	.1065	2.71	1.8125	46.04	.8125	20.64	78536
7/64		.1094	2.78	1.8125	46.04	.8125	20.64	78591
	35	.1100	2.79	1.8750	47.63	.8750	22.23	78535
	34	.1110	2.82	1.8750	47.63	.8750	22.23	78534
	33	.1130	2.87	1.8750	47.63	.8750	22.23	78533
	32	.1160	2.95	1.8750	47.63	.8750	22.23	78532
	31	.1200	3.05	1.8750	47.63	.8750	22.23	78531
1/8		.1250	3.18	1.8750	47.63	.8750	22.23	78592

continued on next page

Solid Carbide Straight Flute (continued)
Style 769

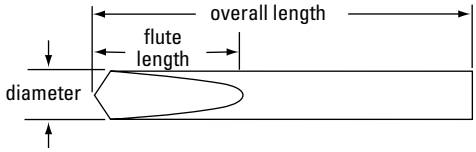
INCH SIZES

Fraction	Drill Diameter Wire/Let	Decimal	mm	Overall Length Inch	mm	Flute Length Inch	mm	Style 769 Uncoated
	30	.1285	3.26	1.9375	49.21	.9375	23.81	78530
	29	.1360	3.45	1.9375	49.21	.9375	23.81	78529
	28	.1405	3.57	1.9375	49.21	.9375	23.81	78528
9/64		.1406	3.57	1.9375	49.21	.9375	23.81	78593
	27	.1440	3.66	2.0625	52.39	1.0000	25.40	78527
	26	.1470	3.73	2.0625	52.39	1.0000	25.40	78526
	25	.1495	3.80	2.0625	52.39	1.0000	25.40	78525
	24	.1520	3.86	2.0625	52.39	1.0000	25.40	78524
	23	.1540	3.91	2.0625	52.39	1.0000	25.40	78523
5/32		.1563	3.97	2.0625	52.39	1.0000	25.40	78594
	22	.1570	3.99	2.1250	53.98	1.0625	26.99	78522
	21	.1590	4.04	2.1250	53.98	1.0625	26.99	78521
	20	.1610	4.09	2.1250	53.98	1.0625	26.99	78520
	19	.1660	4.22	2.1250	53.98	1.0625	26.99	78519
	18	.1695	4.31	2.1250	53.98	1.0625	26.99	78518
11/64		.1719	4.37	2.1250	53.98	1.0625	26.99	78595
	17	.1730	4.39	2.1875	55.56	1.1250	28.58	78517
	16	.1770	4.50	2.1875	55.56	1.1250	28.58	78516
	15	.1800	4.57	2.1875	55.56	1.1250	28.58	78515
	14	.1820	4.62	2.1875	55.56	1.1250	28.58	78514
	13	.1850	4.70	2.1875	55.56	1.1250	28.58	78513
3/16		.1875	4.76	2.1875	55.56	1.1250	28.58	78596
	12	.1890	4.80	2.2500	57.15	1.1875	30.16	78512
	11	.1910	4.85	2.2500	57.15	1.1875	30.16	78511
	10	.1935	4.91	2.2500	57.15	1.1875	30.16	78510
	9	.1960	4.98	2.2500	57.15	1.1875	30.16	78509
	8	.1990	5.05	2.2500	57.15	1.1875	30.16	78508
	7	.2010	5.11	2.2500	57.15	1.1875	30.16	78507
13/64		.2031	5.16	2.2500	57.15	1.1875	30.16	78597
	6	.2040	5.18	2.3750	60.33	1.2500	31.75	78506
	5	.2055	5.22	2.3750	60.33	1.2500	31.75	78505
	4	.2090	5.31	2.3750	60.33	1.2500	31.75	78504
	3	.2130	5.41	2.3750	60.33	1.2500	31.75	78503
7/32		.2188	5.56	2.3750	60.33	1.2500	31.75	78598
	2	.2210	5.61	2.4375	61.91	1.4375	36.51	78502
	1	.2280	5.79	2.4375	61.91	1.4375	36.51	78501
15/64		.2344	5.95	2.4375	61.91	1.3125	33.34	78599
1/4		.2500	6.35	2.5000	63.50	1.3750	34.93	78600
17/64		.2656	6.75	2.6250	66.68	1.4375	36.51	78601
9/32		.2813	7.14	2.6875	68.26	1.5000	38.10	78602
19/64		.2969	7.54	2.7500	69.85	1.5625	39.69	78603
5/16		.3125	7.94	2.8125	71.44	1.6250	41.28	78604
21/64		.3281	8.33	2.9375	74.61	1.6845	42.79	78605
11/32		.3438	8.73	3.0000	76.20	1.6875	42.86	78606
23/64		.3594	9.13	3.0625	77.79	1.7500	44.45	78607
3/8		.3750	9.53	3.1250	79.38	1.8125	46.04	78608
25/64		.3906	9.92	3.2500	82.55	1.8750	47.63	78609
13/32		.4063	10.32	3.3125	84.14	1.9375	49.21	78610
27/64		.4219	10.72	3.3750	85.73	2.0000	50.80	78611
7/16		.4375	11.11	3.4375	87.31	2.0625	52.39	78612
29/64		.4531	11.51	3.5625	90.49	2.1250	53.98	78613
15/32		.4688	11.91	3.6250	92.08	2.1250	53.98	78614
31/64		.4844	12.30	3.6875	93.66	2.1875	55.56	78615
1/2		.5000	12.70	3.7500	95.25	2.2500	57.15	78616

Solid Carbide Spade Drill
Style 780

Features/Benefits:
- 2 straight flutes.
- Manufactured from solid submicron grain carbide.
- 118° point.
- Stub length for rigid setups.
- Uncoated drills standard from stock.

Application Information:
- non-ferrous materials
- hardened materials
- stainless steel
- Ideal for shallow-hole and thin-sheet applications.



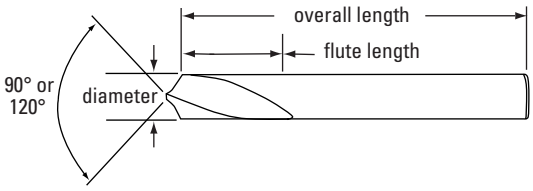
INCH SIZES

Drill Diameter			Overall Length		Flute Length		Style 780
Fraction	Decimal	mm	Inch	mm	Inch	mm	Uncoated
1/32	.0313	0.80	1.5000	38.10	.1875	4.76	78481
1/16	.0625	1.59	1.5000	38.10	.3125	7.94	78482
3/32	.0938	2.38	1.5000	38.10	.4375	11.11	78483
1/8	.1250	3.18	1.5000	38.10	.4375	11.11	78484
5/32	.1563	3.97	2.0000	50.80	.4688	11.91	78485
3/16	.1875	4.76	2.0000	50.80	.5625	14.29	78486
7/32	.2188	5.56	2.0000	50.80	.5938	15.08	78487
1/4	.2500	6.35	2.0000	50.80	.6875	17.46	78488
9/32	.2813	7.15	2.5000	63.50	.7500	19.05	78489
5/16	.3125	7.94	2.5000	63.50	.8750	22.23	78490
11/32	.3438	8.73	2.5000	63.50	.9375	23.81	78491
3/8	.3750	9.53	2.5000	63.50	1.0000	25.40	78492

Solid Carbide Spotting Drill
Style 790

Features/Benefits:
- 2 flutes, right-hand spiral, right-hand cut.
- Manufactured from solid submicron grain carbide.
- Available in 90° and 120° point.
- Stub length for rigid setups.
- Uncoated drills standard from stock.

Application Information:
- steel
- non-ferrous materials
- high-temp alloys
- Designed for general-purpose applications in a wide variety of materials.



INCH SIZES

Drill Diameter			Overall Length		Flute Length		Style 790	
Fraction	Decimal	mm	Inch	mm	Inch	mm	90°	120°
1/4	.2500	6.35	2.5000	63.50	.7500	19.05	78220	78221
3/8	.3750	9.53	3.1250	79.38	.8750	22.23	78222	78223
1/2	.5000	12.70	3.7500	95.25	1.1250	28.58	78224	78225
5/8	.6250	15.88	4.2500	107.95	1.1875	30.16	78226	78227
3/4	.7500	19.05	5.0000	127.00	1.3125	33.34	78228	78229

High-speed steel spotting drills are listed on page 102.

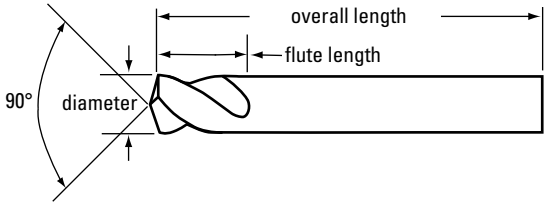
Short Length and Regular Length Spotting Drill Style 90SPS, 90SPR

Features/Benefits:
- Short flute length results in accurate location of spotting hole for 118° drills.
- Manufactured from premium high-speed steel.
- Standard 90° point.
- Short overall length for applications with restricted clearance space.
- Bright drills standard from stock.

Application Information:
- carbon steel
- tool steel
- alloy steel

Style 90SPS

Style 90SPR



INCH SIZES – SHORT LENGTH

Drill Diameter			Overall Length		Flute Length		**Style 90SPS**
Fraction	Decimal	mm	Inch	mm	Inch	mm	Bright
1/4	.2500	6.35	2.5000	63.50	1.0000	25.40	49490
3/8	.3750	9.53	3.1250	79.37	1.1250	28.58	49491
1/2	.5000	12.70	3.7500	95.25	1.5000	38.10	49492
5/8	.6250	15.88	4.2500	107.95	1.6250	41.28	49493
3/4	.7500	19.05	5.0000	127.00	1.7500	44.45	49494
1	1.0000	25.40	6.0000	152.40	1.7500	44.45	49495

INCH SIZES – REGULAR LENGTH

Drill Diameter			Overall Length		Flute Length		**Style 90SPR**
Fraction	Decimal	mm	Inch	mm	Inch	mm	Bright
1/4	.2500	6.35	4.0000	101.60	1.0000	25.40	49496
3/8	.3750	9.53	5.0000	127.00	1.1250	28.58	49497
1/2	.5000	12.70	6.0000	152.40	1.5000	38.10	49498
5/8	.6250	15.88	7.1250	180.98	1.6250	41.28	49499
3/4	.7500	19.05	8.0000	203.20	1.7500	44.45	49500
1	1.0000	25.40	8.0000	203.20	1.7500	44.45	49501

Drill Tolerances / Specifications / Surface Treatment

Drill Diameter Tolerances

Diameter Range (inches)	Plus (+) (inches)	Minus (–) (inches)
through 1/8	.0000	.0005
over 1/8 through 1/4	.0000	.0007
over 1/4 through 1/2	.0000	.0010
over 1/2 through 1	.0000	.0012
over 1 through 2	.0000	.0015
over 2 through 3-1/2	.0000	.0020

Drill Lip Height Tolerances

Diameter Range (inches)	Total Indicator Variation (inches)
1/16 through 1/8	.0020
over 1/8 through 1/4	.0030
over 1/4 through 1/2	.0040
over 1/2 through 1	.0050
over 1 through 3-1/2	.0060

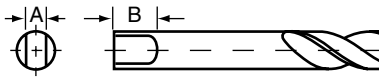
Drill Overall Length and Flute Length Tolerances

Diameter Range (inches)	Plus (+) (inches)	Minus (–) (inches)
#80 through 1/8	.1250	.0625
over 1/8 through 1/2	.1250	.1250
over 1/2 through 1	.2500	.1250
over 1 through 2	.2500	.2500
over 2 through 3-1/2	.3750	.3750

Drill Point Angle Tolerances

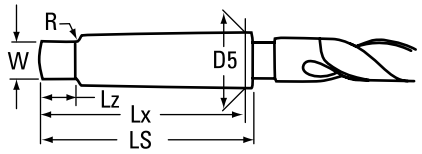
Diameter Range (inches)	Included Angle (degrees)	Tolerance (degrees)
1/16 through 1/2	118° or 135°	± 5°
over 1/2 through 1-1/2	118°	± 3°
over 1-1/2 through 3-1/2	118°	± 2°

Tang Specifications (inches)



Shank Diameter from	Shank Diameter to	Tang Dimensions **A** width	Tang Dimensions **B** length
1/8	3/16	.092	9/32
over 3/16	1/4	.120	5/16
over 1/4	5/16	.160	11/3
over 5/16	3/8	.201	3/8
over 3/8	15/32	.241	7/16
over 15/32	9/16	.300	1/2
over 9/16	21/32	.370	9/16
over 21/32	3/4	.440	5/8
over 3/4	7/8	.511	11/16
over 7/8	1	.605	3/4
over 1-3/16	1-3/8	.813	7/8

Morse Taper Shank Specifications



morse taper shank number	taper per foot	taper per inch	**D5** maximum shank dia.	**LS** length of shank	**Lx** length of shank to gage line	**Lz** length of tang	**W** thickness of tang	**R** radius
1	.5985	.0498	.475	2.56	2.44	.37	.20	.19
2	.5994	.0499	.700	3.12	2.94	.44	.25	.25
3	.6023	.0501	.938	3.87	3.69	.56	.31	.28
4	.6232	.0519	1.231	4.87	4.62	.62	.47	.31
5	.6315	.0526	1.749	6.12	5.87	.75	.62	.37
6	.6256	.0521	2.494	8.56	8.25	1.12	.75	.50

Surface Treatments for Drills

	Recommended Applications	Precautions
Black Oxide	For ferrous materials; improves lubricity and increases wear resistance, improving chip flow.	Avoid in aluminum and other non-ferrous materials.
TiN (Titanium Nitride)	For ferrous and non-metallic materials: free-machining steels and irons, high tensile steels, tough machining steels, plastics, hard rubber, and fiber. The hard, smooth finish increases tool life, improves finish, and allows higher speeds.	Avoid titanium and titanium alloys due to tendency to gall.
TiCN (Titanium Carbonitride)	For ferrous and non-ferrous materials: cast iron, aluminum, stainless steel, brass, abrasive materials, high-silicon automotive aluminum, glass-filled plastics, and composites. The hard, smooth finish increases tool life and improves finish.	Use with caution in titanium, titanium alloys, and aluminum die casting due to tendency to gall.
TiAlN (Titanium Aluminum Nitride)	For ferrous materials, high-temperature alloys, and titanium; stainless steels, gray cast irons or nodular irons, and steels containing high-nickel, cobalt, chromium, and tungsten. Most effective where higher speeds are available.	Avoid in most non-ferrous materials.

Drills - Technical Information

Drill Selection and Application

Ferrous Materials

materials		Hardness - Brinell	geometry class	SFM surface feet per minute	recommended coolant
Carbon Steel	Low	85 - 125	General Purpose or Wide Land Parabolic	80 - 95	Soluble Oil
	Medium	125 - 175	General Purpose or Wide Land Parabolic	70 - 85	Soluble Oil
	High	175 - 225	Heavy-Duty or Wide Land Parabolic	45 - 65	Soluble Oil
Alloyed Steels		< 200	General Purpose or Wide Land Parabolic	60 - 90	Soluble Oil
		200 - 300	Heavy-Duty or Wide Land Parabolic	40 - 70	Soluble Oil
		> 300	Cobalt Heavy-Duty or Wide Land Parabolic	20 - 30	Soluble Oil
Steel Drop Forgings	Heat Treated	330 - 370	Cobalt Heavy-Duty or Wide Land Parabolic	30 - 40	Cutting Oil
		370 - 420	Cobalt Heavy-Duty	20 - 30	Cutting Oil
		> 420	Cobalt Heavy-Duty	10 - 20	Cutting Oil
Grey Cast Iron	Soft	125	General Purpose or Wide Land Parabolic	140 - 150	Dry
	Medium	120 - 200	Heavy-Duty or Wide Land Parabolic	50 - 80	Soluble Oil
	Hard	200 - 350	Heavy-Duty or Wide Land Parabolic	25 - 40	Soluble Oil
Titanium	Titanium Alloys Ti 75A	300 - 440	Cobalt Heavy-Duty	50 - 60	Cutting Oil
	Ti 150A, RS 120	300 - 440	Cobalt Heavy-Duty	40 - 50	Cutting Oil
	Ti 140A, RC 130B	300 - 440	Cobalt Heavy-Duty	30 - 40	Cutting Oil
	Ti 6AL 4V	300 - 440	Cobalt Heavy-Duty	20 - 30	Cutting Oil
Stainless Steel	300 Series	120 - 200	Cobalt Heavy-Duty	20 - 40	Cutting Oil
	400 Series	200 - 300	Cobalt Heavy-Duty or Wide Land Parabolic	40 - 70	Cutting Oil
	Martensitic 416, 420, F416 Plus K, 400F, 416SE, 440F	135 - 185	Cobalt Heavy-Duty or Wide Land Parabolic	40 - 50	Cutting Oil
	Precipitation Hardening, Cast	325 - 375	Cobalt Heavy-Duty	30	Cutting Oil
	Precipitation Hardening, Cast	400 - 450	Cobalt Heavy-Duty or Wide Land Parabolic	20	Cutting Oil
Steel	Heat-Resisting	175 - 225	Cobalt Heavy-Duty or Wide Land Parabolic	10 - 25	Cutting Oil
	Nimonic Alloys	200 - 300	Cobalt Heavy-Duty	10 - 20	Cutting Oil
Manganese	12% - 14% minimum	125 - 220	Heavy-Duty or Wide Land Parabolic	10 - 12	Cutting Oil
Spring Steels		402	Cobalt Heavy-Duty	15 - 30	Soluble Oil
Armor Plate		200 - 300	Cobalt Heavy-Duty	40	Soluble Oil
		250 - 300	Cobalt Heavy-Duty	35	Soluble Oil
		300 - 350	Cobalt Heavy-Duty	30	Cutting Oil

Non-ferrous material		Hardness Brinnel	geometry class	SFM Surface Feet per Minute	recommended coolant
Aluminum	Pure	140 - 350	Fast Spiral	130 - 200	Soluble Oil
	Alloys	140 - 330	Fast Spiral	150 - 300	Soluble Oil
	Leaded	40 - 100	Fast Spiral	200 - 325	Soluble Oil
	Silicon Alloy Die Cast	40 - 100	Fast Spiral	25 - 50	Soluble Oil
Brass		190 - 210	Slow Spiral	200 - 250	Cutting Oil or Soluble Oil
Bronze		150 - 200	Slow Spiral	200 - 250	Soluble Oil
Copper	Nickel Copper Tin Alloy	65 - 100	General Purpose (bright only)	140 - 200	Cutting Oil or Soluble Oil
	Copper Aluminum Alloy	30 - 100	General Purpose (bright only)	120 - 200	
Magnesium Alloys	Wrought	50 - 90	General Purpose (bright only)	140 - 330	Cutting Oil or Soluble Oil
Nickel Alloys	Wrought and Cast	80 - 170	General Purpose or Wide Land Parabolic	70	Cutting Oil or Soluble Oil
	Monel	115 - 240	General Purpose or Wide Land Parabolic	55	Cutting Oil or Soluble Oil
	Beryllium Nickel	200 - 250	General Purpose	12	Cutting Oil or Soluble Oil
Plastic	Thermoplastic		Fast Spiral	60 - 80	Cold Air
	Thermo-setting Plastic		Slow Spiral	50 - 60	Cold Air
Zinc Alloy		112 - 126	General Purpose	200 - 250	Soluble Oil

Determining Feed and Speed Operating Parameters

Look up the material to be drilled in the Drill Selection and Application tables on the previous page and determine the geometry class.

Determine the drill style from the Drill Style by Geometry and Length/Construction table below based on recommended drill type and drill length desired.

Review each drill style to understand the geometry differences. Select the appropriate geometry and check to ensure the desired size is available.

Preliminary speed and feed recommendations for the drill can be determined from the formulae at right.

Recommended operating parameters for high-performance drills are generally 20% faster than for conventional geometries.

Feed rates for high performance drills are heavier than for conventional geometries by 50% or more.

Drill Definitions

RPM = revolutions per minute
SFM = surface feet per minute
FR = feed rate in inches per minute
IPR = inches per revolution

Drill Formulae

RPM = 3.8 x SFM/drill diameter
SFM = 0.26 x RPM x drill diameter
FR = RPM x IPR

Drill Feeds (IPR - Inches per revolution)

Diameter Range (inches)	Normal Feeds IPR	Heavy Feed IPR
1/16 through 1/8	.001 - .002	.002 - .004
over 1/8 through 1/4	.002 - .004	.004 - .008
over 1/4 through 1/2	.004 - .008	.008 - .016
over 1/2 through 1	.008 - .016	.016 - .024
over 1	.016 - .024	.024 - .032

Drill Style by Geometry and Length/Construction

	Drill Length				
Drill Construction	machine	regular	jobber	taper	stub/screw extra
General-Purpose	157	—	150 250AN (tanged shank) 150K (split point)	120 255AN (tanged shank)	—
Left-Hand	157L	—	150L	—	—
Heavy-Duty HSS	159	—	150ASP	120F	120X 906, 912 (extension)
Heavy-Duty Cobalt	559	—	550 550ASP	520	—
Fast Spiral	—	—	150B	120B	—
Slow Spiral	759 (carbide)	—	150C CTD (carbide-tipped)	—	—
Parabolic Flute	—	—	150WLP (wide land) 150DH (deep hole)	120WLP (wide land) 120DH (deep hole)	—
Taper Shank	—	—	—	110, 110S, 510 (cobalt)	110X
Reduced Shank	—	190, 190F, 239 190C (cobalt)	—	—	—
Spade	780 (carbide)	—	—	—	—
Spotting	90SPS	90SPR	—	—	—
Straight Flute	769 (carbide)	—	—	—	—

Drill Cutting Speeds

Drill Size			Feet per Minute														
			10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
Fract	Wire/Let	Dec	Revolutions Per Minute														
	#80	.0135	2830	5659	8490	11320	14150	16980	19810	22640	25470	28300	31123	33953	36782	39612	42441
	#79	.0145	2634	5269	7902	10536	13170	15804	18438	21072	23706	26340	28988	31611	34246	36880	39514
	#78	.0160	2388	4775	7161	9548	11935	14322	16709	19096	21483	23870	26260	28648	31035	33422	35810
	#77	.0180	2122	4244	6366	8488	10610	12732	14854	16976	19098	21220	23343	25465	27587	29709	31831
	#76	.0200	1910	3820	5730	7640	9550	11460	13370	15280	17190	19100	21008	22918	24828	26738	28648
	#75	.0210	1819	3638	5457	7276	9095	10914	12733	14552	16371	18190	20008	21827	23646	25465	27284
	#74	.0225	1698	3396	5106	6808	8510	10212	11914	13616	15318	17020	18674	20372	22069	23767	25465
	#73	.0240	1592	3183	4776	6368	7960	9552	11144	12736	14328	15920	17507	19099	20690	22282	23873
	#72	.0250	1528	3056	4584	6112	7640	9168	10696	12224	13752	15280	16807	18335	19863	21390	22918
	#71	.0260	1469	2938	4419	5892	7365	8838	10311	11784	13257	14730	16160	17629	19099	20568	22037
	#70	.0280	1364	2729	4091	5456	6820	8184	9548	10912	12276	13640	15006	16370	17734	19099	20463
	#69	.0292	1308	2616	3918	5224	6530	7836	9142	1048	11754	13060	14389	15697	17006	18314	19622
	#68	.0310	1232	2465	3696	4928	6160	7392	8624	9856	11088	12320	13554	14786	16018	17250	18482
	#67	.0320	1194	2388	3582	4776	5970	7164	8358	9552	10746	11940	13130	14324	15517	16712	17905
	#66	.0330	1158	2316	3474	4632	5790	6948	8106	9264	10422	11580	12732	13890	15047	16205	17362
	#65	.0350	1091	2182	3273	4364	5455	6546	7637	8728	9819	10910	12005	13096	14187	15279	16370
	#64	.0360	1061	2122	3183	4244	5305	6366	7427	8488	9549	10610	11671	12732	13793	14854	15915
	#63	.0370	1032	2064	3096	4128	5160	6192	7224	8256	9288	10320	11366	12398	13421	14453	15485
	#62	.0380	1005	2010	3015	4020	5025	6030	7035	8040	9045	10050	11057	12060	13068	14073	15078
	#61	.0390	979	1959	2938	3918	4897	5876	6856	7835	8815	9794	10774	11753	12732	13712	14691
	#60	.0400	955	1910	2865	3820	4775	5729	6684	7639	8594	9549	10504	11459	12414	13369	14324
	#59	.0410	932	1863	2795	3726	4658	5590	6521	7453	8388	9316	10248	11180	12111	13043	13975
	#58	.0420	910	1819	2729	3637	4547	5456	6367	7275	8186	9095	10004	10913	11823	12732	13642
	#57	.0430	888	1777	2671	3561	4452	5342	6232	7122	8013	8903	9771	10660	11548	12436	13325
	#56	.0465	821	1643	2465	3286	4108	4929	5751	6572	7394	8215	9036	9857	10678	11500	12322
	#55	.0520	735	1469	2204	2938	3673	4408	5142	5877	6611	7346	8080	8815	9549	10284	11028
	#54	.0550	694	1389	2084	2778	3473	4167	4862	5556	6251	6945	7639	8334	9028	9723	10417
	#53	.0595	641	1283	1924	2566	3207	3848	4490	5131	5773	6414	7062	7704	8346	8988	9630
1/16		.0625	611	1222	1833	2445	3056	3667	4278	4889	5550	6111	6722	7334	7945	8556	9167
	#52	.0635	602	1203	1805	2406	3008	3609	4211	4812	5414	6015	6619	7218	7820	8421	9023
	#51	.0670	570	1140	1710	2280	2851	3421	3991	4561	5131	5701	6271	6841	7413	798	8552
	#50	.0700	546	1091	1637	2183	2729	3274	3820	4366	4911	5457	6002	6548	7094	7640	8185
	#49	.0730	523	1047	1570	2093	2617	3140	3663	4186	4710	5233	5756	6279	6808	7326	7849
	#48	.0760	503	1005	1508	2010	2513	3016	3518	4021	4523	5026	5528	6031	6534	7036	7539
	#47	.0785	487	973	1460	1946	2433	2920	3406	3893	4379	4866	5352	5839	6326	6812	7299
	#46	.0810	472	943	1415	1886	2358	2830	3301	3773	4244	4716	5187	5659	6130	6602	7074
	#45	.0820	466	932	1397	1863	2329	2795	3261	3726	4192	4658	5124	5590	6056	6522	6987
	#44	.0860	444	888	1333	1777	2221	2665	3109	3554	3999	4442	4886	5330	5774	6218	6662
	#43	.0890	429	858	1288	1717	2146	2575	3004	3434	3863	4292	4721	5150	5579	6008	6438
	#42	.0935	408	817	1226	1634	2043	2451	2860	3268	3677	4085	4494	4902	5311	5719	6128
	#41	.0960	398	796	1194	1592	1990	2387	2785	3183	3581	3979	4377	4775	5172	5570	5968
	#40	.0980	390	780	1169	1559	1949	2339	2729	3118	3508	3898	4287	4677	5067	5457	5846
	#39	.0995	384	768	1152	1536	1920	2303	2687	3071	3455	3839	4222	4607	4991	5374	5758
	#38	.1015	376	753	1129	1505	1882	2258	2634	3010	3387	3763	4140	4516	4892	5269	5645
	#37	.1040	367	735	1102	1469	1837	2204	2571	2938	3306	3673	4040	4407	4775	5142	5509

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Drill Cutting Speeds (continued)

Drill Size			Feet per Minute														
			10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
Fract	Wire/Let	Dec	Revolutions Per Minute														
	#36	.1065	359	717	1076	1435	1794	2152	2511	2870	3228	3587	3945	4304	4663	5021	5380
	#35	.1100	347	694	1042	1389	1736	2083	2430	2778	3125	3472	3821	4167	4514	4861	5209
	#34	.1110	344	688	1032	1376	1721	2065	2409	2753	3097	3442	3785	4129	4474	4818	5162
	#33	.1130	338	676	1014	1352	1690	2028	2366	2704	3042	3380	3718	4056	4394	4732	5070
	#32	.1160	329	659	988	1317	1647	1976	2305	2634	2964	3293	3622	3951	4281	4610	4939
	#31	.1200	318	637	955	1273	1592	1910	2228	2546	2865	3183	3501	3821	4138	4456	4775
1/8		.1250	306	611	917	1222	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	4584
	#30	.1285	297	595	892	1189	1487	1784	2081	2378	2676	2973	3270	3567	3864	4162	4459
	#29	.1360	281	562	843	1124	1405	1685	1966	2247	2528	2809	3090	33701	3651	3932	4213
	#28	.1405	272	544	816	1088	1360	1631	1903	2175	2447	2719	2990	3262	3534	3806	4078
	#27	.1440	265	531	796	1061	1327	1592	1857	2122	2388	2653	2919	3183	3448	3714	3979
	#26	.1470	260	520	779	1039	1299	1559	1819	2078	2338	2598	2858	3118	3378	3638	3898
	#25	.1495	256	511	767	1022	1276	1533	1789	2044	2300	2555	2810	3066	3322	3577	3832
	#24	.1520	251	503	754	1005	1257	1508	1759	2010	2262	2513	2764	3016	3267	3518	3769
	#23	.1540	248	496	744	992	1240	1488	1736	1984	2232	2480	2728	2976	3224	3472	3720
	#22	.1570	243	487	730	973	1217	1460	1703	1946	2190	2433	2676	2920	3164	3406	3649
	#21	.1590	240	480	721	961	1201	1441	1681	1922	2162	2402	2644	2883	3123	3363	3604
	#20	.1610	237	475	712	949	1186	1423	1660	1898	2135	2372	2610	2847	3084	3322	3559
	#19	.1660	230	460	690	920	1151	1381	1611	1841	2071	2301	2531	2761	2991	3222	3453
	#18	.1695	226	452	678	904	1130	1356	1582	1808	2034	2260	2479	2704	2930	3155	3380
	#17	.1730	221	442	662	883	1104	1325	1546	1766	1987	2208	2429	2650	2870	3091	3313
	#16	.1770	216	432	647	863	1079	1295	1511	1726	1942	2158	2374	2590	2806	3021	3237
	#15	.1800	213	425	638	851	1064	1276	1489	1702	1914	2127	2334	2546	2759	2971	3183
	#14	.1820	210	420	630	840	1050	1259	1469	1679	1889	2099	2309	2518	2728	2938	3148
	#13	.1850	206	413	620	826	1032	1239	1450	1652	1859	2065	2271	2479	2684	2891	3097
3/16		.1875	204	407	611	815	1019	1222	1426	1630	1833	2037	2241	2445	2648	2852	3056
	#12	.1890	202	404	606	808	1010	1213	1415	1617	1819	2021	2223	2425	2627	2829	3032
	#11	.1910	200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3001
	#10	.1935	197	395	592	790	987	1184	1382	1579	1777	1974	2171	2369	2566	2764	2961
	#9	.1960	195	390	585	780	975	1169	1364	1559	1754	1949	2144	2339	2534	2728	2923
	#8	.1990	192	384	576	768	960	1151	1343	1535	1727	1919	2111	2303	2495	2687	2879
	#7	.2010	190	380	570	760	950	1140	1330	1520	1710	1900	2090	2281	2470	2660	2850
	#6	.2040	187	374	562	749	936	1123	1310	1498	1685	1872	2060	2247	2434	2621	2809
	#5	.2055	186	372	558	744	930	1115	1301	1487	1673	1859	2045	2230	2416	2602	2788
	#4	.2090	183	365	548	731	914	1097	1280	1462	1645	1828	2010	2193	2376	2560	2741
	#3	.2130	179	359	538	717	897	1076	1255	1434	1614	1793	1974	2152	2331	2511	2690
	#2	.2210	173	345	518	691	864	1037	1210	1382	1555	1728	1901	2074	2247	2420	2593
	#1	.2280	168	335	503	670	838	1005	1173	1340	1508	1675	1843	2010	2179	2346	2513
	A	.2340	163	326	491	654	818	982	1145	1309	1472	1636	1796	1959	2122	2285	2448
	B	.2380	161	321	482	642	803	963	1124	1284	1445	1605	1765	1926	2086	2247	2407
	C	.2420	158	316	473	631	789	947	1105	1262	1420	1578	1736	1894	2052	2210	2368
	D	.2460	155	311	467	622	778	934	1089	1245	1400	1556	1708	1863	2018	2174	2329
1/4		.2500	153	306	458	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292
	E	.2500	153	306	458	611	764	917	1070	1222	1375	1528	1681	1834	1968	2139	2292
	F	.2570	149	297	446	594	743	892	1040	1189	1337	1486	1635	1784	1932	2081	2229
	G	.2610	146	293	440	585	732	878	1024	1170	1317	1463	1610	1756	1903	2049	2195

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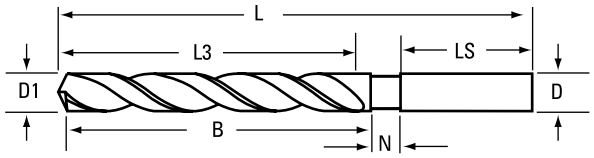
Drill Cutting Speeds (continued)

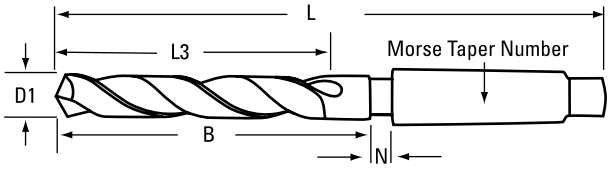
Drill Size			Feet per Minute														
			10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
Fract	Wire/Let	Dec	Revolutions Per Minute														
	H	.2660	144	287	430	574	718	862	1005	1149	1292	1436	1580	1723	1867	2010	2154
	I	.2720	140	281	421	562	702	842	983	1123	1264	1404	1545	1685	1826	1966	2106
	J	.2770	138	276	414	552	690	827	965	1103	1241	1379	1517	1655	1793	1930	2068
	K	.2810	136	272	408	544	680	815	951	1087	1223	1359	1495	1631	1767	1903	2039
	L	.2900	132	263	395	527	659	790	922	1054	1185	1317	1449	1581	1712	1844	1976
	M	.2950	129	259	389	518	648	777	907	1036	1166	1295	1424	1554	1683	1813	1942
	N	.3020	126	253	380	506	633	759	886	1012	1139	1265	1391	1518	1644	1771	1897
5/16		.3125	122	244	367	489	611	733	856	978	1100	1222	1345	1467	1589	1711	1833
	O	.3160	121	242	363	484	605	725	846	967	1088	1209	1330	1450	1571	1692	1813
	P	.3230	118	237	355	473	592	710	828	946	1065	1183	1301	1419	1537	1657	1774
	Q	.3320	115	230	345	460	575	690	805	920	1035	1150	1266	1384	1496	1611	1726
	R	.3390	113	225	338	451	564	676	789	902	1014	1127	1239	1355	1465	1577	1690
	S	.3480	110	220	329	439	549	659	769	878	988	1098	1207	1317	1427	1537	1646
	T	.3580	107	213	320	426	533	640	746	853	959	1066	1173	1280	1387	1494	1600
	U	.3680	104	208	311	415	519	623	727	830	934	1038	1142	1246	1349	1453	1557
3/8		.3750	102	204	306	407	509	611	713	815	917	1019	1120	1222	1324	1426	1528
	V	.3770	101	203	304	405	507	608	709	810	912	1013	1114	1219	1317	1418	1520
	W	.3860	99	198	297	396	495	594	693	792	891	989	1088	1188	1286	1385	1484
	X	.3970	96	192	289	385	481	576	672	769	865	962	1058	1155	1251	1347	1443
	Y	.4040	95	189	284	378	473	567	662	756	851	945	1040	1135	1229	1324	1418
	Z	.4130	92	185	277	370	462	555	647	740	832	925	1017	1110	1202	1295	1387
7/16		.4375	87	175	262	349	437	524	611	698	786	873	960	1048	1135	1222	1310
1/2		.5000	76	153	229	306	382	458	535	611	688	764	840	917	993	1070	1146
5/8		.6250	61	122	183	244	306	367	428	489	550	611	672	733	794	856	917
3/4		.7500	51	102	153	203	255	306	357	407	458	509	560	611	662	713	764
7/8		.8750	44	87	131	175	218	262	306	349	393	436	480	524	568	611	655
1		1.0000	38	76	115	153	191	229	267	306	344	382	420	458	497	535	573
1-1/8		1.1250	34	68	102	136	170	204	238	272	306	340	373	407	441	475	509
1-1/4		1.2500	31	61	92	122	153	183	214	244	275	306	336	367	397	428	458
1-3/8		1.3750	28	56	83	111	139	167	194	222	250	278	306	333	361	389	417
1-1/2		1.5000	26	51	76	102	127	153	178	204	229	255	280	306	331	357	382
1-5/8		1.6250	24	47	70	94	117	141	165	188	212	235	259	282	306	329	353
1-3/4		1.7500	22	44	65	87	109	131	153	175	196	218	240	262	284	306	327
1-7/8		1.8750	20	41	61	81	102	122	143	163	183	204	224	244	265	285	306
2		2.0000	19	38	57	76	95	115	134	153	172	191	210	229	248	267	287
2-1/4		2.2500	17	34	51	68	85	102	119	136	153	170	187	204	221	238	255
2-1/2		2.5000	15	31	46	61	76	92	107	122	137	153	168	183	199	214	229
2-3/4		2.7500	14	28	42	56	69	83	97	111	125	139	153	167	181	194	208
3		3.0000	13	25	38	51	64	76	89	102	115	127	140	153	166	178	191

Special Drills

- If you know the specs for your special tool, please send a blueprint and/or provide this information:
  — Material/hardness to be drilled.
  — Shank diameter or size (D in drawing at right). If standard taper shank is ordered, specify as No. 2 American National Standard Taper, No. 3 American National Standard Taper, etc. If taper shank is special, give diameter at small end, length of shank, diameter at large end, taper per foot, and furnish a sample of gauge if possible. If tang is special, give thickness and length.
  — Body length (B in drawing).
  — Diameter of fluted section (D1). For multiple diameter drills, indicated the diameter of the large fluted section.
  — Flute length (L1).
  — Overall length (L). When ordering extra-length drills, specify type of material being drilled, depth of hole, whether drilling in a vertical or horizontal position, and whether feed is intermittent or with only occasional withdrawals.
  — Neck length (L3).
  — Shank length (LS).
- For multiple-diameter drills, provide:
  — The diameter of the small, fluted section.
  — The included angle of cutting shoulder. Note that this is measured as an angle between the two cutting edges (included angle) and not as an angle with the center line.
  — The length of small diameter. Note that this is measured from the outer corner of the point to the bottom or inner corner of the cutting shoulder.
- For special accuracy requirements, give tolerances on the important dimensions.
- For assistance in designing your special tool, provide
  — Workpiece material hardness — Hole diameter
  — Depth of hole — Thru hole or blind hole
  — Shank type — Coolant or non-coolant
  — Step length if necessary — Step angle
- Make sure that suitable allowance has been made for resharpening and for clearance for the spindle above the drill-brushings. If a particular style of flute-construction is desired, it should be specified by reference to the regular drill of the required flute-style.



Straight Shank Drill



Taper Shank Drill

Drill Nomenclature

Axis
The imaginary straight line which forms the longitudinal center-line of the drill.

Back Taper
A slight decrease in diameter, from front to back in the body of the drill.

Body
The portion of the drill extending from the shank or neck to the outer corners of the cutting lips.

Body Diameter Clearance
That portion of the land that has been cut away so it will not rub against the walls of the hole.

Chisel Edge
The edge at the end of the web that connects the cutting lips.

Drill Diameter
The diameter over the margins of the drill measured at the point.

Flutes
Helical or straight grooves cut or formed in the body of the drill to provide cutting lips, to permit removal of chips, and to allow cutting fluid to reach the cutting lips.

Flute Length
The length from the outer corners of the cutting lips to the extreme back end of the flutes. However, metric drills are measured from the extreme end of the shank to the end of the flute at the point.

Land
The peripheral portion of the body between adjacent flutes.

Land Width
The distance between the leading edge and the heel of the land measured at a right angle to the leading edge.

Lip Relief
The axial relief on the drill point.

Margin
The cylindrical portion of the land which is not cut away to provide clearance.

Neck
The section of reduced diameter between the body and the shank of a drill.

Overall Length
The length from the extreme end of the shank to the outer corners of the cutting lips. However, metric drills are measured from the extreme end of the shank to the end of the flute at the point.

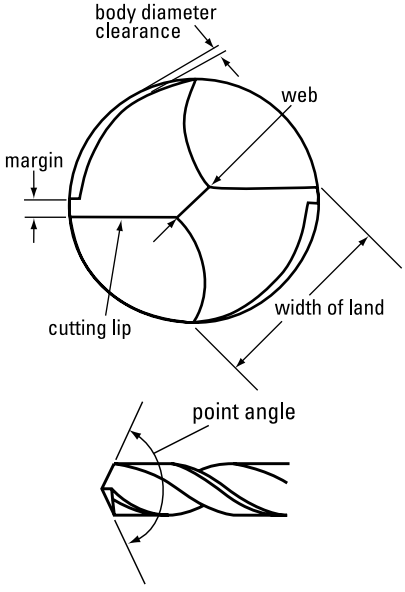
Point
The cutting end of a drill, made up of the ends of the lands and the web. In form it resembles a cone, but departs from a true cone to furnish clearance behind the cutting lips.

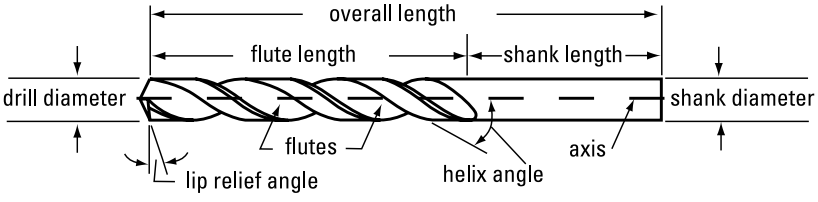
Point Angle
The angle included between the cutting lips projected upon a plane parallel to the drill axis and parallel to the two cutting lips.

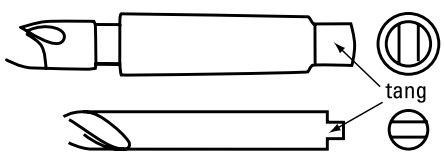
Shank
The part of the drill by which it is held and driven.

Tang
The flattened end of a taper shank, intended to fit into a driving slot in a socket.

Web
The central portion of the body that joins the lands. The extreme end of the web forms the chisel edge on a two-flute drill.







Dimensions for Inch Size Drills (inches)

Drill Size	Decimal Equivalent	Screw Machine Length				Jobbers Length				Taper Length			
		Flute Length		Overall Length		Flute Length		Overall Length		Flute Length		Overall Length	
		faction	decimal	faction	decimal	faction	decimal	faction	decimal	faction	decimal	faction	decimal
1/64	.0156	—	—	—	—	3/16	.1875	3/4	.7500	5/16	.3125	1-1/2	1.5000
80	.0135	—	—	—	—	1/8	.1250	3/4	.7500	5/16	.3125	1-1/2	1.5000
79	.0145	—	—	—	—	1/8	.1250	3/4	.7500	5/16	.3125	1-1/2	1.5000
78	.0160	—	—	—	—	3/16	.1875	7/8	.8750	5/16	.3125	1-1/2	1.5000
77	.0180	—	—	—	—	3/16	.1875	7/8	.8750	5/16	.3125	1-1/2	1.5000
76	.0200	—	—	—	—	3/16	.1875	7/8	.8750	5/16	.3125	1-1/2	1.5000
75	.0210	—	—	—	—	1/4	.2500	1	1.0000	5/16	.3125	1-1/2	1.5000
74	.0225	—	—	—	—	1/4	.2500	1	1.0000	5/16	.3125	1-1/2	1.5000
73	.0240	—	—	—	—	5/16	.3125	1-1/8	1.1250	5/16	.3125	1-1/2	1.5000
72	.0250	—	—	—	—	5/16	.3125	1-1/8	1.1250	5/16	.3125	1-1/2	1.5000
71	.0260	—	—	—	—	3/8	.3750	1-1/4	1.2500	3/4	.7500	2	2.0000
70	.0280	—	—	—	—	3/8	.3750	1-1/4	1.2500	3/4	.7500	2	2.0000
69	.0292	—	—	—	—	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
68	.0310	—	—	—	—	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
1/32	.0312	1/2	.5000	1-3/8	1.3750	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
67	.0320	—	—	—	—	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
66	.0330	—	—	—	—	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
65	.0350	—	—	—	—	5/8	.6250	1-1/2	1.5000	3/4	.7500	2	2.0000
64	.0360	—	—	—	—	5/8	.6250	1-1/2	1.5000	3/4	.7500	2	2.0000
63	.0370	—	—	—	—	5/8	.6250	1-1/2	1.5000	3/4	.7500	2	2.0000
62	.0380	—	—	—	—	5/8	.6250	1-1/2	1.5000	3/4	.7500	2	2.0000
61	.0390	—	—	—	—	11/16	.6875	1-5/8	1.6250	1-1/8	1.1250	2-1/4	2.2500
60	.0400	1/2	.5000	1-3/8	1.3750	11/16	.6875	1-5/8	1.6250	1-1/8	1.1250	2-1/4	2.2500
59	.0410	1/2	.5000	1-3/8	1.3750	11/16	.6875	1-5/8	1.6250	1-1/8	1.1250	2-1/4	2.2500
58	.0420	1/2	.5000	1-3/8	1.3750	11/16	.6875	1-5/8	1.6250	1-1/8	1.1250	2-1/4	2.2500
57	.0430	1/2	.5000	1-3/8	1.3750	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/4	2.2500
56	.0465	1/2	.5000	1-3/8	1.3750	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/4	2.2500
3/64	.0469	1/2	.5000	1-3/8	1.3750	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/4	2.2500
55	.0520	5/8	.6250	1-5/8	1.6250	7/8	.8750	1-7/8	1.8750	1-3/4	1.7500	3	3.0000
54	.0550	5/8	.6250	1-5/8	1.6250	7/8	.8750	1-7/8	1.8750	1-3/4	1.7500	3	3.0000
53	.0595	5/8	.6250	1-5/8	1.6250	7/8	.8750	1-7/8	1.8750	1-3/4	1.7500	3	3.0000
1/16	.0625	5/8	.6250	1-5/8	1.6250	7/8	.8750	1-7/8	1.8750	1-3/4	1.7500	3	3.0000
52	.0635	11/16	.6875	1-11/16	1.6875	7/8	.8750	1-7/8	1.8750	2	2.0000	3-3/4	3.7500
51	.0670	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
50	.0700	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
49	.0730	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
48	.0760	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
5/64	.0781	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
47	.0785	3/4	.7500	1-3/4	1.7500	1	1.0000	2	2.0000	2-1/4	2.2500	4-1/4	4.2500
46	.0810	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/8	2.1250	2-1/4	2.2500	4-1/4	4.2500
45	.0820	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/8	2.1250	2-1/4	2.2500	4-1/4	4.2500
44	.0860	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/8	2.1250	2-1/4	2.2500	4-1/4	4.2500
43	.0890	3/4	.7500	1-3/4	1.7500	1-1/4	1.2500	2-1/4	2.2500	2-1/4	2.2500	4-1/4	4.2500
42	.0935	3/4	.7500	1-3/4	1.7500	1-1/4	1.2500	2-1/4	2.2500	2-1/4	2.2500	4-1/4	4.2500
3/32	.0938	3/4	.7500	1-3/4	1.7500	1-1/4	1.2500	2-1/4	2.2500	2-1/4	2.2500	4-1/4	4.2500
41	.0960	13/16	.8125	1-13/16	1.8125	1-3/8	1.3750	2-3/8	2.3750	2-1/2	2.5000	4-5/8	4.6250
40	.0980	13/16	.8125	1-13/16	1.8125	1-3/8	1.3750	2-3/8	2.3750	2-1/2	2.5000	4-5/8	4.6250
39	.0995	13/16	.8125	1-13/16	1.8125	1-3/8	1.3750	2-3/8	2.3750	2-1/2	2.5000	4-5/8	4.6250
38	.1015	13/16	.8125	1-13/16	1.8125	1-7/16	1.4375	2-1/2	2.5000	2-1/2	2.5000	4-5/8	4.6250
37	.1040	13/16	.8125	1-13/16	1.8125	1-7/16	1.4375	2-1/2	2.5000	2-1/2	2.5000	4-5/8	4.6250
36	.1065	13/16	.8125	1-13/16	1.8125	1-7/16	1.4375	2-1/2	2.5000	2-1/2	2.5000	4-5/8	4.6250
7/64	.1094	13/16	.8125	1-13/16	1.8125	1-1/2	1.5000	2-5/8	2.6250	2-1/2	2.5000	4-5/8	4.6250
35	.1100	7/8	.8750	1-7/8	1.8750	1-1/2	1.5000	2-5/8	2.6250	2-3/4	2.7500	5-1/8	5.1250
34	.1110	7/8	.8750	1-7/8	1.8750	1-1/2	1.5000	2-5/8	2.6250	2-3/4	2.7500	5-1/8	5.1250
33	.1130	7/8	.08750	1-7/8	1.8750	1-1/2	1.5000	2-5/8	2.6250	2-3/4	2.7500	5-1/8	5.1250
32	.1160	7/8	.8750	1-7/8	1.8750	1-5/8	1.6250	2-3/4	2.7500	2-3/4	2.7500	5-1/8	5.1250

continued on next page

Dimensions for Inch Size Drills (inches) (continued)

Drill Size	Decimal Equivalent	Screw Machine Length				Jobbers Length				Taper Length			
		Flute Length		Overall Length		Flute Length		Overall Length		Flute Length		Overall Length	
		faction	decimal	faction	decimal	faction	decimal	faction	decimal	faction	decimal	faction	decimal
31	.1200	7/8	.8750	1-7/8	1.8750	1-5/8	1.6250	2-3/4	2.7500	2-3/4	2.7500	5-1/8	5.1250
1/8	.1250	7/8	.8750	1-7/8	1.8750	1-5/8	1.6250	2-3/4	2.7500	2-3/4	2.7500	5-1/8	5.1250
30	.1285	15/16	.9375	1-15/16	1.9375	1-5/8	1.6250	2-3/4	2.7500	3	3.0000	5-3/8	5.3750
29	.1360	15/16	.9375	1-15/16	1.9375	1-3/4	1.7500	2-7/8	2.8750	3	3.0000	5-3/8	5.3750
28	.1405	15/16	.9375	1-15/16	1.9375	1-3/4	1.7500	2-7/8	2.8750	3	3.0000	5-3/8	5.3750
9/64	.1406	15/16	.9375	1-15/16	1.9375	1-3/4	1.7500	2-7/8	2.8750	3	3.0000	5-3/8	5.3750
27	.1440	1	1.0000	2-1/16	2.0625	1-7/8	1.8750	3	3.0000	3	3.0000	5-3/8	5.3750
26	.1470	1	1.0000	2-1/16	2.0625	1-7/8	1.8750	3	3.0000	3	3.0000	5-3/8	5.3750
25	.1495	1	1.0000	2-1/16	2.0625	1-7/8	1.8750	3	3.0000	3	3.0000	5-3/8	5.3750
24	.1520	1	1.0000	2-1/16	2.0625	2	2.0000	3-1/8	3.1250	3	3.0000	5-3/8	5.3750
23	.1540	1	1.0000	2-1/16	2.0625	2	2.0000	3-1/8	3.1250	3	3.0000	5-3/8	5.3750
5/32	.1562	1	1.0000	2-1/16	2.0625	2	2.0000	3-1/8	3.1250	3	3.0000	5-3/8	5.3750
22	.1570	1-1/16	1.0625	2-1/8	2.1250	2	2.0000	3-1/8	3.1250	3-3/8	3.3750	5-3/4	5.7500
21	.1590	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
20	.1610	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
19	.1660	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
18	.1695	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
11/64	.1719	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
17	.1730	1-1/8	1.2500	2-3/16	2.1875	2-3/16	2.1875	3-3/8	3.3750	3-3/8	3.3750	5-3/4	5.7500
16	.1770	1-1/8	1.2500	2-3/16	2.1875	2-3/16	2.1875	3-3/8	3.3750	3-3/8	3.3750	5-3/4	5.7500
15	.1800	1-1/8	1.2500	2-3/16	2.1875	2-3/16	2.1875	3-3/8	3.3750	3-3/8	3.3750	5-3/4	5.7500
14	.1820	1-1/8	1.2500	2-3/16	2.1875	2-3/16	2.1875	3-3/8	3.3750	3-3/8	3.3750	5-3/4	5.7500
13	.1850	1-1/8	1.2500	2-3/16	2.1875	2-5/16	2.3125	3-1/2	3.5000	3-3/8	3.3750	5-3/4	5.7500
3/16	.1875	1-1/8	1.2500	2-3/16	2.1875	2-5/16	2.3125	3-1/2	3.5000	3-3/8	3.3750	5-3/4	5.7500
12	.1890	1-3/16	1.1875	2-1/4	2.2500	2-5/16	2.3125	3-1/2	3.5000	3-5/8	3.6250	6	6.0000
11	.1910	1-3/16	1.1875	2-1/4	2.2500	2-5/16	2.3125	3-1/2	3.5000	3-5/8	3.6250	6	6.0000
10	.1935	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
9	.1960	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
8	.1990	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
7	.2010	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
13/64	.2031	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
6	.2040	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
5	.2055	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
4	.2090	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
3	.2130	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
7/32	.2188	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
2	.2210	1-5/16	1.3125	2-7/16	2.4375	2-5/8	2.6250	3-7/8	3.8750	3-3/4	3.7500	6-1/8	6.1250
1	.2280	1-5/16	1.3125	2-7/16	2.4375	2-5/8	2.6250	3-7/8	3.8750	3-3/4	3.7500	6-1/8	6.1250
A	.2340	1-5/16	1.3125	2-7/16	2.4375	2-5/8	2.6250	3-7/8	3.8750	3-3/4	3.7500	6-1/8	6.1250
15/64	.2344	1-5/16	1.3125	2-7/16	2.4375	2-5/8	2.6250	3-7/8	3.8750	3-3/4	3.7500	6-1/8	6.1250
B	.2380	1-3/8	1.3750	2-1/2	2.5000	2-3/4	2.7500	4	4.0000	3-3/4	3.7500	6-1/8	6.1250
C	.2420	1-3/8	1.3750	2-1/2	2.5000	2-3/4	2.7500	4	4.0000	3-3/4	3.7500	6-1/8	6.1250
D	.2460	1-3/8	1.3750	2-1/2	2.5000	2-3/4	2.7500	4	4.0000	3-3/4	3.7500	6-1/8	6.1250
1/4-E	.2500	1-3/8	1.3750	2-1/2	2.5000	2-3/4	2.7500	4	4.0000	3-3/4	3.7500	6-1/8	6.1250
F	.2570	1-7/16	1.4375	2-5/8	2.6250	2-7/8	2.8750	4-1/8	4.1250	3-3/4	3.7500	6-1/8	6.1250
G	.2610	1-7/16	1.4375	2-5/8	2.6250	2-7/8	2.8750	4-1/8	4.1250	3-3/4	3.7500	6-1/8	6.1250
17/64	.2656	1-7/16	1.4375	2-5/8	2.6250	2-7/8	2.8750	4-1/8	4.1250	3-7/8	3.8750	6-1/4	6.2500
H	.2660	1-1/2	1.5000	2-11/16	2.6875	2-7/8	2.8750	4-1/8	4.1250	3-7/8	3.8750	6-1/4	6.2500
I	.2720	1-1/2	1.5000	2-11/16	2.6875	2-7/8	2.8750	4-1/8	4.1250	3-7/8	3.8750	6-1/4	6.2500
J	.2770	1-1/2	1.5000	2-11/16	2.6875	2-7/8	2.8750	4-1/8	4.1250	3-7/8	3.8750	6-1/4	6.2500
9/32	.2812	1-1/2	1.5000	2-11/16	2.6875	2-15/16	2.9375	4-1/4	4.2500	3-7/8	3.8750	6-1/4	6.2500
K	.2812	1-1/2	1.5000	2-11/16	2.6875	2-15/16	2.9375	4-1/4	4.2500	3-7/8	3.8750	6-1/4	6.2500
L	.2900	1-9/16	1.5625	2-3/4	2.7500	2-15/16	2.9375	4-1/4	4.2500	3-7/8	3.8750	6-1/4	6.2500
M	.2950	1-9/16	1.5625	2-3/4	2.7500	3-1/16	3.0625	4-3/8	4.3750	4	4.0000	6-3/8	6.3750
19/64	.2969	1-9/16	1.5625	2-3/4	2.7500	3-1/16	3.0625	4-3/8	4.3750	4	4.0000	6-3/8	6.3750
N	.3020	1-5/8	1.6250	2-13/16	2.8125	3-1/16	3.0625	4-3/8	4.3750	4	4.0000	6-3/8	6.3750
5/16	.3125	1-5/8	1.6250	2-13/16	2.8125	3-3/16	3.1875	4-1/2	4.5000	4	4.0000	6-3/8	6.3750

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Dimensions for Inch Size Drills (inches) (continued)

Drill Size	Decimal Equivalent	Screw Machine Length				Jobbers Length				Taper Length			
		Flute Length		Overall Length		Flute Length		Overall Length		Flute Length		Overall Length	
		faction	decimal	faction	decimal	faction	decimal	faction	decimal	faction	decimal	faction	decimal
0	.3160	1-11/16	1.6875	2-15/16	2.9375	3-3/16	3.1875	4-1/2	4.5000	4	4.0000	6-3/8	6.3750
P	.3230	1-11/16	1.6875	2-15/16	2.9375	3-5/16	3.1875	4-5/8	4.6250	4	4.0000	6-3/8	6.3750
21/64	.3281	1-11/16	1.6875	2-15/16	2.9375	3-5/16	3.1875	4-5/8	4.6250	4-1/8	4.1250	6-1/2	6.5000
Q	.3320	1-11/16	1.6875	3	3.0000	3-7/16	3.4375	4-3/4	4.7500	4-1/8	4.1250	6-1/2	6.5000
R	.3390	1-11/16	1.6875	3	3.0000	3-7/16	3.4375	4-3/4	4.7500	4-1/8	4.1250	6-1/2	6.5000
11/32	.3438	1-11/16	1.6875	3	3.0000	3-7/16	3.4375	4-3/4	4.7500	4-1/8	4.1250	6-1/2	6.5000
S	.3480	1-3/4	1.7500	3-1/16	3.0625	3-1/2	3.5000	4-7/8	4.8750	4-1/4	4.2500	6-3/4	6.7500
T	.3580	1-3/4	1.7500	3-1/16	3.0625	3-1/2	3.5000	4-7/8	4.8750	4-1/4	4.2500	6-3/4	6.7500
23/64	.3594	1-3/4	1.7500	3-1/16	3.0625	3-1/2	3.5000	4-7/8	4.8750	4-1/4	4.2500	6-3/4	6.7500
U	.3680	1-13/16	1.8125	3-1/8	3.1250	3-5/8	3.6250	5	5.0000	4-1/4	4.2500	6-3/4	6.7500
3/8	.3750	1-13/16	1.8125	3-1/8	3.1250	3-5/8	3.6250	5	5.0000	4-1/4	4.2500	6-3/4	6.7500
V	.3770	1-7/8	1.8750	3-1/4	3.2500	3-5/8	3.6250	5	5.0000	4-1/4	4.2500	6-3/4	6.7500
W	.3860	1-7/8	1.8750	3-1/4	3.2500	3-3/4	3.7500	5-1/8	5.1250	4-1/4	4.2500	6-3/4	6.7500
25/64	.3906	1-7/8	1.8750	3-1/4	3.2500	3-3/4	3.7500	5-1/8	5.1250	4-3/8	4.3750	7	7.0000
X	.3970	1-15/16	1.9375	3-5/16	3.3125	3-3/4	3.7500	5-1/8	5.1250	4-3/8	4.3750	7	7.0000
Y	.4040	1-15/16	1.9375	3-5/16	3.3125	3-7/8	3.8750	5-1/4	5.2500	4-3/8	4.3750	7	7.0000
13/32	.4062	1-15/16	1.9375	3-5/16	3.3125	3-7/8	3.8750	5-1/4	5.2500	4-3/8	4.3750	7	7.0000
Z	.4130	2	2.0000	3-3/8	3.3750	3-7/8	3.8750	5-1/4	5.2500	4-5/8	4.6250	7-1/4	7.2500
27/64	.4219	2	2.0000	3-3/8	3.3750	3-15/16	3.9375	5-3/8	5.3750	4-5/8	4.6250	7-1/4	7.2500
7/16	.4375	2-1/16	2.0625	3-7/16	3.4375	4-1/16	4.0625	5-1/2	5.5000	4-5/8	4.6250	7-1/4	7.2500
29/64	.4531	2-1/8	2.1250	3-9/16	3.5625	4-3/16	4.1875	5-5/8	5.6250	4-3/4	4.7500	7-1/2	7.5000
15/32	.4688	2-1/8	2.1250	3-5/8	3.6250	4-5/16	4.3125	5-3/4	5.7500	4-3/4	4.7500	7-1/2	7.5000
31/64	.4844	2-3/16	2.1875	3-11/16	3.6875	4-3/8	4.3750	5-7/8	5.8750	4-3/4	4.7500	7-3/4	7.7500
1/2	.5000	2-1/4	2.2500	3-3/4	3.7500	4-1/2	4.5000	6	6.0000	4-3/4	4.7500	7-3/4	7.7500
33/64	.5156	2-3/8	2.3750	3-7/8	3.8750	4-13/16	4.8125	6-5/8	6.6250	4-3/4	4.7500	8	8.0000
17/32	.5312	2-3/8	2.3750	3-7/8	3.8750	4-13/16	4.8125	6-5/8	6.6250	4-3/4	4.7500	8	8.0000
35/64	.5469	2-1/2	2.5000	4	4.0000	4-13/16	4.8125	6-5/8	6.6250	4-7/8	4.8750	8-1/4	8.2500
9/16	.5625	2-1/2	2.5000	4	4.0000	4-13/16	4.8125	6-5/8	6.6250	4-7/8	4.8750	8-1/4	8.2500
37/64	.5781	2-5/8	2.6250	4-1/8	4.1250	4-13/16	4.8125	6-5/8	6.6250	4-7/8	4.8750	8-3/4	8.7500
19/32	.5938	2-5/8	2.6250	4-1/8	4.1250	5-3/16	5.1875	7-1/8	7.1250	4-7/8	4.8750	8-3/4	8.7500
39/64	.6094	2-3/4	2.7500	4-1/4	4.2500	5-3/16	5.1875	7-1/8	7.1250	4-7/8	4.8750	8-3/4	8.7500
5/8	.6250	2-3/4	2.7500	4-1/4	4.2500	5-3/16	5.1875	7-1/8	7.1250	4-7/8	4.8750	8-3/4	8.7500
41/64	.6406	2-7/8	2.8750	4-1/2	4.5000	5-3/16	5.1875	7-1/8	7.1250	5-1/8	5.1250	9	9.0000
21/32	.6562	2-7/8	2.8750	4-1/2	4.5000	5-3/16	5.1875	7-1/8	7.1250	5-1/8	5.1250	9	9.0000
43/64	.6719	2-7/8	2.8750	4-5/8	4.6250	5-5/8	5.6250	7-5/8	7.6250	5-3/8	5.3750	9-1/4	9.2500
11/16	.6875	2-7/8	2.8750	4-5/8	4.6250	5-5/8	5.6250	7-5/8	7.6250	5-3/8	5.3750	9-1/4	9.2500
45/64	.7031	3	3.0000	4-3/4	4.7500	—	—	—	—	5-5/8	5.6250	9-1/2	9.5000
23/32	.7188	3	3.0000	4-3/4	4.7500	—	—	—	—	5-5/8	5.6250	9-1/2	9.5000
47/64	.7344	3-1/8	3.1250	5	5.0000	—	—	—	—	5-7/8	5.8750	9-3/4	9.7500
3/4	.7500	3-1/8	3.1250	5	5.0000	—	—	—	—	5-7/8	5.8750	9-3/4	9.7500
49/64	.7656	3-1/4	3.2500	5-1/8	5.1250	—	—	—	—	6	6.0000	9-7/8	9.8750
25/32	.7812	3-1/4	3.2500	5-1/8	5.1250	—	—	—	—	6	6.0000	9-7/8	9.8750
51/64	.7969	3-3/8	3.3750	5-1/4	5.2500	—	—	—	—	6-1/8	6.1250	10	10.0000
13/16	.8125	3-3/8	3.3750	5-1/4	5.2500	—	—	—	—	6-1/8	6.1250	10	10.0000
53/64	.8281	3-1/2	3.5000	5-3/8	5.3750	—	—	—	—	6-1/8	6.1250	10	10.0000
27/32	.8438	3-1/2	3.5000	5-3/8	5.3750	—	—	—	—	6-1/8	6.1250	10	10.0000
55/64	.8594	3-1/2	3.5000	5-1/2	5.5000	—	—	—	—	6-1/8	6.1250	10	10.0000
7/8	.8750	3-1/2	3.5000	5-1/2	5.5000	—	—	—	—	6-1/8	6.1250	10	10.0000
57/64	.8906	3-5/8	3.6250	5-5/8	5.6250	—	—	—	—	6-1/8	6.1250	10	10.0000
29/32	.9062	3-5/8	3.6250	5-5/8	5.6250	—	—	—	—	6-1/8	6.1250	10	10.0000
59/64	.9219	3-3/4	3.7500	5-3/4	5.7500	—	—	—	—	6-1/8	6.1250	10-3/4	10.7500
15/16	.9375	3-3/4	3.7500	5-3/4	5.7500	—	—	—	—	6-1/8	6.1250	10-3/4	10.7500
61/64	.9531	3-7/8	3.8750	5-7/8	5.8750	—	—	—	—	6-3/8	6.3750	11	11.0000
31/32	.9688	3-7/8	3.8750	5-7/8	5.8750	—	—	—	—	6-3/8	6.3750	11	11.0000
63/64	.9844	4	4.0000	6	6.0000	—	—	—	—	6-3/8	6.3750	11	11.0000
1	1.0000	4	4.0000	6	6.0000	—	—	—	—	6-3/8	6.3750	11	11.0000

Drills - Technical Information

Dimensions for Metric Size Drills (millimeters)

Drill Size (mm)	Decimal Eqivalent (inch)	Screw Machine Length DIN 1897 Flute Length mm	Screw Machine Length DIN 1897 Overall Length mm	Jobbers Length DIN 338 Flute Length mm	Jobbers Length DIN 338 Overall Length mm	Taper Length DIN 340 Flute Length mm	Taper Length DIN 340 Overall Length mm
0.2	.0079	1.5	19	2.5	19	—	—
0.22	.0087	1.5	19	2.5	19	—	—
0.25	.0098	1.5	19	3	19	—	—
0.28	.0110	1.5	19	3	19	—	—
0.3	.0118	1.5	19	3	19	—	—
0.32	.0126	2	19	4	19	—	—
0.35	.0138	2	19	4	19	—	—
0.38	.0150	2	19	4	19	—	—
0.4	.0157	2.5	19	5	20	—	—
0.42	.0165	2.5	19	5	20	—	—
0.45	.0177	2.5	19	5	20	—	—
0.48	.0189	2.5	19	5	20	—	—
0.5	.0197	3	20	6	22	—	—
0.52	.0205	3	20	6	22	—	—
0.55	.0217	3.5	21	7	24	—	—
0.58	.0228	3.5	21	7	24	—	—
0.6	.0236	3.5	21	7	24	—	—
0.62	.0244	4	22	8	26	—	—
0.65	.0256	4	22	8	26	—	—
0.68	.0268	4.5	23	9	28	—	—
0.7	.0276	4.5	23	9	28	—	—
0.72	.0283	4.5	23	9	28	—	—
0.75	.0295	4.5	23	9	28	—	—
0.78	.0307	5	24	10	30	—	—
0.8	.0315	5	24	10	30	—	—
0.82	.0322	5	24	10	30	—	—
0.85	.0335	5	24	10	30	—	—
0.88	.0346	5.5	25	11	32	—	—
0.9	.0354	5.5	25	11	32	—	—
0.92	.0362	5.5	25	11	32	—	—
0.95	.0374	5.5	25	11	32	—	—
0.98	.0385	6	26	12	34	—	—
1.0	.0394	6	26	12	34	33	56
1.05	.0413	6	26	12	34	—	—
1.1	.0433	7	28	14	36	37	60
1.15	.0453	7	28	14	36	—	—
1.2	.0472	8	30	16	38	41	65
1.25	.0492	8	30	16	38	—	—
1.3	.0512	8	30	16	38	41	65
1.35	.0531	9	32	18	40	—	—
1.4	.0551	9	32	18	40	45	70
1.45	.0571	9	32	18	40	—	—
1.5	.0591	9	32	18	40	45	70
1.55	.0610	10	34	20	43	—	—
1.6	.0630	10	34	20	43	50	76
1.65	.0650	10	34	20	43	—	—
1.7	.0669	10	34	20	43	50	76
1.75	.0689	11	36	22	46	—	—
1.8	.0709	11	36	22	46	53	80
1.85	.0728	11	36	22	46	—	—
1.9	.0748	11	36	22	46	53	80
1.95	.0767	12	38	24	49	—	—
2.0	.0787	12	38	24	49	56	85
2.05	.0807	12	38	24	49	—	—

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Dimensions for Metric Size Drills (millimeters) (continued)

Drill Size (mm)	Decimal Eqivalent (inch)	Screw Machine Length DIN 1897 Flute Length mm	Screw Machine Length DIN 1897 Overall Length mm	Jobbers Length DIN 338 Flute Length mm	Jobbers Length DIN 338 Overall Length mm	Taper Length DIN 340 Flute Length mm	Taper Length DIN 340 Overall Length mm
2.1	.0827	12	38	24	49	56	85
2.15	.0846	13	40	27	53	—	—
2.2	.0866	13	40	27	53	59	90
2.25	.0886	13	40	27	53	—	—
2.3	.0906	13	40	27	53	59	90
2.35	.0925	13	40	27	53	—	—
2.4	.0945	14	43	30	57	62	95
2.45	.0964	14	43	30	57	—	—
2.5	.0984	14	43	30	57	62	95
2.55	.1003	14	43	30	57	—	—
2.6	.1024	14	43	30	57	62	95
2.65	.1043	14	43	30	57	—	—
2.7	.1062	16	46	33	61	66	100
2.75	.1082	16	46	33	61	—	—
2.8	.1102	16	46	33	61	66	100
2.85	.1122	16	46	33	61	—	—
2.9	.1142	16	46	33	61	66	100
2.95	.1161	16	46	33	61	—	—
3.0	.1181	16	46	33	61	66	100
3.1	.1220	18	49	36	65	69	106
3.2	.1260	18	49	36	65	69	106
3.3	.1299	18	49	36	65	69	106
3.4	.1339	20	52	39	70	73	112
3.5	.1378	20	52	39	70	73	112
3.6	.1417	20	52	39	70	73	112
3.7	.1457	20	52	39	70	73	112
3.8	.1496	22	55	43	75	78	119
3.9	.1535	22	55	43	75	78	119
4.0	.1575	22	55	43	75	78	119
4.1	.1614	22	55	43	75	78	119
4.2	.1654	22	55	43	75	78	119
4.3	.1692	24	58	47	80	82	126
4.4	.1732	24	58	47	80	82	126
4.5	.1772	24	58	47	80	82	126
4.6	.1811	24	58	47	80	82	126
4.7	.1850	24	58	47	80	82	126
4.8	.1890	26	62	52	86	87	132
5.0	.1969	26	62	52	86	87	132
5.1	.2008	26	62	52	86	87	132
5.2	.2047	26	62	52	86	87	132
5.3	.2086	26	62	52	86	87	132
5.4	.2125	28	66	57	93	91	139
5.5	.2165	28	66	57	93	91	139
5.6	.2205	28	66	57	93	91	139
5.7	.2244	28	66	57	93	91	139
5.8	.2283	28	66	57	93	91	139
5.9	.2322	28	66	57	93	91	139
6.0	.2362	28	66	57	93	91	139
6.1	.2401	31	70	63	101	97	148
6.2	.2440	31	70	63	101	97	148
6.3	.2480	31	70	63	101	97	148
6.4	.2520	31	70	63	101	97	148
6.5	.2559	31	70	63	101	97	148
6.6	.2598	31	70	63	101	97	148

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Dimensions for Metric Size Drills (millimeters) (continued)

Drill Size (mm)	Decimal Eqivalent (inch)	Screw Machine Length DIN 1897 Flute Length mm	Screw Machine Length DIN 1897 Overall Length mm	Jobbers Length DIN 338 Flute Length mm	Jobbers Length DIN 338 Overall Length mm	Taper Length DIN 340 Flute Length mm	Taper Length DIN 340 Overall Length mm
6.7	.2638	31	70	63	101	97	148
6.8	.2677	34	74	69	109	102	156
6.9	.2717	34	74	69	109	102	156
7.0	.2756	34	74	69	109	102	156
7.1	.2795	34	74	69	109	102	156
7.2	.2835	34	74	69	109	102	156
7.3	.2874	34	74	69	109	102	156
7.4	.2913	34	74	69	109	102	156
7.5	.2953	34	74	69	109	102	156
7.6	.2992	37	79	75	117	109	165
7.7	.3031	37	79	75	117	109	165
7.8	.3070	37	79	75	117	109	165
7.9	.3110	37	79	75	117	109	165
8.0	.3150	37	79	75	117	109	165
8.1	.3189	37	79	75	117	109	165
8.2	.3228	37	79	75	117	109	165
8.5	.3346	37	79	75	117	109	165
8.6	.3386	40	84	81	125	115	175
8.7	.3425	40	84	81	125	115	175
8.8	.3464	40	84	81	125	115	175
8.9	.3503	40	84	81	125	115	175
9.0	.3543	40	84	81	125	115	175
9.1	.3582	40	84	81	125	115	175
9.2	.3622	40	84	81	125	115	175
9.3	.3661	40	84	81	125	115	175
9.4	.3700	40	84	81	125	115	175
9.5	.3740	40	84	81	125	115	175
9.6	.3779	43	89	87	133	121	184
9.7	.3817	43	89	87	133	121	184
9.8	.3858	43	89	87	133	121	184
9.	.3897	43	89	87	133	121	184
10.0	.3937	43	89	87	133	121	184
10.1	.3976	43	89	87	133	121	184
10.2	.4016	43	89	87	133	121	184
10.3	.4055	43	89	87	133	121	184
10.4	.4094	43	89	87	133	121	184
10.5	.4134	43	89	87	133	121	184
10.6	.4173	43	89	87	133	121	184
10.7	.4212	47	95	94	142	128	195
10.8	.4252	47	95	94	142	128	195
10.9	.4291	47	95	94	142	128	195
11.0	.4331	47	95	94	142	128	195
11.1	.4370	47	95	94	142	128	195
11.2	.4409	47	95	94	142	128	195
11.3	.4448	47	95	94	142	128	195
11.4	.4488	47	95	94	142	128	195
11.5	.4527	47	95	94	142	128	195
11.6	.4566	47	95	94	142	128	195
11.7	.4606	47	95	94	142	128	195
11.8	.4645	47	95	94	142	128	195
11.9	.4685	51	102	101	151	134	205
12.0	.4724	51	102	101	151	134	205
12.1	.4763	51	102	101	151	134	205
12.2	.4823	51	102	101	151	134	205

continued on next page

Dimensions for Metric Size Drills (millimeters) (continued)

Drill Size (mm)	Decimal Eqivalent (inch)	Screw Machine Length DIN 1897 Flute Length mm	Screw Machine Length DIN 1897 Overall Length mm	Jobbers Length DIN 338 Flute Length mm	Jobbers Length DIN 338 Overall Length mm	Taper Length DIN 340 Flute Length mm	Taper Length DIN 340 Overall Length mm
12.3	.4842	51	102	101	151	134	205
12.4	.4881	51	102	101	151	134	205
12.5	.4921	51	102	101	151	134	205
12.6	.4960	51	102	101	151	134	205
12.7	.5000	51	102	101	151	134	205
12.8	.5039	51	102	101	151	134	205
12.9	.5078	51	102	101	151	134	205
13.0	.5118	51	102	101	151	134	205
13.1	.5157	51	102	101	151	134	205
13.2	.5197	51	102	101	151	134	205
13.3	.5236	54	107	108	160	140	214
13.4	.5118	54	107	108	160	140	214
13.5	.5315	54	107	108	160	140	214
13.6	.5354	54	107	108	160	140	214
13.7	.5394	54	107	108	160	140	214
13.8	.5433	54	107	108	160	140	214
13.9	.5472	54	107	108	160	140	214
14.0	.5512	54	107	108	160	140	214
14.25	.5610	56	111	114	169	144	220
14.5	.5709	56	111	114	169	144	220
14.75	.5807	56	111	114	169	144	220
15.0	.5906	56	111	114	169	144	220
15.25	.6004	58	115	120	178	149	227
15.5	.6102	58	115	120	178	149	227
15.75	.6201	58	115	120	178	149	227
16.0	.6299	58	115	120	178	149	227

Reamers - Contents

TECH TIP

How to Choose the Correct Reamer Style

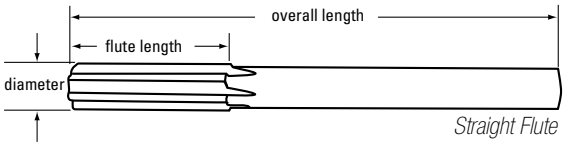
- Straight flute reamers, styles 4001, 4005, 1730, and 4703, are for use in through hole applications.
- Spiral flute reamers, style 4030, are for use in blind holes. They produce a smoother finish than straight flute reamers.
- Use reamer style 616, bridge reamer and style 618, car reamer, for aligning mis-aligned holes.
- Style 642 taper pipe reamers are used to ream a tapered hole before tapping only in soft, stringy materials.
- High spiral taper pin reamers, style 650 are used to produce taper pin holes; the high spiral prevents chip packing.
- Taper pin reamers styles 657 and 659 are used to produce taper pin holes primarily by hand reaming; drill the starting hole a few thousands of an inch smaller than the desired small diameter of the finished hole.

Straight Shank — Straight Flute and Spiral Flute
Styles 4001 (405) and 4030 (405RS)

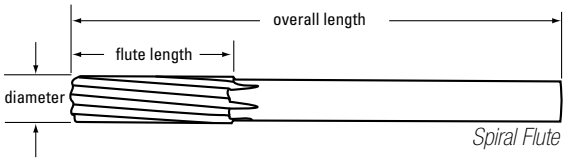
Features/Benefits:
- General-purpose for a wide range of operating conditions and materials.
- Manufactured from premium high-speed steel.
- Use straight flute reamers in through holes; use spiral flute reamers in blind holes.
- Bright finish.

Application Information:
- tool steel
- alloy steel
- cast iron
- aluminum
- plastic
- free-machining stainless steel

Style 4001 Straight Flute *Style 4030 Spiral Flute*



Straight Flute



Spiral Flute

INCH AND METRIC SIZES

Drill Diameter						Overall Length		Flute Length		Number	**Style 4001**	**Style 4030**
Fraction	Dowel Pin	W/L	Metric	Decimal	mm	Inch	mm	Inch	mm	of Flutes	Straight Flute	Spiral Flute
		60		.0400	1.02	2.5000	63.50	.5000	12.70	4	C25003	—
		59		.0410	1.04	2.5000	63.50	.5000	12.70	4	C25005	—
		58		.0420	1.07	2.5000	63.50	.5000	12.70	4	C25008	—
		57		.0430	1.09	2.5000	63.50	.5000	12.70	4	C25010	—
		56		.0465	1.18	2.5000	63.50	.5000	12.70	4	C25019	—
3/64				.0469	1.19	2.5000	63.50	.5000	12.70	4	C25020	—
		55		.0520	1.32	2.5000	63.50	.5000	12.70	4	C25034	—
		54		.0550	1.40	2.5000	63.50	.5000	12.70	4	C25041	—
			1.5	.0591	1.50	2.5000	63.50	.5000	12.70	4	C25059	—
		53		.0595	1.51	2.5000	63.50	.5000	12.70	4	C25053	—
1/16				.0625	1.59	2.5000	63.50	.5000	12.70	4	C25060	C29273
		52		.0635	1.61	2.5000	63.50	.5000	12.70	4	C25063	—
		51		.0670	1.70	3.0000	76.20	.7500	19.05	4	C25072	—
		50		.0700	1.78	3.0000	76.20	.7500	19.05	4	C25079	—
		49		.0730	1.85	3.0000	76.20	.7500	19.05	4	C25087	—
		48		.0760	1.93	3.0000	76.20	.7500	19.05	4	C25094	—
5/64				.0781	1.98	3.0000	76.20	.7500	19.05	4	C25100	C29311
		47		.0785	1.99	3.0000	76.20	.7500	19.05	4	C25101	—
			2.0	.0787	2.00	3.0000	76.20	.7500	19.05	4	C25095	—
		46		.0810	2.06	3.0000	76.20	.7500	19.05	4	C25108	—
		45		.0820	2.08	3.0000	76.20	.7500	19.05	4	C25110	—
		44		.0860	2.18	3.0000	76.20	.7500	19.05	4	C25120	—
		43		.0890	2.26	3.0000	76.20	.7500	19.05	4	C25128	—
		42		.0935	2.37	3.0000	76.20	.7500	19.05	4	C25139	—
3/32				.0938	2.38	3.0000	76.20	.7500	19.05	4	C25140	C29350
		41		.0960	2.44	3.5000	88.90	.8750	22.23	4	C25146	—
		40		.0980	2.49	3.5000	88.90	.8750	22.23	4	C25151	—
		39		.0995	2.53	3.5000	88.90	.8750	22.23	4	C25155	—
		38		.1015	2.58	3.5000	88.90	.8750	22.23	4	C25159	—
		37		.1040	2.64	3.5000	88.90	.8750	22.23	4	C25165	—

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Straight Flute and Spiral Flute (continued)
Styles 4001 (405) and 4030 (405RS)

INCH AND METRIC SIZES

Drill Diameter						Overall Length		Flute Length		Number	Style 4001	Style 4030
Fraction	Dowel Pin	W/L	Metric	Decimal	mm	Inch	mm	Inch	mm	of Flutes	Straight Flute	Spiral Flute
		36		.1065	2.71	3.5000	88.90	.8750	22.23	4	C25171	—
7/64				.1094	2.78	3.5000	88.90	.8750	22.23	4	C25178	C29386
		35		.1100	2.79	3.5000	88.90	.8750	22.23	4	C25180	—
		34		.1110	2.82	3.5000	88.90	.8750	22.23	4	C25183	—
		33		.1130	2.87	3.5000	88.90	.8750	22.23	4	C25187	—
		32		.1160	2.95	3.5000	88.90	.8750	22.23	4	C25194	—
			3.0	.1181	3.00	3.5000	88.90	.8750	22.23	4	C25185	—
		31		.1200	3.05	3.5000	88.90	.8750	22.23	6	C25203	—
	.1230			.1230	3.12	3.5000	88.90	.8750	22.23	4	C25210	—
				.1240	3.15	3.5000	88.90	.8750	22.23	6	C25212	—
	.1247			.1247	3.17	3.5000	88.90	.8750	22.23	6	C25215	—
1/8				.1250	3.18	3.5000	88.90	.8750	22.23	6	C25216	C29421
				.1260	3.20	3.5000	88.90	.8750	22.23	6	C25220	—
		30		.1285	3.26	3.5000	88.90	.8750	22.23	6	C25226	—
		29		.1360	3.45	4.0000	101.60	1.0000	25.40	6	C25243	—
		28		.1405	3.57	4.0000	101.60	1.0000	25.40	6	C25253	—
9/64				.1406	3.57	4.0000	101.60	1.0000	25.40	6	C25254	C29457
		27		.1440	3.66	4.0000	101.60	1.0000	25.40	6	C25262	—
		26		.1470	3.73	4.0000	101.60	1.0000	25.40	6	C25269	—
		25		.1495	3.80	4.0000	101.60	1.0000	25.40	6	C25275	—
		24		.1520	3.86	4.0000	101.60	1.0000	25.40	6	C25281	—
		23		.1540	3.91	4.0000	101.60	1.0000	25.40	6	C25285	—
5/32				.1562	3.97	4.0000	101.60	1.0000	25.40	4	C25290	C29493
		22		.1570	3.99	4.0000	101.60	1.0000	25.40	6	C25292	—
			4.0	.1575	4.00	4.0000	101.60	1.0000	25.40	6	C25291	—
		21		.1590	4.04	4.5000	114.30	1.1250	28.58	6	C25297	—
		20		.1610	4.09	4.5000	114.30	1.1250	28.58	6	C25301	—
		19		.1660	4.22	4.5000	114.30	1.1250	28.58	6	C25313	—
		18		.1695	4.31	4.5000	114.30	1.1250	28.58	6	C25322	—
11/64				.1719	4.37	4.5000	114.30	1.1250	28.58	6	C25327	—
		17		.1730	4.39	4.5000	114.30	1.1250	28.58	6	C25330	—
		16		.1770	4.50	4.5000	114.30	1.1250	28.58	6	C25339	—
		15		.1800	4.57	4.5000	114.30	1.1250	28.58	6	C25346	—
		14		.1820	4.62	4.5000	114.30	1.1250	28.58	6	C25351	—
		13		.1850	4.70	4.5000	114.30	1.1250	28.58	6	C25357	—
	.1855			.1855	4.71	4.5000	114.30	1.1250	28.58	6	C25360	—
				.1865	4.74	4.5000	114.30	1.1250	28.58	6	C25362	—
	.1870			.1870	4.75	4.5000	114.30	1.1250	28.58	6	C25365	—
3/16				.1875	4.76	4.5000	114.30	1.1250	28.58	6	C25366	C29565
				.1885	4.79	4.5000	114.30	1.1250	28.58	6	C25368	—
		12		.1890	4.80	4.5000	114.30	1.1250	28.58	6	C25369	—
		11		.1910	4.85	5.0000	127.00	1.2500	31.75	6	C25374	—
		10		.1935	4.91	5.0000	127.00	1.2500	31.75	6	C25380	—
		9		.1960	4.98	5.0000	127.00	1.2500	31.75	6	C25385	—
			5.0	.1969	5.00	5.0000	127.00	1.2500	31.75	6	C25314	—
		8		.1990	5.05	5.0000	127.00	1.2500	31.75	6	C25392	—
		7		.2010	5.11	5.0000	127.00	1.2500	31.75	6	C25397	—
13/64				.2031	5.16	5.0000	127.00	1.2500	31.75	6	C25402	C29601
		6		.2040	5.18	5.0000	127.00	1.2500	31.75	6	C25404	—
		5		.2055	5.22	5.0000	127.00	1.2500	31.75	6	C25408	—
		4		.2090	5.31	5.0000	127.00	1.2500	31.75	6	C25417	—
		3		.2130	5.41	5.0000	127.00	1.2500	31.75	6	C25426	—
7/32				.2188	5.56	5.0000	127.00	1.2500	31.75	6	C25438	C29637

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Straight Flute and Spiral Flute (continued)
Styles 4001 (405) and 4030 (405RS)

INCH AND METRIC SIZES

Fraction	Drill Diameter Dowel Pin	W/L	Metric	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Number of Flutes	Style 4001 Straight Flute	Style 4030 Spiral Flute
		2		.2210	5.61	6.0000	152.40	1.5000	38.10	6	C25443	—
		1		.2280	5.79	6.0000	152.40	1.5000	38.10	6	C25459	—
		A		.2340	5.94	6.0000	152.40	1.5000	38.10	6	C25473	—
15/64				.2344	5.95	6.0000	152.40	1.5000	38.10	6	C25474	—
			6.0	.2362	6.00	6.0000	152.40	1.5000	38.10	6	C25475	—
		B		.2380	6.05	6.0000	152.40	1.5000	38.10	6	C25483	—
		C		.2420	6.15	6.0000	152.40	1.5000	38.10	6	C25492	—
		D		.2460	6.25	6.0000	152.40	1.5000	38.10	6	C25501	—
	.2480			.2480	6.30	6.0000	152.40	1.5000	38.10	6	C25508	—
				.2490	6.32	6.0000	152.40	1.5000	38.10	6	C25510	—
	.2495			.2495	6.32	6.0000	152.40	1.5000	38.10	6	C25512	—
1/4		E		.2500	6.35	6.0000	152.40	1.5000	38.10	6	C25513	C29709
				.2510	6.38	6.0000	152.40	1.5000	38.10	6	C25516	—
		F		.2570	6.53	6.0000	152.40	1.5000	38.10	6	C25530	—
		G		.2610	6.63	6.0000	152.40	1.5000	38.10	6	C25539	—
17/64				.2656	6.75	6.0000	152.40	1.5000	38.10	6	C25550	C29745
		H		.2660	6.76	6.0000	152.40	1.5000	38.10	6	C25552	—
		I		.2720	6.91	6.0000	152.40	1.5000	38.10	6	C25566	—
			7.0	.2756	7.00	6.0000	152.40	1.5000	38.10	6	C25567	—
		J		.2770	7.04	6.0000	152.40	1.5000	38.10	6	C25577	—
		K		.2810	7.14	6.0000	152.40	1.5000	38.10	6	C25585	—
9/32				.2812	7.14	6.0000	152.40	1.5000	38.10	6	C25608	C29803
		L		.2900	7.37	6.0000	152.40	1.5000	38.10	6	C25605	—
		M		.2950	7.49	6.0000	152.40	1.5000	38.10	6	C25617	—
19/64				.2969	7.54	6.0000	152.40	1.5000	38.10	6	C25622	—
		N		.3020	7.67	6.0000	152.40	1.5000	38.10	6	C25634	—
	.3105			.3105	7.89	6.0000	152.40	1.5000	38.10	6	C25655	—
	.3115			.3115	7.91	6.0000	152.40	1.5000	38.10	6	C25658	—
				.3120	7.92	6.0000	152.40	1.5000	38.10	6	C25660	—
5/16				.3125	7.94	6.0000	152.40	1.5000	38.10	6	C25661	C29853
				.3135	7.96	6.0000	152.40	1.5000	38.10	6	C25663	—
			8.0	.3150	8.00	6.0000	152.40	1.5000	38.10	6	C25668	—
		O		.3160	8.03	6.0000	152.40	1.5000	38.10	6	C25669	—
		P		.3230	8.20	6.0000	152.40	1.5000	38.10	6	C25685	—
21/64				.3281	8.33	6.0000	152.40	1.5000	38.10	6	C25698	C29890
		Q		.3320	8.43	6.0000	152.40	1.5000	38.10	6	C25707	—
		R		.3390	8.61	6.0000	152.40	1.5000	38.10	6	C25723	—
11/32				.3438	8.73	6.0000	152.40	1.5000	38.10	6	C25733	C29925
		S		.3480	8.84	7.0000	177.80	1.7500	44.45	6	C25742	—
			9.0	.3543	9.00	7.0000	177.80	1.7500	44.45	6	C25743	—
		T		.3580	9.09	7.0000	177.80	1.7500	44.45	6	C25764	—
23/64				.3594	9.13	7.0000	177.80	1.7500	44.45	6	C25768	C29960
		U		.3680	9.35	7.0000	177.80	1.7500	44.45	6	C25789	—
	.3730			.3730	9.47	7.0000	177.80	1.7500	44.45	6	C25801	—
				.3740	9.50	7.0000	177.80	1.7500	44.45	6	C25804	—
	.3745			.3745	9.51	7.0000	177.80	1.7500	44.45	6	C25806	—
3/8				.3750	9.53	7.0000	177.80	1.7500	44.45	6	C25807	C29997
				.3760	9.55	7.0000	177.80	1.7500	44.45	6	C25809	—
		V		.3770	9.58	7.0000	177.80	1.7500	44.45	6	C25811	—
		W		.3860	9.80	7.0000	177.80	1.7500	44.45	6	C25833	—
25/64				.3906	9.92	7.0000	177.80	1.7500	44.45	6	C25844	C30033
			10.0	.3937	10.00	7.0000	177.80	1.7500	44.45	6	C25845	—
		X		.3970	10.08	7.0000	177.80	1.7500	44.45	6	C25858	—

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Straight Flute and Spiral Flute (continued)
Styles 4001 (405) and 4030 (405RS)

INCH AND METRIC SIZES

Fraction	Drill Diameter Dowel Pin	W/L	Metric	Decimal	mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Number of Flutes	**Style 4001** Straight Flute	**Style 4030** Spiral Flute
		Y		.4040	10.26	7.0000	177.80	1.7500	44.45	6	C25873	—
13/32				.4062	10.32	7.0000	177.80	1.7500	44.45	6	C25878	C30067
		Z		.4130	10.49	7.0000	177.80	1.7500	44.45	6	C25892	—
27/64				.4219	10.72	7.0000	177.80	1.7500	44.45	6	C25911	—
			11.0	.4331	11.00	7.0000	177.80	1.7500	44.45	6	C25912	—
	.4355			.4355	11.06	7.0000	177.80	1.7500	44.45	6	C25942	—
				.4365	11.09	7.0000	177.80	1.7500	44.45	6	C25944	—
	.4370			.4370	11.10	7.0000	177.80	1.7500	44.45	6	C25946	—
7/16				.4375	11.11	7.0000	177.80	1.7500	44.45	6	C25947	C30134
				.4385	11.14	7.0000	177.80	1.7500	44.45	6	C25949	—
29/64				.4531	11.51	7.0000	177.80	1.7500	44.45	6	C25981	C30168
15/32				.4688	11.91	7.0000	177.80	1.7500	44.45	6	C26014	C30201
			12.0	.4724	12.00	7.0000	177.80	1.7500	44.45	6	C26015	—
31/64				.4844	12.30	8.0000	203.20	2.0000	50.80	6	C26048	C30235
	.4990			.4990	12.67	8.0000	203.20	2.0000	50.80	6	C26080	—
1/2				.5000	12.70	8.0000	203.20	2.0000	50.80	6	C26083	C30268
	.5010			.5010	12.73	8.0000	203.20	2.0000	50.80	8	C26085	—
			13.0	.5118	13.00	8.0000	203.20	2.0000	50.80	8	C26086	—
17/32				.5312	13.49	8.0000	203.20	2.0000	50.80	8	C26150	C30335
			14.0	.5512	14.00	8.0000	203.20	2.0000	50.80	8	C26151	—
9/16				.5625	14.29	8.0000	203.20	2.0000	50.80	8	C26217	C30402
			15.0	.5906	15.00	8.0000	203.20	2.0000	50.80	8	C26218	—
19/32				.5938	15.08	8.0000	203.20	2.0000	50.80	8	C26284	C30469
5/8				.6250	15.88	9.0000	228.60	2.2500	57.15	8	C26351	C30536
			16.0	.6299	16.00	9.0000	228.60	2.2500	57.15	8	C26352	—
21/32				.6562	16.67	9.0000	228.60	2.2500	57.15	8	C26418	C30603
11/16				.6875	17.46	9.0000	228.60	2.2500	57.15	8	C26485	C30670
23/32				.7188	18.26	9.0000	228.60	2.2500	57.15	8	C26550	C30735
3/4				.7500	19.05	9.5000	241.30	2.5000	63.50	8	C26615	C30800
25/32				.7812	19.84	9.5000	241.30	2.5000	63.50	8	C26680	C30865
13/16				.8125	20.64	9.5000	241.30	2.5000	63.50	8	C26746	C30931
27/32				.8438	21.43	9.5000	241.30	2.5000	63.50	8	C26811	—
7/8				.8750	22.23	10.0000	254.00	2.6250	66.68	8	C26876	C31061
29/32				.9062	23.02	10.0000	254.00	2.6250	66.68	8	C26941	—
15/16				.9375	23.81	10.0000	254.00	2.6250	66.68	8	C27006	C31191
31/32				.9688	24.61	10.0000	254.00	2.6250	66.68	8	C27072	—
1IN				1.0000	25.40	10.5000	266.70	2.7500	69.85	8	C27137	C31322
1-1/16				1.0625	26.99	10.5000	266.70	2.7500	69.85	10	C27144	—
1-1/8				1.1250	28.58	11.0000	279.40	2.8750	73.03	10	C27152	C31337
1-3/16				1.1875	30.16	11.0000	279.40	2.8750	73.03	10	C27159	—
1-1/4				1.2500	31.75	11.5000	292.10	3.0000	76.20	10	C27166	C31351
1-3/8				1.3750	34.93	12.0000	304.80	3.2500	82.55	10	C27180	C31365
1-1/2				1.5000	38.10	12.5000	317.50	3.5000	88.90	12	C27195	C31380

INCH SETS

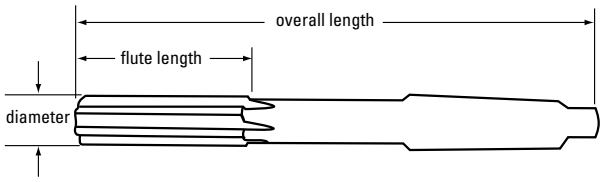
Number of Tools	Size Range	Case Style	**Style 4001** Bright
29	1/16 - 1/2 X 1/64	plastic pouch	C00964

Set C00964

Taper Shank — Straight Flute
Style 4005 (400)

Features/Benefits:
- General-purpose for a wide range of operating conditions and materials.
- Manufactured from premium high-speed steel.
- Straight flute reamers for through holes.
- Bright finish.

Application Information:
- tool steel
- alloy steel
- cast iron
- aluminum
- plastic
- free-machining stainless steel



INCH SIZES

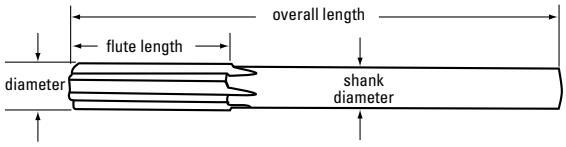
Fraction	Drill Diameter Decimal	mm	Overall Length Inch	mm	Inch	Flute Length mm	Morse Taper	Number of Flutes	**Style 4005** Straight Flute
1/4	.2500	6.35	6.0000	152.40	1.5000	38.10	1	6	C33842
5/16	.3125	7.94	6.0000	152.40	1.5000	38.10	1	6	C33986
3/8	.3750	9.53	7.0000	177.80	1.7500	44.45	1	6	C34129
7/16	.4375	11.11	7.0000	177.80	1.7500	44.45	1	6	C34266
1/2	.5000	12.70	8.0000	203.20	2.0000	50.80	1	6	C34400
17/32	.5312	13.49	8.0000	203.20	2.0000	50.80	1	6	C34467
9/16	.5625	14.29	8.0000	203.20	2.0000	50.80	1	8	C34534
19/32	.5938	15.08	8.0000	203.20	2.0000	50.80	1	8	C34601
5/8	.6250	15.88	9.0000	228.60	2.2500	57.15	2	8	C34668
21/32	.6562	16.67	9.0000	228.60	2.2500	57.15	2	8	C34735
11/16	.6875	17.46	9.0000	228.60	2.2500	57.15	2	8	C34802
23/32	.7188	18.26	9.0000	228.60	2.2500	57.15	2	8	C34867
3/4	.7500	19.05	9.5000	241.30	2.5000	63.50	2	8	C34932
25/32	.7812	19.84	9.5000	241.30	2.5000	63.50	2	8	C34997
13/16	.8125	20.64	9.5000	241.30	2.5000	63.50	2	8	C35063
27/32	.8438	21.43	9.5000	241.30	2.5000	63.50	2	8	C35128
7/8	.8750	22.23	10.0000	254.00	2.6250	66.68	2	8	C35193
29/32	.9062	23.02	10.0000	254.00	2.6250	66.68	2	8	C35258
15/16	.9375	23.81	10.0000	254.00	2.6250	66.68	3	8	C35323
31/32	.9688	24.61	10.0000	254.00	2.6250	66.68	3	8	C35389
1IN	1.0000	25.40	10.5000	266.70	2.7500	69.85	3	8	C35454
1-1/16	1.0625	26.99	10.5000	266.70	2.7500	69.85	3	10	C35461
1-1/8	1.1250	28.58	11.0000	279.40	2.8750	73.03	3	10	C35469
1-3/16	1.1875	30.16	11.0000	279.40	2.8750	73.03	3	10	C35476
1-1/4	1.2500	31.75	11.5000	292.10	3.0000	76.20	4	10	C35483
1-5/16	1.3125	33.34	11.5000	292.10	3.0000	76.20	4	10	C35490
1-3/8	1.3750	34.93	12.0000	304.80	3.2500	82.55	4	10	C35497
1-7/16	1.4375	36.51	12.0000	304.80	3.2500	82.55	4	10	C35505
1-1/2	1.5000	38.10	12.5000	317.50	3.5000	88.90	4	12	C35512

For Morse Taper shank specifications, see page 3.

Solid Carbide — Straight Shank — Straight Flute
Style 1730

Features/Benefits:
- General-purpose for a wide range of operating conditions and materials.
- High red hardness for extended wear life in high-heat conditions.
- Manufactured from premium high-speed steel.
- Straight flute reamers for through holes.
- Bright finish.

Application Information:
- tool steel
- alloy steel
- cast iron
- aluminum
- plastic
- free-machining stainless steel



INCH SIZES

Drill Diameter Fraction	Drill Diameter Decimal	Drill Diameter mm	Shank Diameter Inch	Shank Diameter mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Number of Flutes	**Style 1730** Straight Flute
1/16	.0625	1.59	.058	1.47	1.5000	38.10	.3750	9.53	4	C50103
3/32	.0938	2.38	.088	2.24	2.0000	50.80	.5000	12.70	4	C50121
1/8	.1250	3.18	.120	3.05	2.2500	57.15	.6250	15.88	4	C50133
5/32	.1562	3.97	.151	3.84	2.5000	63.50	.7500	19.05	4	C50145
3/16	.1875	4.76	.182	4.62	2.7500	69.85	.8750	22.23	4	C50157
7/32	.2188	5.56	.213	5.41	3.0000	76.20	1.0000	25.40	6	C50168
1/4	.2500	6.35	.244	6.20	3.0000	76.20	1.0000	25.40	6	C50180
9/32	.2812	7.14	.270	6.86	3.2500	82.55	1.1250	28.58	6	C50194
5/16	.3125	7.94	.301	7.65	3.2500	82.55	1.1250	28.58	6	C50203
11/32	.3438	8.73	.332	8.43	3.5000	88.90	1.2500	31.75	6	C50214
3/8	.3750	9.53	.363	9.22	3.5000	88.90	1.2500	31.75	6	C50226

Reamer Regrinding

In obtaining maximum economy from reamers the same principles apply as in the case of most other cutting tools. One of these principles is not to allow a tool to become too dull. It is best to regrind the chamfer on a reamer long before it exhibits excessive wear or refuses to cut. This sharpening is usually restricted to the entering taper or chamfer. It can be done on almost any tool and cutter grinder. Care must be taken so that each flute is ground exactly even or the tool is apt to cut oversize.

Sharpening the chamfer on a reamer by hand is not recommended as it is practically impossible to keep the cutting edges even.

The following figures show three common types of grinds used on reamers:

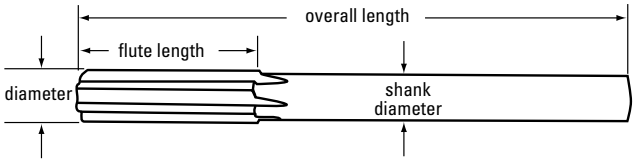
In grinding down a reamer to special size it is usually necessary to relieve or clear the lands. No hard or fast rule may be given as to the amount of this clearance but the following table may be of help:

Size of Reamer	Circular Land Width	Primary Clearance
1/4”	.007	14°
1/2”	.009	11°
1”	.013	9°
1-1/2”	.016	7°
2”	.023	7°

Carbide-Tipped — Straight Shank — Straight Flute
Style 4703

Features/Benefits:
- Runs at carbide speeds for increased productivity.
- Manufactured from high-speed steel body and shank for extra strength with brazed carbide tips.
- Straight flute reamers for through holes.
- Bright finish.

Application Information:
- alloy steel
- carbon steel
- titanium alloys
- aluminum
- free-machining stainless steel



INCH SIZES

Drill Diameter Fraction	Drill Diameter Decimal	Drill Diameter mm	Shank Diameter Inch	Shank Diameter mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Number of Flutes	**Style 4703** Straight Flute
1/4	.2500	6.35	.2405	6.11	6.0000	152.40	1.5000	38.10	4	C50368
9/32	.2812	7.14	.2485	6.31	6.0000	152.40	1.5000	38.10	4	C50382
5/16	.3125	7.94	.2792	7.09	6.0000	152.40	1.5000	38.10	4	C50391
11/32	.3438	8.73	.2792	7.09	6.0000	152.40	1.5000	38.10	4	C50402
3/8	.3750	9.53	.3105	7.89	7.0000	177.80	1.7500	44.45	4	C50414
13/32	.4062	10.32	.3105	7.89	7.0000	177.80	1.7500	44.45	4	C50423
7/16	.4375	11.11	.3730	9.47	7.0000	177.80	1.7500	44.45	6	C50428
15/32	.4688	11.91	.3730	9.47	7.0000	177.80	1.7500	44.45	6	C50433
1/2	.5000	12.70	.4355	11.06	8.0000	203.20	2.0000	50.80	6	C50438
17/32	.5312	13.49	.4355	11.06	8.0000	203.20	2.0000	50.80	6	C50443
9/16	.5625	14.29	.4355	11.06	8.0000	203.20	2.0000	50.80	6	C50449
5/8	.6250	15.88	.5620	14.27	9.0000	228.60	2.2500	57.15	6	C50459

Reamer Regrinding (continued)

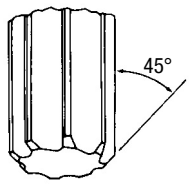


Figure A
Ordinary reamer grind for most jobs.

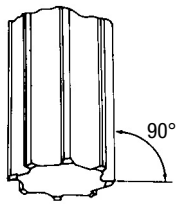


Figure C
Semi-finish reamer grind to straighten out bent or misaligned holes. Corners must be kept sharp.

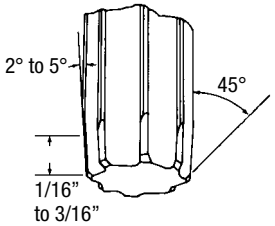


Figure B
Hand reamer grind also used on some machine reamer applications to obtain required finish or tolerance.

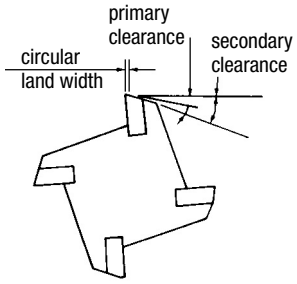


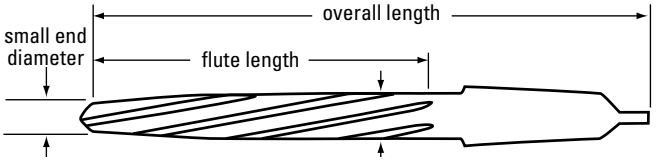
Figure D
A secondary clearance is often ground on reamers as shown in Fig. D. This clearance is only to insure the back of the land being well away from the wall of the reamed hole in order to prevent rubbing.

Taper Shank Bridge Reamer
Style 616 (340)

Features/Benefits:
- Designed for hard service, especially suited for use in structural iron or steel bridgework and ship construction.
- Manufactured from premium high-speed steel.
- Left-hand helix, right-hand cut for difficult materials and applications.
- Sharp point and long taper for easy entry in badly misaligned holes.
- Commonly used in electric and pneumatic portable equipment.
- Black oxide finish standard from stock.

Application Information:
- structural steel
- carbon steel
- cast iron

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.



INCH SIZES

Reamer Diameter Fraction	Reamer Diameter Decimal	Reamer Diameter mm	Small End Diameter Inch	Small End Diameter mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Morse Taper	Number of Flutes	**Style 616** Black Oxide
7/16	.4375	11.11	.2656	6.75	8.2500	209.55	4.3750	111.13	2	4	C23812
1/2	.5000	12.70	.3125	7.94	9.0000	228.60	5.1250	130.18	2	4	C23813
9/16	.5625	14.29	.3750	9.53	9.0000	228.60	5.1250	130.18	2	4	C23814
5/8	.6250	15.88	.3906	9.92	10.0000	254.00	6.1250	155.58	2	4	C23815
11/16	.6875	17.46	.4062	10.32	11.7500	298.45	7.1250	180.98	3	4	C23816
3/4	.7500	19.05	.4688	11.91	12.0000	304.80	7.3750	187.33	3	4	C23817
13/16	.8125	20.64	.5469	13.89	12.0000	304.80	7.3750	187.33	3	4	C23818
7/8	.8750	22.23	.6094	15.48	12.0000	304.80	7.3750	187.33	3	4	C23819
15/16	.9375	23.81	.6719	17.07	12.0000	304.80	7.3750	187.33	3	4	C23820
1	1.0000	25.40	.7344	18.65	12.0000	304.80	7.3750	187.33	3	4	C23821
1-1/16	1.0625	26.99	.8125	20.64	12.0000	304.80	7.3750	187.33	3	4	C23822
1-1/8	1.1250	28.58	.8594	21.83	12.0000	304.80	7.3750	187.33	3	4	C23823
1-3/16	1.1875	30.16	.9219	23.42	12.0000	304.80	7.3750	187.33	3	4	C23824

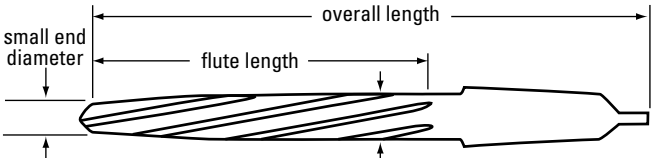
For Morse Taper shank specifications, see page 3.

Taper Shank Car Reamer
Style 618

Features/Benefits:
- Designed for hard service, especially suited for use in structural iron or steel.
- Manufactured from high-speed steel.
- Left-hand helix, right-hand cut for difficult materials and applications.
- Sharp point and long taper for easy entry in badly misaligned holes.
- Commonly used in electric and pneumatic portable equipment.
- Black oxide finish standard from stock.

Application Information:
- carbon steel
- cast iron
- Use for aligning misaligned holes.

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.



INCH SIZES

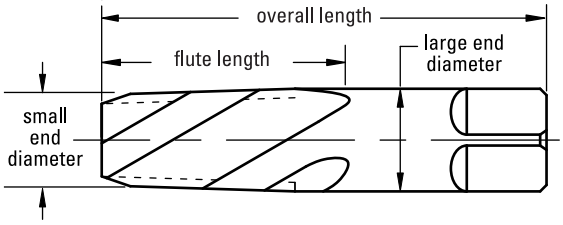
Reamer Diameter			Small End Diameter		Overall Length		Flute Length		Morse	Number	**Style 618**
Fraction	Decimal	mm	Inch	mm	Inch	mm	Inch	mm	Taper	of Flutes	Black Oxide
9/16	.5625	14.290	.3125	7.94	7.5625	192.09	3.9375	100.01	2	5	C23957
5/8	.6250	15.880	.3281	8.33	8.0625	204.79	4.4375	112.71	2	5	C23958
11/16	.6875	17.460	.3594	9.13	8.8125	223.84	4.4375	112.71	3	5	C23959
3/4	.7500	19.050	.4219	10.72	9.5000	241.30	5.0000	127.00	3	5	C23960
13/16	.8125	20.640	.4688	11.91	9.5000	241.30	5.0000	127.00	3	5	C23961
15/16	.9375	23.810	.5625	14.29	9.5000	241.30	5.0000	127.00	3	5	C23962

For Morse Taper shank specifications, see page 3.

Taper Pipe Reamer
Style 642 (853)

Features/Benefits:
- Designed to ream holes to be tapped with American National Standard taper pipe taps.
- Manufactured from premium high-speed steel.
- 3/4-inch taper per foot.
- Left-hand spiral flutes impart smoother, easier cutting action and longer wear life.
- Right-hand cut pushes chip forward.
- Square on shank for use with tap wrench in hand reaming applications.
- Bright finish standard from stock.

Application Information:
- carbon steel
- alloy steel
- cast iron



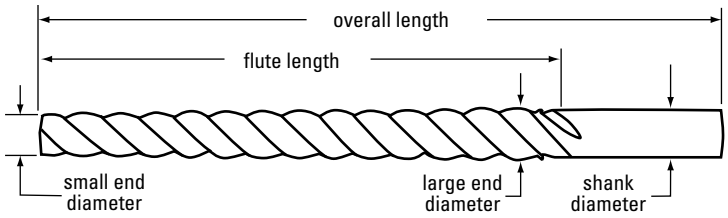
INCH SIZES

Nominal Pipe Diameter Fraction	Decimal	mm	Small End Diameter Inch	mm	Large End Diameter Inch	mm	Overall Length Inch	mm	Flute Length Inch	mm	Number of Flutes	**Style 642** Bright
1/8	.1250	3.18	.3160	8.03	.3620	9.19	2.1250	53.98	.7500	19.05	6	C24982
1/4	.2500	6.35	.4060	10.31	.4720	11.99	2.4375	61.91	1.0625	26.99	6	C24983
3/8	.3750	9.53	.5400	13.72	.6060	15.39	2.5625	65.09	1.0625	26.99	6	C24984
1/2	.5000	12.70	.6650	16.89	.7510	19.08	3.1250	79.38	1.3750	34.93	6	C24985
3/4	.7500	19.50	.8760	22.25	.9620	24.43	3.7500	95.25	1.3750	34.93	8	C24986
1	1.0000	25.40	1.1030	28.02	1.2120	30.78	3.7500	95.25	1.7500	44.45	8	C24987
1-1/4	1.2500	31.75	1.4440	36.68	1.5530	39.45	4.0000	101.60	1.7500	44.45	10	C24988
1-1/2	1.5000	38.10	1.6840	42.77	1.7930	45.54	4.2500	107.95	1.7500	44.45	10	C24989

High Spiral Taper Pin Reamer
Style 650 (231)

Features/Benefits:
- Designed to ream a hole for standard taper pins by machine.
- Free cutting action at high speeds produces a a good finish and minimizes chip packing in flutes.
- Left-hand spiral, right-hand cut helical flute design for difficult applications.
- Manufactured from premium high-speed steel.
- 1/4" taper per foot.
- Dimensions match taper pin specifications.
- Bright finish standard from stock.

Application Information:
- carbon steel
- alloy steel
- cast iron
- aluminum



INCH SIZES

Size Number	Small End Diameter Inch	Small End Diameter mm	Large End Diameter Inch	Large End Diameter mm	Shank Diameter Inch	Shank Diameter mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	No. of Flutes	**Style 650** Bright
#7/0	.0497	1.26	.0666	1.69	.0781	1.98	1.8125	46.04	.8125	20.64	2	C24229
#6/0	.0611	1.55	.0806	2.05	.0938	2.38	1.9375	49.21	.9375	23.81	3	C24230
#5/0	.0719	1.83	.0966	2.45	.1094	2.78	2.1875	55.56	1.1875	30.16	2	C24231
#4/0	.0869	2.21	.1142	2.90	.1250	3.18	2.3125	58.74	1.3125	33.34	3	C24232
#3/0	.1029	2.61	.1302	3.31	.1406	3.57	2.3125	58.74	1.3125	33.34	2	C24233
#2/0	.1137	2.89	.1462	3.71	.1562	3.97	2.5625	65.09	1.5625	39.69	3	C24234
#0	.1287	3.27	.1638	4.16	.1719	4.37	2.9375	74.61	1.6875	42.86	3	C24235
#1	.1447	3.68	.1798	4.57	.1875	4.76	2.9375	74.61	1.6875	42.86	3	C24236
#2	.1605	4.08	.2008	5.10	.2031	5.16	3.1875	80.96	1.9375	49.21	3	C24237
#3	.1813	4.61	.2294	5.83	.2344	5.95	3.6875	93.66	2.3125	58.74	3	C24238
#4	.2071	5.26	.2604	6.61	.2656	6.75	4.0625	103.19	2.5625	65.09	3	C24239
#5	.2409	6.12	.2994	7.60	.3125	7.94	4.3125	109.54	2.8125	71.44	3	C24240
#6	.2773	7.04	.3540	8.99	.3594	9.13	5.4375	138.11	3.6875	93.66	3	C24241
#7	.3297	8.37	.4220	10.72	.4062	10.32	6.3125	160.34	4.4375	112.71	3	C24242
#8	.3971	10.09	.5050	12.83	.4375	11.11	7.1875	182.56	5.1875	131.76	3	C24243
#9	.4805	12.20	.6066	15.41	.5625	14.29	8.3125	211.14	6.0625	153.99	3	C24244
#10	.5799	14.73	.7216	15.41	.6250	15.88	9.3125	236.54	6.8125	173.04	4	C24245

Reamers - Taper Pin

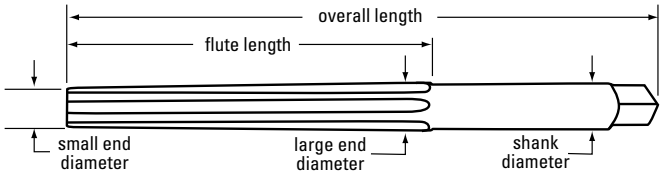
Taper Pin Reamers — Straight Shank
Styles 657 (245) and 659 (245RS)

Features/Benefits:
- Designed to turn a straight hole into a tapered hole for standard taper pins.
- Straight flute design is recommended for most materials and applications.
- Left-hand spiral, right-hand cut helical flute design is recommended for applications where the reamer tends to wedge itself.
- Manufactured from premium high-speed steel.
- Dimensions match taper pin specifications.
- Square on shank for use with tap wrench in hand reaming applications.
- Bright finish standard from stock.

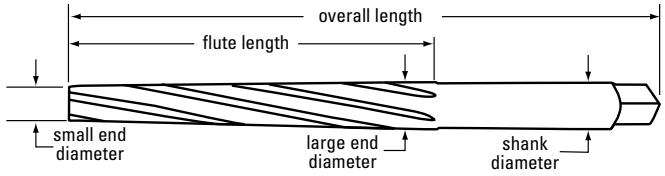
Application Information:
- carbon steel
- alloy steel
- tool steel
- aluminum

Style 657 Straight Flute

Style 659 Helical Flute



Straight Flutes



Helical Flutes

INCH SIZES

Size Number	Small End Diameter Inch	Small End Diameter mm	Large End Diameter Inch	Large End Diameter mm	Shank Diameter Inch	Shank Diameter mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	No. of Flutes	**Style 657** Straight	**Style 659** Helical
#6/0	.0611	1.55	.0806	2.05	.0938	2.38	1.9375	49.21	.9375	23.81	4	C24250	C24271
#5/0	.0719	1.83	.0966	2.45	.1094	2.78	2.1875	55.56	1.1875	30.16	4	C24251	C24272
#4/0	.0869	2.21	.1142	2.90	.1250	3.18	2.3125	58.74	1.3125	33.34	4	C24252	C24273
#3/0	.1029	2.61	.1302	3.31	.1406	3.57	2.3125	58.74	1.3125	33.34	4	C24253	C24274
#2/0	.1137	2.89	.1462	3.71	.1562	3.97	2.5625	65.09	1.5625	39.69	4	C24254	C24275
#0	.1287	3.27	.1638	4.16	.1719	4.37	2.9375	74.61	1.6875	42.86	4	C24255	C24276
#1	.1447	3.68	.1798	4.57	.1875	4.76	2.9375	74.61	1.6875	42.86	6	C24256	C24277
#2	.1605	4.08	.2008	5.10	.2031	5.16	3.1875	80.96	1.9375	49.21	6	C24257	C24278
#3	.1813	4.61	.2294	5.83	.2344	5.95	3.6875	93.66	2.3125	58.74	6	C24258	C24279
#4	.2071	5.26	.2604	6.61	.2656	6.75	4.0625	103.19	2.5625	65.09	6	C24259	C24280
#5	.2409	6.12	.2994	7.60	.3125	7.94	4.3125	109.54	2.8125	71.44	6	C24260	C24281
#6	.2773	7.04	.3540	8.99	.3594	9.13	5.4375	138.11	3.6875	93.66	6	C24261	C24282
#7	.3297	8.37	.4220	10.72	.4062	10.32	6.3125	160.34	4.4375	112.71	6	C24262	C24283
#8	.3971	10.09	.5050	12.83	.4375	11.11	7.1875	182.56	5.1875	131.76	6	C24263	C24284
#9	.4805	12.20	.6066	15.41	.5625	14.29	8.3125	211.14	6.0625	153.99	8	C24264	C24285
#10	.5799	14.73	.7216	18.33	.6250	15.88	9.3125	236.54	6.8125	173.04	8	C24265	C24286

Reamer Technical Information

Reaming Speeds

Speeds for machine reaming may vary considerably depending in part on the material to be reamed, type of machine, and required finish and accuracy. In general most machine reaming is done at about 2/3 the speed used for drilling the same material. Speeds for reaming are shown on pages 125-126.

Reaming Feeds

Feeds for reaming are usually much higher than those used for drilling, often running 200% to 300% of drill feeds. Too low a feed may result in excessive reamer wear. At all times it is necessary that the feed be high enough to permit the reamer to cut rather than to rub or burnish. Too high a feed may tend to reduce the accuracy of the hole and may also lower the quality of the finish. The basic idea is to use as high a feed as possible and still produce the required finish and accuracy.

Stock to be Removed

For the same reason, insufficient stock for reaming may result in a burnishing rather than a cutting action. It is difficult to generalize on this phase as it is tied in closely with type of material, feed, finish required, depth of hole, and chip capacity of the reamer. For machine reaming, 0.010" on a 1/4" hole, 0.015" on a 1/2" hole, up to 0.025" on a 1-1/2" hole, seems a good starting point. For hand reaming, stock allowances are much smaller, partly because of the difficulty in forcing the reamer through greater stock. A common allowance is 0.001" to 0.003".

Alignment

In the ideal reaming job, the spindle, reamer, bushing, and hole to be machined are all in perfect alignment. Any variation from this tends to increase reamer wear and detracts from the accuracy of the hole. Tapered, oversize, or bell-mouthed holes should call for a check of alignment. Sometimes the bad effects of misalignment can be reduced through the use of floating or adjustable holders. Quite often if the user will grind a slight back taper on the reamer it will also be of help in overcoming the effects of misalignment.

Chatter

Chatter while reaming has a very bad effect on reamer life and on the finish in the hole. Chatter may be the result of one of several causes, listed below. Correcting the cause can materially increase both reamer life and the quality of the reamed holes.

- Excessive speed.
- Too light a feed.
- Too much clearance on reamer.
- Insecure holding of work.
- Lack of rigidity in jig or machine.
- Excessive looseness in floating holder.
- Excessive overhang of reamer or spindle.

Coolant

In reaming, the emphasis is usually on finish, and a coolant is normally chosen for this purpose rather than for cooling. Quite often this means a change from that recommended for drilling.

Reamer Diameter Tolerances

Reamer Diameter inches	+ inches	+ inches
through 1/2	.0001	.0004
over 1/2 through 1	.0001	.0005
over 1	.0002	.0006
	+	–
dowel pin sizes	.0000	(.0002)

Reamer Overall Length and Flute Length Tolerances

Reamer Diameter inches	+ inches	– inches
3/64 through 1	.0625	.0625
over 1 through 2	.0938	.0938
over 2 through 3	.1250	.1250

Reamer Lip Height Tolerances

Reamer Diameter inches	Total Indicator Variation inches
through 1/8	.0010
1/8 through 1/4	.0012
over 1/4 through 1/2	.0015
over 1/2 through 1	.0020
over 1 through 3-1/2	.0025

Reamer Straight Shank Diameter Tolerances

Reamer Diameter inches	+ inches	– inches
Tool Style 4001, 4030		
.0390 to .4335	.0000	.0010
.4396 to 1.2495	.0000	.0015
Tool Style 657, 659		
.0781 to .6250	.0010	.0050
Tool Style 650		
.0781 to .6250	.0005	.0020

Reamers - Speeds and Feeds

Reamer Speeds and Feeds — Ferrous Materials

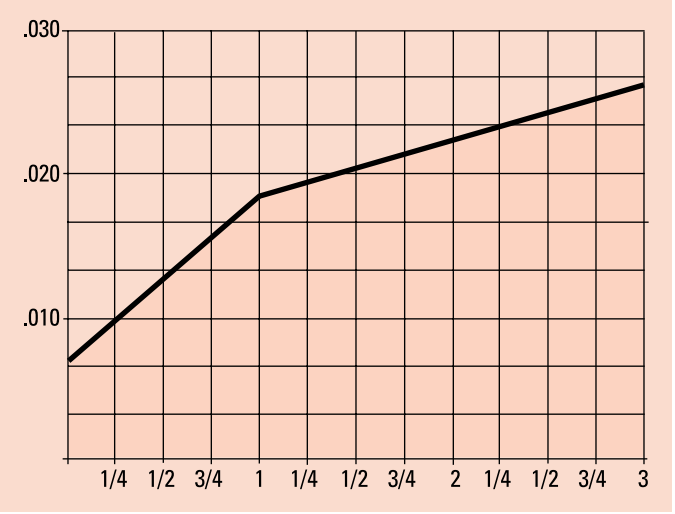
			Feed (ipr) for Diameter (inches)					
	Material	Speed (sfm)	<1/16	> 1/16 - 1/8	>1/8 - 1/4	> 1/4 - 1/2	> 1/2 - 1	> 1
Steel	under 200 BHN	55-80	.0005-.003	.002-.006	.004-.010	.006-.015	.010-.030	.020-.050
	200-300 BHN	30-55	.005-.002	.002-.004	.004-.006	.006-.010	.010-.020	.020-.040
	300-400 BHN	20-30	.0002-.001	.001-.002	.002-.004	.004-.006	.006-.010	.010-.020
	400-500 BHN	10-20	.0002-.001	.001-.002	.002-.004	.004-.006	.006-.010	.010-.020
	500 BHN +	—	.0002-.001	.001-.002	.002-.004	.004-.006	.006-.010	.010-.020
Cast Iron	Soft (Ferritic)	50-100	.001-.003	.003-.006	.006-.010	.010-.015	.015-.030	.030-.050
	Medium (Pearlitic)	25-50	.0002-.002	.001-.004	.002-.006	.004-.010	.006-.020	.010-.040
	Hard (Martensitic orAcicular)	15-25	.0002-.001	.001-.002	.002-.004	.004-.006	.006-.010	.010-.020
Stainless Steel	Free Machining & 400 Ann	40-60	.0005-.002	.002-.004	.004-.006	.006-.010	.010-.020	.020-.040
	300 Series	20-30	.0005-.002	.002-.004	.004-.006	.006-.010	.010-.020	.020-.040
	PH and HT 400Series	15-25	.0002-.002	.001-.004	.002-.006	.004-.010	.006-.020	.010-.040
High-Temp Alloys	Nickel-base	10-20	.0002-.001	.001-.002	.002-.004	.004-.006	.006-.010	.010-.020
	Cobalt-base	10-15	.0002-.001	.001-.002	.002-.004	.004-.006	.006-.010	.010-.020
Titanium	Pure	35-50	.0005-.002	.002-.004	.004-.006	.006-.010	.010-.020	.020-.040
	Alloys	10-20	.0002-.002	.001-.004	.002-.006	.004-.010	.006-.020	.010-.04

Reamer Speeds and Feeds — Non-Ferrous Materials

			Feed (ipr) for Diameter (inches)					
	Material	Speed (sfm)	<1/16	> 1/16 - 1/8	>1/8 - 1/4	> 1/4 - 1/2	> 1/2 - 1	> 1
Aluminum		150-300	.0005-.003	.002-.006	.004-.010	.006-.015	.010-.030	.020-.050
Brass/ Bronze	Free Machining	125-200	.0005-.002	.002-.004	.004-.006	.006-.010	.010-.020	.020-.040
	Tough	75-125	.0005-.002	.002-.004	.004-.006	.006-.010	.010-.020	.020-.040
Copper/ Hard Bronze		50-75	.0002-.001	.001-.002	.002-.004	.004-.006	.006-.010	.010-.020
Magnesium		200-400	.005-.003	.002-.006	.004-.010	.006-.015	.010-.030	.020-.050

Reamer Stock Removal

Stock removal is dependent on material, feed, and finish required. The stock removal chart below illustrates starting points for various diameters when using machine and chucking reamers. See **Reamers - Cutting Speeds**.



Reamers - Cutting Speeds

Reamer Size		Feet per Minute														
Fract/Wire/		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Letter	Decimal	Revolutions per Minute														
#60	.0400	630	1261	1891	2521	3152	3781	4411	5042	5672	6302	6933	7563	8193	8824	9454
#59	.0410	615	1230	1845	2459	3074	3689	4304	4919	5536	6149	6764	7379	7993	8608	9224
#58	.0420	601	1201	1801	2400	3001	3601	4202	4802	5403	6003	6603	7203	7803	8403	9004
#57	.0430	586	1173	1763	2350	2938	3526	4113	4701	5289	5876	6449	7036	7622	8208	8795
#56	.0465	542	1084	1627	2169	2711	3253	3796	4338	4880	5422	5964	6506	7047	7590	8133
#55	.0520	485	970	1455	1939	2424	2909	3394	3879	4363	4848	5333	5818	6302	6787	7278
#54	.0550	458	917	1375	1833	2292	2750	3209	3667	4126	4584	5042	5500	5958	6417	6875
#53	.0595	423	847	1270	1694	2117	2540	2963	3386	3810	4233	4661	5085	5508	5932	6356
1/16	.0625	403	807	1210	1614	2017	2420	2823	3227	3663	4033	4437	4840	5244	5647	6050
#52	.0635	397	794	1191	1588	1985	2382	2779	3176	3573	3970	4369	4764	5161	5558	5955
#51	.0670	376	752	1129	1505	1882	2258	2634	3010	3386	3763	4139	4515	4893	5527	5644
#50	.0700	360	720	1080	1441	1801	2161	2521	2882	3241	3602	3961	4322	4682	5042	5402
#49	.0730	345	691	1036	1381	1727	2072	2418	2763	3109	3454	3799	4144	4493	4835	5180
#48	.0760	332	663	995	1327	1659	1991	2322	2654	2985	3317	3648	3980	4312	4644	4976
#47	.0785	321	642	964	1284	1606	1927	2248	2569	2890	3212	3532	3854	4175	4496	4817
#46	.0810	312	622	934	1245	1556	1868	2179	2490	2801	3113	3423	3735	4046	4357	4669
#45	.0820	308	615	922	1230	1537	1845	2152	2459	2767	3074	3382	3689	3997	4305	4611
#44	.0860	293	586	880	1173	1466	1759	2052	2346	2639	2932	3225	3518	3811	4104	4397
#43	.0890	283	566	850	1133	1416	1700	1983	2266	2550	2833	3116	3399	3682	3965	4249
#42	.0935	269	539	809	1078	1348	1618	1888	2157	2427	2696	2966	3235	3505	3775	4044
#41	.0960	263	525	788	1051	1313	1575	1838	2101	2363	2626	2889	3152	3414	3676	3939
#40	.0980	257	515	772	1029	1286	1544	1801	2058	2315	2573	2829	3087	3344	3602	3858
#39	.0995	253	507	760	1014	1267	1520	1773	2027	2280	2534	2787	3041	3294	3547	3800
#38	.1015	248	497	745	993	1242	1490	1738	1987	2235	2484	2732	2981	3229	3478	3726
#37	.1040	242	485	727	970	1212	1455	1697	1939	2182	2424	2666	2909	3152	3394	3636
#36	.1065	237	473	710	947	1184	1420	1657	1894	2130	2367	2604	2841	3078	3314	3551
#35	.1100	229	458	688	917	1146	1375	1604	1833	2063	2292	2522	2750	2979	3208	3438
#34	.1110	227	454	681	908	1136	1363	1590	1817	2044	2272	2498	2725	2953	3180	3407
#33	.1130	223	446	669	892	1115	1338	1562	1785	2008	2231	2454	2677	2900	3123	3346
#32	.1160	217	435	652	869	1087	1304	1521	1738	1956	2173	2391	2608	2825	3043	3260
#31	.1200	210	420	630	840	1051	1261	1470	1680	1891	2101	2311	2522	2731	2941	3152
1/8	.1250	202	403	605	807	1008	1210	1412	1614	1815	2017	2218	2420	2622	2823	3025
#30	.1285	196	393	589	785	981	1177	1373	1569	1766	1962	2158	2354	2550	2747	2943
#29	.1360	185	371	556	742	927	1112	1298	1483	1668	1854	2039	2224	2410	2595	2781
#28	.1405	180	359	539	718	898	1076	1256	1436	1615	1795	1973	2153	2332	2512	2691
#27	.1440	175	350	525	700	876	1051	1226	1401	1576	1751	1927	2101	2276	2451	2626
#26	.1470	172	343	514	686	857	1029	1201	1371	1543	1715	1886	2058	2229	2401	2573
#25	.1495	169	337	506	675	842	1012	1181	1349	1518	1686	1855	2024	2193	2361	2529
#24	.1520	166	332	498	663	830	995	1161	1327	1493	1659	1824	1991	2156	2322	2488
#23	.1540	164	327	491	655	818	982	1146	1309	1473	1637	1800	1964	2128	2292	2455
#22	.1570	160	321	482	642	803	964	1124	1284	1445	1606	1766	1927	2088	2248	2408
#21	.1590	158	317	476	634	793	951	1109	1269	1427	1585	1745	1903	2061	2220	2379
#20	.1610	156	314	470	626	783	939	1096	1253	1409	1566	1723	1879	2035	2193	2349
#19	.1660	152	304	455	607	760	911	1063	1215	1367	1519	1670	1822	1974	2127	2279
#18	.1695	149	298	447	597	746	895	1044	1193	1342	1492	1636	1785	1934	2082	2231
#17	.1730	146	292	437	583	729	875	1020	1166	1311	1457	1603	1749	1894	2040	2187
#16	.1770	143	285	427	570	712	855	997	1139	1282	1424	1567	1709	1852	1994	2136
#15	.1800	141	281	421	562	702	842	983	1123	1263	1404	1540	1680	1821	1961	2101
#14	.1820	139	277	416	554	693	831	970	1108	1247	1385	1524	1662	1800	1939	2078
#13	.1850	136	273	409	545	681	818	957	1090	1227	1363	1499	1636	1771	1908	2044
3/16	.1875	135	269	403	538	673	807	941	1076	1210	1344	1479	1614	1748	1882	2017
#12	.1890	133	267	400	533	667	801	934	1067	1201	1334	1467	1601	1734	1867	2001
#11	.1910	132	264	396	528	660	792	924	1056	1188	1320	1452	1584	1716	1848	1981
#10	.1935	130	261	391	521	651	781	912	1042	1173	1303	1433	1564	1694	1824	1954
#9	.1960	129	257	386	515	644	772	900	1029	1158	1286	1415	1544	1672	1800	1929

continued on next page

Reamers - Cutting Speeds

Reamer Size		Feet per Minute														
Fract/Wire/		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Letter	Decimal	Revolutions per Minute														
#8	.1990	127	253	380	507	634	760	886	1013	1140	1267	1393	1520	1647	1773	1900
#7	.2010	125	251	376	502	627	752	878	1003	1129	1254	1379	1505	1630	1756	1881
#6	.2040	123	247	371	494	618	741	865	989	1112	1236	1360	1483	1606	1730	1854
#5	.2055	123	246	368	491	614	736	859	981	1104	1227	1350	1472	1595	1717	1840
#4	.2090	121	241	362	482	603	724	845	965	1086	1206	1327	1447	1568	1690	1809
#3	.2130	118	237	355	473	592	710	828	946	1065	1183	1303	1420	1538	1657	1775
#2	.2210	114	228	342	456	570	684	799	912	1026	1140	1255	1369	1483	1597	1711
#1	.2280	111	221	332	442	553	663	774	884	995	1106	1216	1327	1438	1548	1659
A	.2340	108	215	324	432	540	648	756	864	972	1080	1185	1293	1401	1508	1616
B	.2380	106	212	318	424	530	636	742	847	954	1059	1165	1271	1377	1483	1589
C	.2420	104	209	312	416	521	625	729	833	937	1041	1146	1250	1354	1459	1563
D	.2460	102	205	308	411	513	616	719	822	924	1027	1127	1230	1332	1435	1537
1/4	.2500	101	202	302	403	504	605	706	807	908	1008	1109	1210	1311	1412	1513
E	.2500	101	202	302	403	504	605	706	807	908	1008	1109	1210	1299	1412	1513
F	.2570	98	196	294	392	490	589	686	785	882	981	1079	1177	1275	1373	1471
G	.2610	96	193	290	386	483	579	676	772	869	966	1063	1159	1256	1352	1449
H	.2660	95	189	284	379	474	569	663	758	853	948	1043	1137	1232	1327	1422
I	.2720	92	185	278	371	463	556	649	741	834	927	1020	1112	1205	1298	1390
J	.2770	91	182	273	364	455	546	637	728	819	910	1001	1092	1183	1274	1365
K	.2810	90	180	269	359	449	538	628	717	807	897	987	1076	1166	1256	1346
L	.2900	87	174	261	348	435	521	609	696	782	869	956	1043	1130	1217	1304
M	.2950	85	171	257	342	428	513	599	684	770	855	940	1026	1111	1197	1282
N	.3020	83	167	251	334	418	501	585	668	752	835	918	1002	1085	1169	1252
5/16	.3125	81	161	242	323	403	484	565	645	726	807	888	968	1049	1129	1210
O	.3160	80	160	240	319	399	479	558	638	718	798	878	957	1037	1117	1197
P	.3230	78	156	234	312	391	469	546	624	703	781	859	937	1014	1094	1171
Q	.3320	76	152	228	304	380	455	531	607	683	759	836	913	987	1063	1139
R	.3390	75	149	223	298	372	446	521	595	669	744	818	894	967	1041	1115
S	.3480	73	145	217	290	362	435	508	579	652	725	797	869	942	1014	1086
T	.3580	71	141	211	281	352	422	492	563	633	704	774	845	915	986	1056
U	.3680	69	137	205	274	343	411	480	548	616	685	754	822	890	959	1028
3/8	.3750	67	135	202	269	336	403	471	538	605	673	739	807	874	941	1008
V	.3770	67	134	201	267	335	401	468	535	602	669	735	805	869	936	1003
W	.3860	65	131	196	261	327	392	457	523	588	653	718	784	849	914	979
X	.3970	63	127	191	254	317	380	444	508	571	635	698	762	826	889	952
Y	.4040	63	125	187	249	312	374	437	499	562	624	686	749	811	874	936
Z	.4130	61	122	183	244	305	366	427	488	549	611	671	733	793	855	915
7/16	.4375	57	116	173	230	288	346	403	461	519	576	634	692	749	807	865
1/2	.5000	50	101	151	202	252	302	353	403	454	504	554	605	655	706	756
5/8	.6250	40	81	121	161	202	242	282	323	363	403	444	484	524	565	605
3/4	.7500	34	67	101	134	168	202	236	269	302	336	370	403	437	471	504
7/8	.8750	29	57	86	116	144	173	202	230	259	288	317	346	375	403	432
1	1.0000	25	50	76	101	126	151	176	202	227	252	277	302	328	353	378
1-1/8	1.1250	22	45	67	90	112	135	157	180	202	224	246	269	291	314	336
1-1/4	1.2500	20	40	61	81	101	121	141	161	182	202	222	242	262	282	302
1-3/8	1.3750	18	37	55	73	92	110	128	147	165	183	202	220	238	257	275
1-1/2	1.5000	17	34	50	67	84	101	117	135	151	168	185	202	218	236	252
1-5/8	1.6250	16	31	46	62	77	93	109	124	140	155	171	186	202	217	233
1-3/4	1.7500	15	29	43	57	72	86	101	116	129	144	158	173	187	202	216
1-7/8	1.8750	13	27	40	53	67	81	94	108	121	135	148	161	175	188	202
2	2.0000	13	25	38	50	63	76	88	101	114	126	139	151	164	176	189
2-1/4	2.2500	11	22	34	45	56	67	79	90	101	112	123	135	146	157	168
2-1/2	2.5000	10	20	30	40	50	61	71	81	90	101	111	121	131	141	151
2-3/4	2.7500	9	18	28	37	46	55	64	73	83	92	101	110	119	128	137
3	3.0000	9	17	25	34	42	50	59	67	76	84	92	101	110	117	126

TECH TIP

ENLARGING EXISTING HOLES

Often, we become aware of avoidable injuries suffered from the improper use of cutting tools. One very common injury occurs from attempting to enlarge an existing hole with either one or successively larger drill bits to achieve the desired hole size. This injury is most common when using a portable electric, air or cordless drill. The problem occurs when a 2-fluted drill grabs and wedges itself in the existing hole and the torque of the drill will pull it out of your closed hand. As the drill body continues to rotate at very high RPMs, it normally strikes the user on the hand and broken bones are the usual result. This happens very quickly and is very violent. Occasionally, if the power tool is large, like a 1/2" or 3/4" chuck capacity, an arm or leg bone can be easily broken.

Solution? Never attempt to enlarge an existing hole with a drill bit. To enlarge an existing hole, use only: a) a countersink in very thin gauge material; b) a core drill for enlarging to 60% of the hole diameter; or c) a reamer for very slight and precise hole enlarging.

Other Tools - Countersinks

Single-Flute and Three-Flute Countersink
Styles 209SF and 213

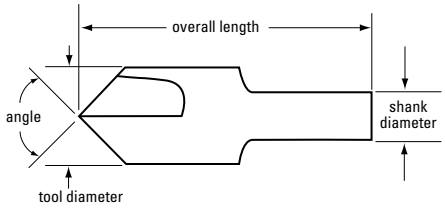
Features/Benefits:
- Designed to countersink, chamfer, deburr, and enlarge holes in sheet metal.
- Use single flute countersinks in holes too small for multi-flute countersinks. Use multi-flute countersinks in much larger size holes.
- Manufactured from premium high-speed steel.
- Single-flute available with 82° and 90° point angles; three-flute available with 82°, 90° and 100° point angles.
- Black finish with bright point.

Application Information:
- tool steel
- alloy steel
- cast iron
- Recommended for portable applications and machine work.
- Operate at high speeds and light feeds for best results.

Surface Treatment Information:
- Black oxide surface finish increases wear resistance and adds lubricity, improving chip flow.

Style 209SF Single-Flute

Style 213 Three-Flute



STYLE 209SF SINGLE-FLUTE — INCH SIZES

Diameter			Shank Diameter		Overall Length		Style 209SF	
Fraction	Decimal	mm	Inch	mm	Inch	mm	82° Angle	90° Angle
1/4	.2500	6.35	.1875	4.76	1.5000	38.10	56736	56756
3/8	.3750	9.53	.2500	6.35	1.7500	44.45	56738	56758
1/2	.5000	12.70	.2500	6.35	2.0000	50.80	56740	56760
3/4	.7500	19.05	.5000	12.70	2.6250	66.68	56744	56774
1	1.0000	25.40	.5000	12.70	2.7500	69.85	56748	56778

STYLE 213 THREE-FLUTE — INCH SIZES

Diameter			Shank Diameter		Overall Length		Shank Length		Style 213		
Fraction	Decimal	mm	Inch	mm	Inch	mm	Inch	mm	82° Angle	90° Angle	100° Angle
1/4	.2500	6.35	.1875	4.76	1.5000	38.10	.7500	19.05	56836	56856	56876
3/8	.3750	9.53	.2500	6.35	1.7500	44.45	.8750	22.23	56838	56858	56878
1/2	.5000	12.70	.2500	6.35	2.0000	50.80	1.0000	25.40	56839	56859	56879
1/2	.5000	12.70	.3750	9.53	2.0000	50.80	1.0000	25.40	56840	56860	56880
5/8	.6250	15.88	.3750	9.53	2.2500	57.15	1.0000	25.40	56842	56862	56882
3/4	.7500	19.05	.5000	12.70	2.6250	66.68	1.2500	31.75	56844	56864	56884

INCH SET

Number of Tools	Size Range	Case Style	Style 213 82° Angle
5	1/4 - 3/4 X 1/8	plastic pouch	64216

Set 64216

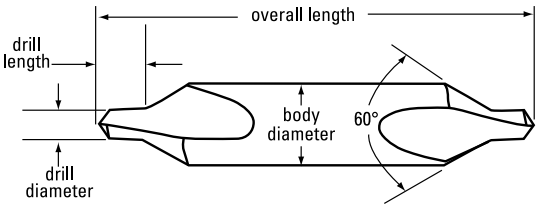
Combined Drill and Countersink — Plain and Bell Type
Styles 217, 217B

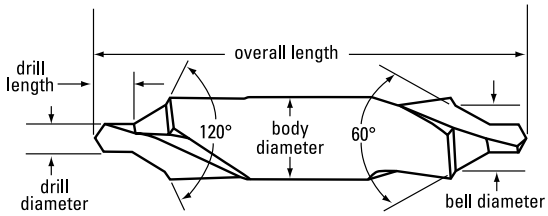
Features/Benefits:
- Designed to produce center hole that serves as the seat or bearing surface for center on a machine.
- Style 217 produces an ordinary 60° included angle center.
- Style 217B produces the same 60° included angle center and bevels the outer edges to 120° included angle.
- Manufactured from premium high-speed steel.
- Bright finish.

Application Information:
- carbon steel
- tool steel
- alloy steel
- cast iron
- Use Style 217 plain type for most applications.
- Use Style 217B bell type for parts passing through several operations where there is a danger of marring the edges of the center hole and destroying the accuracy of the center.

Style 217 Plain Type

Style 217B Bell Type





STYLE 217 PLAIN TYPE — INCH SIZES

Size Number	Drill Diameter Fraction	Drill Diameter Decimal	Drill Diameter Metric	Body Diameter Inch	Body Diameter mm	Overall Length Inch	Overall Length mm	Drill Length Inch	Drill Length mm	**Style 217 Plain Type**
#00	.025	.0250	0.64	.1250	3.18	1.2500	31.75	.0300	0.76	56699
#0	1/32	.0312	0.79	.1250	3.18	1.2500	31.75	.0380	0.97	56700
#1	3/64	.0469	1.19	.1250	3.18	1.2500	31.75	.0469	1.19	56701
#2	5/64	.0781	1.98	.1875	4.76	1.8750	47.63	.0781	1.98	56702
#3	7/64	.1094	2.78	.2500	6.35	2.0000	50.80	.1094	2.78	56703
#4	1/8	.1250	3.18	.3125	7.94	2.1250	53.98	.1250	3.18	56704
#5	3/16	.1875	4.76	.4375	11.11	2.7500	69.85	.1875	4.76	56705
#6	7/32	.2188	5.56	.5000	12.70	3.0000	76.20	.2188	5.56	56706
#7	1/4	.2500	6.35	.6250	15.88	3.2500	82.55	.2500	6.35	56707
#8	5/16	.3125	7.94	.7500	19.05	3.5000	88.90	.3125	7.94	56708

STYLE 217B BELL TYPE — INCH SIZES

Size Number	Drill Diameter Fraction	Drill Diameter Decimal	Drill Diameter Metric	Bell Diameter Inch	Bell Diameter mm	Body Diameter Inch	Body Diameter mm	Overall Length Inch	Overall Length mm	Drill Length Inch	Drill Length mm	**Style 217B Bell Type**
#11	3/64	.0469	1.19	.1000	2.54	.1250	3.18	1.2500	31.75	.0469	1.19	56761
#12	1/16	.0625	1.59	.1500	3.81	.1875	4.76	1.8750	47.63	.0625	1.59	56762
#13	3/32	.0938	2.38	.2000	5.08	.2500	6.35	2.0000	50.80	.0938	2.38	56763
#14	7/64	.1094	2.78	.2500	6.35	.3125	7.94	2.1250	53.98	.1094	2.78	56764
#15	5/32	.1562	3.97	.3500	8.89	.4375	11.11	2.7500	69.85	.1562	3.97	56765
#16	3/16	.1875	4.76	.4000	10.16	.5000	12.70	3.0000	76.20	.1875	4.76	56766
#17	7/32	.2188	5.56	.5000	12.70	.6250	15.88	3.2500	82.55	.2188	5.56	56767
#18	1/4	.2500	6.35	.6000	15.24	.7500	19.05	3.5000	88.90	.2500	6.35	56768

INCH SETS

Number of Tools	Size Numbers	Case Style	**Style 217 Plain Type**	**Style 217B Bell Type**
5	#1, #2, #3, #4, #5	plastic pouch	56710	—
8	#1, #2, #3, #4, #5, #6, #7, #8	plastic pouch	69878	—
8	#11, #12, #13, #14, #15, #16, #17, #18	plastic pouch	—	69879

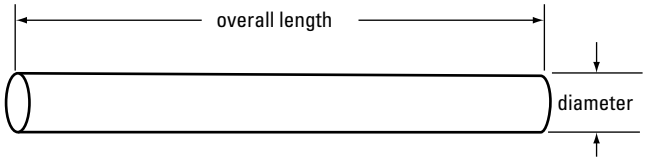
Set 56710

Drill Blanks
Style 165

Features/Benefits:
- Manufactured from premium high-speed steel.
- Hardened and ground to a diameter tolerance of +.0000 to –.0002.
- Jobber length.
- Bright finish.

Application Information:
- alloy steel
- tool steel
- nickel alloys
- cobalt alloys

- Commonly used for the sizing of holes, diameter gages, punches, knockout pins or rollers, and as stock for small cutting tools.



Style 165 Bright Finish

INCH SIZES

Drill Diameter				Overall Length		**Style 165**
Fraction	Wire	Decimal	mm	Inch	mm	Bright
	80	.0135	0.34	0.7500	19.05	46950
	79	.0145	0.37	0.7500	19.05	46949
1/64		.0156	0.40	0.7500	19.05	46801
	78	.0160	0.41	0.8750	22.23	46948
	77	.0180	0.46	0.8750	22.23	46947
	76	.0200	0.51	0.8750	22.23	46946
	75	.0210	0.53	1.0000	25.40	46945
	74	.0225	0.57	1.0000	25.40	46944
	73	.0240	0.61	1.0000	25.40	46943
	72	.0250	0.64	1.1250	28.58	46942
	71	.0260	0.66	1.2500	31.75	46941
	70	.0280	0.71	1.2500	31.75	46940
	69	.0292	0.74	1.3750	34.93	46939
	68	.0310	0.79	1.3750	34.93	46938
1/32		.0313	0.79	1.3750	34.93	46802
	67	.0320	0.81	1.3750	34.93	46937
	66	.0330	0.84	1.3750	34.93	46936
	65	.0350	0.89	1.5000	38.10	46935
	64	.0360	0.91	1.5000	38.10	46934
	63	.0370	0.94	1.5000	38.10	46933
	62	.0380	0.97	1.5000	38.10	46932
	61	.0390	0.99	1.6250	41.28	46931
	60	.0400	1.02	1.6250	41.28	46930
	59	.0410	1.04	1.6250	41.28	46929
	58	.0420	1.07	1.6250	41.28	46928
	57	.0430	1.09	1.7500	44.45	46927
	56	.0465	1.18	1.7500	44.45	46926
3/64		.0469	1.19	1.7500	44.45	46803
	55	.0520	1.32	1.8750	47.63	46925
	54	.0550	1.40	1.8750	47.63	46924
	53	.0595	1.51	1.8750	47.63	46923
1/16		.0625	1.59	1.8750	47.63	46804
	52	.0635	1.61	1.8750	47.63	46922
	51	.0670	1.70	2.0000	50.80	46921
	50	.0700	1.78	2.0000	50.80	46920
	49	.0730	1.85	2.0000	50.80	46919
	48	.0760	1.93	2.0000	50.80	46918
5/64		.0781	1.98	2.0000	50.80	46805

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Drill Blanks (continued)
Style 165

INCH SIZES

Fraction	Drill Diameter Wire	Decimal	mm	Overall Length Inch	mm	Style 165 Bright
	47	.0785	1.99	2.0000	50.80	46917
	46	.0810	2.06	2.1250	53.98	46916
	45	.0820	2.08	2.1250	53.98	46915
	44	.0860	2.18	2.1250	53.98	46914
	43	.0890	2.26	2.2500	57.15	46913
	42	.0935	2.37	2.2500	57.15	46912
3/32		.0938	2.38	2.2500	57.15	46806
	41	.0960	2.44	2.3750	60.33	46911
	40	.0980	2.49	2.3750	60.33	46910
	39	.0995	2.53	2.3750	60.33	46909
	38	.1015	2.58	2.5000	63.50	46908
	37	.1040	2.64	2.5000	63.50	46907
	36	.1065	2.71	2.5000	63.50	46906
7/64		.1094	2.78	2.6250	66.68	46807
	35	.1100	2.79	2.6250	66.68	46905
	34	.1110	2.82	2.6250	66.68	46904
	33	.1130	2.87	2.6250	66.68	46903
	32	.1160	2.95	2.7500	69.85	46902
	31	.1200	3.05	2.7500	69.85	46901
1/8		.1250	3.18	2.7500	69.85	46808
	30	.1285	3.26	2.7500	69.85	46900
	29	.1360	3.45	2.8750	73.03	46899
	28	.1405	3.57	2.8750	73.03	46898
9/64		.1406	3.57	2.8750	73.03	46809
	27	.1440	3.66	3.0000	76.20	46897
	26	.1470	3.73	3.0000	76.20	46896
	25	.1495	3.80	3.0000	76.20	46895
	24	.1520	3.86	3.1250	79.38	46894
	23	.1540	3.91	3.1250	79.38	46893
5/32		.1563	3.97	3.1250	79.38	46810
	22	.1570	3.99	3.1250	79.38	46892
	21	.1590	4.04	3.2500	82.55	46891
	20	.1610	4.09	3.2500	82.55	46890
	19	.1660	4.22	3.2500	82.55	46889
	18	.1695	4.31	3.2500	82.55	46888
11/64		.1719	4.37	3.2500	82.55	46811
	17	.1730	4.39	3.3750	85.73	46887
	16	.1770	4.50	3.3750	85.73	46886
	15	.1800	4.57	3.3750	85.73	46885
	14	.1820	4.62	3.3750	85.73	46884
	13	.1850	4.70	3.5000	88.90	46883
3/16		.1875	4.76	3.5000	88.90	46812
	12	.1890	4.80	3.5000	88.90	46882
	11	.1910	4.85	3.5000	88.90	46881
	10	.1935	4.91	3.6250	92.08	46880
	9	.1960	4.98	3.6250	92.08	46879
	8	.1990	5.05	3.6250	92.08	46878
	7	.2010	5.11	3.6250	92.08	46877
13/64		.2031	5.16	3.6250	92.08	46813
	6	.2040	5.18	3.7500	95.25	46876
	5	.2055	5.22	3.7500	95.25	46875
	4	.2090	5.31	3.7500	95.25	46874
	3	.2130	5.41	3.7500	95.25	46873
7/32		.2188	5.56	3.7500	95.25	46814
	2	.2210	5.61	3.8750	98.43	46872

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Drill Blanks (continued)
Style 165

INCH SIZES

Fraction	Drill Diameter Wire	Decimal	mm	Overall Length Inch	mm	Style 165 Bright
	1	.2280	5.79	3.8750	98.43	46871
	A	.2340	5.94	3.8750	98.43	46971
15/64		.2344	5.95	3.8750	98.43	46815
	B	.2380	6.05	4.0000	101.60	46972
	C	.2420	6.15	4.0000	101.60	46973
	D	.2460	6.25	4.0000	101.60	46974
1/4	E	.2500	6.35	4.0000	101.60	46816
	F	.2570	6.53	4.1250	104.78	46976
	G	.2610	6.63	4.1250	104.78	46977
17/64		.2656	6.75	4.1250	104.78	46817
	H	.2660	6.76	4.1250	104.78	46978
	I	.2720	6.91	4.1250	104.78	46979
	J	.2770	7.04	4.1250	104.78	46980
	K	.2810	7.14	4.2500	107.95	46981
9/32		.2813	7.14	4.2500	107.95	46818
	L	.2900	7.37	4.2500	107.95	46982
	M	.2950	7.49	4.3750	111.13	46983
19/64		.2969	7.54	4.3750	111.13	46819
	N	.3020	7.67	4.3750	111.13	46984
5/16		.3125	7.94	4.5000	114.30	46820
	O	.3160	8.03	4.5000	114.30	46985
	P	.3230	8.20	4.6250	117.48	46986
21/64		.3281	8.33	4.6250	117.48	46821
	Q	.3320	8.43	4.7500	120.65	46987
	R	.3390	8.61	4.7500	120.65	46988
11/32		.3438	8.73	4.7500	120.65	46822
	S	.3480	8.84	4.8750	123.83	46989
	T	.3580	9.09	4.8750	123.83	46990
23/64		.3594	9.13	4.8750	123.83	46823
	U	.3680	9.35	5.0000	127.00	46991
3/8		.3750	9.53	5.0000	127.00	46824
	V	.3770	9.58	5.0000	127.00	46992
	W	.3860	9.80	5.1250	130.18	46993
25/64		.3906	9.92	5.1250	130.18	46825
	X	.3970	10.08	5.1250	130.18	46994
	Y	.4040	10.26	5.2500	133.35	46995
13/32		.4063	10.32	5.2500	133.35	46826
	Z	.4130	10.49	5.2500	133.35	46996
27/64		.4219	10.72	5.3750	136.53	46827
7/16		.4375	11.11	5.5000	139.70	46828
29/64		.4531	11.51	5.6250	142.88	46829
15/32		.4688	11.91	5.7500	146.05	46830
31/64		.4844	12.30	5.8750	149.23	46831
1/2		.5000	12.70	6.0000	152.40	46832

INCH SETS IN METAL INDEX CASE

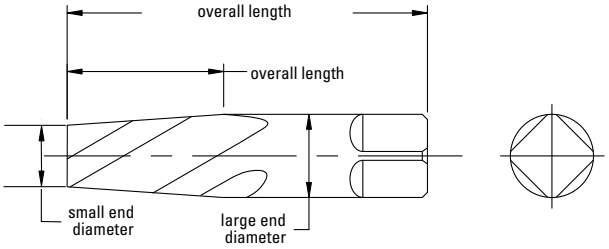
Number of Tools	Size Range	Style 165 Bright
29	1/16 - 1/2 X 1/64	57833
26	Letters A - Z	57832
60	#1 - #60 wire gauge	57831
20	#61 - #80 wire gauge	57830

Set 57833

Screw Extractors
Style 800

Features/Benefits:
- Manufactured with alloy steel substrate.
- Bright finish.

Application Information:
- alloy steel
- tool steel
- low and medium carbon steel
- cast iron



INCH SIZES

Size Number	Small End Diameter Inch	Small End Diameter mm	Large End Diameter Inch	Large End Diameter mm	Overall Length Inch	Overall Length mm	Flute Length Inch	Flute Length mm	Use for these sizes bolts or screws in	Use for these sizes bolts or screws mm	Use for these sizes pipe in	Recom Drill Size	**Style 800** Bright
1	.0625	1.59	.1562	3.97	2.0000	50.80	.7500	19.05	MS 8 to 1/4	2.5 to 6	—	5/64	65001
2	.0860	2.18	.1800	4.57	2.3750	60.33	.7500	19.05	MS 12 to 5/16	6 to 8	—	7/64	65003
3	.1250	3.18	.2500	6.35	2.7500	69.85	1.0000	25.40	5/16 to 7/16	8 to 12	—	5/32	65005
4	.1875	4.76	.3125	7.94	3.0000	76.20	1.0000	25.40	7/16 to 9/16	12 to 14	1/8	1/4	65007
5	.2500	6.35	.4375	11.11	3.3750	85.73	1.5000	38.10	9/16 to 3/4	14 to 20	1/8	17/64	65009
5-1/4	.3438	8.73	.5312	13.49	3.3750	85.73	1.5000	38.10	11/16 to 15/16	—	1/4	23/64	65011
6	.3750	9.53	.5938	15.08	3.7500	95.25	1.7500	44.45	3/4 to 1	—	3/8	13/32	65013
6-3/8	.4688	11.91	.6875	17.46	3.7500	95.25	1.6875	42.86	15/16 to 1-1/8	—	3/8	31/64	65015
7	.5000	12.70	.7812	19.84	4.1250	104.78	2.2500	57.15	1 to 1-3/8	24 to 35	—	17/32	65017
7-1/2	.5938	15.08	.8750	22.23	4.1250	104.78	2.2500	57.15	1-1/8 to 1-1/2	—	1/2	39/64	65019
8	.7500	19.05	1.0312	26.19	4.3750	111.13	2.2500	57.15	1-3/8 to 1-3/4	35 to 44	3/4	13/16	65021
9	1.0000	25.40	1.2812	32.54	4.6250	117.48	2.2500	57.15	1-3/4 to 2-1/8	44 to 54	1	1-1/16	65023
10	1.2500	31.75	1.5625	39.69	5.0000	127.00	2.5000	63.50	2-1/8 to 2-1/2	54 to 63	1-1/4	1-5/16	65025
11	1.5000	38.10	1.8750	47.63	5.6250	142.88	3.0000	76.20	2-1/2 to 3	63 to 76	1-1/2	1-9/16	65027
12	1.8438	46.83	2.2812	57.94	6.2500	158.75	3.5000	88.90	3 to 3-1/2	76 to 88	2	1-15/16	65029

INCH SETS

Number of Tools	**Style**	Size Range	Case Style	Bright
5	**1815**	extractor numbers 1, 2, 3, 4, 5	pouch in tube	65035
6	**1816**	extractor numbers 1, 2, 3, 4, 5, 6	pouch in tube	65036
9	**1819**	extractor numbers 1, 2, 3, 4, 5, 6, 7, 8, 9	pouch only	65039
3	**1823**	extractor numbers 4, 5, 6	tube only	65037
4	**1821**	extractor numbers 5, 5 1/4, 6 3/8, 7 1/2	pouch in tube	65041
6	**1822**	extractor numbers 5, 5 1/4, 6 3/8, 7 1/2, 8, 9	wood block	65042
4	**1818**	extractor numbers 6, 7, 8, 9	wood block	65038
12	**1820**	extractor numbers 1, 2, 3, 4, 5, 6; 150 drill sizes 5/64, 7/64, 5/32, 1/4, 17/64, 13/32	pouch/tube	65040
12	—	extractor numbers 1, 2, 3, 4, 5, 6; 550ASP drill sizes 5/64, 7/64, 5/32, 1/4, 17/64, 13/32	pouch/tube	65043

Set 65040

Other Tools - Drill Accessories

Drill Drifts
Style 100C

Features/Benefits:
- Used to safely drive taper shank tools from the holder or spindle.
- Manufactured from alloy steel.
- Bright finish.

Style 100C Bright

INCH SIZES

Drift Size	Overall Length Inch	Overall Length mm	Thickness Inch	Thickness mm	Width at Hole Inch	Width at Hole mm	**Style 100C** Bright
1	4.5000	114.30	.2031	5.16	.6875	17.46	57121
2	5.1250	130.18	.2500	6.35	.8125	20.64	57122
3	6.7500	171.45	.3125	7.94	1.0625	26.99	57123
4	7.1250	180.98	.4688	11.91	1.1250	28.58	57124
5	8.5000	215.90	.5980	15.19	1.3750	34.93	57125

Reducing Sleeves
Style 100D

Features/Benefits:
- Designed to allow a Morse taper spindle to use a taper shank tool with a smaller taper.
- Manufactured from alloy steel.
- Bright finish

Style 100D Bright

MORSE TAPER SIZES

Tool Morse Taper (Inside) Size	Spindle Morse Taper (Outside) Size	Overall Length Inch	Overall Length mm	**Style 100D** Bright
No. 1	No. 2	3.5625	90.49	57000
No. 2	No. 3	4.4375	112.71	57004
No. 3	No. 4	5.3750	136.53	57007
No. 4	No. 5	6.6250	168.28	57009

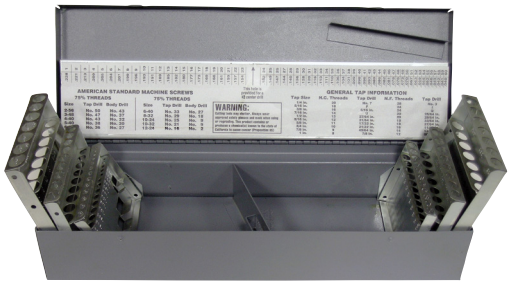
For Morse Taper shank specifications, see page 3.

Drill Set Cases
(no drills)

Features/Benefits:
- Metal index cases.
- Use to build your own drill sets.

SIZES

Number of Drill Holes	Drill Size Range	Order Number
15	1/16 - 1/2 x 1/32	57803
21	1/16 - 3/8 x 1/64	57802
29	1/16 - 1/2 x 1/64	57804
26	Let A - Let Z	57808
60	#1 - #60	57806
20	#61 - #80	57805
25	1mm - 13mm x .5mm	57809
115	1/16 - 1/2 x 1/64, Let A - Let Z, #1 - #60	57810



115-piece Case Number 57810

Other Tools - Technical Information

Countersinks

Countersinks are multi-functional tools that can accomplish many more tasks than the obvious countersinking for screw heads. Countersinks can also be single fluted or multi-fluted. Tapping: A slightly countersunk hole will help the tap center in the hole.

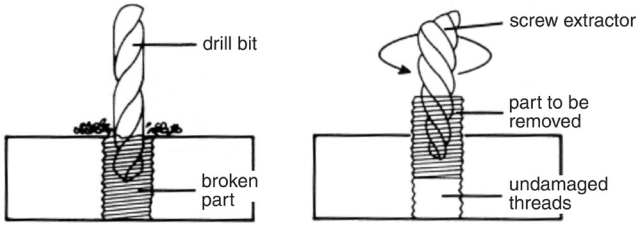
- Deburring: After drilling a hole use a countersink to clean up any unwanted burs at the top or bottom of the hole.
- Enlarging holes: In very thin gauge material, a countersink can enlarge a pre-existing hole.
- Countersinking: When using flat head screws use the countersink to seat the screws.
- Centerdrill: Combination drill and countersinks are sometimes used to locate a precise hole location. The appropriate drill size then follows.

Tips for using countersinks:

- The pre-drilled hole for countersinking should not be less than 10% of the countersink diameter.
- Use single-flute countersinks for smaller holes; multi-flute tools countersink much larger holes.
- Run countersinks at 50% to 66% of recommended drill speeds.
- Single flute countersinks are used in portable and machine work at high speeds. These tools will countersink smaller holes because of the single flute. The hole should be no less than 10% of the countersink diameter.
- Multi-flute countersinks are also used in portable and machine work. They are free cutting and should be operated at 1/2 to 2/3 the speed of drills. They give much better finish than single flute.
- Machine countersinks are made with added shank length for use in lathes and screw machines.

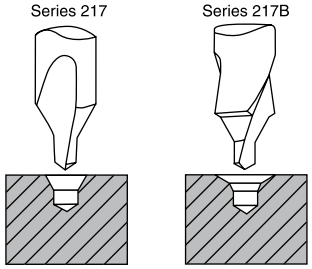
Using Screw Extractors to Remove Broken Screws and Bolts

- Drill a hole into the broken screw using the recommended drill size from the table above.
- Insert the proper screw extractor into the hole and start a counter-clockwise (left-hand) rotation using a tap wrench on the square on the shank.
- The extractor will grip the wall of the hole in the screw and back the screw out without damaging the threads.
- A penetrating oil can be helpful in removing rusty or corroded parts.



Combined Drill and Countersink: Plain or Bell Type?

- Combined drill and countersinks produce the center hole in a part to serve as the seat or bearing surface for the center on a machine.
- Plain type drill and countersinks, Chicago-Latrobe Series 217, will produce an ordinary 60° included angle center, which is satisfactory for most applications.
- Bell type drill and countersinks, C-L Series 217B are recommended for parts passing through several operations where there is a danger of marring the edges of the center hole, thereby destroying the accuracy of the center. They produce a 60° included angle center and bevel the outer edges to 120° included angle to prevent damage to the center hole. In addition, their use ensures proper width of the bearing surface.



Drill Blanks

- Drill and reamer blanks are ideal for use as drifts of dowel pins for gauging purpose, and for making puches.
- They can also be used for round tool bit, countersinks, boring, or burring tools.

Sets - Drill Sets



Jobber Drill Sets
High-Speed Steel and Cobalt

HIGH-SPEED STEEL SETS IN METAL INDEX CASES

		General Purpose			Left-Hand	Heavy-Duty				Parabolic
		150	150D	150-TN	150L	150ASP	150ASP-TN	150ASP-TC	150ASP-TA	150DH-TN
No of Tools	Sizes in Set	Black Oxide	Bright	TiN	Bright	Black Oxide	TiN	TiCN	TiAlN	TiN
Inch Sizes										
13	1/16 - 1/4 x 1/64	57711	49911	—	—	69847	41798	43638	42801	—
15	1/16 - 1/2 x 1/32	57713	49913	69862	69881	69850	41797	43637	42800	—
21	1/16 - 3/8 x 1/64	57712	49912	—	69882	69851	41799	43639	49026	—
29	1/16 - 1/2 x 1/64	57714	49914	69861	69876	45640	41800	43640	49027	57734
26	Let A - Let Z	57718	49918	69883	—	45638	41801	—	—	—
60	#1 - #60	57716	49916	69863	—	45639	41802	—	—	—
20	#61 - #80	57720	57715	69897	—	45656	41803	—	—	—
80	#1 - #80	57717	—	—	—	—	—	—	—	—
115	1/16 - 1/2 x 1/64, Let A - Let Z, #1 - #60	57728	49928	—	—	45650	41804	—	—	—
114	1/16 - 1/2 x 1/64, #1 - #60, 1mm - 13mm x .5mm	57726	—	—	—	—	—	—	—	—
Metric Sizes										
11	1mm - 6mm x .5mm	57723	—	—	—	—	—	—	—	—
13	1mm - 7mm x .5mm	57729	—	—	—	—	—	—	—	—
25	1mm - 13mm x .5mm	57725	—	—	—	45925	—	—	—	—
118	1mm - 13mm x .1mm	57727	—	—	—	—	—	—	—	—

COBALT SETS IN METAL INDEX CASES

		Heavy-Duty		
		550	550-TN	550ASP
Number of Tools	Sizes in Set	Straw	TiN	Straw
Inch Sizes				
13	1/16 - 1/4 x 1/64	57851	69891	—
15	1/16 - 1/2 x 1/32	57852	69871	47795
21	1/16 - 3/8 x 1/64	69887	69892	—
29	1/16 - 1/2 x 1/64	57850	69870	47796
26	Let A - Let Z	69886	—	—
60	#1 - #60	57853	—	—
20	#61 - #80	45657	—	—
115	1/16 - 1/2 x 1/64, Let A - Let Z, #1 - #60	46650	—	—
		—	—	—
Metric Sizes				
11	1mm - 6mm x .5mm	54126	—	—
19	1mm - 10mm x .5mm	—	—	47924
25	1mm - 13mm x .5mm	54127	—	47925

JOBBER DRILL SETS STYLE SUMMARY

Drill Style	Material	Point	Finish	Description
150	HSS	118°	Black Oxide	General Purpose
150D	HSS	118°	Bright	General Purpose
150T	HSS	118°	TiN-coated	General Purpose
150L	HSS	118°	Bright	Left-Hand Spiral
150ASP	HSS	135° Split	Black Oxide	Heavy-duty
150ASP-TN	HSS	135° Split	TiN-coated	Heavy-duty
150ASP-TC	HSS	135° Split	TiCN-coated	Heavy-duty
150ASP-TA	HSS	135° Split	TiAlN-coated	Heavy-duty
150DHT	HSS	135° K-Notch	TiN-coated	Parabolic Deep-Hole
550	Cobalt	135° Split	Straw	Heavy-duty
2550	Cobalt	135° Split	TiN-coated	Heavy-duty
550ASP	Cobalt	135° Split	Straw	Heavy-duty

more sets on next page


Set 57725


Set 69883

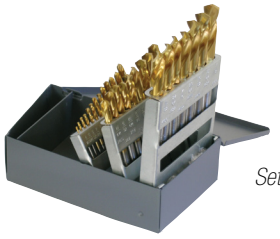

Set 47795


Set 45640

Screw Machine Length Drill Sets
High-Speed Steel and Cobalt

SETS IN METAL INDEX CASES

Number of Tools	Sizes in Set	General Purpose 157 Bright	Heavy-Duty 159 Black Oxide	Heavy-Duty 159-TN TiN	Cobalt Heavy-Duty 559 Straw
Inch Sizes					
15	1/16 - 1/2 x 1/32	—	69889	—	69856
21	1/16 - 3/8 x 1/64	—	69852	—	—
29	1/16 - 1/2 x 1/64	69900	57719	54128	69853
26	Let A - Let Z	69901	—	—	69855
60	#1 - #60	69902	69885	—	69854


Set 54128


Set 69855

Long Length Drill Sets
High-Speed Steel

SETS IN METAL INDEX OR PLASTIC CASES

Number of Tools	Sizes in Set	Case	General Purpose Taper Length 120 Black Oxide	General Purpose 12" Overall Length 120X Black Oxide
Inch Sizes				
15	1/16 - 1/2 x 1/32	metal	69884	—
25	1/8 - 1/2 x 1/64	plastic	—	69869
29	1/16 - 1/2 x 1/64	metal	69864	—
60	#1 - #60	metal	69865	—


Set 69864


Set 69869

Reduced Shank Drill Sets
High-Speed Steel and Cobalt

SETS IN METAL INDEX OR PLASTIC CASES

Number of Tools	Sizes in Set	Case	1/2" Shank High-Speed Steel Round Shanks 190 Black Oxide	1/2" Shank High-Speed Steel Flatted Shanks 190F Black Oxide	1/2" Shank Cobalt Round Shanks 190C Straw
Inch Sizes					
8	9/16 - 1 x 1/16	pouch	57840	69860	—
8	9/16 - 1 x 1/16	metal index	69857	69859	69868
16	17/32 - 1 x 1/32	pouch	69890	69849	—
33	1/2 - 1 x 1/64	metal stand	69858	69848	—

Number of Tools	Sizes in Set	Case	1/4" Shank High-Speed Steel Style 239 Black Oxide
5	1/4 - 1/2 x 1/16	metal index	56340


Set 69859

more sets on next page

Drill and Tap Sets
Styles 150, 150-TN, 150D, 157 Drills

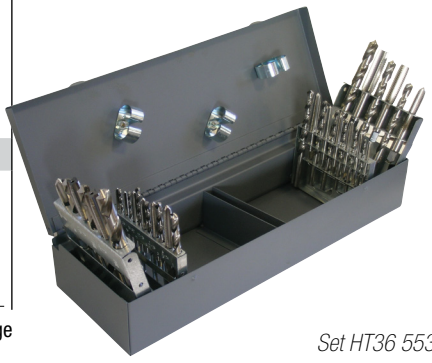
SETS IN METAL INDEX CASES

Number of Tools	Size Range	Set Number	Order Number
Inch Sizes			
18	Jobber Drill Style 150D, HSS, bright #36, #29, #25, #21, #7, F, 5/16, U, 27/64 Hand Taps, industrial-quality, HSS, plug chamfer 6-32NC, 8-32NC, 10-24NC, 10-32NF, 1/4-20NC, 5/16-18NC, 3/8-16NC, 7/16-14NC, 1/2-13NC	HT18	52580
18	Jobber Drill Style 150-TN, HSS, TiN-coated #36, #29, #25, #21, #7, F, 5/16, U, 27/64 Hand Taps, industrial-quality, HSS, plug chamfer 6-32NC, 8-32NC, 10-24NC, 10-32NF, 1/4-20NC, 5/16-18NC, 3/8-16NC, 7/16-14NC, 1/2-13NC	HT18T	52590
18	Jobber Drill Style 150D, HSS, bright #36, #29, #25, #21, #7, F, 5/16, U, 27/64 Spiral Point Taps, industrial-quality, HSS, plug chamfer 6-32NC, 8-32NC, 10-24NC, 10-32NF, 1/4-20NC, 5/16-18NC, 3/8-16NC, 7/16-14NC, 1/2-13NC	GT18	52581
36	Jobber Drill Style 150D, HSS, bright #36, #33, #29 (2 pcs), #25, #21, #16, #15, #7, #3, F, I, 5/16, Q, U, 25/64, 27/64, 39/64 Hand Taps, industrial-quality, HSS, plug chamfer 6-32NC, 6-40NF, 8-32NC, 8-36NF, 10-24NC, 10-32NF, 12-24NC, 12-28NF, ¼-20NC, ¼-28NF, 3/8-16NC, 3/8-24NF, 5/16-18NC, 5/16-24NF, 7/16-14NC, 7/16-20NF, 1/2-13NC, 1/2-20NF	HT36	55305
20	Screw Machine Length Drill Style 157, HSS, bright #44, #39, #36, #29, #25, #7, F, 5/16, U, 27/64 Hand Taps, industrial-quality, HSS, plug chamfer 4-40NC, 5-40NC, 6-32NC, 8-32NC, 10-24NC, 1/4-20NC, 5/16-18NC, 3/8-16NC, 7/16-14NC, 1/2-13NC	68	12910
Metric Sizes			
18	Jobber Drill Style 150, HSS, black oxide 2.05, 2.5, 2.9, 3.3, 4.2, 5.0, 6.7, 8.5, 10.2 Hand Taps, industrial-quality, HSS, plug chamfer M2.5x0.45, M3x0.5, M3.5x0.6, M4x0.7, M5x0.8, M6x1, M8x1.25, M10x1.5, M12x1.75	HM18	52541

more sets on next page

Set HT18 52580

Set GT18 52581



Set HT36 55305

Reamer Set
High-Speed Steel

SET IN PLASTIC POUCH

Number of Tools	Size Range	4001 Bright
Inch Set		
29	1/16 - 1/2 X 1/64	C00964

Set C00964

Countersink Set
High-Speed Steel

SET IN PLASTIC POUCH

Number of Tools	Size Range	213 82° Angle
Inch Set		
5	1/4 - 3/4 X 1/8	64216

Set 64216

Combined Drill and Countersink Sets
High-Speed Steel

SETS IN PLASTIC POUCH

Number of Tools	Size Numbers	217 Plain Type	217B Bell Type
5	#1, #2, #3, #4, #5	56710	—
8	#1, #2, #3, #4, #5, #6, #7, #8	69878	—
8	#11, #12, #13, #14, #15, #16, #17, #18	—	69879

Set 56710

more sets on next page

Sets - Other Sets

Drill Blank Sets
High-Speed Steel

SET IN METAL INDEX CASE

Number of Tools	Size Range	165 Bright
Inch Set		
29	1/16 - 1/2 X 1/64	57833
26	Letters A - Z	57832
60	#1 - #60 wire gauge	57831
20	#61 - #80 wire gauge	57830

Set 57833

Screw Extractor Sets
Style 800

Number of Tools	Style	Size Range	Case Style	Bright
5	**1815**	extractor numbers 1, 2, 3, 4, 5	pouch in tube	65035
6	**1816**	extractor numbers 1, 2, 3, 4, 5, 6	pouch in tube	65036
9	**1819**	extractor numbers 1, 2, 3, 4, 5, 6, 7, 8, 9	pouch only	65039
3	**1823**	extractor numbers 4, 5, 6	tube only	65037
4	**1821**	extractor numbers 5, 5 1/4, 6 3/8, 7 1/2	pouch in tube	65041
6	**1822**	extractor numbers 5, 5 1/4, 6 3/8, 7 1/2, 8, 9	wood block	65042
4	**1818**	extractor numbers 6, 7, 8, 9	wood block	65038
12	**1820**	extractor numbers 1, 2, 3, 4, 5, 6; 50 drill sizes 5/64, 7/64, 5/32, 1/4, 17/64, 13/32	pouch in tube	65040
12	—	extractor numbers 1, 2, 3, 4, 5, 6; 550ASP drill sizes 5/64, 7/64, 5/32, 1/4, 17/64, 13/32	pouch in tube	65043

Set 65040

Order No.	Style No.	Page No.
57830	165. . 134.	142
57831	165. . 134.	142
57832	165. . 134.	142
57833	165. . 134.	142
57840	190.	139
57850	550. . . 34.	138
57851	550. . . 34.	138
57852	550. . . 34.	138
57853	550. . . 34.	138
64216	213. . 130.	141
65001	800.	135
65003	800.	135
65005	800.	135
65007	800.	135
65009	800.	135
65011	800.	135
65013	800.	135
65015	800.	135
65017	800.	135
65019	800.	135
65021	800.	135
65023	800.	135
65025	800.	135
65027	800.	135
65029	800.	135
65035	800.	142
1815	135	
65036	800.	142
1816	135	
65037	800.	142
1823	135	
65038	800.	142
1818	135	
65039	800.	142
1819	135	
65040	800.	142
1820	135	
65041	800.	142
1821	135	
65042	800.	142
1822	135	
65043	135.	800
142		
68804	120DH	73
68805	120DH	73
68806	120DH	73
68807	120DH	73
68808	120DH	73
68809	120DH	73
68810	120DH	73
68811	120DH	74
68812	120DH	74
68813	120DH	74
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69046	150DH	43
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69887	550. . . 34.	138
69889	159. . . 56.	139
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69892	550-TN 34.	138
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70104	150-TN.	8
70105	150-TN.	7
70106	150-TN.	7
70107	150-TN.	7
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70128	150-TN.	7
70129	150-TN.	7
70130	150-TN.	6
70131	150-TN.	6
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70133	150-TN.	6
70134	150-TN.	6
70135	150-TN.	6
70136	150-TN.	6
70137	150-TN.	6
70138	150-TN.	6
70139	150-TN.	6
70140	150-TN.	6
70141	150-TN.	6
70142	150-TN.	6
70143	150-TN.	6
70144	150-TN.	6
70145	150-TN.	6
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70147	150-TN.	6
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70153	150-TN.	5
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70157	150-TN.	5
70158	150-TN.	5
70159	150-TN.	5
70160	150-TN.	5
70161	150-TN.	5
70162	150-TN.	5
70163	150-TN.	5

DRILL SIZE	DECIMAL INCHES	DRILL SIZE	DECIMAL INCHES	DRILL SIZE	DECIMAL INCHES	DRILL SIZE	DECIMAL INCHES	DRILL SIZE	DECIMAL INCHES	DRILL SIZE	DECIMAL INCHES
0.30mm	.0118	1.40mm	.0551	3.20mm	.1260	7/32	.2188	8.60mm	.3386	37/64	.5781
0.32mm	.0126	1.45mm	.0571	30	.1285	5.60mm	.2205	R	.3390	14.75mm	.5807
80	.0135	1.50mm	.0591	3.30mm	.1299	2	.2210	8.70mm	.3425	15.00mm	.5906
0.35mm	.0138	53	.0595	3.40mm	.1339	5.70mm	.2244	11/32	.3438	19/32	.5938
79	.0145	1.55mm	.0610	29	.1360	1	.2280	8.80mm	.3465	15.25mm	.6004
0.38mm	.0150	1/16	.0625	3.50mm	.1378	5.80mm	.2283	S	.3480	39/64	.6094
1/64	.0156	1.60mm	.0630	28	.1405	5.90mm	.2323	8.90mm	.3504	15.50mm	.6102
0.40mm	.0157	52	.0635	9/64	.1406	A	.2340	9.00mm	.3543	15.75mm	.6201
78	.0160	1.65mm	.0650	3.60mm	.1417	15/64	.2344	T	.3580	5/8	.6250
0.42mm	.0165	1.70mm	.0669	27	.1440	6.00mm	.2362	9.10mm	.3583	16.00mm	.6299
0.45mm	.0177	51	.0670	3.70mm	.1457	B	.2380	23/64	.3594	16.25mm	.6398
77	.0180	1.75mm	.0689	26	.1470	6.10mm	.2402	9.20mm	.3622	41/64	.6406
0.48mm	.0189	50	.0700	25	.1495	C	.2420	9.30mm	.3661	16.50mm	.6496
0.50mm	.0197	1.80mm	.0709	3.80mm	.1496	6.20mm	.2441	U	.3680	21/32	.6562
76	.0200	1.85mm	.0728	24	.1520	D	.2460	9.40mm	.3701	16.75mm	.6594
75	.0210	49	.0730	3.90mm	.1535	6.30mm	.2480	9.50mm	.3740	17.00mm	.6693
0.55mm	.0217	1.90mm	.0748	23	.1540	1/4	.2500	3/8	.3750	43/64	.6719
74	.0225	48	.0760	5/32	.1562	E	.2500	V	.3770	17.25mm	.6791
0.60mm	.0236	1.95mm	.0768	22	.1570	6.40mm	.2520	9.60mm	.3780	11/16	.6875
73	.0240	5/64	.0781	4.00mm	.1575	6.50mm	.2559	9.70mm	.3819	17.50mm	.6890
0.62mm	.0244	47	.0785	21	.1590	F	.2570	9.80mm	.3858	45/64	.7031
72	.0250	2.00mm	.0787	20	.1610	6.60mm	.2598	W	.3860	18.00mm	.7087
0.65mm	.0256	2.05mm	.0807	4.10mm	.1614	G	.2610	9.90mm	.3898	23/32	.7188
71	.0260	46	.0810	4.20mm	.1654	6.70mm	.2638	25/64	.3906	18.50mm	.7283
0.70mm	.0276	45	.0820	19	.1660	17/64	.2656	1.00mm	.3937	47/64	.7344
70	.0280	2.10mm	.0827	4.30mm	.1693	H	.2660	X	.3970	19.00mm	.7480
69	.0292	2.15mm	.0846	18	.1695	6.80mm	.2677	1.20mm	.4016	3/4	.7500
0.75mm	.0295	44	.0860	11/64	.1719	6.90mm	.2717	Y	.4040	49/64	.7656
68	.0310	2.20mm	.0866	17	.1730	I	.2720	13/32	.4062	19.50mm	.7677
1/32	.0312	2.25mm	.0886	4.40mm	.1732	7.00mm	.2756	Z	.4130	25/32	.7812
0.80mm	.0315	43	.0890	16	.1770	J	.2770	10.50mm	.4134	20.00mm	.7874
67	.0320	2.30mm	.0906	4.50mm	.1772	7.10mm	.2795	27/64	.4219	51/64	.7969
66	.0330	2.35mm	.0925	15	.1800	K	.2810	10.80mm	.4252	20.50mm	.8071
0.85mm	.0335	42	.0935	4.60mm	.1811	9/32	.2812	11.00mm	.4331	13/16	.8125
65	.0350	3/32	.0938	14	.1820	7.20mm	.2835	7/16	.4375	21.00mm	.8268
0.90mm	.0354	2.40mm	.0945	4.70mm	.1850	7.30mm	.2874	11.20mm	.4409	53/64	.8281
64	.0360	41	.0960	13	.1850	L	.2900	11.50mm	.4528	27/32	.8438
63	.0370	2.45mm	.0965	3/16	.1875	7.40mm	.2913	29/64	.4531	21.50mm	.8465
0.95mm	.0374	40	.0980	12	.1890	M	.2950	11.80mm	.4646	55/64	.8594
62	.0380	2.50mm	.0984	4.8mm	.1890	7.50mm	.2953	15/32	.4688	22.00mm	.8661
61	.0390	39	.0995	11	.1910	19/64	.2969	12.00mm	.4724	7/8	.8750
1.00mm	.0394	38	.1015	4.90mm	.1929	7.60mm	.2992	12.20mm	.4803	22.50mm	.8858
60	.0400	2.60mm	.1024	10	.1935	N	.3020	31/64	.4844	57/64	.8906
59	.0410	37	.1040	9	.1960	7.70mm	.3031	12.50mm	.4921	23.00mm	.9055
1.05mm	.0413	2.70mm	.1063	5.00mm	.1969	7.80mm	.3071	1/2	.5000	29/32	.9062
58	.0420	36	.1065	8	.1990	7.90mm	.3110	12.80mm	.5039	59/64	.9219
57	.0430	7/64	.1094	5.10mm	.2008	5/16	.3125	13.00mm	.5118	23.50mm	.9252
1.10mm	.0433	35	.1100	7	.2010	8.00mm	.3150	33/64	.5156	15/16	.9375
1.15mm	.0453	2.80mm	.1102	13/64	.2031	O	.3160	13.20mm	.5197	24.00mm	.9449
56	.0465	34	.1110	6	.2040	8.10mm	.3189	17/32	.5312	61/64	.9531
3/64	.0469	33	.1130	5.20mm	.2047	8.20mm	.3228	13.50mm	.5315	24.50mm	.9646
1.20mm	.0472	2.90mm	.1142	5	.2055	P	.3230	13.80mm	.5433	31/32	.9688
1.25mm	.0492	32	.1160	5.30mm	.2087	8.30mm	.3268	35/64	.5469	25.00mm	.9843
1.30mm	.0512	3.00mm	.1181	4	.2090	21/64	.3281	14.00mm	.5512	63/64	.9844
55	.0520	31	.1200	5.40mm	.2126	8.40mm	.3307	14.25mm	.5610	1	1.0000
1.35mm	.0531	3.10mm	.1220	3	.2130	Q	.3320	9/16	.5625		
54	.0550	1/8	.1250	5.50mm	.2165	8.50mm	.3346	14.50mm	.5709		

FRACTIONAL - RED WIRE GAGE - PURPLE LETTER - BLUE METRIC - GREEN