

Specialties of the House

Thank you for reading our catalog. We have modified the catalog to reflect the changing market place we serve. We have added several new items; those items which we feel are worth your extra attention have received a ★. We earnestly hope this catalog and the tools we sell meet with your complete satisfaction. If there is ever any difficulty you may have with either tools or service, please call us on our toll-free WATS line.

The items marked with a star (★) are either shown listed exclusively by us or are considered a “hard to find” or specialty item. In some cases, we show them in the catalog for your convenience in determining diameter, length, price and other specifications, however, we may not always have a finished tool on the shelf. Please check with us for availability.

In an effort to please all our customers, we have broadened our product line by trading or purchasing some items, especially standards, from other dealers or manufacturers. We occasionally receive remarks of surprise from some customers if they find another brand drill in our envelopes. If there is a specific brand you want or do not want, please inform us when the order is placed so that we may serve you better.

Our aim is to produce and sell the best cutting tools we can and to provide 100% customer satisfaction, both in terms of product quality and customer service. With that end in mind, we have instituted an employee stock ownership program at the company. The person who answers the telephone or gives you a special quotation or makes your tools or ships them out may be a stockholder; he or she is more likely to be aware that the weekly paycheck is due to you, our customer. We hope you will have reason to be satisfied.

We invite you to visit our World Wide Web site (www.haydendrills.com); it currently contains an organized list of thousands of special drills priced at a very good value.

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★ Denotes a unique or hard-to-get item

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

ALPHABETIC LISTING FOR CATALOG

SEE PAGES 97 AND 98 FOR NUMERIC LISTING

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★	Unique Sets	Call..... 12

★ Denotes a unique or hard-to-get item

List 101

General Purpose Jobber Drills

Fraction, Wire, Letter, MM, HSS

Manufactured in large lots so that prices can be lowest possible. Stocked by dealers, or jobbers, hence the name. Originally laid out by Stephen A. Morse about 125 years ago, the dimensions have changed but little. The smaller fraction sizes have been shortened to correspond to the number size lengths, the helix angles have been increased about 5° over the years, and sizes above 1/2" have been added, all to meet industry requirements. This series remains the workhorse of the twist drill family because of its ability to cut a wide variety of materials under diverse conditions. Other specialized designs to meet the demands of industry are shown in the following lists. We have tried to include in these lists sizes which some other drill producers will manufacture only on request and at special prices. Metric sizes are becoming a larger proportion of our order mix. We have shown the usual metric sizes in the consecutive size listing table for the convenience of the user searching for a definite diameter. See List #1000, Decimal Drills, for diameters smaller than #80 down to .005" or #100. Also, refer to our new metric section where we have shown exact overall and flute lengths in metric conversions.

For reasons of manufacturing convenience the finish on drills may be bright, black oxide or gold colored oxide. Shipments will be made from inventories we have in hand at the time of an order. Changes can be made if requested.

IDENTITY OF TWIST DRILL FEATURES

The above drawing shows the accepted nomenclature for twist drills and their various features. We have available a set of ten drawings for various sorts of special drills, all without dimensions. We will be glad to send a set of these blank drawings on request. Simply fill in your dimensions, indicate ordering quantity, and send to us for prices. We prefer to quote on tool prints rather than part prints.

DIMENSIONS

General Purpose or Jobber Drills

JOBBERLENGTHDRILLS H.S.S. (HIGHSPEEDSTEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.0050		100		3/4	.050	.0210		75		1	1/4
.0053		99		3/4	.050	.0217			.55	15/16	9/32
.0055		98		3/4	.050	.0225		74		1	1/4
.0059		97		3/4	.050	.0236			.60	15/16	9/32
.0059			.15	3/4	.059	.0240		73		1-1/8	5/16
.0063		96		3/4	.050	.0250		72		1-1/8	5/16
.0063			.16	3/4	.059	.0256			.65	1-1/32	5/16
.0067		95		3/4	.050	.0260		71		1-1/4	3/8
.0067			.17	3/4	.059	.0276			.70	1-3/32	11/32
.0071		94		3/4	.060	.0280		70		1-1/4	3/8
.0071			.18	3/4	.059	.0292		69		1-3/8	1/2
.0075		93		3/4	.060	.0295			.75	1-3/32	11/32
.0075			.19	3/4	.059	.0310		68		1-3/8	1/2
.0079		92		3/4	.060	.0313	1/32			1-3/8	1/2
.0079			.20	3/4	.098	.0315			.80	1-3/16	13/32
.0083		91		3/4	.060	.0320		67		1-3/8	1/2
.0083			.21	3/4	.098	.0330		66		1-3/8	1/2
.0087		90		3/4	.070	.0335			.85	1-3/16	13/32
.0087			.22	3/4	.098	.0350		65		1-1/2	5/8
.0091		89		3/4	.070	.0354			.90	1-1/4	27/64
.0091			.23	3/4	.098	.0360		64		1-1/2	5/8
.0094			.24	3/4	.098	.0370		63		1-1/2	5/8
.0095		88		3/4	.070	.0374			.95	1-1/4	27/64
.0099			.25	3/4	.118	.0380		62		1-1/2	5/8
.0100		87		3/4	.080	.0390		61		1-5/8	11/16
.0102			.26	3/4	.118	.0394			1.00	1-11/32	15/32
.0105		86		3/4	.080	.0400		60		1-5/8	11/16
.0106			.27	3/4	.118	.0410		59		1-5/8	11/16
.0111		85		3/4	.090	.0413			1.05	1-11/32	15/32
.0111			.28	3/4	.118	.0420		58		1-5/8	11/16
.0114			.29	3/4	.118	.0430		57		1-3/4	3/4
.0115		84		3/4	.090	.0433			1.10	1-7/16	9/16
.0118			.30	3/4	.118	.0453			1.15	1-7/16	9/16
.0120		83		3/4	.100	.0465		56		1-3/4	3/4
.0125		82		3/4	.100	.0469	3/64			1-3/4	3/4
.0126			.32	3/4	.158	.0472			1.20	1-1/2	5/8
.0130		81		3/4	.100	.0492			1.25	1-1/2	5/8
.0134			.34	3/4	.158	.0512			1.30	1-1/2	5/8
.0135		80		3/4	.100	.0520		55		1-7/8	7/8
.0138				3/4	1/8	.0532			1.35	1-9/16	23/32
.0138			.35	3/4	5/32	.0550		54		1-7/8	7/8
.0142			.36	3/4	5/32	.0551			1.40	1-9/16	23/32
.0145		79		3/4	1/8	.0571			1.45	1-9/16	23/32
.0150			.38	3/4	5/32	.0591			1.50	1-9/16	23/32
.0156	1/64			3/4	3/16	.0595		53		1-7/8	7/8
.0157			.40	25/32	3/16	.0610			1.55	1-11/16	25/32
.0160		78		7/8	3/16	.0625	1/16			1-7/8	7/8
.0165			.42	25/32	3/16	.0630			1.60	1-11/16	25/32
.0173			.44	25/32	3/16	.0635		52		1-7/8	7/8
.0177			.45	25/32	3/16	.0650			1.65	1-11/16	25/32
.0180		77		7/8	3/16	.0669			1.70	1-11/16	25/32
.0181			.46	25/32	3/16	.0670		51		2	1
.0189			.48	25/32	3/16	.0689			1.75	1-13/16	7/8
.0197			.50	7/8	1/4	.0700		50		2	1
.0200		76		7/8	3/16	.0709			1.80	1-13/16	7/8

These can be furnished in Decimal Sizes, See List 1000. Oxiding, Tanging & Flute Polishing quoted on request.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

General Purpose or Jobber Drills

(continued)

JOBBERLENGTHDRILLS H.S.S. (HIGHSPEEDSTEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.0728			1.85	1-13/16	7/8	.1457			3.70	2-3/4	1-17/32
.0730		49		2	1	.1470		26		3	1-7/8
.0748			1.90	1-13/16	7/8	.1476			3.75	2-3/4	1-17/32
.0760		48		2	1	.1495		25		3	1-7/8
.0768			1.95	1-15/16	15/16	.1496			3.80	2-15/16	1-11/16
.0781	5/64			2	1	.1520		24		3-1/8	2
.0785		47		2	1	.1535			3.90	2-15/16	1-11/16
.0787			2.00	1-15/16	15/16	.1540		23		3-1/8	2
.0807			2.05	1-15/16	15/16	.1563	5/32			3-1/8	2
.0810		46		2-1/8	1-1/8	.1570		22		3-1/8	2
.0820		45		2-1/8	1-1/8	.1575			4.00	2-15/16	1-11/16
.0827			2.10	1-15/16	15/16	.1590		21		3-1/4	2-1/8
.0846			2.15	2-3/32	1-1/16	.1610		20		3-1/4	2-1/8
.0860		44		2-1/8	1-1/8	.1614			4.10	2-15/16	1-11/16
.0866			2.20	2-3/32	1-1/16	.1654			4.20	2-15/16	1-11/16
.0886			2.25	2-3/32	1-1/16	.1660		19		3-1/4	2-1/8
.0890		43		2-1/4	1-1/4	.1673			4.25	2-15/16	1-11/16
.0906			2.30	2-3/32	1-1/16	.1693			4.30	3-5/32	1-27/32
.0925			2.35	2-3/32	1-1/16	.1695		18		3-1/4	2-1/8
.0935		42		2-1/4	1-1/4	.1719	11/64			3-1/4	2-1/8
.0938	3/32			2-1/4	1-1/4	.1730		17		3-3/8	2-3/16
.0945			2.40	2-1/4	1-3/16	.1732			4.40	3-5/32	1-27/32
.0960		41		2-3/8	1-3/8	.1770		16		3-3/8	2-3/16
.0965			2.45	2-1/4	1-3/16	.1771			4.50	3-5/32	1-27/32
.0980		40		2-3/8	1-3/8	.1800		15		3-3/8	2-3/16
.0984			2.50	2-1/4	1-3/16	.1811			4.60	3-5/32	1-27/32
.0995		39		2-3/8	1-3/8	.1820		14		3-3/8	2-3/16
.1015		38		2-1/2	1-7/16	.1850		13		3-1/2	2-5/16
.1024			2.60	2-1/4	1-3/16	.1850			4.70	3-5/32	1-27/32
.1040		37		2-1/2	1-7/16	.1870			4.75	3-5/32	1-27/32
.1063			2.70	2-13/32	1-5/16	.1875	3/16			3-1/2	2-5/16
.1065		36		2-1/2	1-7/16	.1890			4.80	3-3/8	2-1/16
.1083			2.75	2-13/32	1-5/16	.1890		12		3-1/2	2-5/16
.1094	7/64			2-5/8	1-1/2	.1910		11		3-1/2	2-5/16
.1100		35		2-5/8	1-1/2	.1929			4.90	3-3/8	2-1/16
.1102			2.80	2-13/32	1-5/16	.1935		10		3-5/8	2-7/16
.1110		34		2-5/8	1-1/2	.1960		9		3-5/8	2-7/16
.1130		33		2-5/8	1-1/2	.1969			5.00	3-3/8	2-1/16
.1142			2.90	2-13/32	1-5/16	.1990		8		3-5/8	2-7/16
.1160		32		2-3/4	1-5/8	.2008			5.10	3-3/8	2-1/16
.1181			3.00	2-13/32	1-5/16	.2010		7		3-5/8	2-7/16
.1200		31		2-3/4	1-5/8	.2031	13/64			3-5/8	2-7/16
.1220			3.10	2-9/16	1-7/16	.2040		6		3-3/4	2-1/2
.1250	1/8			2-3/4	1-5/8	.2047			5.20	3-3/8	2-1/16
.1260			3.20	2-9/16	1-7/16	.2055		5		3-3/4	2-1/2
.1280			3.25	2-9/16	1-7/16	.2067			5.25	3-3/8	2-1/16
.1285		30		2-3/4	1-5/8	.2087			5.30	3-3/8	2-1/16
.1299			3.30	2-9/16	1-7/16	.2090		4		3-3/4	2-1/2
.1339			3.40	2-3/4	1-17/32	.2126			5.40	3-21/32	2-1/4
.1360		29		2-7/8	1-3/4	.2130		3		3-3/4	2-1/2
.1378			3.50	2-3/4	1-17/32	.2165			5.50	3-21/32	2-1/4
.1405		28		2-7/8	1-3/4	.2188	7/32			3-3/4	2-1/2
.1406	9/64			2-7/8	1-3/4	.2205			5.60	3-21/32	2-1/4
.1417			3.60	2-3/4	1-17/32	.2210		2		3-7/8	2-5/8
.1440		27		3	1-7/8	.2244			5.70	3-21/32	2-1/4

These can be furnished in Decimal Sizes, See List 1000. Oxiding, Tanging & Flute Polishing quoted on request.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

General Purpose or Jobber Drills

(continued)

JOBBER LENGTH DRILL H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.2264			5.75	3-21/32	2-1/4	.3281	21/64			4-5/8	3-5/16
.2280		1		3-7/8	2-5/8	.3307			8.40	4-19/32	2-15/16
.2284			5.80	3-21/32	2-1/4	.3320		Q		4-3/4	3-7/16
.2324			5.90	3-21/32	2-1/4	.3347			8.50	4-19/32	2-15/16
.2340		A		3-7/8	2-5/8	.3386			8.60	4-29/32	3-3/16
.2344	15/64			3-7/8	2-5/8	.3390		R		4-3/4	3-7/16
.2363			6.00	3-21/32	2-1/4	.3425			8.70	4-29/32	3-3/16
.2380		B		4	2-3/4	.3438	11/32			4-3/4	3-7/16
.2402			6.10	3-31/32	2-15/32	.3445			8.75	4-29/32	3-3/16
.2420		C		4	2-3/4	.3465			8.80	4-7/8	3-1/2
.2441			6.20	3-31/32	2-15/32	.3480		S		4-7/8	3-1/2
.2461		D		4	2-3/4	.3504			8.90	4-29/32	3-3/16
.2460			6.25	3-31/32	2-15/32	.3543			9.00	4-29/32	3-3/16
.2480			6.30	3-31/32	2-15/32	.3580		T		4-7/8	3-1/2
.2500	1/4	E		4	2-3/4	.3583			9.10	4-29/32	3-3/16
.2520			6.40	3-31/32	2-15/32	.3594	23/64			4-7/8	3-1/2
.2559			6.50	3-31/32	2-15/32	.3622			9.20	4-29/32	3-3/16
.2570		F		4-1/8	2-7/8	.3642			9.25	4-29/32	3-3/16
.2599			6.60	3-31/32	2-15/32	.3661			9.30	4-29/32	3-3/16
.2610		G		4-1/8	2-7/8	.3680		U		5	3-5/8
.2638			6.70	3-31/32	2-15/32	.3701			9.40	4-29/32	3-3/16
.2656	17/64			4-1/8	2-7/8	.3740			9.50	4-29/32	3-3/16
.2658			6.75	4-9/32	2-23/32	.3750	3/8			5	3-5/8
.2660		H		4-1/8	2-7/8	.3770		V		5	3-5/8
.2677			6.80	4-9/32	2-23/32	.3780			9.60	5-1/4	3-7/16
.2717			6.90	4-9/32	2-23/32	.3819			9.70	5-1/4	3-7/16
.2720		I		4-1/8	2-7/8	.3839			9.75	5-1/4	3-7/16
.2756			7.00	4-9/32	2-23/32	.3859			9.80	5-1/4	3-7/16
.2770		J		4-1/8	2-7/8	.3860		W		5-1/8	3-3/4
.2795			7.10	4-9/32	2-23/32	.3898			9.90	5-1/4	3-7/16
.2810		K		4-1/4	2-15/16	.3906	25/64			5-1/8	3-3/4
.2813	9/32			4-1/4	2-15/16	.3937			10.00	5-1/4	3-7/16
.2835			7.20	4-9/32	2-23/32	.3970		X		5-1/8	3-3/4
.2854			7.25	4-9/32	2-23/32	.3976			10.10	5-1/4	3-7/16
.2874			7.30	4-9/32	2-23/32	.4016			10.20	5-1/4	3-7/16
.2900		L		4-1/4	2-15/16	.4040		Y		5-1/4	3-7/8
.2913			7.40	4-9/32	2-23/32	.4055			10.30	5-1/4	3-7/16
.2950		M		4-3/8	3-1/16	.4063	13/32			5-1/4	3-7/8
.2953			7.50	4-9/32	2-23/32	.4094			10.40	5-1/4	3-7/16
.2969	19/64			4-3/8	3-1/16	.4130		Z		5-1/4	3-7/8
.2992			7.60	4-19/32	2-15/16	.4134			10.50	5-1/4	3-7/16
.3020		N		4-3/8	3-1/16	.4173			10.60	5-1/4	3-7/16
.3032			7.70	4-19/32	2-15/16	.4213			10.70	5-19/32	3-11/16
.3051			7.75	4-19/32	2-15/16	.4219	27/64			5-3/8	3-15/16
.3071			7.80	4-19/32	2-15/16	.4252			10.80	5-19/32	3-11/16
.3091			7.85	4-19/32	2-15/16	.4291			10.90	5-19/32	3-11/16
.3110			7.90	4-19/32	2-15/16	.4331			11.00	5-19/32	3-11/16
.3125	5/16			4-1/2	3-3/16	.4370			11.10	5-19/32	3-11/16
.3150			8.00	4-19/32	2-15/16	.4375	7/16			5-1/2	4-1/16
.3160		O		4-1/2	3-3/16	.4409			11.20	5-19/32	3-11/16
.3189			8.10	4-19/32	2-15/16	.4449			11.30	5-19/32	3-11/16
.3228			8.20	4-19/32	2-15/16	.4488			11.40	5-19/32	3-11/16
.3230		P		4-5/8	3-5/16	.4528			11.50	5-19/32	3-11/16
.3248			8.25	4-19/32	2-15/16	.4531	29/64			5-5/8	4-3/16
.3268			8.30	4-19/32	2-15/16	.4567			11.60	5-19/32	3-11/16

These can be furnished in Decimal Sizes, See List 1000. Oxidizing, Tanging & Flute Polishing quoted on request.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

General Purpose or Jobber Drills

(continued)

JOBBERLENGTHDRILL H.S.S. (HIGHSPEEDSTEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/ Number	MM	Length O.A.	Flute Length
.4606			11.70	5-19/32	3-11/16
.4646			11.80	5-19/32	3-11/16
.4685			11.90	5-15/16	3-31/32
.4688	15/32			5-3/4	4-5/16
.4724			12.00	5-15/16	3-31/32
.4764			12.10	5-15/16	3-31/32
.4803			12.20	5-15/16	3-31/32
.4843			12.30	5-15/16	3-31/32
.4844	31/64			5-7/8	4-3/8
.4882			12.40	5-15/16	3-31/32
.4921			12.50	5-15/16	3-31/32
.4961			12.60	5-15/16	3-31/32
.5000	1/2			6	4-1/2
.5000			12.70	5-15/16	3-31/32
.5039			12.80	5-15/16	3-31/32
.5079			12.90	5-15/16	3-31/32
.5118			13.00	5-15/16	3-31/32
.5156	33/64			6-5/8	4-13/16
.5313	17/32			6-5/8	4-13/16
.5315			13.50	6-5/16	4-1/4
.5469	35/64			6-5/8	4-13/16
.5512			14.00	6-5/16	4-1/4
.5625	9/16			6-5/8	4-13/16
.5709			14.50	6-5/8	4-1/2
.5781	37/64			6-5/8	4-13/16
.5906			15.00	6-5/8	4-1/2
.5938	19/32			7-1/8	5-3/16
.6094	39/64			7-1/8	5-3/16
.6102			15.50	7	4-3/4
.6250	5/8			7-1/8	5-3/16
.6299			16.00	7	4-3/4
.6406	41/64			7-1/8	5-3/16
.6496			16.50	7-1/4	4-29/32
.6563	21/32			7-1/8	5-3/16
.6693			17.00	7-1/4	4-29/32
.6719	43/64			7-5/8	5-5/8
.6875	11/16			7-5/8	5-5/8
.6889			17.50	7-17/32	5-3/32

Straight flute drills above 1/2" diameter are less than 7" OAL

These can be furnished in Decimal Sizes, See List 1000. Oxiding, Tanging & Flute Polishing quoted on request.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

Number	Drills in Each Set	Description General Purpose Construction
HJ-13	13	1/16-1/4 by 64ths
HJ-15	15	1/16-1/2 by 32nds
HJ-20	20	No. 61-No.80 inclusive
HJ-26	26	A-Z inclusive
HJ-29	29	1/16-1/2 by 64ths
HJ-60	60	No.1-No. 60 inclusive

Note: Unless otherwise specified, all sets include an index.

These are unusual sets to fit particular needs and may be priced on application.

Low Helix
Heavy Duty
Parabolic Flute
Left Hand
High Helix
Four Flute
Cobalt
Straight Flute
Half Round
Drill Blanks
Reamer Blanks
Double Margin

Additional Styles of Jobber Length Drills

Carried in Stock

As stated in the introductory paragraph describing the General Purpose Jobber Drill, there are specialized designs which do certain drilling jobs so much better than the regular drill that they are worth the extra costs that smaller manufacturing lots entail. For many applications the jobber lengths are satisfactory and the following several series have the same proportions as in List 101 but have modified flute shapes, web proportions or materials. Sizes stocked are priced in our new list price catalog. Sizes not shown there can be produced promptly. We will quote quickly on receipt of quantity desired.

LOW HELIX JOBBER LENGTH DRILLS

LIST 102

These drills are particularly good for brass because the low helix minimizes "pull-in" often experienced when cutting brass. Their wide flutes make them good for plastics because of the voluminous nature of plastic chips. Points can be modified to specifications and drills can be ground quickly to metric sizes at prices depending on the quantity ordered. Note that our stock items include letter sizes, brite finish.

HEAVY DUTY JOBBER LENGTH DRILLS

LIST 103

These drills are designed around the NAS 907 B series which was developed to cut stainless and tough alloy steels employed by the aircraft industry. Their thicker webs and 135° split point make them also desirable for portable hand-tool drilling where stability is absent and a rugged tool is essential. When resharpening is required the user should have facilities for web thinning or point splitting. Widely used in high production shops such as in the automotive industry.

PARABOLIC (EX-CELL) FLUTE JOBBER LENGTH DRILLS

LIST 104

This drill features a high helix heavy web and wide flutes and for some applications performs exceedingly well. It is becoming more popular as its virtues become known.

LEFT HAND JOBBER LENGTH DRILLS

LIST 171

These drills are used in automatic screw machines and in drill heads where spindle centers permit no alternative. Some customers have told us they are also very effective in removing broken screws. They are of the general purpose design described in List 101. They are carried in stock in all sizes except metric, currently from 1/2" to #80. Metric sizes can be produced quickly at prices depending on the quantity ordered.

continued

**HIGH HELIX
JOBBER LENGTH DRILLS**

LIST 195

Designed for aluminum but also used on other easily machined materials such as zinc die castings, magnesium, copper, bronze, soft steel, wood, slate, and certain brasses because of their wide flutes which make for easy chip removal. Not to be confused with crankshaft drills which have a heavy web design. The range of sizes from #80 to 11/16" is larger than shown in any other catalog. Metric sizes can be produced quickly at prices depending on the quantity ordered. All are bright finish.

**COBALT
JOBBER LENGTH DRILLS**

LIST 501

Some materials generate so much heat when they are being cut that the tool material doing the cutting can be softened. Even the slightest increase in red hardness may mean the difference between success and failure on the job. Cobalt added to the high speed steel gives this extra red hardness. In addition it is more abrasion resistant than regular high speed steel with obvious advantages in drilling such materials as glass filled epoxies, asbestos and graphite and clay.

Because cobalt high speed steel is somewhat less shock resistant than regular high speed steel the tools are made with heavier webs and 135° split points. These drills are carried in stock in fraction, wire and letter sizes and can be ground to metric sizes quickly at prices that depend on the quantity ordered. Normally furnished with oxide coating.

**STRAIGHT FLUTE
JOBBER LENGTH DRILLS**

LIST 770

If a job requires a low helix drill this is the lowest helix design obtainable. Does not "pull-in," a feature that makes it good for decorative sheet metal parts being worked with portable drills. Additionally the design provides one third more metal at the point to afford a larger heat sink when cutting difficult-to-machine materials.

We carry these in sizes from #60 to 5/8", the only firm in the country to do so. Larger and intermediate sizes can be produced by starting from scratch on some items and from semi-finished tools on others. We will quote price and delivery on application for specials.

Our double margin design on drills over 3/16" coupled with a superb finish produced by our creep feed grind process results in a tool that not only cuts close to size but produces a finish that often eliminates a reaming operation. Drills over 1/2" diameter are normally less than 7" in length.

**HALF ROUND
JOBBER LENGTH DRILLS**

LIST 780

This is a favorite of brass shops. The drills penetrate rapidly in soft materials and leave a burnished finish. We carry them in jobber lengths from #80 to 5/8" but longer lengths can be fabricated as well as a variety of other configurations. Quotations rendered promptly.

**TUNGSTEN CARBIDE TIPPED
JOBBER LENGTH DRILLS**

LIST 801

These drills have excellent abrasion resistant properties. They are very useful in cutting materials such as cast iron, graphite, aluminum and certain brasses. They are not good for materials that form tough chips, such as steels. Steel chips that cannot be easily crushed find their way between the drill margin and wall of the hole and impose a shock load the drill cannot withstand. Failure occurs at once and the drill usually cannot be repaired. Confine these drills to cutting materials whose chips are easily crushed. Exception: Die Drills. We quote price and delivery on application.

continued

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

Where the primary requirement is for the properties of properly hardened and tempered high speed steel-room hardness, red hardness, abrasion resistance, great strength, shock resistance-then these series are indicated. Made of M-2 high speed steel properly hardened and tempered to between 62 and 64 Rockwell C, the foregoing properties are present in abundance. They are ideal for fabricating into special cutting tools, special punches, guides, rolls, high temperature applications and the like. Drill blank tolerances are in the same direction as twist drill tolerances, $+.000" \text{ } -.0005"$, and they are made in the same diameters and lengths as twist drills, hence the name. They differ from twist drills in that they are hard all over, do not have soft shanks, and they do not have back taper.

Oftentimes the properties of high speed steel must be combined with precision on the diameters, such as with gages. We offer a series held to $+.0002" \text{ } -.000"$ made in all fraction sizes, number sizes, letter sizes, metric sizes and each $.001"$ size to $1.000"$ diameter. The plus tolerances are in the same direction as reamer tolerances, hence these are often called reamer blanks, even though they are twist drill lengths. They, too, do not have soft shanks. Specify plus tolerance when ordering, or even by List #1004.

Note that in sizes above $1/2"$ the blanks are 6" long. We are prepared to quote on lengths, diameter, tolerances and materials different than the above.

Note: Set of drill or reamer blanks may be priced on application.

Twist drills which vibrate while cutting are generating an irregular wall on the hole which they are producing. Inspection of a part which has been cut open to show the wall reveals that the surface is in truth a rudimentary thread. See our discussion on Vibrations in Twist Drills on pages 62-63, "Why Reamers Wear Out" and "Double Margin Solution."

These double margin drills produce holes close enough to size so that in many cases they will replace reamed holes. In cases where a reamed hole is obligatory the longer life of the reamer after cutting the hole with a double margin drill is a pleasant cost cutting surprise.

Double margin drills have a normal drill tolerance and regular drill back taper.

List 111

Screw Machine Length Drills

Drills not priced and other intermediate sizes quoted promptly on application

HSS

Designed for use in automatic screw machines because operators of such machines were often faced with the problem of cutting jobber length drills to fit in the available space. Thick webs then had to be thinned and the drills repointed. By making the flutes half as long and with webs of conventional proportions all those problems were avoided.

Shorter lengths are often advantageous in portable electric or air drills because shorter lengths resist breakage upon accidental bending. Some drill companies have a design specifically made for portable tool applications. It features a heavy web and a split point. We can suggest our cobalt screw machine length drills if a split point is needed.

We have shown metric sizes to 12.50mm in this consecutive listing of fraction, letter and number sizes to aid those in search of a specific diameter.

Sixty-fourth sizes between 1" and 2" can be produced quickly.

The larger sizes of screw machine drills have shanks as follows:

DRILL SIZE	SHANK SIZE
Up to and including 1"	Same as nominal, less back taper
Over 1" including 1-1/4"	1"
Over 1-1/4" including 1-1/2"	1-1/4"
Over 1-1/2" including 2"	1-1/2"

**Please Note - Metric screw machine
length drills have a black oxide finish.**

DIMENSIONS

Screw Machine Length Drills

(continued)

SCREW MACHINE LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.0394			1.00	1-1/32	1/4	.0984			2.50	1-11/16	9/16
.0400		60		1-3/8	1/2	.0995		39		1-13/16	13/16
.0410		59		1-3/8	1/2	.1015		38		1-13/16	13/16
.0413			1.05	1-1/32	1/4	.1024			2.60	1-11/16	9/16
.0420		58		1-3/8	1/2	.1040		37		1-13/16	13/16
.0430		57		1-3/8	1/2	.1063			2.70	1-13/16	5/9
.0433			1.10	1-3/32	9/32	.1065		36		1-13/16	13/16
.0453			1.15	1-3/32	9/32	.1094	7/64			1-13/16	13/16
.0465		56		1-3/8	1/2	.1100		35		1-7/8	7/8
.0469	3/64			1-3/8	1/2	.1102			2.80	1-13/16	5/8
.0472			1.20	1-3/16	5/16	.1110		34		1-7/8	7/8
.0492			1.25	1-3/16	5/16	.1130		33		1-7/8	7/8
.0512			1.30	1-3/16	5/16	.1142			2.90	1-13/16	5/8
.0520		55		1-5/8	5/8	.1160		32		1-7/8	7/8
.0532			1.35	1-1/4	11/32	.1181			3.00	1-13/16	5/8
.0550		54		1-5/8	5/8	.1200		31		1-7/8	7/8
.0551			1.40	1-1/4	11/32	.1220			3.10	1-15/16	23/32
.0571			1.45	1-1/4	11/32	.1250	1/8			1-7/8	7/8
.0591			1.50	1-1/4	11/32	.1260			3.20	1-15/16	23/32
.0595		53		1-5/8	5/8	.1285		30		1-15/16	15/16
.0610			1.55	1-11/32	13/32	.1299			3.30	1-15/16	23/32
.0625	1/16			1-5/8	5/8	.1339			3.40	2-1/16	25/32
.0630			1.60	1-11/32	13/32	.1360		29		1-15/16	15/16
.0635		52		1-11/16	11/16	.1378			3.50	2-1/16	25/32
.0645			1.65	1-11/32	13/32	.1405		28		1-15/16	15/16
.0669			1.70	1-11/32	13/32	.1406	9/64			1-15/16	15/16
.0670		51		1-11/16	11/16	.1412			3.60	2-1/16	25/32
.0689			1.75	1-7/16	7/16	.1440		27		2-1/16	1
.0700		50		1-11/16	11/16	.1457			3.70	2-1/16	25/32
.0709			1.80	1-7/16	7/16	.1470		26		2-1/16	1
.0728			1.85	1-7/16	7/16	.1495		25		2-1/16	1
.0730		49		1-11/16	11/16	.1496			3.80	2-5/32	7/8
.0748			1.90	1-7/16	7/16	.1520		24		2-1/16	1
.0760		48		1-11/16	11/16	.1535			3.90	2-5/32	7/8
.0768			1.95	1-1/2	15/32	.1540		23		2-1/16	1
.0781	5/64			1-11/16	11/16	.1563	5/32			2-1/16	1
.0785		47		1-3/4	3/4	.1570		22		2-1/8	1-1/16
.0787			2.00	1-1/2	15/32	.1575			4.00	2-5/32	7/8
.0807			2.05	1-1/2	15/32	.1590		21		2-1/8	1-1/16
.0810		46		1-3/4	3/4	.1610		20		2-1/8	1-1/16
.0820		45		1-3/4	3/4	.1614			4.10	2-5/32	7/8
.0827			2.10	1-1/2	15/32	.1654			4.20	2-5/32	7/8
.0846			2.15	1-9/16	1/2	.1660		19		2-1/8	1-1/16
.0860		44		1-3/4	3/4	.1693			4.30	2-9/32	15/16
.0866			2.20	1-9/16	1/2	.1695		18		2-1/8	1-1/16
.0886			2.25	1-9/16	1/2	.1719	11/64			2-1/8	1-1/16
.0890		43		1-3/4	3/4	.1730		17		2-3/16	1-1/8
.0906			2.30	1-9/16	1/2	.1732			4.40	2-9/32	15/16
.0925			2.35	1-9/16	1/2	.1770		16		2-3/16	1-1/8
.0935		42		1-3/4	3/4	.1772			4.50	2-9/32	15/16
.0938	3/32			1-3/4	3/4	.1800		15		2-3/16	1-1/8
.0945			2.40	1-11/16	9/16	.1811			4.60	2-9/32	15/16
.0960		41		1-13/16	13/16	.1820		14		2-3/16	1-1/8
.0965			2.45	1-11/16	9/16	.1850		13		2-3/16	1-1/8
.0980		40		1-13/16	13/16	.1850			4.70	2-9/32	15/16

These can be furnished in other sizes. Price and Delivery on application. Oxidizing, Tanging & Flute Polishing quoted on request.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

Screw Machine Length Drills

(continued)

SCREW MACHINE LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.1870				2-3/16	1-1/8	.2874			7.30	2-29/32	1-11/32
.1875	3/16			2-3/16	1-1/8	.2900		L		2-3/4	1-9/16
.1889			4.80	2-7/16	1-1/32	.2913			7.40	2-29/32	1-11/32
.1890		12		2-1/4	1-3/16	.2950		M		2-3/4	1-9/16
.1910		11		2-1/4	1-3/16	.2953			7.50	2-29/32	1-11/32
.1929			4.90	2-7/16	1-1/32	.2969	19/64			2-3/4	1-9/16
.1935		10		2-1/4	1-3/16	.2992			7.60	3-1/8	1-15/32
.1960		9		2-1/4	1-3/16	.3020		N		2-13/16	1-5/8
.1969			5.00	2-7/16	1-1/32	.3032			7.70	3-1/8	1-15/32
.1990		8		2-1/4	1-3/16	.3071			7.80	3-1/8	1-15/32
.2008			5.10	2-7/16	1-1/32	.3110			7.90	3-1/8	1-15/32
.2010		7		2-1/4	1-3/16	.3125	5/16			2-13/16	1-5/8
.2031	13/64			2-1/4	1-3/16	.3150			8.00	3-1/8	1-15/32
.2040		6		2-3/8	1-1/4	.3160		O		2-15/16	1-11/16
.2047			5.20	2-7/16	1-1/32	.3189			8.10	3-1/8	1-15/32
.2055		5		2-3/8	1-1/4	.3228			8.20	3-1/8	1-15/32
.2087			5.30	2-7/16	1-1/32	.3230		P		2-15/16	1-11/16
.2090		4		2-3/8	1-1/4	.3268			8.30	3-1/8	1-15/32
.2126			5.40	2-19/32	1-3/32	.3281	21/64			2-15/16	1-11/16
.2130		3		2-3/8	1-1/4	.3307			8.40	3-1/8	1-15/32
.2165			5.50	2-19/32	1-3/32	.3320		Q		3	1-11/16
.2188	7/32			2-3/8	1-1/4	.3347			8.50	3-1/8	1-15/32
.2205			5.60	2-19/32	1-3/32	.3386			8.60	3-5/16	1-9/16
.2210		2		2-7/16	1-5/16	.3390		R		3	1-11/16
.2244			5.70	2-19/32	1-3/32	.3425			8.70	3-5/16	1-9/16
.2280		1		2-7/16	1-5/16	.3438	11/32			3	1-11/16
.2284			5.80	2-19/32	1-3/32	.3465			8.80	3-5/16	1-9/16
.2324			5.90	2-19/32	1-3/32	.3480		S		3-1/16	1-3/4
.2340		A		2-7/16	1-5/16	.3504			8.90	3-5/16	1-9/16
.2344	15/64			2-7/16	1-5/16	.3543			9.00	3-5/16	1-9/16
.2362			6.00	2-19/32	1-3/32	.3580		T		3-1/16	1-3/4
.2380		B		2-1/2	1-3/8	.3583			9.10	3-5/16	1-9/16
.2402			6.10	2-3/4	1-7/32	.3594	23/64			3-1/16	1-3/4
.2420		C		2-1/2	1-3/8	.3622			9.20	3-5/16	1-9/16
.2441			6.20	2-3/4	1-7/32	.3661			9.30	3-5/16	1-9/16
.2460		D		2-1/2	1-3/8	.3680		U		3-1/8	1-13/16
.2480			6.30	2-3/4	1-7/32	.3701			9.40	3-5/16	1-9/16
.2500	1/4	E		2-1/2	1-3/8	.3740			9.50	3-5/16	1-9/16
.2520			6.40	2-3/4	1-7/32	.3750	3/8			3-1/8	1-13/16
.2559			6.50	2-3/4	1-7/32	.3770		V		3-1/4	1-7/8
.2570		F		2-5/8	1-7/16	.3780			9.60	3-1/2	1-11/16
.2598			6.60	2-3/4	1-7/32	.3819			9.70	3-1/2	1-11/16
.2610		G		2-5/8	1-7/16	.3858			9.80	3-1/2	1-11/16
.2638			6.70	2-3/4	1-7/32	.3860		W		3-1/4	1-7/8
.2656	17/64			2-5/8	1-7/16	.3898			9.90	3-1/2	1-11/16
.2660		H		2-11/16	1-1/2	.3906	25/64			3-1/4	1-7/8
.2677			6.80	2-29/32	1-11/32	.3937			10.00	3-1/2	1-11/16
.2717			6.90	2-29/32	1-11/32	.3970		X		3-5/16	1-15/16
.2720		I		2-11/16	1-1/2	.4016			10.20	3-1/2	1-11/16
.2756			7.00	2-29/32	1-11/32	.4040		Y		3-5/16	1-15/16
.2770		J		2-11/16	1-1/2	.4063	13/32			3-5/16	1-15/16
.2795			7.10	2-29/32	1-11/32	.4130		Z		3-3/8	2
.2810		K		2-11/16	1-1/2	.4134			10.50	3-1/2	1-11/16
.2813	9/32			2-11/16	1-1/2	.4219	27/64			3-3/8	2
.2835			7.20	2-29/32	1-11/32	.4252			10.80	3-3/4	1-27/32

These can be furnished in other sizes. Price and Delivery on application. Oxiding, Tanging & Flute Polishing quoted on request.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

Screw Machine Length Drills

(continued)

SCREW MACHINE LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.4331			11.00	3-3/4	1-27/32	1.2031	1-13/64			6-3/4	4-3/8
.4375	7/16			3-7/16	2-1/16	1.2187	1-7/32			6-3/4	4-3/8
.4409			11.20	3-3/4	1-27/32	1.2343	1-15/64			6-3/4	4-3/8
.4528			11.50	3-3/4	1-27/32	1.2500	1-1/4			6-3/4	4-3/8
.4531	29/64			3-9/16	2-1/8	1.2656	1-17/64			7	4-3/8
.4646			11.80	3-3/4	1-27/32	1.2811	1-9/32			7	4-3/8
.4688	15/32			3-5/8	2-1/8	1.2968	1-19/64			7	4-3/8
.4724			12.00	4-1/32	2	1.3125	1-5/16			7	4-3/8
.4803			12.20	4-1/32	2	1.3281	1-21/64			7-1/8	4-1/2
.4844	31/64			3-11/16	2-3/16	1.3437	1-11/32			7-1/8	4-1/2
.4921			12.50	4-1/32	2	1.3593	1-23/64			7-1/8	4-1/2
.5000	1/2			3-3/4	2-1/4	1.3750	1-3/8			7-1/8	4-1/2
.5156	33/64			3-7/8	2-3/8	1.3906	1-25/64			7-3/8	4-3/4
.5313	17/32			3-7/8	2-3/8	1.4062	1-13/32			7-3/8	4-3/4
.5469	35/64			4	2-1/2	1.4218	1-27/64			7-3/8	4-3/4
.5625	9/16			4	2-1/2	1.4375	1-7/16			7-3/8	4-3/4
.5781	37/64			4-1/8	2-5/8	1.4531	1-29/64			7-1/2	4-7/8
.5938	19/32			4-1/8	2-5/8	1.4687	1-15/32			7-1/2	4-7/8
.6094	39/64			4-1/4	2-3/4	1.4843	1-31/64			7-1/2	4-7/8
.6250	5/8			4-1/4	2-3/4	1.5000	1-1/2			7-1/2	4-7/8
.6406	41/64			4-1/2	2-7/8	1.5156	1-33/64			7-3/4	4-7/8
.6563	21/32			4-1/2	2-7/8	1.5312	1-17/32			7-3/4	4-7/8
.6719	43/64			4-5/8	2-7/8	1.5468	1-35/64			7-3/4	4-7/8
.6875	11/16			4-5/8	2-7/8	1.5625	1-9/16			7-3/4	4-7/8
.7031	45/64			4-3/4	3	1.5781	1-37/64			7-3/4	4-7/8
.7188	23/32			4-3/4	3	1.5937	1-19/32			7-3/4	4-7/8
.7344	47/64			5	3-1/8	1.6093	1-39/64			7-3/4	4-7/8
.7500	3/4			5	3-1/8	1.6250	1-5/8			7-3/4	4-7/8
.7656	49/64			5-1/8	3-1/4	1.6406	1-41/64			8	5-1/8
.7812	25/32			5-1/4	3-1/4	1.6562	1-21/32			8	5-1/8
.7968	51/64			5-1/4	3-3/8	1.6718	1-43/64			8	5-1/8
.8125	13/16			5-1/4	3-3/8	1.6875	1-11/16			8	5-1/8
.8281	53/64			5-3/8	3-1/2	1.7031	1-45/64			8	5-1/8
.8438	27/32			5-3/8	3-1/2	1.7187	1-23/32			8	5-1/8
.8594	55/64			5-1/2	3-1/2	1.7343	1-47/64			8	5-1/8
.8750	7/8			5-1/2	3-1/2	1.7500	1-3/4			8	5-1/8
.8906	57/64			5-5/8	3-5/8	1.7656	1-49/64			8-1/4	5-3/8
.9063	29/32			5-5/8	3-5/8	1.7812	1-25/32			8-1/4	5-3/8
.9219	59/64			5-3/4	3-3/4	1.7968	1-51/64			8-1/4	5-3/8
.9375	15/16			5-3/4	3-3/4	1.8125	1-13/16			8-1/4	5-3/8
.9531	61/64			5-7/8	3-7/8	1.8281	1-53/64			8-1/4	5-3/8
.9688	31/32			5-7/8	3-7/8	1.8437	1-27/32			8-1/4	5-3/8
.9844	63/64			6	4	1.8593	1-55/64			8-1/4	5-3/8
1.0000	1			6	4	1.8750	1-7/8			8-1/4	5-3/8
1.0156	1-1/64			6	4	1.8906	1-57/64			8-1/2	5-5/8
1.0312	1-1/32			6	4	1.9062	1-29/32			8-1/2	5-5/8
1.0469	1-3/64			6	4	1.9218	1-59/64			8-1/2	5-5/8
1.0625	1-1/16			6-1/4	4	1.9375	1-15/16			8-1/2	5-5/8
1.0781	1-5/64			6-3/8	4	1.9531	1-61/64			8-1/2	5-5/8
1.0938	1-3/32			6-3/8	4	1.9687	1-31/32			8-1/2	5-5/8
1.1094	1-7/64			6-3/8	4	1.9843	1-63/64			8-1/2	5-5/8
1.1250	1-1/8			6-3/8	4	2.0000	2			8-1/2	5-5/8
1.1406	1-9/64			6-5/8	4	2.0625	2			8-1/2	5-5/8
1.1562	1-5/32			6-5/8	4	2.1250	2			8-1/2	5-5/8
1.1718	1-11/64			6-5/8	4	2.1875	2			8-1/2	5-5/8
1.1875	1-3/16			6-5/8	4-1/4	2.2500	2			8-1/2	5-5/8

These can be furnished in other sizes. Price and Delivery on application. Oxiding, Tanging & Flute Polishing quoted on request.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

Additional Styles of Screw Machine Length Drills Carried in Stock

The specialized designs which have been developed to meet the needs of industry are not as numerous as is the case with jobber length drills. Even these fewer styles are not needed in the multiplicity of sizes shown for the general purpose series List #111. The sizes we stock are shown but diameters not listed can be produced promptly. We will quote quickly on receipt of quantity desired.

PARABOLIC FLUTE SCREW MACHINE LENGTH DRILLS

LIST 114

High helix, heavy web, and parabolic flute for ample chip room, all make for excellent performance in this style of flute. Heavier feeds and fewer pull-outs give longer runs on production work.

LEFT HAND SCREW MACHINE LENGTH DRILLS

LIST 172

This series of left hand drills is not carried by all drill manufacturers, and those that do usually go to 1/2" only. We go to 1-1/4". For sizes below #60 use List #171. Metric and decimal sizes can be quoted promptly and produced rapidly on receipt of quantity needed. These drills are of the same design as List #171 and used principally in automatic screw machines.

HIGH HELIX NUMERIC CONTROL LENGTH DRILLS

LIST 194

Used for accurate locating in aluminum primarily but are very useful for spotting and centering applications in other materials also. Note self-centering helical points. This list covers a wider range of sizes than conventional center drill lists. Always furnished in bright finish.

FOUR FLUTE CORE DRILLS SCREW MACHINE LENGTH H.S.S.

LIST 441

This series of drills is shown by very few drill producers. It is ideal for hogging out material in close quarter machines such as automatic screw machines and lends itself to conversion to reamers, counterbores, step drills and great variety of special forms. They are carried in stock in fractional sizes from 1/8" to 2". Other sizes can be produced, price and delivery on application

continued

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

Drills of cobalt bearing steels have three principal uses:

- 1). In difficult-to-machine materials such as stainless steels, heat resisting steels and some exotic alloys.
- 2). In abrasive materials such as glass filled epoxies, graphite and clay mixtures, cast iron and similar materials.
- 3). In everyday use where longer life between sharpenings is desired. Frequently these drills have webs thinned at the point for conventional sharpening but the user should be prepared to sharpen the heavier webs that this type of tool steel requires. See the remarks under List #501, cobalt jobber drills. The drills are carried in stock in sizes from #60 to 1".

Relatively few drill producers show this series of tungsten carbide tipped drills, but if space is restricted there is no way of cutting off a TCT jobber length drill and retaining the tip. Not only are these drills good for cutting aluminum and certain brasses but they are excellent in cast iron, graphite, glass filled epoxies and other materials that form weak chips. Avoid using this list on steel for the steel chips are strong and tough enough so that when one gets wedged between the margin and the wall of the drilled hole a shock load is imposed on the tip and failure is immediate and catastrophic.

The larger sizes of screw machine drills have shanks as follows:

DRILL SIZE	SHANK SIZE
Up to and including 1"	Same as nominal, less back taper
Over 1" including 1-1/4"	1"
Over 1-1/4" including 1-1/2"	1-1/4"
Over 1-1/2" including 2"	1-1/2"

List 121

Taper Length Drills

HSS

General purpose design. Approximately the same proportions as taper shank drills but have straight shanks. Used where a longer drill than List 101 is needed.

When diameters under No. 60 are needed in longer lengths, please refer to Longboy Lists 701, 702, 704 & 706.

A heavy duty taper length drill is shown in our List #122. It was developed to drill tough forgings and afford a larger number of resharpenings and therefore has enough differences in dimensions to require a separate listing. See page 40.

Metric sizes are becoming a larger proportion of our order mix. We have shown the usual metric sizes in this consecutive size listing table for the convenience of the user searching for a specific diameter. Intermediate sizes can be produced promptly. Price and delivery quoted on request.

Refer also to List 1000, Decimal Drills, Straight Shank, Jobber Length.

**COBALT TAPER LENGTH
FOUR FLUTE CORE DRILLS**

LIST 5443

Semi-Standard Series

Cobalt Straight Shank Taper Length Four Flute Core Drills

Diameter	OAL	Flute Length
1/2"	7-3/4"	4-3/4"
17/32"	8"	4-3/4"
9/16"	8-1/4"	4-7/4"
19/32"	8-3/4"	4-7/8"
5/8"	8-3/4"	4-7/8"
21/32"	9"	5-1/8"
11/16"	9-1/4"	5-3/8"
23/32"	9-1/2"	5-5/8"
3/4"	9-3/4"	5-7/8"

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

(continued)

TAPER LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.0135	80		1-1/2	5/16	.0768		1.95	3-11/32	2-7/32
.0145	79		1-1/2	5/16	.0781	5/64		3-3/4	2
.0156	1/64		1-1/2	5/16	.0785	47		4-1/4	2-1/4
.0160	78		1-1/2	5/16	.0787		2.00	3-11/32	2-7/32
.0180	77		1-1/2	5/16	.0807		2.05	3-11/32	2-7/32
.0200	76		1-1/2	5/16	.0810	46		4-1/4	2-1/4
.0210	75		1-1/2	5/16	.0820	45		4-1/4	2-1/4
.0225	74		1-1/2	5/16	.0827		2.10	3-11/32	2-7/32
.0240	73		1-1/2	5/16	.0846		2.15	3-17/32	2-5/16
.0250	72		1-1/2	5/16	.0860	44		4-1/4	2-1/4
.0260	71		2	3/4	.0866		2.20	3-17/32	2-5/16
.0280	70		2	3/4	.0886		2.25	3-17/32	2-5/16
.0292	69		2	3/4	.0890	43		4-1/4	2-1/4
.0310	68		2	3/4	.0906		2.30	3-17/32	2-5/16
.0313	1/32		2	3/4	.0925		2.35	3-17/32	2-5/16
.0320	67		2	3/4	.0935	42		4-1/4	2-1/4
.0330	66		2	3/4	.0938	3/32		4-1/4	2-1/4
.0350	65		2	3/4	.0945		2.40	3-3/4	2-7/16
.0360	64		2	3/4	.0960	41		4-5/8	2-1/2
.0370	63		2	3/4	.0965		2.45	3-3/4	2-7/16
.0380	62		2	3/4	.0980	40		4-5/8	2-1/2
.0390	61		2	3/4	.0984		2.50	3-3/4	2-7/16
.0394		1.00	2-7/32	1-5/16	.0995	39		4-5/8	2-1/2
.0400	60		2-1/4	1-1/8	.1015	38		4-5/8	2-1/2
.0410	59		2-1/4	1-1/8	.1024		2.60	3-3/4	2-7/16
.0413		1.05	2-7/32	1-5/16	.1040	37		4-5/8	2-1/2
.0420	58		2-1/4	1-1/8	.1063		2.70	3-15/16	2-19/32
.0430	57		2-1/4	1-1/8	.1065	36		4-5/8	2-1/2
.0433		1.10	2-3/8	1-15/32	.1094	7/64		4-5/8	2-1/2
.0453		1.15	2-3/8	1-15/32	.1100	35		5-1/8	2-3/4
.0465	56		2-1/4	1-1/8	.1102		2.80	3-15/16	2-19/32
.0469	3/64		2-1/4	1-1/8	.1110	34		5-1/8	2-3/4
.0472		1.20	2-9/16	1-5/8	.1130	33		5-1/8	2-3/4
.0492		1.25	2-9/16	1-5/8	.1142		2.90	3-15/16	2-19/32
.0512		1.30	2-9/16	1-5/8	.1160	32		5-1/8	2-3/4
.0520	55		3	1-3/4	.1181		3.00	3-15/16	2-19/32
.0532		1.35	3	1-3/4	.1200	31		5-1/8	2-3/4
.0550	54		3	1-3/4	.1220		3.10	4-3/16	2-23/32
.0551		1.40	2-3/4	1-25/32	.1250	1/8		5-1/8	2-3/4
.0571		1.45	2-3/4	1-25/32	.1260		3.20	4-3/16	2-23/32
.0591		1.50	2-3/4	1-25/32	.1285	30		5-3/8	3
.0595	53		3	1-3/4	.1299		3.30	4-3/16	2-23/32
.0610		1.55	3	1-31/32	.1339		3.40	4-13/32	2-7/8
.0625	1/16		3	1-3/4	.1360	29		5-3/8	3
.0630		1.60	3-3/4	2	.1378		3.50	4-13/32	2-7/8
.0635	52		3-3/4	2	.1405	28		5-3/8	3
.0650		1.65	3	1-31/32	.1406	9/64		5-3/8	3
.0669		1.70	3	1-31/32	.1417		3.60	4-13/32	2-7/8
.0670	51		3-3/4	2	.1440	27		5-3/8	3
.0689		1.75	3-5/32	2-3/32	.1457		3.70	4-13/32	2-7/8
.0700	50		3-3/4	2	.1470	26		5-3/8	3
.0709		1.80	3-5/32	2-3/32	.1495	25		5-3/8	3
.0728		1.85	3-5/32	2-3/32	.1496		3.80	4-11/16	3-1/16
.0730	49		3-3/4	2	.1520	24		5-3/8	3
.0748		1.90	3-5/32	2-3/32	.1535		3.90	4-11/16	3-1/16
.0760	48		3-3/4	2	.1540	23		5-3/8	3

Larger Sizes Available. For Smaller Sizes See our Longboy Listing. Oxiding, Tanging & Flute Polishing Quoted on Request

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

(continued)

TAPER LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.1563	5/32		5-3/8	3	.2500	1/4		6-1/8	3-3/4
.1570	22		5-3/4	3-3/8	.2520		6.40	5-13/16	3-13/16
.1575		4.00	4-11/16	3-1/16	.2559		6.50	5-13/16	3-13/16
.1590	21		5-3/4	3-3/8	.2570	F		6-1/4	3-7/8
.1610	20		5-3/4	3-3/8	.2610	G		6-1/4	3-7/8
.1614		4.10	4-11/16	3-1/16	.2656	17/64		6-1/4	3-7/8
.1654		4.20	4-11/16	3-1/16	.2660	H		6-1/4	3-7/8
.1660	19		5-3/4	3-3/8	.2677		6.80	6-1/8	4-1/32
.1693		4.30	4-31/32	3-7/32	.2720	I		6-1/4	3-7/8
.1695	18		5-3/4	3-3/8	.2756		7.00	6-1/8	4-1/32
.1719	11/64		5-3/4	3-3/8	.2770	J		6-1/4	3-7/8
.1730	17		5-3/4	3-3/8	.2810	K		6-1/4	3-7/8
.1732		4.40	4-31/32	3-7/32	.2813	9/32		6-1/4	3-7/8
.1770	16		5-3/4	3-3/8	.2835		7.20	6-1/8	4-1/32
.1772		4.50	4-31/32	3-7/32	.2900	L		6-3/8	4
.1800	15		5-3/4	3-3/8	.2950	M		6-3/8	4
.1811		4.60	4-31/32	3-7/32	.2953		7.50	6-1/8	4-1/32
.1820	14		5-3/4	3-3/8	.2969	19/64		6-3/8	4
.1850	13		5-3/4	3-3/8	.3020	N		6-3/8	4
.1850		4.70	4-31/32	3-7/32	.3071		7.80	6-1/2	4-9/32
.1875	3/16		5-3/4	3-3/8	.3125	5/16		6-3/8	4
.1889		4.80	5-3/16	3-7/16	.3150		8.00	6-1/2	4-9/32
.1890	12		6	3-5/8	.3160	O		6-1/2	4-1/8
.1910	11		6	3-5/8	.3228		8.20	6-1/2	4-9/32
.1929		4.90	5-3/16	3-7/16	.3230	P		6-1/2	4-1/8
.1935	10		6	3-5/8	.3281	21/64		6-1/2	4-1/8
.1960	9		6	3-5/8	.3320	Q		6-1/2	4-1/8
.1969		5.00	5-3/16	3-7/16	.3347		8.50	6-1/2	4-9/32
.1990	8		6	3-5/8	.3390	R		6-1/2	4-1/8
.2008		5.10	5-3/16	3-7/16	.3438	11/32		6-1/2	4-1/8
.2010	7		6	3-5/8	.3465		8.80	6-7/8	4-17/32
.2031	13/64		6	3-5/8	.3480	S		6-3/4	4-1/4
.2040	6		6	3-5/8	.3543		9.00	6-7/8	4-17/32
.2047		5.20	5-3/16	3-7/16	.3580	T		6-3/4	4-1/4
.2055	5		6	3-5/8	.3594	23/64		6-3/4	4-1/4
.2087		5.30	5-3/16	3-7/16	.3622		9.20	6-7/8	4-17/32
.2090	4		6	3-5/8	.3680	U		6-3/4	4-1/4
.2126		5.40	5-15/32	3-19/32	.3740		9.50	6-7/8	4-17/32
.2130	3		6	3-5/8	.3750	3/8		6-3/4	4-1/4
.2165		5.50	5-15/32	3-19/32	.3770	V		7	4-3/8
.2188	7/32		6	3-5/8	.3858		9.80	7-1/4	4-3/4
.2205		5.60	5-15/32	3-19/32	.3860	W		7	4-3/8
.2210	2		6-1/8	3-3/4	.3906	25/64		7	4-3/8
.2244		5.70	5-15/32	3-19/32	.3937		10.00	7-1/4	4-3/4
.2280	1		6-1/8	3-3/4	.3970	X		7	4-3/8
.2284		5.80	5-15/32	3-19/32	.4016		10.20	7-1/4	4-3/4
.2324		5.90	5-15/32	3-19/32	.4040	Y		7	4-3/8
.2340	A		6-1/8	3-3/4	.4063	13/32		7	4-3/8
.2344	15/64		6-1/8	3-3/4	.4130	Z		7-1/4	4-5/8
.2362		6.00	5-15/32	3-19/32	.4134		10.50	7-1/4	4-3/4
.2380	B		6-1/8	3-3/4	.4219	27/64		7-1/4	4-5/8
.2402		6.10	5-13/16	3-13/16	.4252		10.80	7-11/16	5-1/32
.2420	C		6-1/8	3-3/4	.4331		11.00	7-11/16	5-1/32
.2441		6.20	5-13/16	3-13/16	.4375	7/16		7-1/4	4-5/8
.2460	D		6-1/8	3-3/4	.4409		11.20	7-11/16	5-1/32
.2480		6.30	5-13/16	3-13/16	.4528		11.50	7-11/16	5-1/32

Larger Sizes Available. For Smaller Sizes See our Longboy Listing. Oxiding, Tanging & Flute Polishing Quoted on Request

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

(continued)

TAPER LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.4531	29/64			7-1/2	4-3/4	.8465			21.50	10-9/16	6-15/16
.4646			11.80	7-11/16	5-1/32	.8594	55/64			10	6-1/8
.4688	15/32			7-1/2	4-3/4	.8661			22.00	10-9/16	6-15/16
.4724			12.00	8-1/16	5-9/32	.8750	7/8			10	6-1/8
.4803			12.20	8-1/16	5-9/32	.8858			22.50	10-13/16	7-3/32
.4844	31/64			7-3/4	4-3/4	.8906	57/64			10	6-1/8
.4921			12.50	8-1/16	5-9/32	.9055			23.00	10-13/16	7-3/32
.5000	1/2			7-3/4	4-3/4	.9063	29/32			10	6-1/8
.5039			12.80	8-1/16	5-9/32	.9219	59/64			10-3/4	6-1/8
.5118			13.00	8-1/16	5-9/32	.9252			23.50	10-13/16	7-3/32
.5156	33/64			8	4-3/4	.9375	15/16			10-3/4	6-1/8
.5197			13.20	8-1/16	5-9/32	.9449			24.00	11-3/32	7-9/32
.5313	17/32			8	4-3/4	.9531	61/64			11	6-3/8
.5315			13.50	8-7/16	5-1/2	.9646			24.50	11-3/32	7-9/32
.5433			13.80	8-7/16	5-1/2	.9688	31/32			11-1/8	6-1/2
.5469	35/64			8-1/4	4-7/8	.9843			25.00	11-3/32	7-9/32
.5512			14.00	8-7/16	5-1/2	.9844	63/64			11-1/8	6-1/2
.5610			14.25	8-21/32	5-11/16	1.0000	1			11-1/8	6-1/2
.5625	9/16			8-1/4	4-7/8	1.0039			25.50	11-13/32	7-1/2
.5709			14.50	8-21/32	5-11/16	1.0156	1-1/64			11-1/8	6-1/2
.5781	37/64			8-3/4	4-7/8	1.0236			26.00	11-13/32	7-1/2
.5807			14.75	8-21/32	5-11/16	1.0312	1-1/32			11-1/8	6-1/2
.5906			15.00	8-21/32	5-11/16	1.0433			26.50	11-13/32	7-1/2
.5938	19/32			8-3/4	4-7/8	1.0469	1-3/64			11-1/4	6-5/8
.6094	39/64			8-3/4	4-7/8	1.0625	1-1/16			11-1/4	6-5/8
.6102			15.50	8-15/16	5-7/8	1.0630			27.00	11-23/32	7-5/8
.6200			15.75	8-15/16	5-7/8	1.0781	1-5/64			11-1/2	6-7/8
.6250	5/8			8-3/4	4-7/8	1.0827			27.50	11-23/32	7-5/8
.6299			16.00	8-15/16	5-7/8	1.0938	1-3/32			11-1/2	6-7/8
.6398			16.25	9-1/4	6-1/16	1.1024			28.00	11-23/32	7-5/8
.6406	41/64			9	5-1/8	1.1094	1-7/64			11-3/4	7-1/8
.6496			16.50	9-1/4	6-1/16	1.1221			28.50	12-1/8	7-29/32
.6563	21/32			9	5-1/8	1.1250	1-1/8			11-3/4	7-1/8
.6595			16.75	9-1/4	6-1/16	1.1406	1-9/64			11-7/8	7-1/4
.6693			17.00	9-1/4	6-1/16	1.1417			29.00	12-1/8	7-29/32
.6719	43/64			9-1/4	5-3/8	1.1563	1-5/32			11-7/8	7-1/4
.6791			17.25	9-1/2	6-7/32	1.1614			29.50	12-1/8	7-29/32
.6875	11/16			9-1/4	5-3/8	1.1719	1-11/64			12	7-3/8
.6890			17.50	9-1/2	6-7/32	1.1811			30.00	12-1/8	7-29/32
.7031	45/64			9-1/2	5-5/8	1.1875	1-3/16			12	7-3/8
.7087			18.00	9-1/2	6-7/32	1.2008			30.50	12-7/16	8-5/32
.7188	23/32			9-1/2	5-5/8	1.2031	1-13/64			12-1/8	7-1/2
.7284			18.50	9-23/32	6-3/8	1.2188	1-7/32			12-1/8	7-1/2
.7344	47/64			9-3/4	5-7/8	1.2205			31.00	12-7/16	8-5/32
.7480			19.00	9-23/32	6-3/8	1.2344	1-15/64			12-1/2	7-7/8
.7500	3/4			9-3/4	5-7/8	1.2402			31.50	12-7/16	8-5/32
.7656	49/64			9-7/8	6	1.2500	1-1/4			12-1/2	7-7/8
.7677			19.50	10	6-17/32	1.2812	1-9/32			14-1/8	8-1/2
.7813	25/32			9-7/8	6	1.3125	1-5/16			14-1/4	8-5/8
.7874			20.00	10	6-17/32	1.3438	1-11/32			14-3/8	8-3/4
.7968	51/64			10	6-1/8	1.3750	1-3/8			14-1/2	8-7/8
.8071			20.50	10-9/32	6-23/32	1.4062	1-13/32			14-5/8	9
.8125	13/16			10	6-1/8	1.4375	1-7/16			14-3/4	9-1/8
.8268			21.00	10-9/32	6-23/32	1.4688	1-15/32			14-7/8	9-1/4
.8281	53/64			10	6-1/8	1.5000	1-1/2			15	9-3/8
.8438	27/32			10	6-1/8	1.5625	1-9/16			15-1/4	9-5/8

Larger Sizes Available. For Smaller Sizes See our Longboy Listing. Oxiding, Tanging & Flute Polishing Quoted on Request

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

TAPER LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/ Number	MM	Length O.A.	Flute Length
1.6250		1-5/8		15-5/8	9-7/8
1.6875		1-11/16		15-3/4	10
1.7500		1-3/4		16-1/4	10-1/2
1.8125		1-13/16		16-1/4	10-1/2
1.8750		1-7/8		16-1/2	10-3/4
1.9375		1-15/16		16-5/8	10-3/4
2.0000		2		16-5/8	10-3/4

Larger Sizes Available. For Smaller Sizes See our Longboy Listing. Oxiding, Tanging & Flute Polishing Quoted on Request

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

Additional Styles of Taper Length Drills Carried in Stock

Because taper length drills (the same length as taper shank drills) afford the extra reach often needed on a job, they are frequently specified in other styles as well as general purpose design. We are pleased to carry these other styles in stock for it affords us the opportunity to deliver quickly the "Odd Ball" item which has become synonymous with our name.

PARABOLIC FLUTE TAPER LENGTH DRILLS

LIST 124

This drill features a high helix, heavy web and wide flutes and for some applications performs exceedingly well. It is becoming more popular as its virtues become known. Available in both wide land and narrow land styles.

HIGH HELIX TAPER LENGTH DRILLS

LIST 196

Aluminum and plastics are difficult materials in which to drill deep holes for their chips tend to pack together and clog in the drill flutes. High helix drills ease that problem. Note that we have a larger range, #60- 1", than most other drill companies. Intermediate sizes not shown in our price catalog can be produced promptly. On sizes from 33/64" to 1" the flute lengths are about 15% longer than shown for other styles. See page 41 for overall and flute lengths. These drills are not to be confused with crankshaft drills which do not have the same chip space or web thickness.

FOUR FLUTE CORE DRILLS TAPER LENGTH

LIST 443

These drills are carried in stock in sizes from 1/8" to 1-1/4," considerably smaller on the low end of the range and much larger on the high end of the range than most other drill companies show. Not only are they useful for enlarging existing holes but they can be converted to counterbores, step drills, reamers and an endless variety of other tools. Our ability to grind these to intermediate sizes quickly make them money-savers for the user.

COBALT TAPER LENGTH DRILLS

LIST 521

1/16" to 1" is the range of sizes we carry in this series. The extra red hardness and abrasion resistance often permits this tool to function where the general purpose design fails. The heavy web (and split or notched point) means the user should have adequate sharpening equipment for proper maintenance of the tool. The results are well worth the price.

continued

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

**TUNGSTEN CARBIDE TIPPED
TAPER LENGTH DRILLS**

LIST 821

As is the case with jobber drills cutting into abrasive materials, such as glass filled epoxies, graphite and the like, a tungsten carbide tipped taper length drill often is indispensable. We carry this style in sizes from 1/8" to 1" but intermediate sizes can be produced promptly at prices dependent on the quantity ordered of a size.

**OIL HOLE
TAPER LENGTH DRILLS**

LIST 4121

Oil hole drills are often required for drilling deep holes. They keep the tool cool at the cutting lips to prevent disintegration of the edges, they put the cutting compound exactly where it is needed, they flush chips out of the hole, all essential functions. Their higher costs are easily overbalanced by the increased production obtained by their use. See the discussion of oil hole drills, List 4000, page 97.

**TUNGSTEN CARBIDE TIPPED
FOUR FLUTE TAPER LENGTH
CORE DRILLS**

LIST 840

Admirably suited for heavy stock removal in deep holes in abrasive materials such as cast iron.

DIMENSIONS

General Purpose or Jobber Drills - Metric

List 101

**JOBBER LENGTH DRILLS
H.S.S. (HIGH SPEED STEEL)**

FOR PRICES SEE OUR PRICE LIST CATALOG

Diameter		Flute Length		Overall Length		Diameter		Flute Length		Overall Length	
mm	Decimal	mm	Fraction	mm	Fraction	mm	Decimal	mm	Fraction	mm	Fraction
.15	.0059	1.50	1/16	19	3/4	1.35	.0532	18	23/32	40	1-9/16
.16	.0063	1.50	1/16	19	3/4	1.40	.0551	18	23/32	40	1-9/16
.17	.0067	1.50	1/16	19	3/4	1.45	.0571	18	23/32	40	1-9/16
.18	.0071	1.50	1/16	19	3/4	1.50	.0591	18	25/32	40	1-9/16
.19	.0075	1.50	1/16	19	3/4	1.55	.0610	20	25/32	43	1-11/16
.20	.0079	2.50	3/32	19	3/4	1.60	.0630	20	25/32	43	1-11/16
.21	.0083	2.50	3/32	19	3/4	1.65	.0650	20	25/32	43	1-11/16
.22	.0087	2.50	3/32	19	3/4	1.70	.0669	20	25/32	43	1-11/16
.23	.0091	2.50	3/32	19	3/4	1.75	.0689	22	7/8	46	1-13/16
.24	.0094	2.50	3/32	19	3/4	1.80	.0709	22	7/8	46	1-13/16
.25	.0098	3	1/8	19	3/4	1.85	.0728	22	7/8	46	1-13/16
.26	.0102	3	1/8	19	3/4	1.90	.0748	22	7/8	46	1-13/16
.27	.0106	3	1/8	19	3/4	1.95	.0768	24	15/16	49	1-15/16
.28	.0110	3	1/8	19	3/4	2.00	.0787	24	15/16	49	1-15/16
.29	.0114	3	1/8	19	3/4	2.05	.0807	24	15/16	49	1-15/16
.30	.0118	4	1/8	19	3/4	2.10	.0827	24	15/16	49	1-15/16
.32	.0126	4	5/32	19	3/4	2.15	.0846	27	1-1/16	53	2-3/32
.34	.0134	4	5/32	19	3/4	2.20	.0866	27	1-1/16	53	2-3/32
.35	.0138	4	5/32	19	3/4	2.25	.0886	27	1-1/16	53	2-3/32
.36	.0142	4	5/32	19	3/4	2.30	.0906	27	1-1/16	53	2-3/32
.38	.0150	4	5/32	19	3/4	2.35	.0925	27	1-1/16	53	2-3/32
.40	.0157	5	3/16	20	25/32	2.40	.0945	30	1-3/16	57	2-1/4
.42	.0165	5	3/16	20	25/32	2.45	.0965	30	1-3/16	57	2-1/4
.44	.0173	5	3/16	20	25/32	2.50	.0984	30	1-3/16	57	2-1/4
.45	.0177	5	3/16	20	25/32	2.60	.1024	30	1-3/16	57	2-1/4
.46	.0181	5	3/16	20	25/32	2.70	.1063	33	1-5/16	61	2-13/32
.48	.0189	5	3/16	20	25/32	2.75	.1083	33	1-5/16	61	2-13/32
.50	.0197	6	1/4	22	7/8	2.80	.1102	33	1-5/16	61	2-13/32
.55	.0217	7	9/32	24	15/16	2.90	.1142	33	1-5/16	61	2-13/32
.60	.0236	7	9/32	24	15/16	3.00	.1181	33	1-5/16	61	2-13/32
.65	.0256	8	5/16	26	1-1/32	3.10	.1220	36	1-7/16	65	2-9/16
.70	.0276	9	11/32	28	1-1/32	3.20	.1260	36	1-7/16	65	2-9/16
.75	.0295	9	11/32	28	1-1/32	3.25	.1280	36	1-7/16	65	2-9/16
.80	.0315	10	13/32	30	1-3/16	3.30	.1299	36	1-7/16	65	2-9/16
.85	.0335	10	13/32	30	1-3/16	3.40	.1339	39	1-17/32	70	2-3/4
.90	.0354	11	27/64	32	1-1/4	3.50	.1378	39	1-17/32	70	2-3/4
.95	.0374	11	27/64	32	1-1/4	3.60	.1417	39	1-17/32	70	2-3/4
1.00	.0394	12	15/32	34	1-11/32	3.70	.1457	39	1-17/32	70	2-3/4
1.05	.0413	12	15/32	34	1-11/32	3.75	.1476	39	1-17/32	70	2-3/4
1.10	.0433	14	9/16	36	1-7/16	3.80	.1496	43	1-11/16	75	2-15/16
1.15	.0453	14	9/16	36	1-7/16	3.90	.1535	43	1-11/16	75	2-15/16
1.20	.0487	16	5/8	38	1-1/2	4.00	.1575	43	1-11/16	75	2-15/16
1.25	.0492	16	5/8	38	1-1/2	4.10	.1614	43	1-11/16	75	2-15/16
1.30	.0512	16	5/8	38	1-1/2	4.20	.1654	43	1-11/16	75	2-15/16

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

General Purpose or Jobber Drills - Metric

List 101

JOBBER LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Diameter		Flute Length		Overall Length		Diameter		Flute Length		Overall Length	
mm	Decimal	mm	Fraction	mm	Fraction	mm	Decimal	mm	Fraction	mm	Fraction
4.25	.1673	43	1-11/16	75	2-15/16	7.85	.3091	75	2-15/16	117	4-19/32
4.30	.1693	47	1-27/32	80	3-5/32	7.90	.3110	75	2-15/16	117	4-19/32
4.40	.1732	47	1-27/32	80	3-5/32	8.00	.3150	75	2-15/16	117	4-19/32
4.50	.1772	47	1-27/32	80	3-5/32	8.10	.3189	75	2-15/16	117	4-19/32
4.60	.1811	47	1-27/32	80	3-5/32	8.20	.3228	75	2-15/16	117	4-19/32
4.70	.1850	47	1-27/32	80	3-5/32	8.25	.3248	75	2-15/16	117	4-19/32
4.75	.1870	47	1-27/32	80	3-5/32	8.30	.3268	75	2-15/16	117	4-19/32
4.80	.1890	52	2-1/16	86	3-3/8	8.40	.3307	75	2-15/16	117	4-19/32
4.90	.1929	52	2-1/16	86	3-3/8	8.50	.3347	75	2-15/16	117	4-19/32
5.00	.1969	52	2-1/16	86	3-3/8	8.60	.3386	81	3-3/16	125	4-29/32
5.10	.2008	52	2-1/16	86	3-3/8	8.70	.3425	81	3-3/16	125	4-29/32
5.20	.2047	52	2-1/16	86	3-3/8	8.75	.3445	81	3-3/16	125	4-29/32
5.25	.2067	52	2-1/16	86	3-3/8	8.80	.3465	81	3-3/16	125	4-29/32
5.30	.2087	52	2-1/16	86	3-3/8	8.90	.3504	81	3-3/16	125	4-29/32
5.40	.2126	57	2-1/4	93	3-21/32	9.00	.3543	81	3-3/16	125	4-29/32
5.50	.2165	57	2-1/4	93	3-21/32	9.10	.3583	81	3-3/16	125	4-29/32
5.60	.2205	57	2-1/4	93	3-21/32	9.20	.3622	81	3-3/16	125	4-29/32
5.70	.2244	57	2-1/4	93	3-21/32	9.25	.3642	81	3-3/16	125	4-29/32
5.75	.2264	57	2-1/4	93	3-21/32	9.30	.3661	81	3-3/16	125	4-29/32
5.80	.2284	57	2-1/4	93	3-21/32	9.40	.3701	81	3-3/16	125	4-29/32
5.90	.2323	57	2-1/4	93	3-21/32	9.50	.3740	81	3-3/16	125	4-29/32
6.00	.2362	57	2-1/4	93	3-21/32	9.60	.3780	87	3-7/16	133	5-1/4
6.10	.2402	63	2-15/32	101	3-31/32	9.70	.3819	87	3-7/16	133	5-1/4
6.20	.2441	63	2-15/32	101	3-31/32	9.75	.3839	87	3-7/16	133	5-1/4
6.25	.2461	63	2-15/32	101	3-31/32	9.80	.3858	87	3-7/16	133	5-1/4
6.30	.2480	63	2-15/32	101	3-31/32	9.90	.3898	87	3-7/16	133	5-1/4
6.40	.2520	63	2-15/32	101	3-31/32	10.00	.3937	87	3-7/16	133	5-1/4
6.50	.2559	63	2-15/32	101	3-31/32	10.10	.3976	87	3-7/16	133	5-1/4
6.60	.2598	63	2-15/32	101	3-31/32	10.20	.4016	87	3-7/16	133	5-1/4
6.70	.2638	63	2-15/32	101	3-31/32	10.30	.4055	87	3-7/16	133	5-1/4
6.75	.2658	69	2-23/32	109	4-9/32	10.40	.4094	87	3-7/16	133	5-1/4
6.80	.2677	69	2-23/32	109	4-9/32	10.50	.4134	87	3-7/16	133	5-1/4
6.90	.2717	69	2-23/32	109	4-9/32	10.60	.41731	87	3-7/16	133	5-1/4
7.00	.2756	69	2-23/32	109	4-9/32	10.70	.4213	94	3-11/16	142	5-19/32
7.10	.2795	69	2-23/32	109	4-9/32	10.80	.4252	94	3-11/16	142	5-19/32
7.20	.2835	69	2-23/32	109	4-9/32	10.90	.4291	94	3-11/16	142	5-19/32
7.25	.2854	69	2-23/32	109	4-9/32	11.00	.4331	94	3-11/16	142	5-19/32
7.30	.2874	69	2-23/32	109	4-9/32	11.10	.4370	94	3-11/16	142	5-19/32
7.40	.2913	69	2-23/32	109	4-9/32	11.20	.4409	94	3-11/16	142	5-19/32
7.50	.2953	69	2-23/32	109	4-9/32	11.30	.4449	94	3-11/16	142	5-19/32
7.60	.2992	75	2-15/16	117	4-19/32	11.40	.4488	94	3-11/16	142	5-19/32
7.70	.3032	75	2-15/16	117	4-19/32	11.50	.4528	94	3-11/16	142	5-19/32
7.75	.3051	75	2-15/16	117	4-19/32	11.60	.4567	94	3-11/16	142	5-19/32
7.80	.3071	75	2-15/16	117	4-19/32	11.70	.4606	94	3-11/16	142	5-19/32

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

General Purpose or Jobber Drills - Metric

List 101

JOBBER LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

Diameter		Flute Length		Overall Length	
mm	Decimal	mm	Fraction	mm	Fraction
11.80	.4646	94	3-11/16	142	5-19/32
11.90	.4685	101	3-31/32	151	5-15/16
12.00	.4724	101	3-31/32	151	5-15/16
12.10	.4764	101	3-31/32	151	5-15/16
12.20	.4803	101	3-31/32	151	5-15/16
12.30	.4843	101	3-31/32	151	5-15/16
12.40	.4882	101	3-31/32	151	5-15/16
12.50	.4921	101	3-31/32	151	5-15/16
12.60	.4961	101	3-31/32	151	5-15/16
12.70	.5000	101	3-31/32	151	5-15/16
12.80	.5039	101	3-31/32	151	5-15/16
12.90	.5079	101	3-31/32	151	5-15/16
13.00	.5118	101	3-31/32	151	5-15/16
13.50	.5315	108	4-1/4	160	6-5/16
14.00	.5512	108	4-1/4	160	6-5/16
14.50	.5709	114	4-1/2	169	6-5/8
15.00	.5906	114	4-1/2	169	6-5/8
15.50	.6102	120	4-3/4	178	7
16.00	.6299	120	4-3/4	178	7
16.50	.6496	125	4-29/32	184	7-1/4
17.00	.6693	125	4-29/32	184	7-1/4
17.50	.6889	130	5-3/32	191	7-17/32

DIMENSIONS

Screw Machine Length Drills - Metric

List 111

**SCREW MACHINE LENGTH DRILLS
H.S.S. (HIGH SPEED STEEL)**

FOR PRICES SEE OUR PRICE LIST CATALOG

Diameter		Flute Length		Overall Length		Diameter		Flute Length		Overall Length	
mm	Decimal	mm	Fraction	mm	Fraction	mm	Decimal	mm	Fraction	mm	Fraction
1.00	.0394	6	1/4	26	1-1/32	3.90	.1535	22	7/8	55	2-5/32
1.05	.0413	6	1/4	26	1-1/32	4.00	.1575	22	7/8	55	2-5/32
1.10	.0433	7	9/32	28	1-3/32	4.10	.1614	22	7/8	55	2-5/32
1.15	.0453	7	9/32	28	1-3/32	4.20	.1654	22	7/8	55	2-5/32
1.20	.0472	8	5/16	30	1-3/16	4.30	.1693	24	15/16	58	2-9/32
1.25	.0492	8	5/16	30	1-3/16	4.40	.1732	24	15/16	58	2-9/32
1.30	.0512	8	5/16	30	1-3/16	4.50	.1772	24	15/16	58	2-9/32
1.35	.0532	9	11/32	32	1-1/4	4.60	.1811	24	15/16	58	2-9/32
1.40	.0551	9	11/32	32	1-1/4	4.70	.1850	24	15/16	58	2-9/32
1.45	.0571	9	11/32	32	1-1/4	4.80	.1890	26	1-1/32	62	2-7/16
1.50	.0591	9	11/32	32	1-1/4	4.90	.1929	26	1-1/32	62	2-7/16
1.55	.0610	10	13/32	34	1-11/32	5.00	.1969	26	1-1/32	62	2-7/16
1.60	.0630	10	13/32	34	1-11/32	5.10	.2008	26	1-1/32	62	2-7/16
1.65	.0650	10	13/32	34	1-11/32	5.20	.2047	26	1-1/32	62	2-7/16
1.70	.0669	10	13/32	34	1-11/32	5.30	.2087	26	1-1/32	62	2-7/16
1.75	.0689	11	7/16	36	1-7/16	5.40	.2126	28	1-3/32	66	2-19/32
1.80	.0709	11	7/16	36	1-7/16	5.50	.2165	28	1-3/32	66	2-19/32
1.85	.0728	11	7/16	36	1-7/16	5.60	.2205	28	1-3/32	66	2-19/32
1.90	.0748	11	7/16	36	1-7/16	5.70	.2244	28	1-3/32	66	2-19/32
1.95	.0768	12	15/32	38	1-1/2	5.80	.2284	28	1-3/32	66	2-19/32
2.00	.0787	12	15/32	38	1-1/2	5.90	.2324	28	1-3/32	66	2-19/32
2.05	.0807	12	15/32	38	1-1/2	6.00	.2362	28	1-3/32	66	2-19/32
2.10	.0827	12	15/32	38	1-1/2	6.10	.2402	31	1-7/32	70	2-3/4
2.15	.0846	13	1/2	40	1-9/16	6.20	.2441	31	1-7/32	70	2-3/4
2.20	.0866	13	1/2	40	1-9/16	6.30	.2480	31	1-7/32	70	2-3/4
2.25	.0886	13	1/2	40	1-9/16	6.40	.2520	31	1-7/32	70	2-3/4
2.30	.0906	13	1/2	40	1-9/16	6.50	.2559	31	1-7/32	70	2-3/4
2.35	.0925	13	1/2	40	1-9/16	6.60	.2598	31	1-7/32	70	2-3/4
2.40	.0945	14	9/16	43	1-11/16	6.70	.2638	31	1-7/32	70	2-3/4
2.45	.0965	14	9/16	43	1-11/16	6.80	.2677	34	1-11/32	74	2-29/32
2.50	.0984	14	9/16	43	1-11/16	6.90	.2717	34	1-11/32	74	2-29/32
2.60	.1024	14	9/16	43	1-11/16	7.00	.2756	34	1-11/32	74	2-29/32
2.70	.1063	16	5/8	46	1-13/16	7.10	.2795	34	1-11/32	74	2-29/32
2.80	.1102	16	5/8	46	1-13/16	7.20	.2835	34	1-11/32	74	2-29/32
2.90	.1142	16	5/8	46	1-13/16	7.30	.2874	34	1-11/32	74	2-29/32
3.00	.1181	16	5/8	46	1-13/16	7.40	.2913	34	1-11/32	74	2-29/32
3.10	.1220	18	23/32	49	1-15/16	7.50	.2953	34	1-11/32	74	2-29/32
3.20	.1260	18	23/32	49	1-15/16	7.60	.2992	37	1-15/32	79	3-1/8
3.30	.1299	18	23/32	49	1-15/16	7.70	.3032	37	1-15/32	79	3-1/8
3.40	.1339	20	25/32	52	2-1/16	7.80	.3071	37	1-15/32	79	3-1/8
3.50	.1378	20	25/32	52	2-1/16	7.90	.3110	37	1-15/32	79	3-1/8
3.60	.1417	20	25/32	52	2-1/16	8.00	.3150	37	1-15/32	79	3-1/8
3.70	.1457	20	25/32	52	2-1/16	8.10	.3189	37	1-15/32	79	3-1/8
3.80	.1496	22	7/8	55	2-5/32	8.20	.3228	37	1-15/32	79	3-1/8

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

Screw Machine Length Drills - Metric

List 111

SCREW MACHINE LENGTH DRILLS H.S.S. (HIGH SPEED STEEL)

FOR PRICES SEE OUR PRICE LIST CATALOG

<u>Diameter</u>		<u>Flute Length</u>		<u>Overall Length</u>	
mm	Decimal	mm	Fraction	mm	Fraction
8.30	.3268	37	1-15/32	79	3-1/8
8.40	.3307	37	1-15/32	79	3-1/8
8.50	.3347	37	1-15/32	79	3-1/8
8.60	.3386	40	1-9/16	84	3-5/16
8.70	.3425	40	1-9/16	84	3-5/16
8.80	.3465	40	1-9/16	84	3-5/16
8.90	.3504	40	1-9/16	84	3-5/16
9.00	.3543	40	1-9/16	84	3-5/16
9.10	.3583	40	1-9/16	84	3-5/16
9.20	.3622	40	1-9/16	84	3-5/16
9.30	.3661	40	1-9/16	84	3-5/16
9.40	.3701	40	1-9/16	84	3-5/16
9.50	.3740	40	1-9/16	84	3-5/16
9.60	.3780	43	1-11/16	89	3-1/2
9.70	.3819	43	1-11/16	89	3-1/2
9.80	.3858	43	1-11/16	89	3-1/2
9.90	.3898	43	1-11/16	89	3-1/2
10.00	.3937	43	1-11/16	89	3-1/2
10.20	.4016	43	1-11/16	89	3-1/2
10.50	.4134	43	1-11/16	89	3-1/2
10.80	.4252	47	1-27/32	95	3-3/4
11.00	.4331	47	1-27/32	95	3-3/4
11.20	.4409	47	1-27/32	95	3-3/4
11.50	.4528	47	1-27/32	95	3-3/4
11.80	.4646	47	1-27/32	95	3-3/4
12.00	.4724	51	2	102	4-1/32
12.20	.4803	51	2	102	4-1/32
12.50	.4921	51	2	102	4-1/32

DIMENSIONS

Taper Length Drills - Metric

List 121

**TAPER LENGTH DRILLS
H.S.S. (HIGH SPEED STEEL)**

FOR PRICES SEE OUR PRICE LIST CATALOG

Diameter		Flute Length		Overall Length		Diameter		Flute Length		Overall Length	
mm	Decimal	mm	Fraction	mm	Fraction	mm	Decimal	mm	Fraction	mm	Fraction
1.00	.0394	33	1-5/16	56	2-7/32	4.00	.1574	78	3-1/16	119	4-11/16
1.05	.0413	33	1-5/16	56	2-7/32	4.10	.1613	78	3-1/16	119	4-11/16
1.10	.0433	37	1-15/32	60	2-3/8	4.20	.1653	78	3-1/16	119	4-11/16
1.15	.0453	37	1-15/32	60	2-3/8	4.30	.1692	82	3-7/32	126	4-31/32
1.20	.0472	41	1-5/8	65	2-9/16	4.40	.1731	82	3-7/32	126	4-31/32
1.25	.0491	41	1-5/8	65	2-9/16	4.50	.1772	82	3-7/32	126	4-31/32
1.30	.0511	41	1-5/8	65	2-9/16	4.60	.1811	82	3-7/32	126	4-31/32
1.35	.0531	45	1-25/32	70	2-3/4	4.70	.1850	82	3-7/32	126	4-31/32
1.40	.0550	45	1-25/32	70	2-3/4	4.80	.1890	87	3-7/16	132	5-3/16
1.45	.0570	45	1-25/32	70	2-3/4	4.90	.1929	87	3-7/16	132	5-3/16
1.50	.0591	45	1-25/32	70	2-3/4	5.00	.1968	87	3-7/16	132	5-3/16
1.55	.0610	50	1-31/32	76	3	5.10	.2008	87	3-7/16	132	5-3/16
1.60	.0630	50	1-31/32	76	3	5.20	.2047	87	3-7/16	132	5-3/16
1.65	.0649	50	1-31/32	76	3	5.30	.2086	87	3-7/16	132	5-3/16
1.70	.0669	50	1-31/32	76	3	5.40	.2126	91	3-19/32	139	5-15/32
1.75	.0688	53	2-3/32	80	3-5/32	5.50	.2165	91	3-19/32	139	5-15/32
1.80	.0708	53	2-3/32	80	3-5/32	5.60	.2204	91	3-19/32	139	5-15/32
1.85	.0727	53	2-3/32	80	3-5/32	5.70	.2243	91	3-19/32	139	5-15/32
1.90	.0747	53	2-3/32	80	3-5/32	5.80	.2283	91	3-19/32	139	5-15/32
1.95	.0766	56	2-7/32	85	3-11/32	5.90	.2322	91	3-19/32	139	5-15/32
2.00	.0786	56	2-7/32	85	3-11/32	6.00	.2361	91	3-19/32	139	5-15/32
2.05	.0805	56	2-7/32	85	3-11/32	6.10	.2401	97	3-13/16	148	5-13/16
2.10	.0825	56	2-7/32	85	3-11/32	6.20	.2440	97	3-13/16	148	5-13/16
2.15	.0844	59	2-5/16	90	3-17/32	6.30	.2479	97	3-13/16	148	5-13/16
2.20	.0864	59	2-5/16	90	3-17/32	6.40	.2519	97	3-13/16	148	5-13/16
2.25	.0886	59	2-5/16	90	3-17/32	6.50	.2558	97	3-13/16	148	5-13/16
2.30	.0906	59	2-5/16	90	3-17/32	6.80	.2677	102	4-1/32	156	6-1/8
2.35	.0925	59	2-5/16	90	3-17/32	7.00	.2756	102	4-1/32	156	6-1/8
2.40	.0945	62	2-7/16	95	3-3/4	7.20	.2835	102	4-1/32	156	6-1/8
2.45	.0965	62	2-7/16	95	3-3/4	7.50	.2953	102	4-1/32	156	6-1/8
2.50	.0984	62	2-7/16	95	3-3/4	7.80	.3071	109	4-9/32	165	6-1/2
2.60	.1024	62	2-7/16	95	3-3/4	8.00	.3150	109	4-9/32	165	6-1/2
2.70	.1063	66	2-19/32	100	3-15/16	8.20	.3228	109	4-9/32	165	6-1/2
2.80	.1102	66	2-19/32	100	3-15/16	8.50	.3346	109	4-9/32	165	6-1/2
2.90	.1142	66	2-19/32	100	3-15/16	8.80	.3465	115	4-17/32	175	6-7/8
3.00	.1181	66	2-19/32	100	3-15/16	9.00	.3543	115	4-17/32	175	6-7/8
3.10	.1220	69	2-23/32	106	4-3/16	9.20	.3622	115	4-17/32	175	6-7/8
3.20	.1260	69	2-23/32	106	4-3/16	9.50	.3740	115	4-17/32	175	6-7/8
3.30	.1299	69	2-23/32	106	4-3/16	9.80	.3858	121	4-3/4	184	7-1/4
3.40	.1338	73	2-7/8	112	4-13/32	10.00	.3937	121	4-3/4	184	7-1/4
3.50	.1378	73	2-7/8	112	4-13/32	10.20	.4016	121	4-3/4	184	7-1/4
3.60	.1417	73	2-7/8	112	4-13/32	10.50	.4134	121	4-3/4	184	7-1/4
3.70	.1456	73	2-7/8	112	4-13/32	10.80	.4252	128	5-1/32	195	7-11/16
3.80	.1495	78	3-1/16	119	4-11/16	11.00	.4331	128	5-1/32	195	7-11/16
3.90	.1535	78	3-1/16	119	4-11/16	11.20	.4409	128	5-1/32	195	7-11/16

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

Taper Length Drills - Metric

List 121

**TAPER LENGTH DRILLS
H.S.S. (HIGH SPEED STEEL)**

FOR PRICES SEE OUR PRICE LIST CATALOG

Diameter		Flute Length		Overall Length		Diameter		Flute Length		Overall Length	
mm	Decimal	mm	Fraction	mm	Fraction	mm	Decimal	mm	Fraction	mm	Fraction
11.50	.4528	128	5-1/32	195	7-11/16	28.50	1.1220	201	7-29/32	307	12-1/8
11.80	.4646	128	5-1/32	195	7-11/16	29.00	1.1417	201	7-29/32	307	12-1/8
12.00	.4724	134	5-9/32	205	8-1/16	29.50	1.1614	201	7-29/32	307	12-1/8
12.20	.4803	134	5-9/32	205	8-1/16	30.00	1.1811	201	7-29/32	307	12-1/8
12.50	.4921	134	5-9/32	205	8-1/16	30.50	1.2008	207	8-5/32	316	12-7/16
12.80	.5039	134	5-9/32	205	8-1/16	31.00	1.2205	207	8-5/32	316	12-7/16
13.00	.5118	134	5-9/32	205	8-1/16	31.50	1.2402	207	8-5/32	316	12-7/16
13.20	.5197	134	5-9/32	205	8-1/16						
13.50	.5315	140	5-1/2	214	8-7/16						
13.80	.5433	140	5-1/2	214	8-7/16						
14.00	.5512	140	5-1/2	214	8-7/16						
14.25	.5610	144	5-11/16	220	8-21/32						
14.50	.5709	144	5-11/16	220	8-21/32						
14.75	.5807	144	5-11/16	220	8-21/32						
15.00	.6004	144	5-11/16	220	8-21/32						
15.50	.6102	149	5-7/8	227	8-15/16						
15.75	.6201	149	5-7/8	227	8-15/16						
16.00	.6299	149	5-7/8	227	8-15/16						
16.25	.6398	154	6-1/16	235	9-1/4						
16.50	.6496	154	6-1/16	235	9-1/4						
16.75	.6594	154	6-1/16	235	9-1/4						
17.00	.6693	154	6-1/16	235	9-1/4						
17.25	.6791	158	6-7/32	241	9-1/2						
17.50	.6890	158	6-7/32	241	9-1/2						
18.00	.7087	158	6-7/32	241	9-1/2						
18.50	.7283	162	6-3/8	247	9-23/32						
19.00	.7480	162	6-3/8	247	9-23/32						
19.50	.7677	166	6-17/32	254	10						
20.00	.7874	166	6-17/32	254	10						
20.50	.8071	171	6-23/32	261	10-9/32						
21.00	.8268	171	6-23/32	261	10-9/32						
21.50	.8465	176	6-15/16	268	10-9/16						
22.00	.8661	176	6-15/16	268	10-9/16						
22.50	.8858	180	7-3/32	275	10-13/16						
23.00	.9055	180	7-3/32	275	10-13/16						
23.50	.9252	180	7-3/32	275	10-13/16						
24.00	.9449	185	7-9/32	282	11-3/32						
24.50	.9646	185	7-9/32	282	11-3/32						
25.00	.9843	185	7-9/32	282	11-3/32						
25.50	1.0039	190	7-1/2	290	11-13/32						
26.00	1.0236	190	7-1/2	290	11-13/32						
26.50	1.0433	190	7-1/2	290	11-13/32						
27.00	1.0630	195	7-5/8	298	11-23/32						
27.50	1.0827	195	7-5/8	298	11-23/32						
28.00	1.1024	195	7-5/8	298	11-23/32						

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

Parabolic Flute Taper Length Drills - Metric

List 124

**PARABOLIC FLUTE TAPER LENGTH DRILLS
H.S.S. (HIGH SPEED STEEL)**

FOR PRICES SEE OUR PRICE LIST CATALOG

<u>Diameter</u>		<u>Flute Length</u>		<u>Overall Length</u>	
mm	Decimal	mm	Fraction	mm	Fraction
1.50	.0591	45	1-25/32	70	2-3/4
2.00	.0787	56	2-7/32	85	3-11/32
2.50	.0984	62	2-7/16	95	3-3/4
3.00	.1181	66	2-19/32	100	3-15/16
3.50	.1379	73	2-7/8	112	4-13/32
4.00	.1575	78	3-1/16	119	4-11/16
4.50	.1772	82	3-7/32	126	4-31/32
5.00	.1969	87	3-7/16	132	5-3/16
5.20	.2047	87	3-7/16	132	5-3/16
5.50	.2165	91	3-19/32	139	5-15/32
5.60	.2205	91	3-19/32	139	5-15/32
6.00	.2362	91	3-19/32	139	5-15/32
6.50	.2559	97	3-13/16	148	5-13/16
6.80	.2677	102	4-1/32	156	6-1/8
7.00	.2756	102	4-1/32	156	6-1/8
7.50	.2953	102	4-1/32	156	6-1/8
8.00	.3150	109	4-9/32	165	6-1/2
8.20	.3228	109	4-9/32	165	6-1/2
8.50	.3346	109	4-9/32	165	6-1/2
8.60	.3386	115	4-17/32	175	6-7/8
9.00	.3543	115	4-17/32	175	6-7/8
9.50	.3740	115	4-17/32	175	6-7/8
10.00	.3937	121	4-3/4	184	7-1/4
10.50	.4134	121	4-3/4	184	7-1/4
11.00	.4331	128	5-1/32	195	7-11/16
11.50	.4528	128	5-1/32	195	7-11/16
12.00	.4724	134	5-9/32	205	8-1/16
12.50	.4921	134	5-9/32	205	8-1/16
13.00	.5118	134	5-9/32	205	8-1/16
13.50	.5315	140	5-1/2	214	8-7/16
14.00	.5512	140	5-1/2	214	8-7/16
14.50	.5709	144	5-11/16	220	8-21/32
15.00	.5906	144	5-11/16	220	8-21/32
15.50	.6102	149	5-7/8	227	8-15/16
16.00	.6299	149	5-7/8	227	8-15/16
16.50	.6496	154	6-1/16	235	9-1/4
17.00	.6693	154	6-1/16	235	9-1/4
17.50	.6890	158	6-7/32	241	9-1/2

For "SPEEDY SPECIALS" Call 800-521-1780

HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

Taper Shank Drills - Metric

List 201

**TAPER SHANK DRILLS
H.S.S. (HIGH SPEED STEEL)**

FOR PRICES SEE OUR PRICE LIST CATALOG

Diameter		Flute Length		Overall Length		Diameter		Flute Length		Overall Length	
mm	Decimal	mm	Fraction	mm	Fraction	mm	Decimal	mm	Fraction	mm	Fraction
3.00	.1181	33	1-5/16	114	4-1/2	14.00	.5512	108	4-1/4	189	7-7/16
3.20	.1260	36	1-7/16	117	4-19/32	14.25	.5610	114	4-1/2	212	8-3/8
3.50	.1378	39	1-17/32	120	4-3/4	14.50	.5709	114	4-1/2	212	8-3/8
3.80	.1496	43	1-11/16	124	4-7/8	14.75	.5807	114	4-1/2	212	8-3/8
4.00	.1575	43	1-11/16	124	4-7/8	15.00	.5906	114	4-1/2	212	8-3/8
4.20	.1654	43	1-11/16	124	4-7/8	15.25	.6004	120	4-3/4	218	8-19/32
4.50	.1772	47	1-27/32	128	5-1/32	15.50	.6102	120	4-3/4	218	8-19/32
4.80	.1890	52	2-1/16	133	5-1/4	15.75	.6201	120	4-3/4	218	8-19/32
5.00	.1969	52	2-1/16	133	5-1/4	16.00	.6299	120	4-3/4	218	8-19/32
5.20	.2047	52	2-1/16	133	5-1/4	16.25	.6398	125	4-29/32	223	8-25/32
5.50	.2165	57	2-1/4	138	5-7/16	16.50	.6496	125	4-29/32	223	8-25/32
5.80	.2283	57	2-1/4	138	5-7/16	16.75	.6594	125	4-29/32	223	8-25/32
6.00	.2362	57	2-1/4	138	5-7/16	17.00	.6693	125	4-29/32	223	8-25/32
6.20	.2441	63	2-15/32	144	5-11/16	17.25	.6791	130	5-3/32	228	9
6.50	.2559	63	2-15/32	144	5-11/16	17.50	.6890	130	5-3/32	228	9
6.80	.2677	69	2-23/32	150	5-29/32	18.00	.7087	130	5-3/32	228	9
7.00	.2756	69	2-23/32	150	5-29/32	18.50	.7283	135	5-5/16	233	9-5/32
7.20	.2835	69	2-23/32	150	5-29/32	19.00	.7480	135	5-5/16	233	9-5/32
7.50	.2953	69	2-23/32	150	5-29/32	19.50	.7677	140	5-1/2	238	9-11/32
7.80	.3071	75	2-15/16	156	6-1/8	20.00	.7874	140	5-1/2	238	9-11/32
8.00	.3150	75	2-15/16	156	6-1/8	20.50	.8071	145	5-23/32	243	9-9/16
8.20	.3228	75	2-15/16	156	6-1/8	21.00	.8268	145	5-23/32	243	9-9/16
8.50	.3346	75	2-15/16	156	6-1/8	21.50	.8465	150	5-29/32	248	9-3/4
8.80	.3465	81	3-3/16	162	6-3/8	22.00	.8661	150	5-29/32	248	9-3/4
9.00	.3543	81	3-3/16	162	6-3/8	22.50	.8858	155	6-3/32	253	10
9.20	.3622	81	3-3/16	162	6-3/8	23.00	.9055	155	6-3/32	253	10
9.50	.3740	81	3-3/16	162	6-3/8	23.50	.9252	155	6-3/32	276	10-7/8
9.80	.3858	87	3-7/16	168	6-5/8	24.00	.9449	160	6-5/16	281	11-1/16
10.00	.3937	87	3-7/16	168	6-5/8	24.50	.9646	160	6-5/16	281	11-1/16
10.20	.4016	87	3-7/16	168	6-5/8	25.00	.9843	160	6-5/16	281	11-1/16
10.50	.4134	87	3-7/16	168	6-5/8	25.50	1.0039	165	6-1/2	286	11-1/4
10.80	.4252	94	3-11/16	175	6-7/8	26.00	1.0236	165	6-1/2	286	11-1/4
11.00	.4331	94	3-11/16	175	6-7/8	26.50	1.0433	165	6-1/2	286	11-1/4
11.20	.4409	94	3-11/16	175	6-7/8	27.00	1.0630	170	6-11/16	291	11-7/16
11.50	.4528	94	3-11/16	175	6-7/8	27.50	1.0827	170	6-11/16	291	11-7/16
11.80	.4646	94	3-11/16	175	6-7/8	28.00	1.1024	170	6-11/16	291	11-7/16
12.00	.4724	101	3-31/32	182	7-5/32	28.50	1.1220	175	6-7/8	296	11-5/8
12.20	.4803	101	3-31/32	182	7-5/32	29.00	1.1417	175	6-7/8	296	11-5/8
12.50	.4921	101	3-31/32	182	7-5/32	29.50	1.1614	175	6-7/8	296	11-5/8
12.80	.5039	101	3-31/32	182	7-5/32	30.00	1.1811	175	6-7/8	296	11-5/8
13.00	.5118	101	3-31/32	182	7-5/32	30.50	1.2008	180	7-3/32	301	11-27/32
13.20	.5197	101	3-31/32	182	7-5/32	31.00	1.2205	180	7-3/32	301	11-27/32
13.50	.5315	108	4-1/4	189	7-7/16	31.50	1.2402	180	7-3/32	301	11-27/32
13.80	.5433	108	4-1/4	189	7-7/16	32.00	1.2598	185	7-9/32	334	13-1/8

For "SPEEDY SPECIALS" Call 800-521-1780

HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

Taper Shank Drills - Metric

List 201

**TAPER SHANK DRILLS
H.S.S. (HIGH SPEED STEEL)**

FOR PRICES SEE OUR PRICE LIST CATALOG

Diameter		Flute Length		Overall Length	
mm	Decimal	mm	Fraction	mm	Fraction
32.50	1.2795	185	7-9/32	334	13-1/8
33.00	1.2992	185	7-9/32	334	13-1/8
33.50	1.3189	185	7-9/32	334	13-1/8
34.00	1.3386	190	7-15/32	339	13-3/8
34.50	1.3583	190	7-15/32	339	13-3/8
35.00	1.3780	190	7-15/32	339	13-3/8
35.50	1.3976	190	7-15/32	339	13-3/8
36.00	1.4173	195	7-11/16	344	13-9/16
36.50	1.4370	195	7-11/16	344	13-9/16
37.00	1.4567	195	7-11/16	344	13-9/16
37.50	1.4764	195	7-11/16	344	13-9/16
38.00	1.4961	200	7-7/8	349	13-3/4
39.00	1.5354	200	7-7/8	349	13-3/4
40.00	1.5748	200	7-7/8	349	13-3/4
41.00	1.6142	205	8-1/16	354	13-15/16
42.00	1.6535	205	8-1/16	354	13-15/16
43.00	1.6929	210	8-1/4	359	14-1/8
44.00	1.7323	210	8-1/4	359	14-1/8
45.00	1.7717	210	8-1/4	359	14-1/8
46.00	1.8110	215	8-15/32	364	14-3/8
47.00	1.8504	215	8-15/32	364	14-3/8
48.00	1.8898	220	8-21/32	369	14-17/32
49.00	1.9291	220	8-21/32	369	14-17/32
50.00	1.9685	220	8-21/32	369	14-17/32
51.00	2.0079	225	8-27/32	412	16-1/4

STANDARD SHANKS

3.00 - 14.00mm #1MTS

14.25 - 23.00mm #2MTS

23.50 - 31.50mm #3MTS

32.00 - 50.00mm #4MTS

51.00mm #5MTS

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

List 122

HSS

Heavy Duty Taper Length Drills

For Heavy Duty Jobber Drill See our List #103
Straight Shank Tang Drive Taper Length Drills
with 118° Thinned Web Points

These drills differ from List 121 drills in several important respects:

1. The flutes are 20% longer.
2. The webs are 50% heavier.
3. The shanks are tanged to fit drill drivers, or sleeves.
4. When assembled into a drill driver the overall length is greater than the corresponding size taper shank drill.

Diam. Inches	Decimal Equiv.	Overall Length Inches	Flute Length Inches	Shank Diam. Inches	Recommended Minimum Sleeve Size No.
1/8	.1250	5-1/8	3-3/8	Shank Diameter Same as Nominal Diameter of Drill	1
9/64	.1406	5-3/8	3-5/8		1
5/32	.1563	5-3/8	3-3/4		1
11/64	.1719	5-3/4	4-1/8		1
3/16	.1875	5-3/4	4-1/8		1
13/64	.2031	6	4-3/8		1
7/32	.2188	6	4-3/8		1
15/64	.2344	6-1/8	4-13/16		1
1/4	.2500	6-1/8	4-13/16		1
17/64	.2656	6-1/4	5		1
9/32	.2813	6-1/4	5		1
19/64	.2969	6-3/8	5-1/8		1
5/16	.3125	6-3/8	5-1/8		1
21/64	.3281	6-1/2	5-1/4		2
11/32	.3438	6-1/2	5-1/4		2
23/64	.3594	6-3/4	5-3/8		2
3/8	.3750	6-3/4	5-3/8		2
25/64	.3906	7	5-5/8		2
13/32	.4063	7	5-5/8		2
27/64	.4219	7-1/4	5-11/16		2
7/16	.4375	7-1/4	5-11/16	2	
29/64	.4531	7-1/2	5-3/4	2	
15/32	.4688	7-1/2	5-3/4	2	
31/64	.4844	7-3/4	5-3/4	2	
1/2	.5000	7-3/4	5-3/4	2	
33/64	.5156	8	6	2	
17/32	.5313	8	6	1/2	
35/64	.5469	8-1/4	6-1/4	1/2	
9/16	.5625	8-1/4	6-1/4	1/2	
37/64	.5781	8-3/4	6-1/2	1/2	
19/32	.5938	8-3/4	6-1/2	1/2	
39/64	.6094	8-3/4	6-1/2	1/2	
5/8	.6250	8-3/4	6-1/2	1/2	
41/64	.6406	9	6-3/4	5/8	
21/32	.6563	9	6-3/4	5/8	
11/16	.6875	9-1/4	6-7/8	5/8	
23/32	.7188	9-1/2	7-1/8	5/8	
3/4	.7500	9-3/4	7-3/8	3/4	

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

List 196
HSS
High Helix Taper Length Drills
Straight Shank Taper Length Drills
with 118° Thinned Web Points

Diam. Inches	Decimal Equiv.	Overall Length Inches	Flute Length Inches	Diam. Inches	Decimal Equiv.	Overall Length Inches	Flute Length Inches
3/64	.0469	2-1/4	1-1/8	5/8	.6250	8-3/4	6-1/2
1/16	.0625	3	1-3/4	41/64	.6406	9	6-3/4
5/64	.0781	3-3/4	2	21/32	.6563	9	6-3/4
7/64	.1094	4-5/5	2-1/2	11/16	.6875	9-1/4	6-7/8
1/8	.1250	5-1/8	2-3/4	23/32	.7188	9-1/2	6-3/4
9/64	.1406	5-3/8	3	3/4	.7500	9-3/4	7
5/32	.1563	5-3/8	3	49/64	.7656	9-7/8	7-1/8
11/64	.1719	5-3/4	3-3/8	25/32	.7812	9-7/8	7-1/8
3/16	.1875	5-3/4	3-3/8	51/64	.7969	10	7-1/4
13/64	.2031	6	3-5/8	13/16	.8125	10	7-1/4
7/32	.2188	6	3-5/8	53/64	.8281	10	7-1/4
15/64	.2344	6-1/8	3-3/4	27/32	.8483	10	7-1/4
1/4	.2500	6-1/8	3-3/4	55/64	.8594	10	7-1/4
17/64	.2656	6-1/4	3-7/8	7/8	.875	10	7-1/4
9/32	.2813	6-1/4	3-7/8	57/64	.8906	10	7-1/4
19/64	.2969	6-3/8	4	29/32	.9062	10	7-1/4
5/16	.3125	6-3/8	4	59/64	.9219	10-3/4	7-1/2
21/64	.3282	6-1/2	4-1/8	15/16	.9375	10-3/4	7-1/2
11/32	.3438	6-1/2	4-1/8	61/64	.9531	11	7-3/4
23/64	.3594	6-3/4	4-1/4	31/32	.9688	11	7-3/4
3/8	.3750	6-3/4	4-1/4	1	1.0000	11	7-3/4
25/64	.3906	7	4-3/8				
13/32	.4063	7	4-3/8				
27/64	.4219	7-1/4	4-5/8				
7/16	.4375	7-1/4	4-5/8				
29/64	.4531	7-1/2	4-3/4				
15/32	.4688	7-1/2	4-3/4				
31/64	.4844	7-3/4	4-3/4				
1/2	.5000	7-3/4	4-3/4				
33/64	.5156	8	6				
17/32	.5313	8	6				
35/64	.5469	8-1/4	6-1/4				
9/16	.5625	8-1/4	6-1/4				
37/64	.5781	8-3/4	6-1/2				
19/32	.5938	8-3/4	6-1/2				
39/64	.6094	8-3/4	6-1/2				

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

LIST 201-DIMENSIONS

Taper Shank Drills

The equivalent of List 121 in design and application except the larger diameter drills require taper shanks to drive them properly.

Shanks are standard in the Morse series.

B & S Taper Shanks are special.

Stub tapers are special.

Drills not priced can be quoted promptly on receipt of quantity required.

**TAPER SHANK DRILLS
H.S.S. (HIGHSPEEDSTEEL)**

LIST 201

FOR PRICES SEE OUR PRICE LIST CATALOG

See our List 750 p. 84-85 for drills longer than regular.

#1 Morse Taper Shank Drills

Decimal Equivalent	Inch	Size Letter/ Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/ Number	MM	Length O.A.	Flute Length
.1181			3.00	4-1/2	1-5/16	.1960		9		6	2-3/4
.1200		31		5-1/8	1-7/8	.1969			5.00	5-1/4	2-1/16
.1250	1/8			5-1/8	1-7/8	.1990		8		6	2-3/4
.1260			3.20	4-19/32	1-7/16	.2010		7		6	2-3/4
.1285		30		5-3/8	2-1/8	.2031	13/64			6	2-3/4
.1360		29		5-3/8	2-1/8	.2040		6		6	2-3/4
.1378			3.50	4-3/4	1-17/32	.2047			5.20	5-1/4	2-1/16
.1405		28		5-3/8	2-1/8	.2055		5		6	2-3/4
.1406	9/64			5-3/8	2-1/8	.2090		4		6	2-3/4
.1440		27		5-3/8	2-1/8	.2130		3		6	2-3/4
.1470		26		5-3/8	2-1/8	.2165			5.50	5-7/16	2-1/4
.1495		25		5-3/8	2-1/8	.2188	7/32			6	2-3/4
.1496			3.80	4-7/8	1-11/16	.2210		2		6	2-3/4
.1520		24		5-3/8	2-1/8	.2280		1		6	2-3/4
.1540		23		5-3/8	2-1/8	.2284			5.80	5-7/16	2-1/4
.1563	5/32			5-3/8	2-1/8	.2340		A		6-1/8	2-7/8
.1570		22		5-3/4	2-1/2	.2344	15/64			6-1/8	2-7/8
.1575			4.00	4-7/8	1-11/16	.2362			6.00	5-7/16	2-1/4
.1590		21		5-3/4	2-1/2	.2380		B		6-1/8	2-7/8
.1610		20		5-3/4	2-1/2	.2420		C		6-1/8	2-7/8
.1654			4.20	4-7/8	1-11/16	.2421			6.20	5-11/16	2-15/32
.1660		19		5-3/4	2-1/2	.2460		D		6-1/8	2-7/8
.1695		18		5-3/4	2-1/2	.2500	1/4	E		6-1/8	2-7/8
.1719	11/64			5-3/4	2-1/2	.2559			6.50	5-11/16	2-15/32
.1730		17		5-3/4	2-1/2	.2570		F		6-1/4	3
.1770		16		5-3/4	2-1/2	.2610		G		6-1/4	3
.1772			4.50	5-1/32	1-27/32	.2656	17/64			6-1/4	3
.1800		15		5-3/4	2-1/2	.2660		H		6-1/4	3
.1820		14		5-3/4	2-1/2	.2677			6.80	5-29/32	2-23/32
.1850		13		5-3/4	2-1/2	.2720		I		6-1/4	3
.1875	3/16			5-3/4	2-1/2	.2756			7.00	5-29/32	2-23/32
.1890			4.80	5-1/4	2-1/16	.2770		J		6-1/4	3
.1890		12		6	2-3/4	.2810		K		6-1/4	3
.1910		11		6	2-3/4	.2813	9/32			6-1/4	3
.1935		10		6	2-3/4	.2835			7.20	5-29/32	2-23/32

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

(continued)

TAPER SHANK DRILL H.S.S. (HIGHSPEED STEEL)

See our List 750 p. 84-85 for drills longer than regular.

FOR PRICES SEE OUR PRICE LIST CATALOG

Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.2900		L		6-3/8	3-1/8	.3970		X		7	3-5/8
.2950		M		6-3/8	3-1/8	.4016			10.20	6-5/8	3-7/16
.2953			7.50	5-29/32	2-23/32	.4040		Y		7	3-5/8
.2969	19/64			6-3/8	3-1/8	.4063	13/32			7	3-5/8
.3020		N		6-3/8	3-1/8	.4130		Z		7-1/4	3-7/8
.3071			7.80	6-1/8	2-15/16	.4134			10.50	6-5/8	3-7/16
.3125	5/16			6-3/8	3-1/8	.4219	27/64			7-1/4	3-7/8
.3150			8.00	6-1/8	2-15/16	.4252			10.80	6-7/8	3-11/16
.3160		O		6-1/2	3-1/4	.4331			11.00	6-7/8	3-11/16
.3228			8.20	6-1/8	2-15/16	.4375	7/16			7-1/4	3-7/8
.3230		P		6-1/2	3-1/4	.4409			11.20	6-7/8	3-11/16
.3281	21/64			6-1/2	3-1/4	.4528			11.50	6-7/8	3-11/16
.3320		Q		6-1/2	3-1/4	.4531	29/64			7-1/2	4-1/8
.3347			8.50	6-1/8	2-15/16	.4646			11.80	6-7/8	3-11/16
.3390		R		6-1/2	3-1/4	.4688	15/32			7-1/2	4-1/8
.3438	11/32			6-1/2	3-1/4	.4724			12.00	7-5/32	3-31/32
.3465			8.80	6-3/8	3-3/16	.4803			12.20	7-5/32	3-31/32
.3480		S		6-3/4	3-1/2	.4921			12.50	7-5/32	3-31/32
.3543			9.00	6-3/8	3-3/16	.5039			12.80	7-5/32	3-31/32
.3580		T		6-3/4	3-1/2	.5118			13.00	7-5/32	3-31/32
.3594	23/64			6-3/4	3-1/2	.5197			13.20	7-5/32	3-31/32
.3622			9.20	6-3/8	3-3/16	.5315			13.50	7-7/16	4-1/4
.3680		U		6-3/4	3-1/2	.5433			13.80	7-7/16	4-1/4
.3740			9.50	6-3/8	3-3/16	.5512			14.00	7-7/16	4-1/4
.3750	3/8			6-3/4	3-1/2						
.3770		V		6-3/4	3-1/2						
.3858			9.80	6-5/8	3-7/16						
.3860		W		7	3-5/8						
.3906	25/64			7	3-5/8						
.3937			10.00	6-5/8	3-7/16						

#2 Morse Taper Shank Drills

Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent	Inch	Size Letter/Number	MM	Length O.A.	Flute Length
.4844	31/64			8-1/4	4-3/8	.6406	41/64			9	5-1/8
.5000	1/2			8-1/4	4-3/8	.6496			16.50	8-25/32	4-29/32
.5156	33/64			8-1/2	4-5/8	.6563	21/32			9	5-1/8
.5313	17/32			8-1/2	4-5/8	.6595			16.75	8-25/32	4-29/32
.5469	35/64			8-3/4	4-7/8	.6693			17.00	8-25/32	4-29/32
.5610			14.25	8-3/8	4-1/2	.6719	43/64			9-1/4	5-3/8
.5625	9/16			8-3/4	4-7/8	.6791			17.25	9	5-3/32
.5709			14.50	8-3/8	4-1/2	.6875	11/16			9-1/4	5-3/8
.5781	37/64			8-3/4	4-7/8	.6890			17.50	9	5-3/32
.5807			14.75	8-3/8	4-1/2	.7031	45/64			9-1/2	5-5/8
.5906			15.00	8-3/8	4-1/2	.7082			18.00	9	5-3/32
.5938	19/32			8-3/4	4-7/8	.7188	23/32			9-1/2	5-5/8
.6004			15.25	8-19/32	4-3/4	.7284			18.50	9-5/32	5-5/16
.6094	39/64			8-3/4	4-7/8	.7344	47/64			9-3/4	5-7/8
.6102			15.50	8-19/32	4-3/4	.7480			19.00	9-5/32	5-5/16
.6200			15.75	8-19/32	4-3/4	.7500	3/4			9-3/4	5-7/8
.6250	5/8			8-3/4	4-7/8	.7656	49/64			9-7/8	6
.6299			16.00	8-19/32	4-3/4	.7677			19.50	9-11/32	5-1/2
.6398			16.25	8-25/32	4-29/32	.7813	25/32			9-7/8	6

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

(continued)

TAPER SHANK DRILLS H.S.S. (HIGH SPEED STEEL)

**See our List 750 p. 84-85 for drills longer than regular. FOR PRICES SEE OUR
#5 Morse Taper Shank Drills PRICE LIST CATALOG**

Decimal Equivalent		Size Letter/Number	MM	Length O.A.	Flute Length	Decimal Equivalent		Size Letter/Number	MM	Length O.A.	Flute Length
1.5312	1-17/32			16-3/8	9-3/8	2.5000	2-1/2			18-3/4	11-1/4
1.5625	1-9/16			16-5/8	9-5/8	2.5197			*64.00	17	9-5/8
1.5938	1-19/32			16-7/8	9-7/8	2.5591			*65.00	17	9-5/8
1.6250	1-5/8			17	10	2.5625	2-9/16			19-1/2	11-7/8
1.6562	1-21/32			17-1/8	10-1/8	2.5984			*66.00	17	9-5/8
1.6875	1-11/16			17-1/8	10-1/8	2.6250	2-5/8			19-1/2	11-7/8
1.7188	1-23/32			17-1/8	10-1/8	2.6378			*67.00	17	9-5/8
1.7500	1-3/4			17-1/8	10-1/8	2.6772			*68.00	17-1/4	9-7/8
1.7812	1-25/32			17-1/8	10-1/8	2.6875	2-11/16			20-3/8	12-3/4
1.8125	1-13/16			17-1/8	10-1/8	2.7165			*69.00	17-1/4	9-7/8
1.8438	1-27/32			17-1/8	10-1/8	2.7500	2-3/4			20-3/8	12-3/4
1.8750	1-7/8			17-3/8	10-3/8	2.7559			*70.00	17-1/4	9-7/8
1.9062	1-29/32			17-3/8	10-3/8	2.7953			*71.00	17-1/4	9-7/8
1.9375	1-15/16			17-3/8	10-3/8	2.8125	2-13/16			21-1/8	13-3/8
1.9688	1-31/32			17-3/8	10-3/8	2.8346			*72.00	17-3/8	10
2.0000	2			17-3/8	10-3/8	2.8740			*73.00	17-3/8	10
2.0079			*51.00	16-1/4	8-27/32	2.8750	2-7/8			21-1/8	13-3/8
2.0312	2-1/32			17-3/8	10-3/8	2.9134			*74.00	17-3/8	10
2.0472			*52.00	16-1/4	8-7/8	2.9375	2-15/16			21-3/4	14
2.0625	2-1/16			17-3/8	10-1/4	2.9528			*75.00	17-3/8	10
2.0866			*53.00	16-1/4	8-7/8	2.9921			*76.00	17-5/8	10-1/4
2.0938	2-3/32			17-3/8	10-1/4	3.0000	3			21-3/4	14
2.1250	2-1/8			17-3/8	10-1/4						
2.1260			*54.00	16-3/8	9						
2.1562	2-5/32			17-3/8	10-1/4						
2.1654			*55.00	16-3/8	9						
2.1875	2-3/16			17-3/8	10-1/4						
2.2047			*56.00	16-3/8	9						
2.2188	2-7/32			17-3/8	10-1/8						
2.2441			*57.00	16-5/8	9-1/4						
2.2500	2-1/4			17-3/8	10-1/8						
2.2835			*58.00	16-5/8	9-1/4						
2.3125	2-5/16			17-3/8	10-1/8						
2.3228			*59.00	16-5/8	9-1/4						
2.3622			*60.00	16-5/8	9-1/4						
2.3750	2-3/8			17-3/8	10-1/8						
2.4016			*61.00	16-7/8	9-1/2						
2.4375	2-7/16			18-3/4	11-1/4						
2.4409			*62.00	16-7/8	9-1/2						
2.4803			*63.00	16-7/8	9-1/2						

*Sizes above 51.00mm are Price on Application. (POA)

#6 Morse Taper Shank Drills

3.1250	3-1/8			24-5/8	14-5/8
3.2500	3-1/4			25-1/2	15-1/2
3.3750	3-3/8			25-1/2	15-1/2
3.5000	3-1/2			25-1/2	16-1/4
3.6250	3-5/8			25-7/8	16-1/4
3.7500	3-3/4			29	16-1/2
3.8750	3-7/8			29	16-1/2
4.0000	4			29	16-1/2

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

TAPERSHANK DRILLS H.S.S. (HIGH SPEED STEEL)

LIST 201-A

**FOR PRICES SEE OUR
PRICE LIST CATALOG**

List 201-A Alternate Shanks

Diam.	Length O.A.	Flute	Shank No.	Diam.	Length O.A.	Flute	Shank No.
3/8	7-3/8	3-1/2	2	1-1/4	12-1/2	7-7/8	3
25/64	7-1/2	3-5/8	2	1-33/64	15	9-3/4	4
13/32	7-1/2	3-5/8	2	1-17/32	15	9-3/8	4
27/64	7-3/4	3-7/8	2	1-35/64	15-1/4	9-5/8	4
7/16	7-3/4	3-7/8	2	1-9/16	15-1/4	9-5/8	4
29/64	8	4-1/8	2	1-37/64	15-1/2	9-7/8	4
15/32	8	4-1/8	2	1-19/32	15-1/2	9-7/8	4
31/64	7-3/4	4-3/8	1	1-39/64	15-5/8	10	4
1/2	8	4-5/8	1	1-5/8	15-5/8	10	4
33/64	8	4-5/8	1	1-41/64	15-3/4	10-1/8	4
17/32	8	4-5/8	1	1-21/32	15-3/4	10-1/8	4
35/64	8-1/4	4-7/8	1	1-43/64	15-3/4	10-1/8	4
9/16	8-1/4	4-7/8	1	1-11/16	15-3/4	10-1/8	4
41/64	9-3/4	5-1/8	3	1-45/64	15-3/4	10-1/8	4
21/32	9-3/4	5-1/8	3	1-23/32	15-3/4	10-1/8	4
43/64	10	5-3/8	3	1-47/64	16-1/4	10-3/8	4
11/16	10	5-3/8	3	1-3/4	16-1/4	10-3/8	4
45/64	10-1/4	5-5/8	3	1-25/32	16-1/4	10-3/8	4
23/32	10-1/4	5-5/8	3	1-13/16	16-1/4	10-3/8	4
47/64	10-1/2	5-7/8	3	1-27/32	16-1/4	10-3/8	4
3/4	10-5/8	6	3	1-7/8	16-1/2	10-1/2	4
49/64	10-5/8	6	3	1-29/32	16-1/2	10-1/2	4
25/32	10-5/8	6	3	1-15/16	16-5/8	10-5/8	4
51/64	10	6-1/8	2	1-31/32	16-5/8	10-5/8	4
13/16	10	6-1/8	2	2	16-5/8	10-5/8	4
53/64	10	6-1/8	2	3-1/8	22	14-1/4	5
27/32	10	6-1/8	2	3-1/4	23	15-1/4	5
55/64	10	6-1/8	2	3-3/8	23	15-1/4	5
7/8	10	6-1/8	2	3-1/2	24	16-1/4	5
57/64	10	6-1/8	2	3-3/4	25-7/8	16-1/4	5
29/32	10	6-1/8	2	4	29	16-1/2	5
1	12	6-3/8	4				
1-1/32	12-1/8	6-1/2	4				
1-1/16	12-1/4	6-5/8	4				
1-5/64	11-1/2	6-7/8	3				
1-3/32	11-1/2	6-7/8	3				
1-7/64	11-3/4	7-1/8	3				
1-1/8	11-3/4	7-1/8	3				
1-9/64	11-7/8	7-1/4	3				
1-5/32	11-7/8	7-1/4	3				
1-11/64	12	7-3/8	3				
1-3/16	12	7-3/8	3				
1-13/64	12-1/8	7-1/2	3				
1-7/32	12-1/8	7-1/2	3				
1-15/64	12-1/8	7-1/2	3				

Cobalt taper shank drills do not always have the same shank size as high speed drills. If shank size is critical, please check below.

**1/4" thru 11/32" #1MTS
3/8" thru 5/8" #2MTS
21/32" thru 1" #3MTS**

**1-1/32" thru 1-1/4" #4MTS
1-5/16" thru 2" #5MTS**

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

DIMENSIONS

TAPERSHANK

Dimensions of Taper Shanks and Sockets

American National Standard Taper Number	Diam. at End of Socket	Whole Length	Depth	Length	Width	End of Socket to Tang Slot	Taper per Inch	Tang Thickness
	A	B	S	T	W	K		t
1	.47500	2-9/16	2-7/16	3/8	7/32	2-1/16	.049882	.20
2	.70000	3-1/8	2-15/16	7/16	17/64	2-1/2	.049951	.25
3	.93800	3-7/8	3-11/16	9/16	21/64	3-1/16	.050196	.31
4	1.23100	4-7/8	4-5/8	5/8	31/64	3-7/8	.051938	.47
5	1.74800	6-1/8	5-7/8	3/4	21/32	4-15/16	.052626	.62
6	2.49400	8-9/16	8-1/4	1-1/8	25/32	7	.052138	.75

APPROXIMATE LENGTH OF SHANK AND NECK

No. 1 MTS	3-1/2"	No. 4 MTS	6"
No. 2 MTS	4"	No. 5 MTS	8"
No. 3 MTS	5"	No. 6 MTS	10"

Subtract the above dimension from the Overall Length to get approximate Flute Length

Shanks Two Sizes or Three Sizes Smaller Than Regular quoted on Request.
Nitriding and Flute Polishing quoted on Request.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

Additional Styles of Taper Shank Drills Carried in Stock

Because of the heavy forces required to cut large diameter holes economically the conventional driving device is the taper shank. Taking advantage of this situation several other drill designs have developed as shown below.

HIGH HELIX TAPER SHANK DRILLS

LIST 197

High Helix drills are often used on materials that form chips which tend to weld together and resist being carried up the flutes. Wide polished flutes ease the problem. These drills are always furnished with bright finish. Classed and priced as specials by many drill companies.

CHIPBREAKER TAPER SHANK DRILLS

LIST 203

Materials that form long stringy chips can not always be avoided. A drill design that breaks up the chips to smaller more manageable forms often is the solution to tool clogging problems.

FATBOY DRILLS

LIST 204

These drills were originally all 12" OAL, 5" flute and #5 Morse Taper Shanks. Their popularity lead to making them with #4 Shanks as alternate on sizes below 2-1/2" with a corresponding shortening of the overall length. The flutes are still 5" long.

FOUR FLUTE CORE DRILLS TAPER SHANK

**LIST 444
444-A**

Usually thought of as heavy stock removal tools the taper shank is the ideal driving method. Alternate shanks are listed to facilitate suitable choice.

Continued

**COBALT
TAPER SHANK DRILLS**

LIST 541

Higher red hardness and greater abrasion resistance make this material the only possible solution to some drilling jobs. Compromising factors are a somewhat more brittle tool, higher costs, and vulnerability to political problems of cobalt producing offshore sources.

**TUNGSTEN CARBIDE TIPPED
TAPER SHANK DRILLS**

LIST 831

The correct design for cutting into abrasive materials such as cast iron, graphite and glass filled epoxies. The size range listed in our catalog is from 1/4" to 1-1/4" but larger and smaller sizes can be constructed. Intermediate sizes can be ground promptly on request.

**TUNGSTEN CARBIDE TIPPED
FOUR FLUTE CORE DRILLS
TAPER SHANK**

LIST 844

Tungsten carbide tipped core drills are not quite so vulnerable to chip wedging that causes catastrophic failures in two flute TCT drills. Small chips can usually exit through the hole being enlarged instead of working their way between the wall of the hole and the margin of the drill. With care it is possible to cut materials that form tough chips, such as forgings and exotic alloys. Lower costs result through longer tool life.

Note that Industry Standards for flute and overall lengths are shorter than American Standards for taper shank two flute drills.

**OIL HOLE DRILLS
TAPER SHANK**

LIST 4201

Taper Shank oil hole drills are listed here showing the most popular sizes. Intermediate sizes can be quoted promptly. See the discussion of oil drills List 4000 Page 97.

Extra long oil hole drills can accomplish jobs that are otherwise impossible. Many sizes and lengths can be furnished on inquiry. We will be pleased to quote price and delivery.

End Entry

Side Entry

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

Lists 141 & 241

Silver and Deming Drills, or S & D HSS and COBALT

A valuable tool for those users who have limited capacity to drive large diameter drills, such as the need to produce a 5/8" hole but with only a 1/2" electric drill available.

Larger sizes must be used with care to prevent overspeeding and subsequent premature failure. We suggest cobalt bearing HSS. This analysis of steel has a greater tolerance to the problems of overspeeding.

**1/2" SHANK DRILLS
(S & D) REGULAR H.S.S.**

LIST 141

**1/2" SHANK DRILLS
(S & D) COBALT H.S.S.**

LIST 241

**3/4" SHANK DRILLS
REGULAR H.S.S.**

LIST 141-3/4"

Size	Dec. Equiv.	Overall Length	Flute Length	Size	Dec. Equiv.	Overall Length	Flute Length	Size	Dec. Equiv.	Overall Length	Flute Length
33/64	.5156	6	3	29/32	.9062	6	3	1-19/64	1.2968	6	3
17/32	.5313	6	3	59/64	.9219	6	3	1-5/16	1.3125	6	3
35/64	.5469	6	3	15/16	.9375	6	3	1-21/64	1.3281	6	3
9/16	.5625	6	3	61/64	.9531	6	3	1-11/32	1.3437	6	3
37/64	.5781	6	3	31/32	.9687	6	3	1-23/64	1.3593	6	3
19/32	.5937	6	3	63/64	.9844	6	3	1-3/8	1.3750	6	3
39/64	.6094	6	3	1	1.0000	6	3	1-25/64	1.3906	6	3
5/8	.6250	6	3	1-1/64	1.0156	6	3	1-13/32	1.4062	6	3
41/64	.6406	6	3	1-1/32	1.0312	6	3	1-27/64	1.4218	6	3
21/32	.6562	6	3	1-3/64	1.0468	6	3	1-7/16	1.4375	6	3
43/64	.6719	6	3	1-1/16	1.0625	6	3	1-29/64	1.4531	6	3
11/16	.6875	6	3	1-5/64	1.0781	6	3	1-15/32	1.4687	6	3
45/64	.7031	6	3	1-3/32	1.0937	6	3	1-31/64	1.4843	6	3
23/32	.7187	6	3	1-7/64	1.1093	6	3	1-1/2	1.5000	6	3
47/64	.7344	6	3	1-1/8	1.1250	6	3	1-9/16	1.5625	6	3
3/4	.7500	6	3	1-9/64	1.1406	6	3	1-5/8	1.6250	6	3
49/64	.7656	6	3	1-5/32	1.1562	6	3	1-11/16	1.6875	6	3
25/32	.7812	6	3	1-11/64	1.1718	6	3	1-3/4	1.7500	6	3
51/64	.7969	6	3	1-3/16	1.1875	6	3	1-13/16	1.8125	6	3
13/16	.8125	6	3	1-13/64	1.2031	6	3	1-7/8	1.8750	6	3
53/64	.8281	6	3	1-7/32	1.2187	6	3	1-15/16	1.9375	6	3
27/32	.8437	6	3	1/15/64	1.2343	6	3	2	2.0000	6	3
55/64	.8594	6	3	1-1/4	1.2500	6	3	Diameters over 1-1/2" available in 3/4" shank only.			
7/8	.8750	6	3	1-17/64	1.2656	6	3				
57/64	.8906	6	3	1-9/32	1.2812	6	3				

Packed individually.

These can be furnished in Decimal, Metric and other intermediate sizes. Price and delivery on application.

*For quantities more than 12 inquire about our extra discount.

Drills with 1/4" shanks available. Sizes 17/64" to 1/2".

Feed rates of S & D drills must be kept to limits imposed by the strength of 1/2" shanks.

For "SPEEDY SPECIALS" Call 800-521-1780

HAYDEN TWIST DRILL AND TOOL CO.

LIST 181, 182

60°

COMBINED DRILLS AND COUNTERSINKS, H.S.S.

They produce bearing surfaces in parts that rotate on centers in subsequent operations, hence are often incorrectly called center drills. Do not confuse with Spotting and Centering drills, used to start holes on irregular surfaces, such as castings and forgings.

The Bell type produces a protected center.

Certain larger sizes available. Price and delivery quoted on application.

For Lists 581 and 582 in cobalt steel, see following pages.

PLAIN TYPE

LIST181

R.H and L.H.

Number	Body Diameter	Length Overall	Drill Diameter	Drill Length	
00000	1/8	1-1/4	.010	.010	
0000	1/8	1-1/4	.015	.015	
000	1/8	1-1/4	.020	.020	
00	1/8	1-1/4	.025	.025	
0	1/8	1-1/4	1/32	1/32	
1	1/8	1-1/4	3/64	3/64	
2	3/16	1-7/8	5/64	5/64	
3	1/4	2	7/64	7/64	
4	5/16	2-1/8	1/8	1/8	
4-1/2	3/8	2-1/2	9/64	9/64	
5	7/16	2-3/4	3/16	3/16	
6	1/2	3	7/32	7/32	
7	5/8	3-1/4	1/4	1/4	
8	3/4	3-1/2	5/16	5/16	
9	7/8	3-5/8	11/32	11/32	
10	1	3-3/4	3/8	3/8	

82° and 90°
Available in HSS.
Price on Application.

M-42 also Available:
See List 581 on the
following pages.

BELL TYPE

LIST182

R.H and L.H.

Number	Body Diameter	Length Overall	Drill Diameter	Drill Length	
11	1/8	1-1/4	3/64	3/64	
12	3/16	1-7/8	1/16	1/16	
13	1/4	2	3/32	3/32	
14	5/16	2-1/8	7/64	7/64	
15	7/16	2-3/4	5/32	5/32	
16	1/2	3	3/16	3/16	
17	5/8	3-1/4	7/32	7/32	
18	3/4	3-1/2	1/4	1/4	
19	7/8	3-5/8	5/16	5/16	
20	1	3-3/4	3/8	3/8	

Sets Available on Application.

M-42 also Available:
See List 582 on following
pages.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

LIST 581 - PLAIN TYPE LIST 582 - BELL TYPE Cobalt Combined Drills and Countersinks

Sizes #1-8 and #11-18 carried in stock but larger sizes available. M-42 commonly used analysis but T-15 can be quoted.

See Lists 181 and 182 for H.S.S. Tools.

Subject to political problems of off-shore cobalt producing sources.

PLAIN TYPE

LIST581

Number	Body Diameter	Length Overall	Drill Diameter	Drill Length
1	1/8	1-1/4	3/64	3/64
2	3/16	1-7/8	5/64	5/64
3	1/4	2	7/64	7/64
4	5/16	2-1/8	1/8	1/8
4-1/2	3/8	2-1/2	9/64	9/64
5	7/16	2-3/4	3/16	3/16
6	1/2	3	7/32	7/32
7	5/8	3-1/4	1/4	1/4
8	3/4	3-1/2	5/16	5/16

Steel: M-42
T-15-Price on Application.

Sizes 9 and 10: Price on Application.
Sets Available on Application.

BELL TYPE

LIST582

Number	Body Diameter	Length Overall	Drill Diameter	Drill Length
11	1/8	1-1/4	3/64	3/64
12	3/16	1-7/8	1/16	1/16
13	1/4	2	3/32	3/32
14	5/16	2-1/8	7/64	7/64
15	7/16	2-3/4	5/32	5/32
16	1/2	3	3/16	3/16
17	5/8	3-1/4	7/32	7/32
18	3/4	3-1/2	1/4	1/4

LIST 183

EXTRA LONG COMBINED DRILLS AND COUNTERSINKS

Listed by body diameter in inches.

Some customers call them by number sizes, which is incorrect, for a number size has a standard specific length.

Sometimes used by toolmakers as a substitute for a spotting and centering drill when reach is needed.

1" by 6" sometimes available.

EXTRA LONG TYPE

LIST 183

Body Diameter	Length Overall	Drill Diameter	For Reference Only Same Proportions Except For Length
1/8	3	3/64	
1/8	4	3/64	#1
1/8	5	3/64	
1/8	6	3/64	
3/16	4	5/64	
3/16	5	5/64	#2
3/16	6	5/64	
1/4	3	7/64	
1/4	4	7/64	
1/4	5	7/64	#3
1/4	6	7/64	
5/16	3	1/8	
5/16	4	1/8	
5/16	5	1/8	#4
5/16	6	1/8	
3/8	4	9/64	
3/8	5	9/64	#4-1/2
3/8	6	9/64	
7/16	4	3/16	
7/16	5	3/16	#5
7/16	6	3/16	
1/2	5	7/32	
1/2	6	7/32	#6
5/8	6	1/4	#7
3/4	6	5/16	#8

ANGLES OTHER THAN 60°
QUOTED ON APPLICATION.

Use Body Diameter for identification.

NOTE: Number sizes refer to items with dimensions shown on the two preceding pages.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

LIST 185, 186

SPOTTING AND CENTERING DRILLS

Short and stiff, they are used to start holes in precise locations, later to be followed by longer drills which tend to “walk” when starting. Now furnished in two standard styles, 90° and 118° points. Other angles can be quoted.

See List 194 for similar tools of intermediate diameters. Note their self-centering points.

Not cleared because O.D. is not supposed to enter the hole. The point angle should be smaller than the following drill’s angle for maximum accuracy. If the job needs an intermediate size, suggest List 111 which can be shortened to make a stiffer tool.

For longer tools see List 187.

SPOTTING AND CENTERING DRILLS

LIST 185

Size	Flute Length	Overall Length	
1/8	3/8	1-1/4	
3/16	1/2	1-3/8	
1/4	3/4	1-1/2	
5/16	3/4	1-1/2	
3/8	1	2	
7/16	1	2	
1/2	1	2	
5/8	1-1/8	2-1/4	
3/4	1-1/8	2-1/4	
7/8	1-1/4	2-1/2	
1	1-1/4	2-1/2	
1-1/4	2	4	
1-1/2	2-1/2	5	
1-3/4	2-3/4	5-1/2	

For Right Hand
Jobber Length Sizes
See List #187

SPOTTING AND CENTERING DRILLS

LEFT HAND

LIST 186

Size	Flute Length	Overall Length	
1/8	3/8	1-1/4	
3/16	1/2	1-3/8	
1/4	3/4	1-1/2	
5/16	3/4	1-1/2	
3/8	1	2	
7/16	1	2	
1/2	1	2	
5/8	1-1/8	2-1/4	
3/4	1-1/8	2-1/4	
7/8	1-1/4	2-1/2	
1	1-1/4	2-1/2	
1-1/4	2	4	
1-1/2	2-1/2	5	
1-3/4	2-3/4	5-1/2	

LIST 187

Jobber Length Spotting & Centering Drills

These drills were designed for N.C. applications and other jig bore-like jobs requiring the utmost accuracy in hole location. They feature:

- | | Benefit |
|---|---|
| 1. No back taper on O.D. | Eliminates possible shifting in chuck. |
| 2. Extra thin webs. | Short chisel edge minimizes point wander. |
| 3. Parallel webs. | Can be repointed without thinning web. |
| 4. 90° Point. | Proper angle to guide 118° & 135° pointed drills. |
| 5. Lip height variation is 1/2 that shown in American Standards | Not for drilling beyond depth of point.
More accurate cutting. |
| 6. Short flutes. | Maximum stiffness. |
| 7. Diameter tolerance
+.000"-.0005" | Perfect fit in collets. |

Diameter	Decimal Equivalent	Length Overall	Flute Length
1/4	.250	4	3/4
3/8	.375	5	1-1/4
1/2	.500	6	1-1/2
5/8	.625	7	1-1/2
3/4	.750	8	1-3/4
1	1.000	8	2-1/8

High Helix Section

This is a Specialty of the House.

In the few following pages are listed the broadest range of high helix drills ever shown in one catalog. Starting with the shortest:

Numeric Control Length	List 194	pages 21 & 60
Jobber Length	List 195	pages 14 & 61
Taper Length	List 196	pages 28, 41 & 61
Taper Shank	List 197	pages 48 & 61
8" Long	List 190-8	page 58
12" Long	List 190-12	page 59

8" LONG HIGHHELIXDRILLS

LIST190-8

Size	Dec. Equiv.	Flute Length	Overall Length	Size	Dec. Equiv.	Flute Length	Overall Length	Size	Dec. Equiv.	Flute Length	Overall Length
35	.1100	6	8	14	.1820	6	8	17/64	.2656	6	8
34	.1110	6	8	13	.1850	6	8	H	.2660	6	8
33	.1130	6	8	3/16	.1875	6	8	I	.2720	6	8
32	.1160	6	8	12	.1890	6	8	J	.2770	6	8
31	.1200	6	8	11	.1910	6	8	K	.2810	6	8
1/8	.1250	6	8	10	.1935	6	8	9/32	.2813	6	8
30	.1285	6	8	9	.1960	6	8	L	.2900	6	8
29	.1360	6	8	8	.1990	6	8	M	.2950	6	8
28	.1405	6	8	7	.2010	6	8	19/64	.2969	6	8
9/64	.1406	6	8	13/64	.2031	6	8	N	.3020	6	8
27	.1440	6	8	6	.2040	6	8	5/16	.3125	6	8
26	.1470	6	8	5	.2055	6	8	O	.3160	6	8
25	.1495	6	8	4	.2090	6	8	P	.3230	6	8
24	.1520	6	8	3	.2130	6	8	21/64	.3281	6	8
23	.1540	6	8	7/32	.2188	6	8	Q	.3320	6	8
5/32	.1563	6	8	2	.2210	6	8	R	.3390	6	8
22	.1570	6	8	1	.2280	6	8	11/32	.3438	6	8
21	.1590	6	8	A	.2340	6	8	S	.3480	6	8
20	.1610	6	8	15/64	.2344	6	8	T	.3580	6	8
19	.1660	6	8	B	.2380	6	8	23/64	.3594	6	8
18	.1695	6	8	C	.2420	6	8	U	.3680	6	8
11/64	.1719	6	8	D	.2460	6	8	3/8	.3750	6	8
17	.1730	6	8	1/4E	.2500	6	8				
16	.1770	6	8	F	.2570	6	8				
15	.1800	6	8	G	.2610	6	8				

**These can be furnished in Decimal,
Metric and other intermediate sizes.**

Price and Delivery on Application.

**See our List 708 Longboy Drills,
regular helix.**

LIST 190-12

High Helix Drills - 12" Long

These are for deep holes in aluminum. Improved conveyor action often is essential to prevent chips from welding together. Kerosene or mineral seal helpful as a cutting compound.

Always furnished in bright finish.

**12" LONG
HIGHHELIXDRILLS**

LIST190-12

Size	Dec. Equiv.	Flute Length	Overall Length	Size	Dec. Equiv.	Flute Length	Overall Length	Size	Dec. Equiv.	Flute Length	Overall Length
17	.1730	9	12	1/4E	.2500	9	12	V	.3770	9	12
16	.1770	9	12	F	.2570	9	12	W	.3860	9	12
15	.1800	9	12	G	.2610	9	12	25/64	.3906	9	12
14	.1820	9	12	17/64	.2656	9	12	X	.3970	9	12
13	.1850	9	12	H	.2660	9	12	Y	.4040	9	12
3/16	.1875	9	12	I	.2720	9	12	13/32	.4063	9	12
12	.1890	9	12	J	.2770	9	12	Z	.4130	9	12
11	.1910	9	12	K	.2810	9	12	27/64	.4219	9	12
10	.1935	9	12	9/32	.2813	9	12	7/16	.4375	9	12
9	.1960	9	12	L	.2900	9	12	29/64	.4531	9	12
8	.1990	9	12	M	.2950	9	12	15/32	.4688	9	12
7	.2010	9	12	19/64	.2969	9	12	31/64	.4844	9	12
13/64	.2031	9	12	N	.3020	9	12	1/2	.5000	9	12
6	.2040	9	12	5/16	.3125	9	12				
5	.2055	9	12	0	.3160	9	12				
4	.2090	9	12	P	.3230	9	12				
3	.2130	9	12	21/64	.3281	9	12				
7/32	.2188	9	12	Q	.3320	9	12				
2	.2210	9	12	R	.3390	9	12				
1	.2280	9	12	11/32	.3438	9	12				
A	.2340	9	12	S	.3480	9	12				
15/64	.2344	9	12	T	.3580	9	12				
B	.2380	9	12	23/64	.3594	9	12				
C	.2420	9	12	U	.3680	9	12				
D	.2460	9	12	3/8	.3750	9	12				

These can be furnished in Decimal, Metric and other intermediate sizes.

Price and Delivery on Application.

See our List 712 Longboy Drills.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

LIST 194

High Helix Numeric Control Length Drills

Used for accurate locating in aluminum primarily but are very useful for spotting and centering applications in other materials also. Note self centering points, 118°.

List shows a wider range of sizes than conventional center drill lists show.

Always furnished in bright finish.

HIGH HELIX NUMERIC CONTROL LENGTH DRILLS

LIST 194

Furnished with self centering points and polished flutes

Size	Dec. Equiv.	Flute Length	Overall Length	Size	Dec. Equiv.	Flute Length	Overall Length	Size	Dec. Equiv.	Flute Length	Overall Length
1/16	.0625	7/8	2-1/8	18	.1695	7/8	2-1/2	5/16	.3125	1-3/8	2-1/2
51	.0670	7/8	2-1/8	11/64	.1719	7/8	2-1/2	O	.3160	1-3/8	2-1/2
50	.0700	7/8	2-1/8	17	.1730	7/8	2-1/2	P	.3230	1-3/8	2-1/2
49	.0730	7/8	2-1/8	16	.1770	7/8	2-1/2	21/64	.3281	1-3/8	2-1/2
48	.0760	7/8	2-1/8	15	.1800	7/8	2-1/2	Q	.3320	1-3/8	2-1/2
5/64	.0781	7/8	2-1/8	14	.1820	7/8	2-1/2	R	.3390	1-3/8	2-1/2
47	.0785	7/8	2-1/8	13	.1850	7/8	2-1/2	11/32	.3438	1-3/8	2-1/2
46	.0810	7/8	2-1/8	3/16	.1875	7/8	2-1/2	S	.3480	1-3/8	2-1/2
45	.0820	7/8	2-1/8	12	.1890	7/8	2-1/2	T	.3580	1-3/8	2-1/2
44	.0860	7/8	2-1/8	11	.1910	7/8	2-1/2	23/64	.3594	1-3/8	2-1/2
43	.0890	7/8	2-1/2	10	.1935	7/8	2-1/2	U	.3680	1-3/8	2-1/2
42	.0935	7/8	2-1/2	9	.1960	7/8	2-1/2	3/8	.3750	1-3/8	2-1/2
3/32	.0938	7/8	2-1/2	8	.1990	7/8	2-1/2	V	.3770	1-3/8	2-1/2
41	.0960	7/8	2-1/2	7	.2010	7/8	2-1/2	W	.3860	1-3/8	2-1/2
40	.0980	7/8	2-1/2	13/64	.2031	7/8	2-1/2	25/64	.3906	1-3/8	2-1/2
39	.0995	7/8	2-1/2	6	.2040	7/8	2-1/2	X	.3970	1-3/8	2-1/2
38	.1015	7/8	2-1/2	5	.2055	7/8	2-1/2	Y	.4040	1-3/8	2-1/2
37	.1040	7/8	2-1/2	4	.2090	7/8	2-1/2	13/32	.4063	1-3/8	2-1/2
36	.1065	7/8	2-1/2	3	.2130	7/8	2-1/2	Z	.4130	1-3/8	2-1/2
7/64	.1094	7/8	2-1/2	7/32	.2188	7/8	2-1/2	27/64	.4219	1-3/8	2-1/2
35	.1100	7/8	2-1/2	2	.2210	1-3/8	2-1/2	7/16	.4375	1-3/8	2-1/2
34	.1110	7/8	2-1/2	1	.2280	1-3/8	2-1/2	29/64	.4531	1-3/8	2-1/2
33	.1130	7/8	2-1/2	A	.2340	1-3/8	2-1/2	15/32	.4688	1-3/8	2-1/2
32	.1160	7/8	2-1/2	15/64	.2344	1-3/8	2-1/2	31/64	.4844	1-3/8	2-1/2
31	.1200	7/8	2-1/2	B	.2380	1-3/8	2-1/2	1/2	.5000	1-3/8	2-1/2
1/8	.1250	7/8	2-1/2	C	.2420	1-3/8	2-1/2				
30	.1285	7/8	2-1/2	D	.2460	1-3/8	2-1/2				
29	.1360	7/8	2-1/2	1/4E	.2500	1-3/8	2-1/2				
28	.1405	7/8	2-1/2	F	.2570	1-3/8	2-1/2				
9/64	.1406	7/8	2-1/2	G	.2610	1-3/8	2-1/2				
27	.1440	7/8	2-1/2	17/64	.2656	1-3/8	2-1/2				
26	.1470	7/8	2-1/2	H	.2660	1-3/8	2-1/2				
25	.1495	7/8	2-1/2	I	.2720	1-3/8	2-1/2				
24	.1520	7/8	2-1/2	J	.2770	1-3/8	2-1/2				
23	.1540	7/8	2-1/2	K	.2810	1-3/8	2-1/2				
5/32	.1563	7/8	2-1/2	9/32	.2813	1-3/8	2-1/2				
22	.1570	7/8	2-1/2	L	.2900	1-3/8	2-1/2				
21	.1590	7/8	2-1/2	M	.2950	1-3/8	2-1/2				
20	.1610	7/8	2-1/2	19/64	.2969	1-3/8	2-1/2				
19	.1660	7/8	2-1/2	N	.3020	1-3/8	2-1/2				

These can be furnished in Decimal,
Metric and other intermediate sizes.

Price and delivery on Application.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

**HIGHHELIX
JOBBER LENGTH DRILLS**

LIST 195

Designed for aluminum but also used on other easily machined materials. Range of sizes, No. 80 to 1 1/16", larger than shown in any other catalog.

Always furnished in bright finish.

For dimensions see page 8, for prices see our price list catalog.

**HIGH HELIX
TAPER LENGTH DRILLS**

LIST 196

Used where List 195 drills are not long enough. Range, No. 60 to 1-1/4" is larger than shown in competitive catalogs.

Always furnished in bright finish.

For dimensions see page 24, for prices see our price list catalog.

**HIGH HELIX
TAPER SHANK DRILLS**

LIST 197

For dimensions see page 42, for prices see our price list catalog.

VIBRATIONS IN TWIST DRILLS

A twist drill is a long slender tool. No matter how firmly it may be held in the chuck the point can be deflected easily. Finger pressure alone will do it so much on some sizes that the deflection can be seen. Torsional deflections cannot be seen as readily as lateral deflections but they exist and have their effects, too.

When the chisel edge of a drill comes in contact with the work it may or may not cause the drill to “walk”, depending on the condition of the surface, the geometry of the point, stiffness of the drill and similar factors. If the point is deflected perpendicularly to the cutting edge and then springs back towards center but is repeatedly deflected again by the feed of the machine a vibration is set up that causes the axis at the point to describe a path much like one of the following:

Notice that these odd numbered polygons have one feature in common. They permit the two lips of a twist drill to generate a surface and rotate inside a form that is not a cylinder. For simplicity please regard a three sided figure:

The drill diameter will fit across any two opposite points on the perimeter of the figure. The mid-point of the diameter follows the three sided polygon. The end result is a hole that will not accept a cylinder of the same size as the drill. Operators say the drill cut an undersize hole. A better term is that it cut a threaded hole. The drill can be threaded down the hole it produced. Slitting the hole open to inspect its surface reveals the form: a rudimentary double thread with a pitch roughly equal to $1/2$ the lead on the drill.

WHY REAMERS WEAR OUT

In the metal cutting process a hard strong tool is pressed into the work with considerable force, enough force to stress the work-piece at the chip forming area up through the elastic limit, past the yield point, up to and beyond the ultimate strength of the work material. The ruptured chip is severed from the parent metal but it leaves behind it an area that also had been severely stressed but is still adhering to the original part. This severely stressed or work-hardened area may often have components as hard as the high speed steel tool used to form the chip.

The wall of a drilled hole is one example of such a work-hardened area. Drill diameters are usually chosen so that the sequential reamer cuts below the hardest part of the wall. Since drills cut oversize as a normal thing and the amount oversize is a probability rather than an exact amount it is easy to see that unless care is taken sometimes a reamer is called upon to cut something at its outside diameter as hard as it is itself with ruinous results. The following table will shed some light on this condition and suggest to the tool user size allowances that should be made. Also see "Probable Oversize Values For Drilled Holes," page 91.

Drill Diameter	1/16"	5/64	3/16	5/16	3/4	1
Probable Hole Oversize	.002"	.003	.004	.005	.006	.007

See "Drilled Holes for Tapping"
MCTI, published in 1954.

DOUBLE MARGIN DRILLS

LIST 1007

JOBBER LENGTH

Our jobber length double margin drills will cut a hole sufficiently accurate to eliminate the need for a ream operation in many instances. Thus there is no cause to worry about reamer life.

If a reamer operation is obligatory a double margin drill can be selected enough smaller in diameter so that a controlled amount is left for the reamer to cut, not the variable or probable amount left by a vibrating drill. Thus the margins of an expensive reamer are not called upon to cut work hardened material, only the chamfer. This can be sharpened easily, providing long life for the reamer, smooth holes in the product and lower cost of operation. For prices see our price list catalog.

Should it be desirable to drill and ream in one operation, see our List #1011, Drill & Ream, Jobber Length.

Sizes not listed can be quoted quickly on application.

Hayden List #1010 - Taper Length - page 69

Hayden List #1011 - Jobber Length - page 70

Hayden List #1012 - Screw Machine Length - page 71

LIST 1008 GROUND TO SPECIFICATIONS LIST 1009 CARRIED IN STOCK

The reamers we carry in stock are Right Hand Helix. There are two reasons:

1. Positive rakes make a better finish.
2. In grinding from the rough to any particular size the grinding wheel bridges two or more flutes, thus keeping the outside diameter truly cylindrical. When grinding straight flute reamers the wheel alternately grinds some very hard high speed steel and then some Michigan air. The reamer, the machine slides, the housings, the spindle bearings, all are elastic and yield. The result is a low front edge and a low trailing edge. Clearing takes away the back edge but the low front edge remains with its attendant ills: rough finish, low tool life, irregularly sized holes.

We will furnish any style requested. We recommend Right Hand Helix.

•Sizes 1/32 and smaller are 3 flute. •Sizes above 1/32 to 1/8 are 4 flute. •Sizes above 1/8 are American Standard B94.2-1977.

REAMERS GROUND TO SPECIFICATIONS

LIST 1008

AMERICAN NATIONAL STANDARD
REAMER TOLERANCES

See List 1009 for general dimensions.

ANSI B94.2-1977

ELEMENT	RANGE	DIRECTION	TOLERANCE
Diameter of Reamer	Up to 1/4 incl.	Plus	.0001" to .0004"
	Over 1/4 to 1 incl.	Plus	.0001" to .0005"
	Over 1	Plus	.0002" to .0006"

We can fabricate larger diameters and longer or shorter lengths. Prices quoted promptly on receipt of specification.

Standard stock sizes are shown in List 1009.

TCT reamers. List 1018, page 68.

Note: Drill tolerances for diameter are always minus, in contrast to reamer tolerances which are plus.

*Dowel Pin Sizes have limits + .0000" - .0002". All other reamers have plus tolerances to American Standards.
O/U= Over and Under

Sizes not shown here can be priced from list 1008.

Decimal +.0002 -.0000	Dec. Equiv.	Overall Length	Flute Length	Decimal +.0002 -.0000	Dec. Equiv.	Overall Length	Flute Length
.0135	80	2	3/8	.1160	32	3-1/2	7/8
.0145	79	2	3/8	.1200	31	3-1/2	7/8
.0156	1/64	2	3/8	.1230	DP*	3-1/2	7/8
.0160	78	2	3/8	.1240	O/U	3-1/2	7/8
.0180	77	2	3/8	.1247	DP*	3-1/2	7/8
.0200	76	2	3/8	.1250	1/8	3-1/2	7/8
.0210	75	2	3/8	.1260	O/U	3-1/2	7/8
.0225	74	2	3/8	.1285	30	4	1
.0240	73	2	3/8	.1360	29	4	1
.0250	72	2	3/8	.1405	28	4	1
.0260	71	2	3/8	.1406	9/64	4	1
.0280	70	2-1/2	1/2	.1440	27	4	1
.0292	69	2-1/2	1/2	.1470	26	4	1
.0310	68	2-1/2	1/2	.1495	25	4	1
.0313	1/32	2-1/2	1/2	.1520	24	4	1
.0320	67	2-1/2	1/2	.1540	23	4	1
.0330	66	2-1/2	1/2	.1563	5/32	4	1
.0350	65	2-1/2	1/2	.1570	22	4	1
.0360	64	2-1/2	1/2	.1590	21	4-1/2	1-1/8
.0370	63	2-1/2	1/2	.1610	20	4-1/2	1-1/8
.0380	62	2-1/2	1/2	.1660	19	4-1/2	1-1/8
.0390	61	2-1/2	1/2	.1695	18	4-1/2	1-1/8
.0400	60	3	3/4	.1730	17	4-1/2	1-1/8
.0410	59	3	3/4	.1770	16	4-1/2	1-1/8
.0420	58	3	3/4	.1800	15	4-1/2	1-1/8
.0430	57	3	3/4	.1820	14	4-1/2	1-1/8
.0465	56	3	3/4	.1850	13	4-1/2	1-1/8
.0469	3/64	3	3/4	.1855	DP	4-1/2	1-1/8
.0520	55	3	3/4	.1865	O/U	4-1/2	1-1/8
.0550	54	3	3/4	.1870	DP	4-1/2	1-1/8
.0595	53	3	3/4	.1875	3/16	4-1/2	1-1/8
.0625	1/16	3	3/4	.1885	O/U	4-1/2	1-1/8
.0635	52	3	3/4	.1890	12	4-1/2	1-1/8
.0670	51	3	3/4	.1910	11	5	1-1/4
.0700	50	3	3/4	.1935	10	5	1-1/4
.0730	49	3	3/4	.1960	9	5	1-1/4
.0760	48	3	3/4	.1990	8	5	1-1/4
.0781	5/64	3	3/4	.2010	7	5	1-1/4
.0785	47	3	3/4	.2031	13/64	5	1-1/4
.0810	46	3	3/4	.2040	6	5	1-1/4
.0820	45	3	3/4	.2055	5	5	1-1/4
.0860	44	3	3/4	.2090	4	5	1-1/4
.0890	43	3	3/4	.2130	3	5	1-1/4
.0935	42	3	3/4	.2188	7/32	5	1-1/4
.0938	3/32	3	3/4	.2210	2	6	1-1/2
.0960	41	3-1/2	7/8	.2280	1	6	1-1/2
.0980	40	3-1/2	7/8	.2340	A	6	1-1/2
.0995	39	3-1/2	7/8	.2344	15/64	6	1-1/2
.1015	38	3-1/2	7/8	.2380	B	6	1-1/2
.1040	37	3-1/2	7/8	.2420	C	6	1-1/2
.1065	36	3-1/2	7/8	.2460	D	6	1-1/2
.1094	7/64	3-1/2	7/8	.2480	DP*	6	1-1/2
.1100	35	3-1/2	7/8	.2490	O/U	6	1-1/2
.1110	34	3-1/2	7/8	.2495	DP*	6	1-1/2
.1130	33	3-1/2	7/8	.2500	1/4E	6	1-1/2

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

*Dowel Pin Sizes have limits + .0000" - .0002". All other reamers have plus tolerances to American Standards.
O/U= Over and Under

Decimal +.0002 -.0000	Dec. Equiv.	Overall Length	Flute Length	Decimal +.0002 -.0000	Dec. Equiv.	Overall Length	Flute Length
.2510	O/U	6	1-1/2	.4130	Z	7	1-3/4
.2570	F	6	1-1/2	.4219	27/64	7	1-3/4
.2610	G	6	1-1/2	.4355	DP*	7	1-3/4
.2656	17/64	6	1-1/2	.4365	O/U	7	1-3/4
.2660	H	6	1-1/2	.4370	DP*	7	1-3/4
.2720	I	6	1-1/2	.4375	7/16	7	1-3/4
.2770	J	6	1-1/2	.4385	O/U	7	1-3/4
.2810	K	6	1-1/2	.4531	29/64	7	1-3/4
.2813	9/32	6	1-1/2	.4688	15/32	7	1-3/4
.2900	L	6	1-1/2	.4844	31/64	8	2
.2950	M	6	1-1/2	.4980	DP*	8	2
.2969	19/64	6	1-1/2	.4990	O/U	8	2
.3020	N	6	1-1/2	.4995	DP*	8	2
.3105	DP*	6	1-1/2	.5000	1/2	8	2
.3115	O/U	6	1-1/2	.5010	O/U	8	2
.3120	DP*	6	1-1/2	.5313	17/32	8	2
.3125	5/16	6	1-1/2	.5625	9/16	8	2
.3135	O/U	6	1-1/2	.5938	19/32	8	2
.3160	O	6	1-1/2	.6250	5/8	9	2-1/4
.3230	P	6	1-1/2	.6563	21/32	9	2-1/4
.3281	21/64	6	1-1/2	.6875	11/16	9	2-1/4
.3320	Q	6	1-1/2	.7188	23/32	9	2-1/4
.3390	R	6	1-1/2	.7500	3/4	9-1/2	2-1/2
.3438	11/32	6	1-1/2	.7813	25/32	9-1/2	2-1/2
.3480	S	7	1-3/4	.8125	13/16	9-1/2	2-1/2
.3580	T	7	1-3/4	.8437	27/32	9-1/2	2-1/2
.3594	23/64	7	1-3/4	.8750	7/8	10	2-5/8
.3680	U	7	1-3/4	.9062	29/32	10	2-5/8
.3730	DP*	7	1-3/4	.9375	15/16	10	2-5/8
.3740	O/U	7	1-3/4	.9688	31/32	10	2-5/8
.3745	DP*	7	1-3/4	1.0000	1	10-1/2	2-3/4
.3750	3/8	7	1-3/4	1.0625	1-1/16	10-1/2	2-3/4
.3760	O/U	7	1-3/4	1.1250	1-1/8	11	2-7/8
.3770	V	7	1-3/4	1.1875	1-3/16	11	2-7/8
.3860	W	7	1-3/4	1.2500	1-1/4	11-1/2	3
.3906	25/64	7	1-3/4	1.3125	1-5/16	11-1/2	3
.3970	X	7	1-3/4	1.3750	1-3/8	12	3-1/4
.4040	Y	7	1-3/4	1.4375	1-7/16	12	3-1/4
.4063	13/32	7	1-3/4	1.5000	1-1/2	12-1/2	3-1/2

Sizes not shown can be priced from List 1008.
See List 1018 for TCT Reamers.
For longer lengths refer to List 412, 418, 424,
pages 74 & 75, which are 4-flute core drills that
can be ground into long flute reamers.
Many sizes carried in straight flute.
Some taper shank reamers available.

Carbide Tipped Chucking reamers carried in stock in
Semi-Finished condition.
Straight flute, Straight Shank.
Submit Quantity, Size and Tolerance for price and
delivery.

SPECIFICATIONS FOR END-CUTTING REAMERS

All reamers are considered end cutting

Below are shown several styles of end cutting reamers. When ordering special reamers please

specify the style of end cut desired. Unless otherwise specified a standard reamer chamfer will be furnished, shown as style No. 1.

STYLE No.1-End Cutting on 45° Chamfer Standard Chamfer

STYLE No.2-180° End Cutting to Bottom of Flute
NO ADDITIONAL CHARGE

STYLE No.3-180° End Cutting to Diam. "C"
PRICES UPON REQUEST

STYLE No.4-180° End Cutting Across Center
PRICES UPON REQUEST

SPECIFICATIONS FOR SPECIAL REAMERS

Orders for special reamers can be entered immediately if complete description and all necessary dimensions outlined below are given.

STRAIGHT SHANK REAMER

TAPER SHANK REAMER

D= Diameters of reamers, with tolerances
L= Length over-all
F= Length of flutes

S=Length of shank
N=Length of neck
B=Diameter of straight shank; if regular taper shank, give American Standard size number

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

We carry in stock TCT Reamers in sizes from 3/16 to 1-1/2", all in rough unfinished state. They can be ground to any size required within the above size range. They are all straight flute straight shank. For dimensions and proportions see List 1009, pages 65 & 66.

3/16	13/32	11/16
7/32	7/16	3/4
1/4	15/32	13/16
9/32	1/2	7/8
5/16	9/16	15/16
11/32	5/8	1
3/8		1-1/16
		1-1/8

Shorter than standard: Cut and retip
 Longer than regular: Start from scratch or weld shank extension
 Price on Application - Solid Carbide Reamers
 For HSS Reamers see Lists 1008 and 1009, pages 64 thru 66.

THE DRILL & REAM

THE PRODUCTION OF HOLES CLOSE-TO-SIZE DRILL AND REAM IN ONE OPERATION

Many holes are produced that have no need for close tolerances on diameter: vents, lubrication channels, clearances for other working members of a mechanism, etc. Other holes that become bearing members, or press fits, or location spots often need to be produced in large numbers and at low cost. Here is where we invite you to examine the merits of the Drill and Ream.

In essence the Drill & Ream is a specialized form of step drill. The two major cutting lips remove the largest volume of material in the hole and they are closely followed by four reamer-acting cutting lips generated from the familiar double margin drill. In this case the drill tolerances (+0.0,-.xxx) are removed and the reamer tolerances (+0.xxx,+0.xxx) substituted along with reamer tolerances on back taper. The result is a tool that can produce a reamed hole while drilling. Cost reductions over the life of the tool can pay for the tool many times over.

HSS

Diameter of Reamer Section		Length Overall	Length of Flute	Normally Furnished Drill Smaller Than Reamer by:	Length of Step	
MM	Inch					
1.6-1.9	.0625-.0780	3-3/4	2	.008	.125	}
1.91-2.4	.0781-.0936	4-1/4	2-1/4	.008	.125	
2.41-2.7	.0937-.1092	4-5/8	2-1/2	.009	.125	}
2.71-3.1	.1093-.1249	5-1/8	2-3/4	.009	.125	
3.11-3.5	.1250-.1405	5-3/8	3	.010	.125	}
3.51-4.0	.1406-.1561	5-3/8	3	.010	normally same as	
4.01-4.3	.1562-.1718	5-3/8	3-3/8	.010	drill	}
4.31-4.75	.1719-.1874	5-3/4	3-3/8	.011	diameter	
4.76-5.1	.1875-.2030	5-3/4	3-3/8	.011	or	}
5.11-5.5	.2031-.2186	6	3-5/8	.011	can	
5.51-6.0	.2187-.2343	6-1/8	3-3/4	.011	be as	}
6.01-6.4	.2344-.2499	6-1/8	3-3/4	.011	long as	
6.41-6.7	.2500-.2655	6-1/4	3-7/8	.012	3 times	}
6.71-7.1	.2656-.2811	6-1/4	3-7/8	.012	drill O.D.	
7.11-7.5	.2812-.2968	6-1/4	3-7/8	.012		}
7.51-7.9	.2969-.3124	6-3/8	4	.012		
7.91-8.3	.3125-.3280	6-3/8	4	.013		}
8.31-8.7	.3281-.3436	6-1/2	4-1/8	.013		
8.71-9.1	.3437-.3593	6-1/2	4-1/8	.013		}
9.11-9.5	.3594-.3749	6-3/4	4-1/4	.014		
9.51-9.9	.3750-.3905	6-3/4	4-1/4	.014		}
9.91-10.3	.3906-.4061	7	4-3/8	.014		
10.31-10.7	.4062-.4218	7	4-3/8	.014		}
10.71-11.1	.4219-.4374	7-1/4	4-5/8	.014		
11.11-11.5	.4375-.4530	7-1/4	4-5/8	.015		}
11.51-11.9	.4531-.4687	7-1/2	4-3/4	.015		
11.91-12.3	.4688-.4843	7-1/2	4-3/4	.015		}
12.31-12.7	.4844-.4999	7-3/4	4-3/4	.015		
12.71-13.1	.5000-.5155	7-3/4	4-3/4	.015		}
13.11-13.5	.5156-.5311	8	4-3/4	.015		
13.51-13.9	.5312-.5468	8	4-3/4	.015		}
13.91-14.3	.5469-.5624	8-1/4	4-7/8	.015		
14.91-15.1	.5781-.5936	8-3/4	4-7/8	.015		}
15.11-15.5	.5937-.6093	8-3/4	4-7/8	.015		
15.51-15.9	.6094-.6249	9	5-1/8	.015		}
15.91-16.3	.6250-.6406	9	5-1/8	.015		
16.31-17.5	.6407-.6875	9-1/4	5-3/8	.018		}
17.51-19.1	.6876-.7500	9-3/4	5-7/8	.018		
19.11-22.2	.7501-.8750	10	6-1/8	.018		}
22.21-25.4	.8751-1.000	11-1/8	6-1/2	.018		
25.41-26.9	1.0001-1.0624	11-1/2	6-7/8	.018		}
26.91-28.6	1.0625-1.1249	11-3/4	7-1/8	.020		
28.61-30.1	1.1250-1.1874	12	7-3/8	.020		}
30.11-31.7	1.1875-1.2499	12-1/2	7-7/8	.020		
31.71-33.3	1.2500-1.3124	14-1/4	8-5/8	.020		}
33.31-34.9	1.3125-1.3749	14-1/2	8-7/8	.025		
34.91-36.5	1.3750-1.4374	14-3/4	9-1/8	.025		}
36.51-38.1	1.4375-1.5000	15-1/4	9-5/8	.025		

Sizes to 2.000" can be quoted.
 Tolerance on reamer section: +.0001" to +.0004".
 .0001" Back taper in Length of Flute.
 Tolerance on drill section : + .0000" to -.0005" with back taper.
 Lengths may vary due to raw stock used.

See also Step Drills, List 2000

HSS

Conventional chucking reamers have lengths which are often inconvenient to use. Since taper length drills and chucking reamers have similar lengths and our List 1010 Drill & Ream are the same as taper length drills we have been called upon to produce these tools in jobber lengths. The tools in the following table will perform well in the more constricted areas where jobber length drills are satisfactory as well as being somewhat more economical than our List 1010.

Diameter of Reamer Section		Length Overall	Length of Flute	Normally Furnished Drill Smaller Than Reamer by:	Length of Step	
MM	Inch					
1.6-1.9	.0625-.0780	2	1	.008	.125	} .012 } .014 } Maximum } .015 } of } .016 } Step- } Undersize } .018 } in } .019 } Order } to } .021 } Qualify } for } These } .022 } Prices } .032
1.91-2.4	.0781-.0936	2-1/4	1-1/4	.008	.125	
2.41-2.7	.0937-.1092	2-5/8	1-1/2	.009	.125	
2.71-3.1	.1093-.1249	2-3/4	1-3/4	.009	.125	
3.11-3.5	.1250-.1405	2-7/8	2	.010	.125	
3.51-4.0	.1406-.1561	3-1/8	2-1/8	.010	normally	
4.01-4.3	.1562-.1718	3-1/4	2-5/16	.010	same as	
4.31-4.75	.1719-.1874	3-1/2	2-7/16	.011	drill	
4.76-5.1	.1875-.2030	3-5/8	2-1/2	.011	diameter	
5.11-5.5	.2031-.2186	3-3/4	2-5/8	.011	or	
5.51-6.0	.2187-.2343	3-7/8	2-3/4	.011	can	
6.01-6.4	.2344-.2499	4	2-7/16	.011	be as	
6.41-6.7	.2500-.2655	4-1/8	2-15/16	.012	long as	
6.71-7.1	.2656-.2811	4-1/4	3-1/16	.012	3 times	
7.11-7.5	.2812-.2968	4-3/8	3-3/16	.012	drill O.D.	
7.51-7.9	.2969-.3124	4-1/2	3-5/16	.012		
7.91-8.3	.3125-.3280	4-5/8	3-7/16	.013		
8.31-8.7	.3281-.3436	4-3/4	3-1/2	.013		
8.71-9.1	.3437-.3593	4-7/8	3-5/8	.013		
9.11-9.5	.3594-.3749	5	3-3/4	.014		
9.51-9.9	.3750-.3905	5-1/8	3-7/8	.014		
9.91-10.3	.3906-.4061	5-1/4	3-15/16	.014		
10.31-10.7	.4062-.4218	5-3/8	4-1/16	.014		
10.71-11.1	.4219-.4374	5-1/2	4-3/16	.014		
11.11-11.5	.4375-.4530	5-5/8	4-5/16	.015		
11.51-11.9	.4531-.4687	5-3/4	4-3/8	.015		
11.91-12.3	.4688-.4843	5-7/8	4-1/2	.015		
12.31-12.7	.4844-.4999	6	4-13/16	.015		
12.71-13.1	.5000-.5155	6-5/8	4-13/16	.015		
13.11-13.5	.5156-.5311	6-5/8	4-13/16	.015		
13.51-13.9	.5312-.5468	6-5/8	4-13/16	.015		
13.91-14.3	.5469-.5624	6-5/8	4-13/16	.015		
14.31-14.9	.5625-.5780	6-5/8	5-3/16	.015		
14.91-15.1	.5781-.5936	7-1/8	5-3/16	.015		
15.11-15.5	.5937-.6093	7-1/8	5-3/16	.015		
15.51-15.9	.6094-.6249	7-1/8	5-3/16	.015		
15.91-16.3	.6250-.6406	7-1/8	5-3/16	.015		
16.31-17.5	.6407-.6875	7-3/8	5-5/8	.018		

See also Step Drills, List 2000

Tolerance on reamer section: **+.0001" to +.0004"**.
 .0001" Back taper in Length of Flute.
 Tolerance on drill section : **+ .0000" to -.0005"** with back taper.
 Lengths may vary due to raw stock used.

HSS

Screw Machine Length tools have two major applications, one where space is constricted and two where hand held tools are subject to bending and possible tool malfunctioning.

Diameter of Reamer Section		Normally Furnished				
MM	Inch	Length Overall	Length of Flute	Drill Smaller Than Reamer by:	Length of Step	
1.6-1.9	.0625-.0780	1-11/16	11/16	.008	.125	.012
1.91-2.4	.0781-.0936	1-3/4	3/4	.008	.125	
2.41-2.7	.0937-.1092	1-13/16	13/16	.009	.125	
2.71-3.1	.1093-.1249	1-7/8	7/8	.009	.125	.014
3.11-3.5	.1250-.1405	1-15/16	15/16	.010	.125	
3.51-4.0	.1406-.1561	2-1/16	1	.010	normally	.015
4.01-4.3	.1562-.1718	2-1/8	1-1/16	.010	same as	
4.31-4.75	.1719-.1874	2-3/16	1-1/8	.011	drill	.016
4.76-5.1	.1875-.2030	2-1/4	1-3/16	.011	diameter	
5.11-5.5	.2031-.2186	2-3/8	1-1/4	.011	or	.018
5.51-6.0	.2187-.2343	2-7/16	1-5/16	.011	can	
6.01-6.4	.2344-.2499	2-1/2	1-3/8	.011	be as	.019
6.41-6.7	.2500-.2655	2-5/8	1-7/16	.012	long as	
6.71-7.1	.2656-.2811	2-11/16	1-1/2	.012	3 times	.021
7.11-7.5	.2812-.2968	2-3/4	1-9/16	.012	drill O.D.	
7.51-7.9	.2969-.3124	2-13/16	1-5/8	.012		.022
7.91-8.3	.3125-.3280	2-15/16	1-11/16	.013		
8.31-8.7	.3281-.3436	3	1-11/16	.013		.032
8.71-9.1	.3437-.3593	3-1/16	1-3/4	.013		
9.11-9.5	.3594-.3749	3-1/8	1-13/16	.014		
9.51-9.9	.3750-.3905	3-1/4	1-7/8	.014		
9.91-10.3	.3906-.4061	3-5/16	1-15/16	.014		
10.31-10.7	.4062-.4218	3-3/8	2	.014		
10.71-11.1	.4219-.4374	3-7/16	2-1/16	.014		
11.11-11.5	.4375-.4530	3-9/16	2-1/8	.015		
11.51-11.9	.4531-.4687	3-5/8	2-1/8	.015		
11.91-12.3	.4688-.4843	3-11/16	2-3/16	.015		
12.31-12.7	.4844-.4999	3-3/4	2-1/4	.015		
12.71-13.1	.5000-.5155	3-7/8	2-3/8	.015		
13.11-13.5	.5156-.5311	3-7/8	2-3/8	.015		
13.51-13.9	.5312-.5468	4	2-1/2	.015		
13.91-14.3	.5469-.5624	4	2-1/2	.015		
14.31-14.7	.5625-.5780	4-1/8	2-5/8	.015		
14.71-15.1	.5781-.5936	4-1/8	2-5/8	.015		
15.11-15.5	.5937-.6093	4-1/4	2-3/4	.015		
15.51-15.9	.6094-.6249	4-1/4	2-3/4	.015		
15.91-16.3	.6250-.6417	4-1/2	2-7/8	.015		

Sizes to 2.000" can be quoted.

Tolerance on reamer section: +.0001" to +.0004".

.0001" Back taper in Length of Flute.

Tolerance on drill section : + .0000" to -.0005" with back taper.

Lengths may vary due to raw stock used.

See also Step Drills, List 2000

LIST 441, 443 , 444, 444-A Four Flute Core Drills - HSS A Specialty of the House

This four flute series of tools is, we believe, one of the broadest range of core drills ever assembled in one catalog. Their built-in strength and stiffness make them ideal for their primary purpose of enlarging holes, as well as their secondary purpose of providing prefabricated stocks for rapid conversion to special tools, such as reamers, spotfacers, and counterbores.

Long flute reamers can be made quickly if customer can accept four flutes.

We also have in stock many sizes of extra long SS and TS four flute core drills.

List 441 - Four Flute Core Drills, Screw Machine Length
List 443 - Four Flute Core Drills, Taper Length
List 444 - Four Flute Core Drills, Regular Taper Shanks
List 444A - Four Flute Core Drills, Alternate Taper Shanks

FOUR FLUTE CORE DRILLS

LIST 441 Screw Machine

1/8"-2"

See description on page 21. Dimensions pages 17-20 and pricing see our price list.

443 Taper Length

1/8"-1-1/4"

See description on page 28. Dimensions pages 23-27 and pricing see our price list.

444 444-A Taper Shank

3/8"-3"

See description on page 48. Dimensions pages 42-46 and pricing see our price list.

Core Drills and The 4x2 Point

Core drills are by definition intended to enlarge existing holes. Yet their construction is such that it is often desirable to use them as hole originating tools. Their heavier web construction gives them greater strength, stiffness, and heat transfer properties. Their multiple contact points with the wall of the hole tend to make rounder holes closer to size than with two fluted drills. Often a hole produced with a single pass by a core drill with a 4x2 point will substitute for drill and reamed hole.

The 4x2 point illustrated above can be put on a four flute core drill at a moderate cost.

The web thickness of a conventional two flute drill is about 15% of the diameter at the point, increasing slowly towards the shank so that if the drill breaks it likely will be near the point and thus have a salvage value. Since the strength of a drill is concentrated in its web (doubling its thickness increases its strength four times) it is easy to see that a core drill with a 50% web is considerably stronger than a conventional twist drill. However, this increased strength is obtained at a price: it cuts down on available chip room. Moreover, the 4x2 point distributes the chips unequally between the two pairs of flutes. The foregoing is intended to caution the user to evaluate all of the factors fairly as to the effects on his specific drilling problems.

LISTS 412-SS, 412-TS, 418-SS, 418-TS, 424-SS, 424-TS Extra Long Four Flute Core Drills - HSS

The only stock of extra long four flute core drills in existence, cataloged and priced. Most sources show T.L. tools only. We show Stub, T.L., T.S. and Alternate Shanks. See Lists 441, 443, 444, 444-A for the largest assortment of Four Flute Core Drills carried in stock by anyone.

These are not simply extra long core drills, they are also:

- (1) Line Reamers-already partially fabricated.
- (2) Extra long flute reamers-unfinished, ready to be ground to specifications.

The six series of core drills mentioned in the catalog have uses far beyond the scope the name would indicate. They can be converted into reamers, end mills, counterbores, spot facers, step drills, step reamers, line reamers and an endless variety of special forms, all from shelf items and all at fabrication times much shorter than starting from scratch. Send your prints for prompt estimates.

The first digit of the above list represents four flutes; the second two digits stand for the number of inches of overall length; the "SS" or "TS" is the abbreviation for straight shank or taper shank.

12" FOUR FLUTE CORE DRILLS, H.S.S. STRAIGHT SHANK & TAPER SHANK

		LIST 412 S.S.		LIST 412 T.S.		
Diameter	Decimal Equiv.	Flute Length	Overall Length	Shank No.	Flute Length	Overall Length
1/4	.2500	9	12			
17/64	.2656	9	12			
9/32	.2813	9	12			
19/64	.2969	9	12			
5/16	.3125	9	12			
21/64	.3281	9	12			
11/32	.3438	9	12			
23/64	.3594	9	12			
3/8	.3750	9	12	1	8	12
25/64	.3906	9	12	1	8	12
13/32	.4063	9	12	1	8	12
27/64	.4219	9	12	1	8	12
7/16	.4375	9	12	1	8	12
29/64	.4531	9	12	1	8	12
15/32	.4688	9	12	1	8	12
31/64	.4844	9	12	2	8	12
1/2	.5000	9	12	2	8	12
33/64	.5156	9	12	2	8	12
17/32	.5313	9	12	2	8	12
35/64	.5469	9	12	2	8	12
9/16	.5625	9	12	2	8	12
37/64	.5781	9	12	2	8	12
19/32	.5938	9	12	2	8	12
39/64	.6094	9	12	2	8	12
5/8	.6250	9	12	2	8	12
41/64	.6406	9	12	2	8	12
21/32	.6563	9	12	2	8	12
43/64	.6719	9	12	2	8	12
11/16	.6875	9	12	2	8	12
45/64	.0731	9	12	2	8	12
23/32	.7188	9	12	2	8	12
47/64	.7344	9	12	2	8	12
3/4	.7500	9	12	2	8	12
49/64	.7656	9	12	2	8	12
25/32	.7812	9	12	2	8	12
51/64	.4969	9	12	3	7	12
13/16	.8125	9	12	3	7	12
53/64	.8281	9	12	3	7	12
27/32	.8437	9	12	3	7	12
55/64	.8594	9	12	3	7	12
7/8	.8750	9	12	3	7	12
57/64	.8906	9	12	3	7	12
29/32	.9062	9	12	3	7	12
59/64	.9212	9	12	3	7	12
15/16	.9375	9	12	3	7	12
61/64	.9531	9	12	3	7	12
31/32	.9687	9	12	3	7	12
63/64	.9844	9	12	3	7	12
1	1.0000	9	12	3	7	12

418 } Price on Application. Some sizes in 18" and 24" overall lengths are in stock.
424 } Also see page 23 for cobalt four flute core drills.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

LISTS 701, 702, 704, 706, 708, 710, 712, 718, 724

LONGBOY DRILLS - STRAIGHT SHANK

A Specialty of the House

HSS - General purpose construction, long flutes.

Diameters from #80 to 1-1/4".

Very popular where the stock taper length drill will not reach the required distance, such as drilling electrolyte holes in EDM tooling, cleaning vent holes in tire molds, etc.

Intermediate sizes and high helix vent drills quoted promptly.

A broader and more complete range of sizes than shown in any other "Longboy" list.

List 701 - Longer Than Taper Length
 List 702 - 2" Longboy Drills
 List 704 - 4" Longboy Drills
 List 706 - 6" Longboy Drills
 List 708 - 8" Longboy Drills
 List 710 - 10" Longboy Drills
 List 712 - 12" Longboy Drills
 List 718 - 18" Longboy Drills
 List 724 - 24" Longboy Drills

LONGER THAN TAPER LENGTH HIGH SPEED STRAIGHT SHANK

LIST 701

Size	Decimal Equiv.	Overall Length	Flute Length	Size	Decimal Equiv.	Overall Length	Flute Length
80	.0135	1-1/2	3/8	66	.0330	3	1-5/8
79	.0145	1-1/2	3/8	65	.0350	3	1-3/4
1/64	.0156	1-3/4	3/8	64	.0360	3	1-3/4
78	.0160	1-3/4	3/8	63	.0370	3	1-3/4
77	.0180	1-7/8	3/8	62	.0380	3	1-3/4
76	.0200	2	3/8	61	.0390	3	1-3/4
75	.0210	2-1/8	1/2	60	.0400	3-1/8	1-7/8
74	.0225	2-1/4	1/2	59	.0410	3-1/8	1-7/8
73	.0240	2-3/8	5/8	58	.0420	3-1/4	1-7/8
72	.0250	2-1/2	5/8	57	.0430	3-1/4	1-7/8
71	.0260	2-5/8	3/4	56	.0465	3-1/4	1-7/8
70	.0280	2-5/8	3/4	3/64	.0468	3-3/8	1-7/8
69	.0292	2-3/4	1	55	.0520	3-3/8	1-7/8
68	.0310	2-7/8	1-1/4	54	.0550	3-1/2	1-7/8
1/32	.0312	2-7/8	1-1/2	53	.0595	3-1/2	1-7/8
67	.0320	3	1-5/8	1/16	.0625	3-3/4	1-7/8

2" LONGBOYS, H.S.S.**LIST 702**

Size	Decimal Equiv.	Flute Length	Size	Decimal Equiv.	Flute Length
80	.0135	3/8	78	.0160	3/8
79	.0145	3/8	77	.0180	3/8
1/64	.0156	3/8			

4" LONGBOYS, H.S.S.**LIST 704**

Size	Decimal Equiv.	Flute Length	Size	Decimal Equiv.	Flute Length
80	.0135	5/8	65	.0350	2-1/4
79	.0145	5/8	64	.0360	2-1/4
1/64	.0156	5/8	63	.0370	2-1/4
78	.0160	5/8	62	.0380	2-1/4
			61	.0390	2-1/4
77	.0180	3/4	60	.0400	2-1/4
76	.0200	3/4			
75	.0210	3/4	59	.0410	2-1/2
			58	.0420	2-1/2
74	.0225	1	57	.0430	2-1/2
73	.0240	1	56	.0465	2-1/2
			3/64	.0468	2-1/2
72	.0250	1-1/4	55	.0520	2-1/2
71	.0260	1-1/4	54	.0550	2-1/2
70	.0280	1-1/4			
69	.0292	1-1/4	53	.0595	3
68	.0310	1-1/2			
1/32	.0312	1-1/2			
67	.0320	2			
66	.0330	2			

Check the new flute lengths - changed to make longer lived tools.

Size	Decimal Equiv.	Flute Length	Size	Decimal Equiv.	Flute Length
76	.0200	3/4	54	.0550	2-1/2
75	.0210	3/4			
			53	.0595	3
74	.0225	1	1/16	.0625	3
73	.0240	1	52	.0635	3
			51	.0670	3
72	.0250	1-1/4	50	.0700	3
71	.0260	1-1/4	49	.0730	3
70	.0280	1-1/4	48	.0760	3
69	.0292	1-1/4			
			5/64	.0781	3-1/2
68	.0310	1-1/2	47	.0785	3-1/2
			46	.0810	3-1/2
1/32	.0312	1-1/2	45	.0820	3-1/2
67	.0320	2	44	.0860	4
66	.0330	2	43	.0890	4
			42	.0935	4
65	.0350	2-1/4	3/32	.0937	4
64	.0360	2-1/4	41	.0960	4
63	.0370	2-1/4	40	.0980	4
62	.0380	2-1/4	39	.0995	4
61	.0390	2-1/4	38	.1015	4
60	.0400	2-1/4	37	.1040	4
			36	.1065	4
			7/64	.1093	4
59	.0410	2-1/2	35	.1100	4
58	.0420	2-1/2	34	.1110	4
57	.0430	2-1/2	33	.1130	4
56	.0465	2-1/2	32	.1160	4
3/64	.0468	2-1/2	31	.1200	4
55	.0520	2-1/2	1/8	.1250	4

For shorter flutes see Aircraft Extension Drills, List 761-6.

Check the new flute lengths - changed to make longer lived tools.

Size	Decimal Equiv.	Size	Decimal Equiv.
5-1/2" Flute Minimum		B	.2380
35	.1100	C	.2420
34	.1110	D	.2460
33	.1130	1/4E	.2500
32	.1160	F	.2570
31	.1200	G	.2610
1/8	.1250	17/64	.2656
30	.1285	H	.2660
29	.1360	I	.2720
28	.1405	J	.2770
9/64	.1406	K	.2810
27	.1440	9/32	.2812
26	.1470	L	.2900
25	.1495	M	.2950
24	.1520	19/64	.2968
23	.1540	N	.3020
5/32	.1562	5/16	.3125
22	.1570	O	.3160
21	.1590	P	.3230
20	.1610	21/64	.3281
19	.1660	Q	.3320
18	.1695	R	.3390
11/64	.1718	11/32	.3437
17	.1730	S	.3480
16	.1770	T	.3580
15	.1800	23/64	.3593
14	.1820	U	.3680
13	.1850	3/8	.3750
3/16	.1875	V	.3770
12	.1890	W	.3860
11	.1910	25/64	.3906
10	.1935	X	.3970
9	.1960	Y	.4040
8	.1990	13/32	.4062
7	.2010	Z	.4130
13/64	.2031	27/64	.4218
6	.2040	7/16	.4375
5	.2055	15/32	.4687
4	.2090	31/64	.4843
3	.2130	1/2	.5000
7/32	.2187		
2	.2210		
1	.2280		
A	.2340		
15/64	.2343		

The Cobalt List 708-C is a Specialty of the House.

See our List 190-8 on Page 58 for High Helix Drills 8" Long.

Size	Decimal Equiv.	Size	Decimal Equiv.
7" Flute Minimum		B	.2380
35	.1100	C	.2420
34	.1110	D	.2460
33	.1130	1/4E	.2500
32	.1160	F	.2570
31	.1200	G	.2610
1/8	.1250	17/64	.2656
30	.1285	H	.2660
29	.1360	I	.2720
28	.1405	J	.2770
9/64	.1406	K	.2810
27	.1440	9/32	.2812
26	.1470	L	.2900
25	.1495	M	.2950
24	.1520	19/64	.2968
23	.1540	N	.3020
5/32	.1562	5/16	.3125
22	.1570	O	.3160
21	.1590	P	.3230
20	.1610	21/64	.3281
19	.1660	Q	.3320
18	.1695	R	.3390
11/64	.1718	11/32	.3437
17	.1730	S	.3480
16	.1770	T	.3580
15	.1800	23/64	.3593
14	.1820	U	.3680
13	.1850	3/8	.3750
3/16	.1875	V	.3770
12	.1890	W	.3860
11	.1910	25/64	.3906
10	.1935	X	.3970
9	.1960	Y	.4040
8	.1990	13/32	.4062
7	.2010	Z	.4130
13/64	.2031	27/64	.4218
6	.2040	7/16	.4375
5	.2055	29/64	.4531
4	.2090	15/32	.4687
3	.2130	31/64	.4843
7/32	.2187	1/2	.5000
2	.2210		
1	.2280		
A	.2340		
15/64	.2343		

Size	Decimal Equiv.	Flute	Size	Decimal Equiv.	Flute	Size	Decimal Equiv.	Flute	Size	Decimal Equiv.	Flute
1/16	.0625	3				J	.2770	9	9/16	.5625	9
52	.0635	3	19	.1660	9	K	.2810	9	37/64	.5781	9
51	.0670	3	18	.1695	9	9/32	.2812	9	19/32	.5938	9
50	.0700	3	11/64	.1718	9	L	.2900	9	39/64	.6094	9
49	.0730	3	17	.1730	9	M	.2950	9	5/8	.6250	9
48	.0760	3	16	.1770	9	19/64	.2969	9	41/64	.6406	9
5/64	.0781	3	15	.1800	9	N	.3020	9	21/32	.6562	9
47	.0785	3	14	.1820	9	5/16	.3125	9	43/64	.6719	9
46	.0810	3	13	.1850	9	O	.3160	9	11/16	.6875	9
45	.0820	3	3/16	.1875	9	P	.3230	9	45/64	.7031	9
44	.0860	3	12	.1890	9	21/64	.3281	9	23/32	.7188	9
43	.0890	3	11	.1910	9	Q	.3320	9	47/64	.7344	9
42	.0935	3	10	.1935	9	R	.3390	9	3/4	.7500	9
			9	.1960	9	11/32	.3438	9	49/64	.7656	9
3/32	.0938	6	8	.1990	9	S	.3480	9	25/32	.7812	9
41	.0960	6	7	.2010	9	T	.3580	9	51/64	.7969	9
40	.0980	6	13/64	.2031	9	23/64	.3594	9	13/16	.8125	9
39	.0995	6	6	.2040	9	U	.3680	9	53/64	.8281	9
38	.1015	6	5	.2040	9	3/8	.3750	9	27/32	.8438	9
37	.1040	6	4	.2090	9	V	.3770	9	55/64	.8594	9
36	.1065	6	3	.2130	9	W	.3860	9	7/8	.8750	9
7/64	.1094	6	7/32	.2188	9	25/64	.3906	9	57/64	.8906	9
35	.1100	6	2	.2210	9	X	.3970	9	29/32	.9062	9
34	.1110	6	1	.2280	9	Y	.4040	9	59/64	.9219	9
33	.1130	6	A	.2340	9	13/32	.4062	9	15/16	.9375	9
32	.1160	6	15/64	.2343	9	Z	.4130	9	61/64	.9531	9
31	.1200	6	B	.2380	9	27/64	.4219	9	31/32	.9688	9
			C	.2420	9	7/16	.4375	9	63/64	.9844	9
1/8	.1250	9	D	.2460	9	29/64	.4531	9	1	1.0000	9
30	.1285	9	1/4E	.2500	9	15/32	.4688	9			
29	.1360	9	F	.2570	9	31/64	.4844	9			
28	.1405	9	G	.2610	9	1/2	.5000	9			
9/64	.1406	9	17/64	.2656	9	33/64	.5156	9			
27	.1440	9	H	.2660	9	17/32	.5312	9			
26	.1470	9	I	.2720	9	35/64	.5469	9			
25	.1495	9									
24	.1520	9									
23	.1540	9									
5/32	.1562	9									
22	.1570	9									
21	.1590	9									
20	.1610	9									

See our List 190-12 for High Helix Drills 12" Long.
See our List 761-12 for Short Flutes on Drills 12" Long.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

Size	Decimal Equiv.	Flute	Size	Decimal Equiv.	Flute
17	.1730	12	X	.3970	13
16	.1770	12	Y	.4040	13
15	.1800	12	13/32	.4062	13
14	.1820	12	Z	.4130	13
13	.1850	12	27/64	.4218	13
			7/16	.4375	13
3/16	.1875	12	29/64	.4531	13
12	.1890	12	15/32	.4687	13
11	.1910	12	31/64	.4843	13
10	.1935	12	1/2	.5000	13
9	.1960	12	33/64	.5156	13
8	.1990	12	17/32	.5312	13
7	.2010	12	35/64	.5468	13
13/64	.2031	12	9/16	.5625	13
6	.2040	12	37/64	.5781	13
5	.2055	12	19/32	.5937	13
4	.2090	12	39/64	.6093	13
3	.2130	12	5/8	.6250	13
7/32	.2187	12	41/64	.6406	13
2	.2210	12	21/32	.6562	13
1	.2280	12	43/64	.6718	13
A	.2340	12	11/16	.6875	13
15/64	.2343	12	45/64	.7031	13
B	.2380	12	23/32	.7187	13
C	.2420	12	47/64	.7343	13
D	.2460	12	3/4	.7500	13
1/4E	.2500	12			
F	.2570	12			
G	.2610	12			
17/64	.2656	12			
H	.2660	12			
I	.2720	12			
J	.2770	12			
K	.2810	12			
9/32	.2812	12			
L	.2900	12			
M	.2950	12			
19/64	.2968	12			
N	.3020	12			
5/16	.3125	12			
O	.3160	12			
P	.3230	12			
21/64	.3281	12			
Q	.3320	12			
R	.3390	12			
11/32	.3437	12			
S	.3480	12			
T	.3580	12			
23/64	.3593	12			
U	.3680	12			
3/8	.3750	13			
V	.3770	13			
W	.3860	13			
25/64	.3906	13			

18" LONGBOYS, H.S.S.S.

**LIST 718
Continued**

Size	Decimal Equiv.	Flute	Size	Decimal Equiv.	Flute
49/64	.7656	13	1-3/64	1.0468	13
25/32	.7812	13	1-1/16	1.0625	13
51/64	.7968	13	1-5/64	1.0781	13
13/16	.8125	13	1-3/32	1.0937	13
53/64	.8281	13	1-7/64	1.1093	13
27/32	.8437	13	1-1/8	1.1250	13
55/64	.8593	13	1-9/64	1.1406	13
7/8	.8750	13	1-5/32	1.1562	13
57/64	.8906	13	1-11/64	1.1718	13
29/32	.9062	13	1-3/16	1.1875	13
59/64	.9218	13	1-13/64	1.2031	13
15/16	.9375	13	1-7/32	1.2187	13
61/64	.9531	13	1-15/64	1.2343	13
31/32	.9687	13	1-1/4	1.2500	13
63/64	.9843	13			
1	1.0000	13			
1-1/64	1.0156	13			
1-1/32	1.0312	13			

24" LONGBOYS, H.S.S.S.

LIST 724

Size	Decimal Equiv.	Flute	Size	Decimal Equiv.	Flute
1/4	.2500	19	27/32	.8438	19
5/16	.3125	19	7/8	.8750	19
3/8	.3750	19	29/32	.9063	19
7/16	.4375	19	15/16	.9375	19
1/2	.5000	19	31/32	.9688	19
17/32	.5312	19	1	1.0000	19
9/16	.5625	19	1-1/16	1.0625	19
19/32	.5938	19	1-1/8	1.1250	19
5/8	.6250	19	1-3/16	1.1875	19
21/32	.6563	19	1-1/4	1.2500	19
11/16	.6875	19			
23/32	.7188	19			
3/4	.7500	19			
25/32	.7813	19			
13/16	.8125	19			

Intermediate sizes quoted promptly on request.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

LIST 750 (-Length)

TAPER SHANK EXTRA LONG DRILLS, H.S.S.

Regular Taper Shanks

Overall Length			10"	12"	15"	18"	OVERALL LENGTH			10"	12"	15"	18"
Size	Decimal Equiv.	Taper Shank	Flute Length	Flute Length	Flute Length	Flute Length	Size	Decimal Equiv.	Taper Shank	Flute Length	Flute Length	Flute Length	Flute Length
1/8	.1250	1	6-1/2	8-1/2			25/32	.7813	2		8	11	14
9/64	.1406	1	6-1/2	8-1/2			51/64	.7969	3		7	10	13
5/32	.1563	1	6-1/2	8-1/2			13/16	.8125	3		7	10	13
11/64	.1719	1	6-1/2	8-1/2			53/64	.8281	3		7	10	13
3/16	.1875	1	6-1/2	8-1/2	11-1/2	14	27/32	.8438	3		7	10	13
13/64	.2031	1	6-1/2	9	12	14	55/64	.8594	3		7	10	13
7/32	.2188	1	6-1/2	9	12	14	7/8	.8750	3		7	10	13
15/64	.2344	1	6-1/2	9	12	14	57/64	.8906	3		7	10	13
1/4	.2500	1	6-1/2	9	12	14	29/32	.9063	3		7	10	13
17/64	.2656	1	6-1/2	9	12	14	59/64	.9219	3		7	10	13
9/32	.2813	1	6-1/2	9	12	14	15/16	.9375	3		7	10	13
19/64	.2969	1	6-1/2	9	12	14	61/64	.9531	3		7	10	13
5/16	.3125	1	6-1/2	9	12	14	31/32	.9688	3		7	10	13
21/64	.3281	1	6-1/2	9	12	14	63/64	.9844	3			10	13
11/32	.3438	1	6-1/2	9	12	14	1	1.0000	3			10	13
23/64	.3594	1	6-1/2	9	12	14	1- 1/64	1.0156	3			10	13
3/8	.3750	1	6-1/2	9	12	14	1- 1/32	1.0313	3			10	13
25/64	.3906	1	6-1/2	9	12	14	1- 3/64	1.0469	3			10	13
13/32	.4063	1	6-1/2	9	12	14	1- 1/16	1.0625	3			10	13
27/64	.4219	1	6-1/2	9	12	14	1- 5/64	1.0781	4			9	12
7/16	.4375	1	6-1/2	9	12	14	1- 3/32	1.0938	4			9	12
29/64	.4531	1	6-1/2	9	12	14	1- 7/64	1.1094	4			9	12
15/32	.4688	1	6-1/2	9	12	14	1- 1/8	1.1250	4			9	12
31/64	.4844	2	6-1/2	8	11	14	1- 9/64	1.1406	4			9	12
1/2	.5000	2	6-1/2	8	11	14	1- 5/32	1.1563	4			9	12
33/64	.5156	2	6-1/2	8	11	14	1-11/64	1.1719	4			9	12
17/32	.5313	2	6-1/2	8	11	14	1- 3/16	1.1875	4			9	12
35/64	.5469	2	6-1/2	8	11	14	1-13/64	1.2031	4			9	12
9/16	.5625	2		8	11	14	1- 7/32	1.2188	4			9	12
37/64	.5781	2		8	11	14	1-15/64	1.2344	4			9	12
19/32	.5938	2		8	11	14	1- 1/4	1.2500	4			9	12
39/64	.6094	2		8	11	14	1-17/64	1.2656	4				12
5/8	.6250	2		8	11	14	1- 9/32	1.2813	4				12
41/64	.6406	2		8	11	14	1-19/64	1.2969	4				12
21/32	.6563	2		8	11	14	1- 5/16	1.3125	4				12
43/64	.6719	2		8	11	14	1-21/64	1.3281	4				12
11/16	.6875	2		8	11	14	1-11/32	1.3438	4				12
45/64	.7031	2		8	11	14	1-23/64	1.3594	4				12
23/32	.7188	2		8	11	14	1- 3/8	1.3750	4				12
47/64	.7344	2		8	11	14	1-25/64	1.3906	4				12
3/4	.7500	2		8	11	14	1-13/32	1.4063	4				12
49/64	.7656	2		8	11	14	1-27/64	1.4219	4				12

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

LIST 750 (-Length) TAPER SHANK EXTRA LONG DRILLS, H.S.S.

OVERALL LENGTH			10"	12"	15"	18"	24"
Size	Decimal Equiv.	Taper Shank	Flute Length	Flute Length	Flute Length	Flute Length	Flute Length
1-7/16	1.4375	4				12	18
1-29/64	1.4531	4				12	18
1-15/32	1.4688	4				12	18
1-31/64	1.4844	4				12	18
1-1/2	1.5000	4				12	18
1-17/32	1.5313	5				10.5	18
1-9/16	1.5625	5				10.5	17
1-19/32	1.5938	5				10.5	17
1-5/8	1.6250	5				10.5	17
1-21/32	1.6563	5				10.5	17
1-11/16	1.6875	5				10.5	17
1-23/16	1.7188	5				10.5	17
1-3/4	1.7500	5				10.5	17
1-25/32	1.7813	5				10.5	17
1-13/16	1.8125	5				10.5	17
1-43/64	1.8438	5				10.5	17
1-7/8	1.8750	5				10.5	17
1-29/32	1.9063	5				10.5	17
1-15/16	1.9375	5				10.5	17
1-31/32	1.9688	5				10.5	17
2	2.0000	5				10.5	17
2-1/16	2.0625	5				10	17
2-1/8	2.1250	5				10	17
2-3/16	2.1875	5				10	17
2-1/4	2.2500	5				10	17
2-5/16	2.3125	5				10	17
2-3/8	2.3750	5				10	17
2-7/17	2.4375	5				10	17
2-1/2	2.5000	5				10	17

Intermediate sizes quoted promptly on request.

We draw on American and International stocks for these taper shank drills.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

LIST 761 - 6
LIST 761 - 12

Aircraft Extension Drills - HSS

Made in large quantities during World War II to drill shallow holes in airframes. Flutes are the length of corresponding diameter jobber drills.

Heavy webs, high helix, special lengths, and special materials are available on order. The current low prices reflect costs of the large lots produced.

Useful for drilling holes in constricted areas. Sometimes the drill is bent by hand while cutting to clear an obstruction, therefore, the shanks are spring tempered.

Also available in M-42 Cobalt, our List 561-6 and 561-12 on the following page.

**AIRCRAFT EXTENSION DRILLS
HIGH SPEED STEEL**

**LIST 761-6
LIST 761-12**

Size	Flute Length	Overall Length	Overall Length	Size	Flute Length	Overall Length	Overall Length	Size	Flute Length	Overall Length	Overall Length
80	.100"	6	-	36	1-7/16	6	12	F	2-7/8	6	12
79	.120	6	-	7/64	1-1/2	6	12	G	2-7/8	6	12
1/64	3/16	6	-	35	1-1/2	6	12	17/64	2-7/8	6	12
78	3/16	6	-	34	1-1/2	6	12	H	2-7/8	6	12
77	3/16	6	-	33	1-1/2	6	12	I	2-7/8	6	12
76	3/16	6	-	32	1-5/8	6	12	J	2-7/8	6	12
75	1/4	6	-	31	1-5/8	6	12	K	2-15/16	6	12
74	1/4	6	-	1/8	1-5/8	6	12	9/32	2-15/16	6	12
73	5/16	6	-	30	1-5/8	6	12	L	2-15/16	6	12
72	5/16	6	-	29	1-3/4	6	12	M	3-1/16	6	12
71	3/8	6	-	28	1-3/4	6	12	19/64	3-1/16	6	12
70	3/8	6	-	9/64	1-3/4	6	12	N	3-1/16	6	12
69	1/2	6	-	27	1-7/8	6	12	5/16	3-3/16	6	12
68	1/2	6	-	26	1-7/8	6	12	O	3-3/16	6	12
1/32	1/2	6	-	25	1-7/8	6	12	P	3-5/16	6	12
67	1/2	6	-	24	2	6	12	21/64	3-5/16	6	12
66	1/2	6	-	23	2	6	12	Q	3-7/16	6	12
65	5/8	6	-	5/32	2	6	12	R	3-7/16	6	12
64	5/8	6	-	22	2	6	12	11/32	3-7/16	6	12
63	5/8	6	-	21	2-1/8	6	12	S	3-1/2	6	12
62	5/8	6	-	20	2-1/8	6	12	T	3-1/2	6	12
61	11/16	6	-	19	2-1/8	6	12	23/64	3-1/2	6	12
60	11/16	6	12	18	2-1/8	6	12	U	3-5/8	6	12
59	11/16	6	12	11/64	2-1/8	6	12	3/8	3-5/8	6	12
58	11/16	6	12	17	2-3/16	6	12	V	3-5/8	6	12
57	3/4	6	12	16	2-3/16	6	12	W	3-3/4	6	12
56	3/4	6	12	15	2-3/16	6	12	25/64	3-3/4	6	12
3/64	3/4	6	12	14	2-3/16	6	12	X	3-3/4	6	12
55	7/8	6	12	13	2-5/16	6	12	Y	3-7/8	6	12
54	7/8	6	12	3/16	2-5/16	6	12	13/32	3-7/8	6	12
53	7/8	6	12	12	2-5/16	6	12	Z	3-7/8	6	12
1/16	7/8	6	12	11	2-5/16	6	12	27/64	3-15/16	6	12
52	7/8	6	12	10	2-5/16	6	12	7/16	4-1/16	6	12
51	1	6	12	9	2-7/16	6	12	29/64	4-3/16	6	12
50	1	6	12	8	2-7/16	6	12	15/32	4-5/16	6	12
49	1	6	12	7	2-7/16	6	12	31/64	4-3/8	6	12
48	1	6	12	13/64	2-7/16	6	12	1/2	4-1/2	6	12
5/64	1	6	12	6	2-1/2	6	12				
47	1	6	12	5	2-1/2	6	12				
46	1-1/8	6	12	4	2-1/2	6	12				
45	1-1/8	6	12	3	2-1/2	6	12				
44	1-1/8	6	12	7/32	2-1/2	6	12				
43	1-1/4	6	12	2	2-5/8	6	12				
42	1-1/4	6	12	1	2-5/8	6	12				
3/32	1-1/4	6	12	A	2-5/8	6	12				
41	1-3/8	6	12	15/64	2-5/8	6	12				
40	1-3/8	6	12	B	2-3/4	6	12				
39	1-3/8	6	12	C	2-3/4	6	12				
38	1-7/16	6	12	D	2-3/4	6	12				
37	1-7/16	6	12	1/4E	2-3/4	6	12				

For longer flutes see Longboy Drills, Lists 706 and 712.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

**AIRCRAFT EXTENSION DRILLS
COBALT**

LIST 561-6

LIST 561-12

Size	Flute Length	Overall Length	Overall Length	Size	Flute Length	Overall Length	Overall Length
1/16	7/8	6	12	11	2-5/16	6	12
52	7/8	6	12	10	2-5/16	6	12
51	1	6	12	9	2-7/16	6	12
50	1	6	12	8	2-7/16	6	12
49	1	6	12	7	2-7/16	6	12
48	1	6	12	13/64	2-7/16	6	12
5/64	1	6	12	6	2-1/2	6	12
47	1	6	12	5	2-1/2	6	12
46	1-1/8	6	12	4	2-1/2	6	12
45	1-1/8	6	12	3	2-1/2	6	12
44	1-1/8	6	12	7/32	2-1/2	6	12
43	1-1/4	6	12	2	2-5/8	6	12
42	1-1/4	6	12	1	2-5/8	6	12
3/32	1-1/4	6	12	15/64	2-5/8	6	12
41	1-3/8	6	12	1/4	2-3/4	6	12
40	1-3/8	6	12	Sizes up to 1/2" diameter, prices on application.			
39	1-3/8	6	12				
38	1-7/16	6	12				
37	1-7/16	6	12				
36	1-7/16	6	12				
7/64	1-1/2	6	12				
35	1-1/2	6	12				
34	1-1/2	6	12				
33	1-1/2	6	12				
32	1-5/8	6	12				
31	1-5/8	6	12				
1/8	1-5/8	6	12				
30	1-5/8	6	12				
29	1-3/4	6	12				
28	1-3/4	6	12				
9/64	1-3/4	6	12				
27	1-7/8	6	12				
26	1-7/8	6	12				
25	1-7/8	6	12				
24	2	6	12				
23	2	6	12				
5/32	2	6	12				
22	2	6	12				
21	2-1/8	6	12				
20	2-1/8	6	12				
19	2-1/8	6	12				
18	2-1/8	6	12				
11/64	2-1/8	6	12				
17	2-3/16	6	12				
16	2-3/16	6	12				
15	2-3/16	6	12				
14	2-3/16	6	12				
13	2-5/16	6	12				
3/16	2-5/16	6	12				
12	2-5/16	6	12				

For longer flutes see Longboy Drills, Lists 706 and 712.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

LIST 1000

Decimal Drills - HSS

A Specialty of the House

Drills in the table are those ending in ".00x" which are not available from List 101.
 Made to American Standards except for closer tolerances on diameter: +.000"-.0005".
 Advantageously priced due to large manufacturing quantities.

DECIMAL DRILLS

LIST 1000

Decimal	Overall	Flute	Decimal	Overall	Flute	Decimal	Overall	Flute	Decimal	Overall	Flute
.006	3/4	.050	.088	2-1/4	1-1/4	.149	3	1-3/4	.212	3-3/4	2-1/2
.007	3/4	.060	.090	2-1/4	1-1/4	.150	3-1/8	2	.214	3-3/4	2-1/2
.008	3/4	.060	.091	2-1/4	1-1/4	.151	3-1/8	2	.215	3-3/4	2-1/2
.009	3/4	.070	.092	2-1/4	1-1/4	.153	3-1/8	2	.216	3-3/4	2-1/2
.014	3/4	.120	.093	2-1/4	1-1/4	.155	3-1/8	2	.217	3-3/4	2-1/2
.017	7/8	3/16	.094	2-3/8	1-3/8	.156	3-1/8	2	.218	3-3/4	2-1/2
.019	7/8	3/16	.095	2-3/8	1-3/8	.158	3-1/4	2-1/8	.219	3-7/8	2-5/8
.022	1	1/4	.097	2-3/8	1-3/8	.160	3-1/4	2-1/8	.220	3-7/8	2-5/8
.023	1-1/8	5/16	.099	2-3/8	1-3/8	.162	3-1/4	2-1/8	.222	3-7/8	2-5/8
.027	1-1/4	3/8	.100	2-1/2	1-3/8	.163	3-1/4	2-1/8	.223	3-7/8	2-5/8
.029	1-3/8	1/2	.101	2-1/2	1-3/8	.164	3-1/4	2-1/8	.224	3-7/8	2-5/8
.030	1-3/8	1/2	.102	2-1/2	1-3/8	.165	3-1/4	2-1/8	.225	3-7/8	2-5/8
.034	1-1/2	5/8	.103	2-1/2	1-3/8	.167	3-1/4	2-1/8	.226	3-7/8	2-5/8
.044	1-3/4	3/4	.105	2-1/2	1-3/8	.168	3-1/4	2-1/8	.227	3-7/8	2-5/8
.045	1-3/4	3/4	.106	2-1/2	1-3/8	.169	3-1/4	2-1/8	.229	3-7/8	2-5/8
.046	1-3/4	3/4	.107	2-5/8	1-1/2	.170	3-1/4	2-1/8	.230	3-7/8	2-5/8
.047	1-3/4	3/4	.108	2-5/8	1-1/2	.171	3-1/4	2-1/8	.231	3-7/8	2-5/8
.048	1-3/4	3/4	.109	2-5/8	1-1/2	.172	3-3/8	2-3/16	.232	3-7/8	2-5/8
.049	1-7/8	7/8	.112	2-5/8	1-1/2	.173	3-3/8	2-3/16	.233	3-7/8	2-5/8
.050	1-7/8	7/8	.114	2-3/4	1-5/8	.174	3-3/8	2-3/16	.235	4	2-3/4
.051	1-7/8	7/8	.115	2-3/4	1-5/8	.175	3-3/8	2-3/16	.236	4	2-3/4
.053	1-7/8	7/8	.117	2-3/4	1-5/8	.176	3-3/8	2-3/16	.237	4	2-3/4
.054	1-7/8	7/8	.118	2-3/4	1-5/8	.178	3-3/8	2-3/16	.239	4	2-3/4
.056	1-7/8	7/8	.119	2-3/4	1-5/8	.179	3-3/8	2-3/16	.240	4	2-3/4
.057	1-7/8	7/8	.121	2-3/4	1-5/8	.181	3-3/8	2-3/16	.241	4	2-3/4
.058	1-7/8	7/8	.123	2-3/4	1-5/8	.183	3-1/2	2-5/16	.243	4	2-3/4
.059	1-7/8	7/8	.124	2-3/4	1-5/8	.184	3-1/2	2-5/16	.244	4	2-3/4
.060	1-7/8	7/8	.127	2-3/4	1-5/8	.186	3-1/2	2-5/16	.245	4	2-3/4
.062	1-7/8	7/8	.129	2-7/8	1-3/4	.188	3-1/2	2-5/16	.247	4	2-3/4
.064	2	1	.130	2-7/8	1-3/4	.190	3-1/2	2-5/16	.249	4	2-3/4
.066	2	1	.131	2-7/8	1-3/4	.192	3-5/8	2-7/16	.251	4-1/8	2-7/8
.068	2	1	.132	2-7/8	1-3/4	.193	3-5/8	2-7/16	.253	4-1/8	2-7/8
.069	2	1	.133	2-7/8	1-3/4	.194	3-5/8	2-7/16	.254	4-1/8	2-7/8
.071	2	1	.134	2-7/8	1-3/4	.195	3-5/8	2-7/16	.255	4-1/8	2-7/8
.072	2	1	.135	2-7/8	1-3/4	.197	3-5/8	2-7/16	.256	4-1/8	2-7/8
.074	2	1	.137	2-7/8	1-3/4	.198	3-5/8	2-7/16	.258	4-1/8	2-7/8
.075	2	1	.138	2-7/8	1-3/4	.200	3-5/8	2-7/16	.259	4-1/8	2-7/8
.077	2	1	.139	2-7/8	1-3/4	.202	3-5/8	2-7/16	.260	4-1/8	2-7/8
.078	2	1	.140	2-7/8	1-3/4	.203	3-5/8	2-7/16	.262	4-1/8	2-7/8
.079	2-1/8	1-1/8	.141	3	1-3/4	.205	3-3/4	2-1/2	.263	4-1/8	2-7/8
.080	2-1/8	1-1/8	.142	3	1-3/4	.206	3-3/4	2-1/2	.264	4-1/8	2-7/8
.083	2-1/8	1-1/8	.143	3	1-3/4	.207	3-3/4	2-1/2	.265	4-1/8	2-7/8
.084	2-1/8	1-1/8	.145	3	1-3/4	.208	3-3/4	2-1/2	.267	4-1/8	2-7/8
.085	2-1/8	1-1/8	.146	3	1-3/4	.210	3-3/4	2-1/2	.268	4-1/8	2-7/8
.087	2-1/4	1-1/4	.148	3	1-3/4	.211	3-3/4	2-1/2	.269	4-1/8	2-7/8

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

**DECIMAL
DRILLS**

LIST 1000

Decimal	Length	Flute	Decimal	Length	Flute	Decimal	Length	Flute	Decimal	Length	Flute
.270	4-1/8	2-7/8	.336	4-3/4	3-7/16	.401	5-1/4	3-7/8	.459	5-3/4	4-5/16
.271	4-1/8	2-7/8	.337	4-3/4	3-7/16	.402	5-1/4	3-7/8	.460	5-3/4	4-5/16
.273	4-1/8	2-7/8	.338	4-3/4	3-7/16	.403	5-1/4	3-7/8	.461	5-3/4	4-5/16
.274	4-1/8	2-7/8	.340	4-3/4	3-7/16	.405	5-1/4	3-7/8	.462	5-3/4	4-5/16
.275	4-1/8	2-7/8	.341	4-3/4	3-7/16	.406	5-1/4	3-7/8	.463	5-3/4	4-5/16
.276	4-1/8	2-7/8	.342	4-3/4	3-7/16	.407	5-1/4	3-7/8	.464	5-3/4	4-5/16
.278	4-1/4	2-15/16	.343	4-3/4	3-7/16	.408	5-1/4	3-7/8	.465	5-3/4	4-5/16
.279	4-1/4	2-15/16	.344	4-7/8	3-1/2	.409	5-1/4	3-7/8	.466	5-3/4	4-5/16
.280	4-1/4	2-15/16	.345	4-7/8	3-1/2	.410	5-1/4	3-7/8	.467	5-3/4	4-5/16
.282	4-1/4	2-15/16	.346	4-7/8	3-1/2	.411	5-1/4	3-7/8	.468	5-3/4	4-5/16
.283	4-1/4	2-15/16	.347	4-7/8	3-1/2	.412	5-1/4	3-7/8	.469	5-7/8	4-3/8
.284	4-1/4	2-15/16	.349	4-7/8	3-1/2	.414	5-3/8	3-15/16	.470	5-7/8	4-3/8
.285	4-1/4	2-15/16	.350	4-7/8	3-1/2	.415	5-3/8	3-15/16	.471	5-7/8	4-3/8
.286	4-1/4	2-15/16	.351	4-7/8	3-1/2	.416	5-3/8	3-15/16	.472	5-7/8	4-3/8
.287	4-1/4	2-15/16	.352	4-7/8	3-1/2	.417	5-3/8	3-15/16	.473	5-7/8	4-3/8
.288	4-1/4	2-15/16	.353	4-7/8	3-1/2	.418	5-3/8	3-15/16	.474	5-7/8	4-3/8
.289	4-1/4	2-15/16	.354	4-7/8	3-1/2	.419	5-3/8	3-15/16	.475	5-7/8	4-3/8
.291	4-3/8	3-1/16	.355	4-7/8	3-1/2	.420	5-3/8	3-15/16	.476	5-7/8	4-3/8
.292	4-3/8	3-1/16	.356	4-7/8	3-1/2	.421	5-3/8	3-15/16	.477	5-7/8	4-3/8
.293	4-3/8	3-1/16	.357	4-7/8	3-1/2	.422	5-1/2	4-1/16	.478	5-7/8	4-3/8
.294	4-3/8	3-1/16	.359	4-7/8	3-1/2	.423	5-1/2	4-1/16	.479	5-7/8	4-3/8
.296	4-3/8	3-1/16	.360	5	3-5/8	.424	5-1/2	4-1/16	.480	5-7/8	4-3/8
.297	4-3/8	3-1/16	.361	5	3-5/8	.425	5-1/2	4-1/16	.481	5-7/8	4-3/8
.298	4-3/8	3-1/16	.362	5	3-5/8	.426	5-1/2	4-1/16	.482	5-7/8	4-3/8
.299	4-3/8	3-1/16	.363	5	3-5/8	.427	5-1/2	4-1/16	.483	5-7/8	4-3/8
.300	4-3/8	3-1/16	.364	5	3-5/8	.428	5-1/2	4-1/16	.484	5-7/8	4-3/8
.301	4-3/8	3-1/16	.365	5	3-5/8	.429	5-1/2	4-1/16	.485	6	4-1/2
.303	4-1/2	3-3/16	.366	5	3-5/8	.430	5-1/2	4-1/16	.486	6	4-1/2
.304	4-1/2	3-3/16	.367	5	3-5/8	.431	5-1/2	4-1/16	.487	6	4-1/2
.305	4-1/2	3-3/16	.369	5	3-5/8	.432	5-1/2	4-1/16	.488	6	4-1/2
.306	4-1/2	3-3/16	.370	5	3-5/8	.433	5-1/2	4-1/16	.489	6	4-1/2
.307	4-1/2	3-3/16	.371	5	3-5/8	.434	5-1/2	4-1/16	.490	6	4-1/2
.308	4-1/2	3-3/16	.372	5	3-5/8	.435	5-1/2	4-1/16	.491	6	4-1/2
.309	4-1/2	3-3/16	.373	5	3-5/8	.436	5-1/2	4-1/16	.492	6	4-1/2
.310	4-1/2	3-3/16	.376	5	3-5/8	.438	5-5/8	4-3/16	.493	6	4-1/2
.312	4-1/2	3-3/16	.379	5-1/8	3-3/4	.439	5-5/8	4-3/16	.494	6	4-1/2
.313	4-1/2	3-3/16	.380	5-1/8	3-3/4	.440	5-5/8	4-3/16	.495	6	4-1/2
.314	4-1/2	3-3/16	.381	5-1/8	3-3/4	.441	5-5/8	4-3/16	.496	6	4-1/2
.317	4-5/8	3-5/16	.382	5-1/8	3-3/4	.442	5-5/8	4-3/16	.497	6	4-1/2
.318	4-5/8	3-5/16	.383	5-1/8	3-3/4	.443	5-5/8	4-3/16	.498	6	4-1/2
.319	4-5/8	3-5/16	.384	5-1/8	3-3/4	.444	5-5/8	4-3/16	.499	6	4-1/2
.320	4-5/8	3-5/16	.385	5-1/8	3-3/4	.445	5-5/8	4-3/16	.501"+(see note below)		
.321	4-5/8	3-5/16	.387	5-1/8	3-3/4	.446	5-5/8	4-3/16			
.322	4-5/8	3-5/16	.388	5-1/8	3-3/4	.447	5-5/8	4-3/16			
.324	4-5/8	3-5/16	.389	5-1/8	3-3/4	.448	5-5/8	4-3/16			
.325	4-5/8	3-5/16	.390	5-1/8	3-3/4	.449	5-5/8	4-3/16			
.326	4-5/8	3-5/16	.391	5-1/8	3-3/4	.450	5-5/8	4-3/16			
.327	4-5/8	3-5/16	.392	5-1/8	3-3/4	.451	5-5/8	4-3/16			
.328	4-5/8	3-5/16	.393	5-1/8	3-3/4	.452	5-5/8	4-3/16			
.329	4-3/4	3-7/16	.394	5-1/8	3-3/4	.453	5-5/8	4-3/16			
.330	4-3/4	3-7/16	.395	5-1/8	3-3/4	.454	5-3/4	4-5/16			
.331	4-3/4	3-7/16	.396	5-1/8	3-3/4	.455	5-3/4	4-5/16			
.333	4-3/4	3-7/16	.398	5-1/4	3-7/8	.456	5-3/4	4-5/16			
.334	4-3/4	3-7/16	.399	5-1/4	3-7/8	.457	5-3/4	4-5/16			
.335	4-3/4	3-7/16	.400	5-1/4	3-7/8	.458	5-3/4	4-5/16			

Drills in sizes above .500" can be made either from jobber lengths or in the Silver & Deming pattern, with shanks of 1/2" diameter. Price on Application.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

PROBABLE OVERSIZE VALUES FOR DRILLED HOLES

Most tap drill tables show drill sizes based on a theoretical percentage of full thread. Drills, as a general rule, will produce a hole slightly larger than nominal size. Thus the effective percentage of thread actually produced will be less than the theoretical.

To establish a mean for the amount oversize that a general purpose drill may be expected to cut, a series of tests was conducted by drill manufacturers. Using six sizes of drill, ranging from 1/16" to 1" in diameter, a total of 2,808 holes were drilled in cast iron and steel. Regular high speed steel drills were used with drilling equipment of the type normally found in metal working shops. Drill bushings were not used but reasonable care in starting the drilling cut was exercised to avoid "walking" of the drill point. The average depth of hole drilled was equal to 1-1/2" times the drill diameter. Measurement of the hole was made at mid-point of the depth drilled.

The average of the maximum, minimum and mean amounts oversize are shown in this figure.

The curve shows a marked increase in amount oversize for drills larger than 3/4". For this size range reaming is recommended.

The figures indicate what may be expected under average conditions.

Norm for oversize - average of 468 holes for each drill size - steel and cast iron.

LIST 2000

Step Drills - One drill on the End of Another

A Specialty of the House

A step drill is made by grinding a smaller diameter on the end of an otherwise finished drill. This tool saves much time but, in addition, a step drill has the following advantages:

1. If the stations in a screw machine are filled and another operation is necessary a step drill or a step reamer can often eliminate the costs of second operation work.
2. If two operations can be combined into one and a \$10,000 station on a special machine eliminated then costs are lowered.
3. By using the toolmaker to hold step lengths and related dimensions, tool setup and operator problems are reduced. Part uniformity and product reliability are improved.
4. Burrs on internal surfaces are reduced, diameter concentricities are assured and parts are more likely to meet customer requirements with the use of step drills.

Accelerated deliveries are sometimes available.

See lists 2001 to 2075 for popular sizes carried in stock, page 94.

See lists 1010 to 1012 pages 68 thru 71 for Drill and Ream, a highly specialized form of step drill.

See list 3000 pages 96 & 97 for Subland Drills.

Note difference in $\left\{ \begin{array}{l} \text{construction time} \\ \text{quotation time} \\ \text{fabricating time} \end{array} \right\}$ between step drills and subland drills, page 93.

Try not to confuse step and subland drills by using the names interchangeably.

We will be glad to quote firm prices on receipt of specifications.

When to use Step Drills or Subland Drills Based on Tool Cost of the Holes Produced

A project is being considered by a customer and methods of manufacturing are under discussion. A given hole has two or more diameters and the use of separate individual tool has been rejected. Handling time, complex jigs and fixtures, past bad experience, whatever, the decision is made to use a single tool, a step drill or a subland drill. Which is the most economical?

On the one hand a step drill is relatively cheap and can be produced quickly. The subland construction is more expensive to produce but it can be resharpened and returned to service quickly. Its total life may be six or seven times that of a step drill with corresponding lower tool costs per hole. A more expensive subland tool often turns out to be more economical over its total life. Often the best combination turns out to be a step drill for use while a subland is being constructed. This takes advantage of the shorter time to produce step drills and the better costs of long-lived subland drills. We will be glad to submit quotations on subland drills with major diameter over 1/2".

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

STEP DRILLS TO SPECIFICATIONS

LIST 2000

When designing step drills the lowest costs can be attained by observing the following limits:

Steps must not be less than 1/3 body diameter.

Steps must not exceed 10 diameters in length.

Tolerance on diameters: +.000" -.0005"

Tolerance on lengths: 1/64" ($\pm .008$ ")

Tolerance on angles: $\pm 1^\circ$

Tolerance on concentricity: TIR=.002" or less.

Minimum radius on inside corners: .010"

Closer limits on above elements: price on application.

A.-Large Diameter=_____

B.-Overall Length=_____

C.-Length of Flute=_____

D.-Number of Morse Taper Shank=_____

E.-Point Angle-degrees=_____

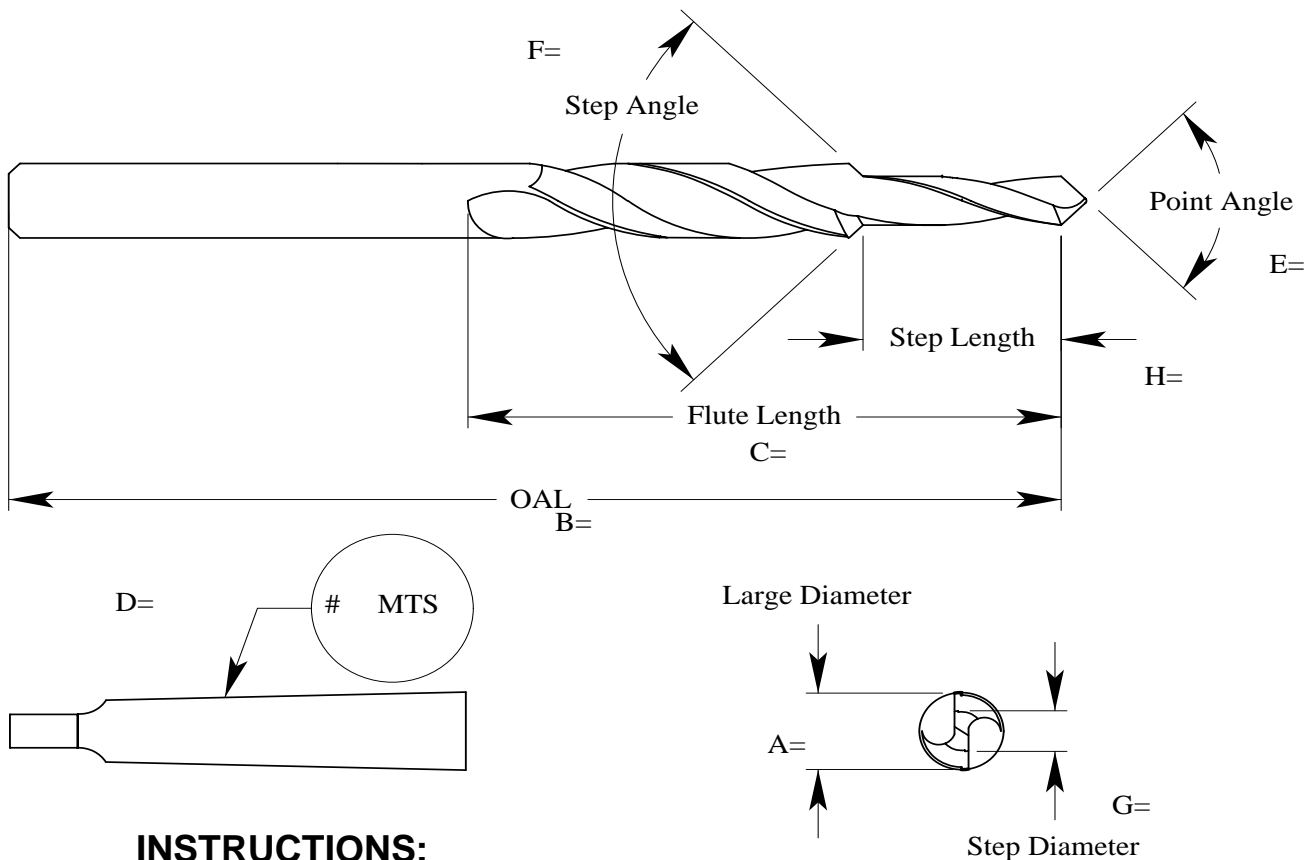
F.-Step Angle-degrees=_____

G.-Step Diameter=_____

Shank Diameter (If different than A)

H.-Step Length=_____

Hayden List #_____



INSTRUCTIONS:

- I. Fill out information requested above.
- II. Specify quantity and minimum number acceptable. We will normally start 1 extra when up to 12 are ordered and 10% extra when more are ordered. If all are finished, all will be shipped and invoiced, unless instructed to the contrary.
- III. If drop shipments are to be made give complete details, including zip.
- IV. Furnish sketch, as shown above, or use one of our set of many undimensioned drawings. Ask for a set. Different styles should make it easy to get exactly the special drill you need.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

Drill and Counterbore For Fillister Head and Socket Head Cap Screws

Tap Size	Drill Major Diameter	Drill Minor Diameter	Step Length	Jobber Length			Taper Length		
				Flute Length	Overall Length	List	Flute Length	Overall Length	List
No. 6	1/4	.150	1/2	2-3/4	4	2001	3-3/4	6-1/8	2011
No. 8	L	.178	1/2	2-15/16	4-1/4	2002	4	6-3/8	2012
No. 10	Q	.204	5/8	3-7/16	4-3/4	2003	4-1/8	6-1/2	2013
1/4	13/32	9/32	11/16	3-7/8	5-1/4	2004	4-3/8	7	2014
5/16	1/2	11/32	3/4	4-1/2	6	2005	4-3/4	7-3/4	2015
3/8	19/32	13/32	7/8	5-3/16	7-1/8	2006	4-7/8	8-3/4	2016
1/2	25/32	17/32	1	Not Available; beyond Jobber Series-			6	9-7/8	2017

Drill and Counterbore For 82° Flat Head Machine Screws

Tap Size	Drill Major Diameter	Drill Minor Diameter	Step Length	Jobber Length			Taper Length		
				Flute Length	Overall Length	List	Flute Length	Overall Length	List
No. 6	9/32	.142	1/2	2-15/16	4-1/4	2021	3-7/8	6-1/4	2031
No. 8	Q	.169	1/2	3-17/16	4-3/4	2022	4-1/8	6-1/2	2032
No. 10	W	.196	5/8	3-3/4	5-1/8	2023	4-3/8	7	2033
1/4	1/2	.257	11/16	4-13/16	6-5/8	2024	4-3/4	7-3/4	2034
5/16	5/8	.320	3/4	5-3/16	7-1/8	2025	4-7/8	8-3/4	2035
3/8	3/4	.383	7/8	-	-	-	5-7/8	9-3/4	2036
1/2	7/8	.510	1	-	-	-	6-1/8	10	2037

Drill Tap Hole For 60-70% Thread and Chamfer 45°

Tap Size	Drill Major Diameter	Drill Minor Diameter	Step Length	Jobber Length			Taper Length		
				Flute Length	Overall Length	List	Flute Length	Overall Length	List
5-40	9/64	.101	1/2	1-3/4	2-7/8	2041	3	5-3/8	2060
6-32	5/32	.109	1/2	2	3-1/8	2042	3	5-3/8	2061
8-32	3/16	.136	1/2	2-5/16	3-1/2	2043	3-3/8	5-3/4	2062
8-36	3/16	.136	1/2	2-5/16	3-1/2	2044	3-3/8	5-3/4	2063
10-24	1/4	.152	5/8	2-3/4	4	2045	3-3/4	6-1/8	2064
10-32	1/4	.161	5/8	2-3/4	4	2046	3-3/4	6-1/8	2065
1/4-20	21/64	.204	13/16	3-5/16	4-5/8	2047	4-1/8	6-1/2	2066
1/4-28	21/64	.218	13/16	3-5/16	4-5/8	2048	4-1/8	6-1/2	2067
5/16-18	13/32	.261	15/16	3-7/8	5-1/4	2049	4-3/8	7	2068
5/16-24	13/32	.272	15/16	3-7/8	5-1/4	2050	4-3/8	7	2069
3/8-16	31/64	.316	1	4-3/8	5-7/8	2051	4-3/4	7-3/4	2070
3/8-24	31/64	.339	1	4-3/8	5-7/8	2052	4-3/4	7-3/4	2071
7/16-14	17/32	.375	1-1/16	4-13/16	6-5/8	2053	4-3/4	8	2072
7/16-20	17/32	.390	1-1/16	4-13/16	6-5/8	2054	4-3/4	8	2073
1/2-13	5/8	.437	1-1/16	5-3/16	7-1/8	2056	4-7/8	8-3/4	2074
1/2-20	5/8	.452	1-1/16	5-3/16	7-1/8	2057	4-7/8	8-3/4	2075

SUBLAND DRILLS - One Drill Inside Another

A subland drill can be described as one drill inside of another. Many variations are possible, such as combining a drill and a reamer, two drills and a reamer, a four flute inside four flutes, tungsten carbide tips and many others, all with the ultimate purpose of lowering the production costs of large volume operations.

The construction time is longer than for a step drill but usually high production runs leave longer time for planning and procuring tooling.

When specifying subland drills please consider the following limits and tolerances:

- A. The small diameter should not be less than 45% of the large diameter: the web for the smaller diameter needs to be strong enough for the large diameter also.
- B. The depth of the hole should not be greater than 3 times the diameter of the small drill. Chip removal is the limiting factor.
- C. Tolerance on Large Diameter: $+.000''-.0012''$ Subland Diameter: $+.000''-.0015''$
- D. Tolerance on step length: $+.008''-.008''$
- E. Tolerance on angles: $2^\circ (\pm 1^\circ)$
- F. Tolerance on concentricity: $.001''$
- G. Closer tolerance affect both delivery and price.

See List 2000, page 94 for Step Drills.

Note difference in $\left\{ \begin{array}{l} \text{construction} \\ \text{quotation time} \\ \text{fabricating time} \end{array} \right\}$ between subland drills and step drills, page 93.

To identify positively the type of subland drill desired use the flute construction names as shown on the next page. Specify as "Subland Drill, 2-2 construction" or 4-4, 2-2 etc., as desired, see next page.

Flute Constructions Available

2-2	Regular Helix, High Helix, Low Helix	
2-2-2	Regular Helix, Low Helix	
3-3	Core Drill, Piloted Counterbore, Reamer	
4-4	Core Drill, Drill & Chamfer, Reamer	
2-4		Drill and Reamer
2-6		Drill and Reamer

Most subland tools are made of high speed steel.
 Solid Carbide and Carbide tipped tools can be quoted.
 Allow 10 days for quotation.

To specify a tool, any tool, the rule is, in sequence:

- | | | | |
|----|---------------------------|-----|------------------------|
| I | Give the largest diameter | III | Name the tool |
| II | Give the overall length | IV | List the modifications |

For example: 5/8" Jobber Length Drill, High Helix, Tanged, with 2-2 subland 1/4" projecting 5/16"

(I) The Diameter (II) Overall Length (III) The Tool (IV) The Modifications

When requesting a price quotation on a special drill do not neglect to specify quantities.
 Machine set-up costs must be allocated over the quantities involved.

We reserve the right to ship over or under ordered quantity by 10%.

We prefer to quote on tool prints rather than part prints.

List 4121

List 4201

For use in high production jobs where tool life and chip removal problems exist. Usually used in deep holes but occasionally short length tools are made with this construction.

Taper shank drills are normally furnished with both side entry in the shank for the oil feed and end entry. Extra long taper shank tools are occasionally either side entry or end entry (if critical, please specify). Straight shank drills, which are usually used in screw machines or turret lathes, have end entry construction. The various types of construction make it desirable to send prints for quotation.

Since oil hole drills have three major advantages working for them, namely, cooling the cutting end of the drill, putting the cutting compound exactly where it is needed, and washing the chips out of the hole, they are very attractive to the tool engineer. Their cost-effectiveness has been demonstrated on many applications.

Extra long oil hole drills are available in the straight shank series in sizes from 1/8" x 6" to 3/4" x 24". In the taper shank style they range from 1/4" x 12" to 2" x 26". Please send us your specifications and we will be pleased to quote.

Low helix angles are useful on certain jobs. We will be pleased to quote on receipt of specifications.

For spindles that are not equipped with oil feed mechanisms there are available drills with coolant inducer glands and drill sockets similarly designed to adapt oil hole drills to non-oil hole machines.

In addition to the lists shown in this catalog we can furnish the following tools, either in standard catalog dimensions or modified to your requirements:

Carbide Burrs	Sets:
Crankshaft Drills	Drill
Die Drills	Reamer
End Mills-Single End and Double End	Reduced Shank
Roughing	Solid Carbide
Miniature	Twist Drills
Extra Long Oil Hole Drills	Blanks
S.S. and T.S.	Reamers
Fishtail Drills	End Mills
Glass Drills, TCT	TCT Step Drills
Reduced Shank Drills	Taps and Dies
(Other than those shown on page 50)	Threaded Shank Drills
Aircraft Routers	Track Bits
	Vent Drills

In addition we carry drills in our Drill Bank, composed of Over Runs, Jobs Cancelled in Process, Manufacturing Mistakes, etc., all priced at bargain rates.

**Table 4: General Dimensions of Tangs for Straight Shank Drills
(To fit Split Sleeve Collet Type Drill Drivers, see ANSI B94.35)**

Nominal Diameter of Drill Shank		Thickness of Tang				Length of Tang	
A		J				K	
Inches	Millimeters	Inches		Millimeters		Inches	Millimeters
		Max.	Min.	Max.	Min.		
1/8 thru 3/16	3.18 thru 4.76	.094	.090	2.39	2.29	9/32	7.0
over 3/16 thru 1/4	over 4.76 thru 6.35	.122	.118	3.10	3.00	5/16	8.0
over 1/4 thru 5/16	over 6.35 thru 7.94	.162	.158	4.11	4.01	11/32	8.5
over 5/16 thru 3/8	over 7.94 thru 9.53	.203	.199	5.16	5.06	3/8	9.5
over 3/8 thru 15/32	over 9.53 thru 11.91	.243	.239	6.17	6.07	7/16	11.0
over 15/32 thru 9/16	over 11.91 thru 14.29	.303	.297	7.70	7.55	1/2	12.5
over 9/16 thru 21/32	over 14.29 thru 16.67	.373	.367	9.47	9.32	9/16	14.5
over 21/32 thru 3/4	over 16.67 thru 19.05	.443	.437	11.25	11.10	5/8	16.0
over 3/4 thru 7/8	over 19.05 thru 22.23	.514	.508	13.05	12.90	11/16	17.5
over 7/8 thru 1	over 22.23 thru 25.40	.609	.601	15.47	15.27	3/4	19.0
over 1 thru 1-3/16	over 25.40 thru 30.16	.700	.692	17.78	17.58	13/16	20.5
over 1-3/16 thru 1-3/8	over 30.16 thru 34.93	.817	.809	20.75	20.55	7/8	22.0

CATALOG NUMERIC LISTING

SEE PAGES 4 AND 5 FOR ALPHABETIC LISTING

LIST NO.	NAME	PAGE NO.
101	General Purpose Jobber Drills - Fraction, Wire, Letter, MM	6-11, 30-32
102	Low Helix Jobber Length Drills	13
103	Heavy Duty Jobber Length Drills	13
104	Parabolic Flute Jobber Length Drills	13
105	General Purpose Jobber Drills - Sets	12
111	General Purpose Screw Machine Length Drills - Fraction, Wire, Letter, MM	17-20, 33-34
114	Parabolic Flute Screw Machine Length	21
121	General Purpose Taper Length - Fraction, Wire, Letter, M/M	23-27, 35-36
122	Heavy Duty Taper Length	40
124	Parabolic Flute Taper Length, M/M	28, 37
141	Silver & Deming Drills	50
171	Left Hand Drills - Jobber Length	13
172	Left Hand Drills - Screw Machine Length	21
181	Combined Drills & Countersinks - Plain RH and LH	51
182	Combined Drills & Countersinks - Bell	51
183	Combined Drills & Countersinks - Extra Long	53
185	Spotting & Centering Drills - RH	54
186	Spotting & Centering Drills - LH	54
187	Spotting & Centering Drills, Jobber Length	55
190-8	★ High Helix Drills - 8" Long	56
190-12	★ High Helix Drills - 12" Long	57
194	High Helix Numeric Control Length Drills	21, 58
195	High Helix Jobber Length	14, 59
196	High Helix Taper Length	28, 41, 59
197	★ High Helix Taper Shank	48, 59
201	M/M, Taper Shank Drills	38-39, 42-45
201-A	Alternate Taper Shank Drills	46
203	Chipbreaker, Taper Shank	48
204	Fat Boy Taper Shank Drills	48
241	Silver & Deming Drills, Cobalt	50
412	★ Four Flute Core Drills, 12" Long S.S. & T.S.	72, 73
418	★ Four Flute Core Drills, 18" Long S.S. & T.S.	73
424	★ Four Flute Core Drills, 24" Long S.S. & T.S.	73
441	★ Four Flute Core Drills, Screw Machine Length	21, 70, 71
443	Four Flute Core Drills, Taper Length	28, 70, 71
444	Four Flute Core Drills, Taper Shank	48, 70, 71
444-A	Four Flute Core Drills, Taper Shank Alternate	48, 70, 71

★ Denotes a unique or hard-to-get item

CATALOG NUMERIC LISTING

SEE PAGES 4 AND 5 FOR ALPHABETIC LISTING

LIST NO.	NAME	PAGE NO.
501	Cobalt Drills, Jobber Length	14
511	Cobalt Drills, Screw Machine	22
521	Cobalt Drills, Taper Length	28
541	Cobalt Drills, Taper Shank	49
561-6	Cobalt Drills, Aircraft Extension	86
561-12	Cobalt Drills, Aircraft Extension	86
581	Cobalt Combined Drills & Countersinks - Plain	52
582	Cobalt Combined Drills & Countersinks - Bell	52
701	★ Longer Than Taper Length Drills	74
702	★ Longboy Drills - 2" Long	74, 75
704	★ Longboy Drills - 4" Long	74, 75
706	Longboy Drills - 6" Long	74, 76
708	Longboy Drills - 8" Long	74, 77
708-C	★ Longboy Drills - 8" Long, Cobalt	77
710	Longboy Drills - 10" Long	74, 78
712	Longboy Drills - 12" Long	74, 79
712-C	★ Longboy Drills - 12" Long, Cobalt	79
718	Longboy Drills - 18" Long	74, 80, 81
724	★ Longboy Drills - 24" Long	74, 81
750	Taper Shank Extra Long Drills	82, 83
761-6	Aircraft Extension Drills - 6" Long	84-86
761-12	Aircraft Extension Drills - 12" Long	84-86
770	★ Straight Flute Drills	15
780	Half Round Drills	15
801	Jobber Length Drills - Carbide Tipped	15
811	Screw Machine Length Drills - Carbide Tipped	22
821	Taper Length Drills - Carbide Tipped	29
831	Taper Shank Drills - Carbide Tipped	49
840	Four Flute Core Drills, Straight Shank - Carbide Tipped	29
844	Four Flute Core Drills, Taper Shank - Carbide Tipped	49
1000	★ Decimal Drills	87, 88
1002	Blanks - Minus Series (Drill)	16
1004	Blanks - Plus Series (Reamer)	16
1007	★ Double Margin Drills	16, 61
1008	Chucking Reamers (To Specifications) RH Helix	62
1009	Chucking Reamers (To Tenths) Listed Sizes, RH Helix	63, 64
1010	★ Drill & Ream, Taper Length	66, 67
1011	★ Drill & Ream, Jobber Length	66, 68
1012	★ Drill & Ream, Screw Machine Length	66, 69
1018	Tungsten Carbide Tipped Reamers	66
2000	★ Step Drills	90-92
2001-2075	★ Step Drills Carried in Stock	92
3000	Subland Drills	93, 94
4000	Oil Hole Drills	95
4121	Oil Hole Drills, Taper Length	29, 95
4201	Oil Hole Drills, Taper Shank	49, 95
5443	★ Cobalt Four Flute Core Drills, Taper Length	23
None	★ Unique Sets	12

★ Denotes a unique or hard-to-get item

HOW TO ORDER DRILLS

- 1st** Give the Maximum Diameter:
1/4", .250", "E", .635mm, etc.
- 2nd** Give the Overall Length:
Jobber Length, Taper Length, Screw Machine Length, 10", 12", 5-7/8" or what-ever.
- 3rd** Name the Tool:
Heavy Duty Drill, High Helix Drill, Left Hand Drill, Reamer, Counterbore, etc.
- 4th** List Features or Variations:
Flute Length, Cobalt, Tanged, Step, 90° Point, Nitrided, Polished Flute, Radius on Outer Corner, other modifications of stock items-or tools started from scratch.
- 5th** Give Limits, if different from USCTI or American Standards.
Note that drill diameters are ALWAYS toleranced in the minus direction. Reason: Drills are often used in drill bushings. This avoids seizing.
- 6th** Furnish Drawings-to avoid errors.
- 7th** Please specify quantity desired as quantity has a vital influence on price.

Finally: We prefer to quote on tool drawings, not part drawings. You know better than we do what machines you have in your shop, chuck capacities, socket sizes, speeds available and all the other features surrounding the tool and its use. Ask for our package of 10 undimensioned drill drawings. For Economy's Sake - *Do not use drills after they have become dull.* The margin behind the point can become so damaged that 5 to 10 times the usual sharpening allowance must be ground away to recondition it. A drill with an .008" wear land is dull!

GLOSSARY

- Bell Type** ----- A combined drill and counter sink with a double angle on the point to produce a protected center hole.
- Cobalt** - ----- Certain of the basic steel analysis to which cobalt has been added.
- Crankshaft** - ----- A heavy duty high helix drill used to drill deep holes, such as oil holes in crankshafts.
- H.D.** ----- Heavy Duty design.
- H.S.S.** ----- High Speed Steel - Any of the analyses shown in tool steel producers' catalogs, such as T1, M2, etc.
- N.C. Length** ----- Numeric Control - 2-1/2" OAL.
- O.A.L.** ----- Over All Length. A drill is measured from the back end of the shank to the outer corner of the lip. The length to the chisel edge is not considered.
- P.O.A.** ----- Price on Application.
- S.M. Length** ----- A jobber length drill with approximately 1/2 the flute cut off for use in screw machines where space is constricted. This is a Screw Machine Length Drill.
- T15** ----- A steel high in Carbon, Tungsten, Vanadium and Cobalt.
- Tang** - ----- The flatted end of the shank which fits into the drill driving device.
- Taper Length** - ----- Same length as a Taper Shank Drill of the same diameter.
- T.S. -Taper Shank** - The drive device frequently used on large and heavy duty drills.
- T.C.T.** ----- Tungsten CarbideTipped.
- TiN** ----- Titanium Nitride Coating.

For "SPEEDY SPECIALS" Call 800-521-1780 HAYDEN TWIST DRILL AND TOOL CO.

CREDIT TERMS

Since credit is a privilege and not a right we are pleased to be able to extend it to any customer with good credit references . We will ask for credit references from new customers. We will continue to extend credit in any amount to anyone so long as they observe our terms of payment: 1% - 10 days, net 30. When those terms are violated we must then withdraw credit. We are neither a bank nor a financing facility nor do we wish to be.

The 1% discount is meant as an incentive reward for prompt payment. A 30, 60 or 90 day delay effectively nullifies that reward and we must re-invoice those firms whose employees think the 1% is an integral part of the pricing.

REMITTANCES

Naturally we welcome all remittances but occasionally we receive some showing a decided lack of common courtesy. We are pleased to request that all our good customers refrain from permitting their employees to:

1. Change our invoices without our permission.
2. Omit payment for some items on an invoice without discussion.
3. Issue a Debit Memo without prior consultation.
4. Use our Credit Memo more than once.

Being only human we are perfectly capable of making mistakes ourselves. When those mistakes are made known to us courteously we will not only correct them but thank you for calling them to our attention. We will even spread the word around so that our employees and our friends will know what well-mannered customers do business with us.

OUR MISTAKES

Should any tools not be in accordance with your specification and the error is our own we will:

1. Authorize the return at once upon notification.
2. Pay transportation both ways.
3. Do everything we can to make up for the time lost by replacing the tools with all the speed within our capabilities.

CAUTION

Cutting tools may shatter or break if not properly used. Careful use will provide the utmost value. The wearing of safety glasses by users and persons in the vicinity is required by Federal Law.

FAX 810-754-3312