

















Solid Carbide Non-Coolant Fed Drills





HIGH PERFORMANCE

		Style 114	High performance, stub length. For high carbon, high alloy and stainless steels, titanium, high temperature alloys, aluminum, bronze, cast and ductile iron. Available in TiN and TiAlN coating.	Page. 10
		Style 113	High performance, stub length. For low to medium carbon steels under 30 Rc/286 Hb and softer stainless steels. TiCN coated.	Page. 12
		Style 118A	High performance, jobber length. For high carbon, high alloy and stainless steels, titanium, high temperature alloys, aluminum, bronze, cast and ductile iron. TiAlN coated	Page. 14
		Style 116	High performance, jobber length. For low to medium carbon steels under 30 Rc/286 Hb, and softer stainless steels. TiCN coated.	Page. 15





GENERAL PURPOSE

		Style 121	High helix, jobber length. For maximum wear resistance and increased penetration rates in short chipping materials. Ideal for gray iron, cast aluminum, brass and bronze.	Page. 16
		Style 111	General purpose flute, stub length. Self-centering four facet point provides efficient drilling of cast iron, cast aluminum, bronze, hard plastics and other non-ferrous materials.	Page. 17
		Style 124	General purpose flute, jobber length. Self-centering four facet point provides efficient drilling of cast iron, cast aluminum, bronze and hard plastics.	Page. 18
		Style 144	Drill/Countersink, double ended construction offers extreme rigidity.	Page. 20

STRAIGHT FLUTE, HEAVY DUTY

		Style 151	Spade style die drill. Straight flute, right hand cut, heavy duty web reduces breakage drilling shallow holes in hardened steels.	Page. 20
		Style 155	Die drill, heavy duty. Straight flute, right hand cut, heavy web construction. Ideal for high accuracy hole drilling in hard metal parts over 40 Rc and abrasive materials.	Page. 21

STRAIGHT FLUTE, BORE DRILLS

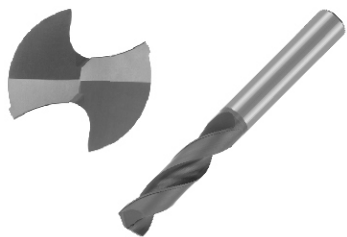
		Style 153	Bore drill/Burnisher, short length. Double margin, flat clearance construction. For cast iron, cast aluminum, cored holes and angular exits.	Page. 22
		Style 154	Bore drill/Burnisher, long length. Double margin, flat clearance construction. For cast iron, cast aluminum, cored holes and angular exits.	Page. 23

Solid Carbide, High Performance, Stub Length Drill

Style 114^(TiN) / 114A^(TiAlN)

Available in TiN or TiAlN coating

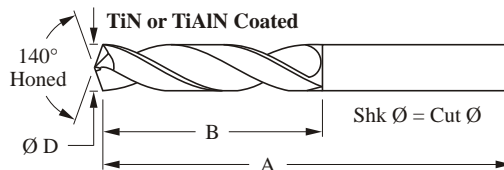
Submicron carbide grade provides maximum wear resistance when cutting high carbon, high alloy and stainless steels, titanium, high temperature alloys, aluminum, bronze, cast and ductile iron.



- Stub length and 140° double split point eliminates spot drilling and reaming in most instances.
- Heavy web, high helix flute clears chips effectively allowing up to five times greater penetration rate vs. standard high speed steel.
- Right hand spiral, right hand cut.
- See style 113 for steel cutting carbide grade.
- Coating adds lubricity, enhances wear resistance and prevents edge build-up. TiAlN coating is recommended for short chipping, abrasive and high temperature materials. TiN coating is recommended for long chipping, low-carbon, ductile and gummy materials.
- Allow 1.5 x Ø of flute for chip exit up to 7/16" (11.1mm) and 1 x Ø over 7/16".

Depth $\approx 3 \times \text{Ø}$

Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -0.0010	+0.000 -0.025	+0.000 -0.0005	+0.000 -0.013



EDP # For TiAlN coating add the letter (A) after EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"					
	Inch/ Wire	mm		Inch	mm	Inch	mm				
11400980	40	2.489	.0980	1-15/16	49.	9/16	14.				
11400984		2.5	.0984								
11400995	39	2.527	.0995								
11401015	38	2.578	.1015								
11401040	37	2.642	.1040	2	51.	5/8	16.				
11401065	36	2.705	.1065								
11401094	7/64	2.779	.1094								
11401100	35	2.794	.1100								
11401110	34	2.819	.1110								
11401130	33	2.87	.1130								
11401160	32	2.946	.1160					2-1/16	52.	11/16	17.
11401181		3.	.1181								
11401200	31	3.048	.1200								
11401250	1/8	3.175	.1250								
11401260		3.2	.1260								
11401285	30	3.264	.1285								
11401299		3.3	.1299								
11401339		3.4	.1339								
11401360	29	3.454	.1360								
11401378		3.5	.1378	2-5/32	55.	25/32	20.				
11401405	28	3.569	.1405								
11401406	9/64	3.571	.1406								
11401417		3.6	.1417								
11401440	27	3.658	.1440								
11401470	26	3.734	.1470								
11401495	25	3.797	.1495								
11401520	24	3.861	.1520								
11401540	23	3.912	.1540					2-7/32	56.	27/32	21.
11401562	5/32	3.967	.1562								
11401570	22	3.988	.1570								
11401575		4.	.1575								
11401590	21	4.039	.1590								
11401610	20	4.089	.1610								
11401614		4.1	.1614								
11401624		4.125	.1624								
11401654		4.2	.1654								

EDP # For TiAlN coating add the letter (A) after EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"					
	Inch/ Wire	mm		Inch	mm	Inch	mm				
11401660	19	4.216	.1660	2-7/32	56.	27/32	21.				
11401673		4.25	.1673								
11401695	18	4.305	.1695								
11401719	11/64	4.366	.1719								
11401730	17	4.394	.1730	2-9/32	58.	29/32	23.				
11401770	16	4.496	.1770								
11401772		4.5	.1772								
11401800	15	4.572	.1800								
11401820	14	4.623	.1820	2-3/8	60.	1	25.				
11401850	13	4.7	.1850								
11401875	3/16	4.763	.1875								
11401890	12	4.801	.1890								
11401910	11	4.851	.1910								
11401929		4.9	.1929								
11401935	10	4.915	.1935								
11401960	9	4.978	.1960	2-7/16	62.	1-1/16	27.				
11401969		5.	.1969								
11401990	8	5.055	.1990								
11402010	7	5.105	.2010								
11402031	13/64	5.159	.2031								
11402040	6	5.182	.2040								
11402055	5	5.22	.2055								
11402090	4	5.309	.2090					2-1/2	64.	1-1/8	29.
11402130	3	5.41	.2130								
11402165		5.5	.2165								
11402188	7/32	5.558	.2188								
11402205		5.6	.2205								
11402210	2	5.613	.2210								
11402280	1	5.791	.2280								
11402340	A	5.944	.2340	2-17/32	64.	1-5/32	29.				
11402344	15/64	5.954	.2344								
11402362		6.	.2362								
11402380	B	6.045	.2380								
11402402		6.1	.2402								
11402420	C	6.147	.2420								

Shk Ø = Cut Ø

Shk Ø = Cut Ø

Solid Carbide, High Performance, Stub Length Drill

Style 114^(TiN) / 114A^(TiAlN)

Available in TiN or TiAlN coating

EDP # For TiAlN coating add the letter (A) after EDP #	Cutting Ø "D"		Dec. Equiv. Inch	Overall Length "A"		Flute Length "B"		EDP # For TiAlN coating add the letter (A) after EDP #	Cutting Ø "D"		Dec. Equiv. Inch	Overall Length "A"		Flute Length "B"									
	Inch/ Wire	mm		Inch	mm	Inch	mm		Inch/ Wire	mm		Inch	mm	Inch	mm								
11402460	D	6.248	.2460	2-19/32	66.	1-7/32	31.	11404219	27/64	10.716	.4219	3-7/16	87.	1-15/16	49.								
11402480		6.3	.2480					11404252		10.8	.4252												
11402500	1/4	6.35	.2500					11404311		10.95	.4311												
11402520		6.4	.2520					11404331		11.	.4331												
11402559		6.5	.2559					11404375	7/16	11.113	.4375												
11402570	F	6.528	.2570	11404488		11.4	.4488	11404528	29/64	11.509	.4528	3-1/2	89.	2	51.								
11402598		6.6	.2598	11404531		11.5	.4531																
11402610	G	6.629	.2610	11404567		11.6	.4567																
11402630		6.68	.2630	2-5/8	67.	1-1/4	32.	11404688	15/32	11.908	.4688	3-15/16	100.	2-3/16	56.								
11402656	17/64	6.746	.2656					11404724		12.	.4724												
11402660	H	6.756	.2660					11404764		12.1	.4764												
11402697		6.85	.2697					11404844	31/64	12.304	.4844												
11402720	I	6.909	.2720					11404862			12.35					.4862							
11402756		7.	.2756	11404882		12.4	.4882																
11402770	J	7.036	.2770	2-11/16	68.	1-5/16	33.	11404921		12.5	.4921	4-7/16	113.	2-3/8	60.								
11402795		7.1	.2795					11404961		12.6	.4961												
11402810	K	7.137	.2810					11405000	1/2	12.7	.5000												
11402812	9/32	7.142	.2812					11405039			12.8					.5039							
11402835		7.2	.2835					11405079			12.9					.5079							
11402900	L	7.366	.2900	11405118		13.	.5118	11405156	33/64	13.096	.5156	4-7/16	113.	2-3/8	60.								
11402950	M	7.493	.2950	11405312	17/32	13.492	.5312																
11402953		7.5	.2953	11405315			13.5									.5315							
11402969	19/64	7.541	.2969	2-3/4	70.	1-3/8	35.	11405354		13.6	.5354	4-1/2	114.	2-1/2	64.								
11402992		7.6	.2992					11405433		13.8	.5433												
11403020	N	7.671	.3020					11405469	35/64	13.891	.5469												
11403071		7.8	.3071					11405512			14.					.5512							
11403125	5/16	7.938	.3125					11405551			14.1					.5551							
11403150		8.	.3150	11405571		14.15	.5571	11405625	9/16	14.288	.5625	4-5/8	117.	2-5/8	67.								
11403160	O	8.026	.3160	11405709		14.5	.5709																
11403189		8.1	.3189	11405748		14.6	.5748																
11403230	P	8.204	.3230	2-7/8	73.	1-1/2	38.	11405781	37/64	14.684	.5781	4-3/4	121.	2-3/4	70.								
11403281	21/64	8.334	.3281					11405906			15.					.5906							
11403320	Q	8.433	.3320					11405938		19/32	15.083					.5938							
11403346		8.5	.3346					11406094	39/64	15.479	.6094												
11403370		8.56	.3370					11406102			15.5					.6102							
11403390	R	8.611	.3390	11406250	5/8	15.875	.6250																
11403438	11/32	8.733	.3438	11406299			16.	.6299															
11403480	S	8.839	.3480	3	76.	1-5/8	41.	11406406	41/64	16.271	.6406	5	127.	3	76.								
11403543		9.	.3543					11406496		16.5	.6496												
11403580	T	9.093	.3580					11406562	21/32	16.667	.6562												
11403594	23/64	9.129	.3594					11406594			16.75					.6594							
11403680	U	9.347	.3680					11406693			17.					.6693							
11403740		9.5	.3740	3-5/16	84.	1-13/16	46.	11406719	43/64	17.066	.6719	5-1/4	133.	3-1/4	83.								
11403750	3/8	9.525	.3750					11406875	11/16	17.463	.6875												
11403770	V	9.576	.3770					11406890		17.5	.6890												
11403819		9.7	.3819					11406929		17.6	.6929												
11403860	W	9.804	.3860					11407031	45/64	17.859	.7031												
11403906	25/64	9.921	.3906	11407087		18.	.7087																
11403937		10.	.3937	11407188	23/32	18.258	.7188																
11403970	X	10.084	.3970	11407283			18.5	.7283															
11404040	Y	10.262	.4040	3-3/8	86.	1-7/8	48.	11407344	47/64	18.654	.7344	5-1/2	140.	3-1/2	89.								
11404062	13/32	10.317	.4062					11407480			19.					.7480							
11404094		10.4	.4094					11407500	3/4	19.05	.7500												
11404130	Z	10.49	.4130																				
11404134		10.5	.4134																				
11404173		10.6	.4173																				

Shk Ø = Cut Ø

Style 113

TiCN coating

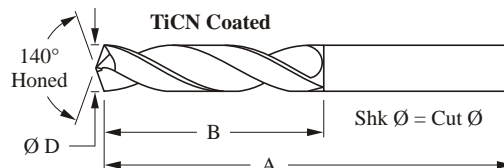


Steel cutting carbide grade provides maximum tool life when cutting low to medium carbon steels under 30 Rc/286 Hb, softer stainless steels.

- Stub length and 140° double split point eliminate spot drilling and reaming in most instances.
- Heavy web and unique flute shape break chips at high feed rates in gummy and stringy materials.
- Right hand spiral, right hand cut.
- TiCN coating adds lubricity, heat resistance and prevents edge build-up.
- See style 114 for non-ferrous materials, hardened steels and stainless.
- Allow 1.5 x Ø of flute for chip exit up to 7/16" (11.1mm) and 1 x Ø over 7/16".

Depth $\approx 3 \times \text{Ø}$

Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -.0010	+0.000 -0.025	+0.000 -.0005	+0.000 -0.013



EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
11301250	1/8	3.175	.1250				
11301260		3.2	.1260				
11301285	30	3.264	.1285	2-1/16	52.	11/16	17.
11301339		3.4	.1339				
11301360	29	3.454	.1360				
11301378		3.5	.1378				
11301405	28	3.569	.1405				
11301406	9/64	3.571	.1406				
11301440	27	3.658	.1440	2-5/32	55.	25/32	20.
11301470	26	3.734	.1470				
11301495	25	3.797	.1495				
11301520	24	3.861	.1520				
11301540	23	3.912	.1540				
11301562	5/32	3.967	.1562				
11301570	22	3.988	.1570				
11301575		4.	.1575				
11301590	21	4.039	.1590	2-7/32	56.	27/32	21.
11301610	20	4.089	.1610				
11301624		4.125	.1624				
11301660	19	4.216	.1660				
11301673		4.25	.1673				
11301695	18	4.305	.1695				
11301719	11/64	4.366	.1719				
11301730	17	4.394	.1730	2-9/32	58.	29/32	23.
11301770	16	4.496	.1770				
11301772		4.5	.1772				
11301800	15	4.572	.1800				
11301820	14	4.623	.1820				
11301850	13	4.7	.1850				
11301875	3/16	4.763	.1875	2-3/8	60.	1	25.
11301890	12	4.801	.1890				
11301910	11	4.851	.1910				

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
11301935	10	4.915	.1935				
11301960	9	4.978	.1960	2-3/8	60.	1	25.
11301969		5.	.1969				
11301990	8	5.055	.1990				
11302010	7	5.105	.2010				
11302031	13/64	5.159	.2031	2-7/16	62.	1-1/16	27.
11302040	6	5.182	.2040				
11302055	5	5.220	.2055				
11302090	4	5.309	.2090				
11302130	3	5.41	.2130				
11302165		5.5	.2165				
11302188	7/32	5.558	.2188	2-1/2	64.	1-1/8	29.
11302205		5.6	.2205				
11302210	2	5.613	.2210				
11302280	1	5.791	.2280				
11302340	A	5.944	.2340				
11302344	15/64	5.954	.2344				
11302362		6.	.2362				
11302380	B	6.045	.2380	2-17/32	64.	1-5/32	29.
11302402		6.1	.2402				
11302420	C	6.147	.2420				
11302460	D	6.248	.2460				
11302500	1/4	6.35	.2500	2-19/32	66.	1-7/32	31.
11302559		6.5	.2559				
11302570	F	6.528	.2570				
11302610	G	6.629	.2610				
11302630		6.68	.2630				
11302656	17/64	6.746	.2656				
11302660	H	6.756	.2660	2-5/8	67.	1-1/4	32.
11302697		6.85	.2697				
11302720	I	6.909	.2720				
11302756		7.	.2756				

Shk Ø = Cut Ø

Style 113 TiCN coating

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
11302770	J	7.036	.2770				
11302795		7.1	.2795				
11302810	K	7.137	.2810	2-11/16	68.	1-5/16	33.
11302812	9/32	7.142	.2812				
11302900	L	7.366	.2900				
11302950	M	7.493	.2950				
11302953		7.5	.2953				
11302969	19/64	7.541	.2969	2-3/4	70.	1-3/8	35.
11303020	N	7.671	.3020				
11303071		7.8	.3071				
11303125	5/16	7.938	.3125				
11303150		8.	.3150	2-13/16	71.	1-7/16	37.
11303160	O	8.026	.3160				
11303189		8.1	.3189				
11303230	P	8.204	.3230				
11303281	21/64	8.334	.3281				
11303320	Q	8.433	.3320	2-7/8	73.	1-1/2	38.
11303346		8.5	.3346				
11303370		8.56	.3370				
11303390	R	8.611	.3390	2-15/16	75.	1-9/16	40.
11303438	11/32	8.733	.3438				
11303480	S	8.839	.3480				
11303543		9.	.3543				
11303580	T	9.093	.3580	3	76.	1-5/8	41.
11303594	23/64	9.129	.3594				
11303680	U	9.347	.3680				
11303740		9.5	.3740				
11303750	3/8	9.525	.3750	3-1/4	83.	1-3/4	44.
11303770	V	9.576	.3770				
11303819		9.7	.3819				
11303860	W	9.804	.3860	3-5/16	84.	1-13/16	46.
11303906	25/64	9.921	.3906				
11303937		10.	.3937				
11303970	X	10.084	.3970				
11304040	Y	10.262	.4040				
11304062	13/32	10.317	.4062				
11304094		10.4	.4094	3-3/8	86.	1-7/8	48.
11304130	Z	10.49	.4130				
11304134		10.5	.4134				
11304173		10.6	.4173				
11304219	27/64	10.716	.4219				
11304252		10.8	.4252	3-7/16	87.	1-15/16	49.
11304311		10.95	.4311				
11304331		11.	.4331				
11304375	7/16	11.113	.4375				
11304488		11.4	.4488				
11304528		11.5	.4528	3-1/2	89.	2	51.
11304531	29/64	11.509	.4531				
11304567		11.6	.4567				
11304688	15/32	11.908	.4688				
11304724		12.	.4724				
11304764		12.1	.4764	3-15/16	100.	2-3/16	56.
11304844	31/64	13.304	.4844				
11304862		12.35	.4862				

Shk Ø = Cut Ø

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
11304882		12.4	.4882				
11304921		12.5	.4921	3-15/16	100.	2-3/16	56.
11304961		12.6	.4961				
11305000	1/2	12.7	.5000				
11305079		12.9	.5079				
11305118		13.	.5118	4-7/16	113.	2-3/8	60.
11305156	33/64	13.096	.5156				
11305312	17/32	13.492	.5312				
11305315		13.5	.5315				
11305354		13.6	.5354				
11305433		13.8	.5433				
11305469	35/64	13.891	.5469				
11305512		14.	.5512	4-1/2	114.	2-1/2	64.
11305551		14.1	.5551				
11305571		14.15	.5571				
11305625	9/16	14.288	.5625				
11305709		14.5	.5709				
11305748		14.6	.5748				
11305781	37/64	14.684	.5781	4-5/8	117.	2-5/8	67.
11305906		15.	.5906				
11305938	19/32	15.083	.5938				
11306094	39/64	15.479	.6094				
11306102		15.5	.6102				
11306250	5/8	15.875	.6250	4-3/4	121.	2-3/4	70.
11306299		16.	.6299				
11306331		16.08	.6331				
11306406	41/64	16.271	.6406				
11306496		16.5	.6496				
11306562	21/32	16.667	.6562	5	127.	3	76.
11306594		16.75	.6594				
11306693		17	.6693				
11306719	43/64	17.066	.6719				
11306875	11/16	17.463	.6875				
11306890		17.5	.6890				
11306929		17.6	.6929				
11307031	45/64	17.859	.7031				
11307087		18.	.7087	5-1/4	133.	3-1/4	83.
11307188	23/32	18.258	.7188				
11307283		18.5	.7283				
11307344	47/64	18.654	.7344				
11307480		19.	.7480				
11307500	3/4	19.05	.7500	5-1/2	140.	3-1/2	89.
11307579		19.25	.7579				

Shk Ø = Cut Ø

Style 118A

TiAlN coating

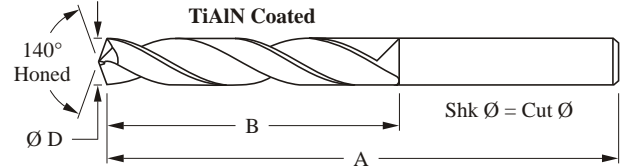


Submicron carbide grade and TiAlN coating provides maximum wear resistance when cutting high carbon, high alloy and stainless steels, titanium, high temperature alloys, aluminum, bronze, cast and ductile iron.

- Jobber length and 140° double split point eliminate spot drilling and reaming in most instances.
- Heavy web, high helix flute clears chips effectively allowing up to five times greater penetration rate vs. standard high speed steel.
- Right hand spiral, right hand cut.
- See style 116 for steel cutting carbide grade.
- TiAlN coating adds lubricity, enhances wear resistance, prevents edge build-up, and is recommended for short chipping, abrasive and high temperature materials.
- Allow 1.5 x Ø of flute for chip exit up to 7/16" (11.1mm) and 1 x Ø over 7/16".

Depth $\approx 4.5 \times \text{Ø}$

Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -0.010	+0.000 -0.025	+0.000 -0.005	+0.000 -0.013



EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
11801250A	1/8	3.175	.1250	2-1/4	57.	7/8	22.
11801378A		3.5	.1378	2-11/32	60.	31/32	25.
11801406A	9/64	3.572	.1406	2-3/8		1	
11801562A	5/32	3.967	.1562	2-15/32	63.	1-1/8	29.
11801575A		4.	.1575				
11801719A	11/64	4.366	.1719	2-5/8	67.	1-1/4	32.
11801772A		4.5	.1772				
11801875A	3/16	4.763	.1875	2-11/16	68.	1-5/16	33.
11801969A		5.	.1969	2-3/4	70.	1-3/8	35.
11802010A	7	5.105	.2010	2-13/16	71.	1-7/16	37.
11802031A	13/64	5.159	.2031				
11802165A		5.5	.2165	2-15/16	75.	1-17/32	39.
11802188A	7/32	5.558	.2188				
11802344A	15/64	5.954	.2344	3	76.	1-5/8	41.
11802362A		6.	.2362				
11802460A	D	6.248	.2460	3-3/16	81.	1-5/8	41.
11802500A	1/4	6.35	.2500				
11802559A		6.5	.2559				
11802570A	F	6.528	.2570				
11802656A	17/64	6.746	.2656	3-1/4	83.	1-23/32	44.
11802720A	I	6.909	.2720				
11802756A		7.	.2756				
11802812A	9/32	7.142	.2812	3-7/16	87.	1-25/32	45.
11802953A		7.5	.2953				
11802969A	19/64	7.541	.2969	3-9/16	90.	1-31/32	48.
11803125A	5/16	7.938	.3125				
11803150A		8.	.3150				
11803230A	P	8.204	.3230	3-25/32	96.	2-3/32	53.
11803281A	21/64	8.334	.3281				
11803320A	Q	8.433	.3320				
11803346A		8.5	.3346	3-7/8	98.	2-13/16	56.
11803438A		8.733	.3438				
11803480A	S	8.839	.3480				
11803543A		9.	.3543				
11803594A	23/64	9.129	.3594				
11803680A	U	9.347	.3680	4-1/32	102.	2-9/32	58.
11803740A		9.5	.3740				
11803750A	3/8	9.525	.3750				
11803860A	W	9.804	.3860	4-1/8	105.	2-3/8	60.
11803906A	25/64	9.921	.3906				

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
11803937A		10.	.3937	4-1/8	105.	2-3/8	60.
11804062A	13/32	10.317	.4062	4-1/8	105.	2-19/32	66.
11804134A		10.5	.4134				
11804219A	27/64	10.716	.4219	4-1/2	114.	2-11/16	68.
11804331A		11.	.4331				
11804375A	7/16	11.113	.4375	4-21/32	118.	2-13/16	71.
11804528A		11.5	.4528				
11804531A	29/64	11.509	.4531				
11804688A	15/32	11.908	.4688	4-25/32	121.	2-7/8	73.
11804724A		12.	.4724				
11804844A	31/64	12.304	.4844	5-5/16	135.	3	76.
11804921A		12.5	.4921	5-13/32	137.	3-3/32	79.
11805000A	1/2	12.7	.5000				
11805118A		13.	.5118				
11805156A	33/64	13.096	.5156	5-11/16	144.	3-5/16	84.
11805312A	17/32	13.492	.5312				
11805315A		13.5	.5315				
11805469A	35/64	13.891	.5469	5-15/16	151.	3-13/32	87.
11805512A		14.	.5512				
11805625A	9/16	14.288	.5625	5-15/16	151.	3-1/2	89.
11805709A		14.5	.5709				
11805781A	37/64	14.684	.5781	6-3/16	157.	3-11/16	94.
11805906A		15.	.5906				
11805938A	19/32	15.083	.5938				
11806094A	39/64	15.479	.6094	6-5/16	160.	3-25/32	96.
11806102A		15.5	.6102				
11806250A	5/8	15.875	.6250				
11806299A		16.	.6299				
11806496A		16.5	.6496	6-19/32	167.	4-1/8	103.
11806562A	21/32	16.667	.6562				
11806693A		17.	.6693				
11806719A	43/64	17.066	.6719				
11806875A	11/16	17.463	.6875				
11806890A		17.5	.6890	7-1/16	179.	4-1/2	114.
11807031A	45/64	17.859	.7031				
11807087A		18.	.7087				
11807283A		18.5	.7283				
11807344A	47/64	18.654	.7344				
11807480A		19.	.7480				
11807500A	3/4	19.05	.7500				

Shk Ø = Cut Ø

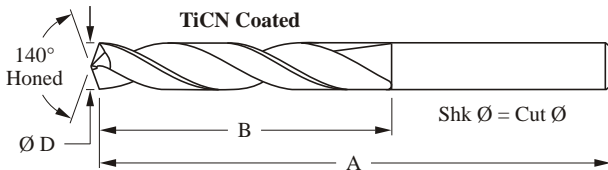
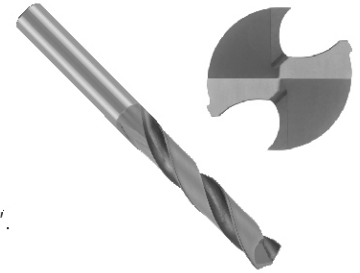
Solid Carbide, High Performance, Jobber Length Drill

Steel cutting carbide grade provides maximum tool life when cutting low to medium carbon steels under 30 Rc/286 Hb, softer stainless steels.

Style 116

TiCN coating

- Solid carbide, heavy web and 140° double split point allow self-starting without spot drilling in many extended reach situations.
- Heavy web and unique flute shape break chips at high feed rates in gummy and stringy materials.
- Right hand spiral, right hand cut.
- See style 118A for non-ferrous materials, hardened steels and stainless.
- TiCN coating adds lubricity, heat resistance and prevents edge build-up.
- Allow 1.5 x Ø of flute for chip exit up to 7/16" (11.1mm) and 1 x Ø over 7/16".



Depth $\cong 4.5 \times \text{Ø}$

Nominal Size	Diameter Tolerances			
	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -0.010	+0.000 -0.025	+0.000 -0.005	+0.000 -0.013

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
	11601250	1/8	3.175	.1250	2-1/4	57.	7/8
11601378		3.5	.1378	2-11/32	60.	31/32	25.
11601406	9/64	3.572	.1406	2-3/8		1	
11601562	5/32	3.967	.1562	2-15/32	63.	1-1/8	29.
11601575		4.	.1575				
11601719	11/64	4.366	.1719	2-5/8	67.	1-1/4	32.
11601772		4.5	.1772				
11601875	3/16	4.763	.1875	2-11/16	68.	1-5/16	33.
11601969		5.	.1969	2-3/4	70.	1-3/8	35.
11602010	7	5.105	.2010	2-13/16	71.	1-7/16	37.
11602031	13/64	5.159	.2031				
11602165		5.5	.2165	2-15/16	75.	1-17/32	39.
11602188	7/32	5.558	.2188				
11602344	15/64	5.954	.2344	3	76.	1-5/8	41.
11602362		6.	.2362				
11602460	D	6.248	.2460	3-3/16	81.	1-5/8	41.
11602500	1/4	6.35	.2500				
11602559		6.5	.2559				
11602570	F	6.528	.2570				
11602656	17/64	6.746	.2656	3-1/4	83.	1-23/32	44.
11602720	I	6.909	.2720				
11602756		7.	.2756				
11602812	9/32	7.142	.2812	3-7/16	87.	1-25/32	45.
11602953		7.5	.2953				
11602969	19/64	7.541	.2969	3-9/16	90.	1-31/32	48.
11603125	5/16	7.938	.3125				
11603150		8.	.3150				
11603230	P	8.204	.3230	3-25/32	96.	2-3/32	53.
11603281	21/64	8.334	.3281				
11603320	Q	8.433	.3320				
11603346		8.5	.3346				
11603438	11/32	8.733	.3438	3-7/8	98.	2-13/16	56.
11603480	S	8.839	.3480				
11603543		9.	.3543				
11603594	23/64	9.129	.3594	4-1/32	102.	2-9/32	58.
11603680	U	9.347	.3680				
11603740		9.5	.3740				
11603750	3/8	9.525	.3750				

Shk Ø = Cut Ø

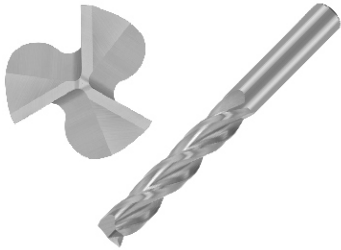
EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
	11603860	W	9.804	.3860	4-1/8	105.	2-3/8
11603906	25/64	9.921	.3906				
11603937		10.	.3937				
11604062	13/32	10.317	.4062	2-19/32	66.		
11604134		10.5	.4134				
11604219	27/64	10.716	.4219	4-1/2	114.	2-11/16	68.
11604331		11.	.4331				
11604375	7/16	11.113	.4375	4-21/32	118.	2-13/16	71.
11604528		11.5	.4528				
11604531	29/64	11.509	.4531				
11604688	15/32	11.908	.4688	4-25/32	121.	2-7/8	73.
11604724		12.	.4724				
11604844	31/64	12.304	.4844	5-5/16	135.	3	76.
11605000	1/2	12.7	.5000	5-13/32	137.	3-3/32	79.
11605118		13.	.5118				
11605156	33/64	13.096	.5156	5-11/16	144.	3-5/16	84.
11605312	17/32	13.492	.5312				
11605315		13.5	.5315				
11605469	35/64	13.891	.5469	5-15/16	151.	3-13/32	87.
11605512		14.	.5512				
11605625	9/16	14.288	.5625				
11605709		14.5	.5709	6-3/16	157.	3-11/16	94.
11605906	19/32	15.	.5906				
11605938		15.083	.5938	6-5/16	160.	3-25/32	96.
11606102		15.5	.6102				
11606250	5/8	15.875	.6250	6-19/32	167.	4-1/8	103.
11606299		16.	.6299				
11606496		16.5	.6496				
11606562	21/32	16.667	.6562	7-1/16	179.	4-1/2	114.
11606693		17.	.6693				
11606875	11/16	17.463	.6875				
11606890		17.5	.6890	47/64	179.	4-1/2	114.
11607031	45/64	17.859	.7031				
11607087		18.	.7087	7-1/16	179.	4-1/2	114.
11607283		18.5	.7283				
11607344	47/64	18.654	.7344				
11607480		19.	.7480	3/4	190.5		
11607500		19.05	.7500				

Shk Ø = Cut Ø

Solid Carbide, 3 Flute, Jobber Length Drill

Style 121

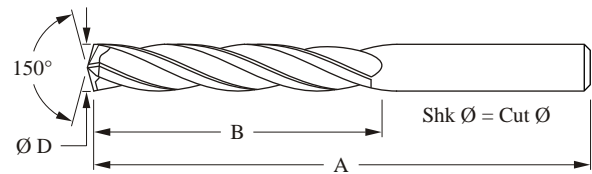
High abrasion resistant carbide provides maximum wear resistance and increased penetration rates in short chipping materials. Ideal for gray iron, brass, bronze.



- 3-flute, high helix construction offers exceptional straightness, diameter tolerances, core drilling capability and can eliminate reaming operations.
- Jobber length and 150° self centering web thinned point can eliminate spot drilling in most applications.
- Excellent hole positioning and size control make this an excellent starting drill.
- Right hand spiral, right hand cut.
- Allow 1.5 x Ø of flute for chip exit up to 7/16" (11.1mm) and 1 x Ø over 7/16".

Depth $\cong 4 \times \text{Ø}$

Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -0.005	+0.000 -0.013	+0.000 -0.020	+0.000 -0.051



EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
12100938	3/32	2.383	.0938	2	51.	1	25.
12100984		2.5	.0984				
12101094	7/64	2.778	.1094	2-1/4	57.	1-1/4	32.
12101250	1/8	3.175	.1250				
12101378		3.5	.1378	2-1/2	64.	1-3/8	35.
12101406	9/64	3.571	.1406				
12101562	5/32	3.967	.1562	2-3/4	70.	1-5/8	41.
12101575		4.	.1575				
12101719	11/64	4.366	.1719	3	76.	1-3/4	44.
12101772		4.5	.1772				
12101875	3/16	4.763	.1875	3-1/4	83.	2	51.
12101969		5.	.1969				
12102031	13/64	5.159	.2031	3-1/2	89.	2-1/8	54.
12102165		5.5	.2165				
12102188	7/32	5.558	.2188	3-3/4	95.	2-3/8	60.
12102344	15/64	5.954	.2344				
12102362		6.	.2362	4	102.	2-1/2	64.
12102500	1/4	6.35	.2500				
12102559		6.5	.2559	4-1/4	108.	2-3/4	70.
12102656	17/64	6.746	.2656				
12102756		7.	.2756	4-1/2	114.	2-7/8	73.
12102812	9/32	7.142	.2812				
12102953		7.5	.2953	4-3/4	121.	3	76.
12102969	19/64	7.541	.2969				
12103125	5/16	7.938	.3125	5	127.	3-1/2	83.
12103150		8.	.3150				
12103281	21/64	8.334	.3281	5-1/2	133.	4	86.
12103346		8.5	.3346				
12103438	11/32	8.733	.3438	6	139.	4-1/2	93.
12103543		9.	.3543				
12103594	23/64	9.129	.3594	6-1/2	145.	5	100.
12103740		9.5	.3740				
12103750	3/8	9.525	.3750				

Shk Ø = Cut Ø

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
12103906	25/64	9.921	.3906	4-1/2	114.	2-7/8	73.
12103937		10.	.3937				
12104062	13/32	10.317	.4062	5	120.	3	76.
12104134		10.5	.4134				
12104219	27/64	10.716	.4219	5-1/2	126.	3-1/2	80.
12104331		11.	.4331				
12104375	7/16	11.113	.4375	6	132.	4	83.
12104528		11.5	.4528				
12104531	29/64	11.509	.4531	6-1/2	138.	4-1/2	86.
12104688	15/32	11.908	.4688				
12104724		12.	.4724	7	144.	5	89.
12104844	31/64	13.304	.4844				
12104921		12.5	.4921	7-1/2	150.	5-1/2	92.
12105000	1/2	12.7	.5000				

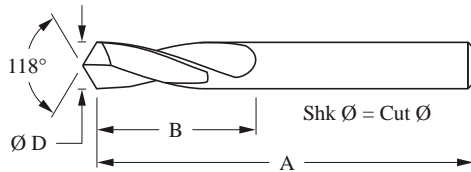
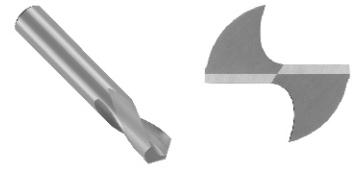
Shk Ø = Cut Ø

Solid Carbide, General Purpose, Stub Length Drill

Standard helix and self-centering four facet point provides efficient drilling of cast iron, aluminum casting, bronze, hard plastics and other non-ferrous materials.

Style 111

- Submicron carbide grade offers additional toughness.
- Short tool length increases accuracy and drill life.
- Right hand spiral, right hand cut.
- Allow 1.5 to 2 x Ø of flute for chip exit.



Depth $\cong 1 \times \text{Ø}$

Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -0.005	+0.000 -0.013	+0.000 -0.020	+0.000 -0.025

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
11100984		2.5	.0984	1-3/4	44.	5/8	16.
11101181		3.	.1181				
11101250	1/8	3.175	.1250	2	51.	5/8	16.
11101378		3.5	.1378				
11101406	9/64	3.571	.1406				
11101562	5/32	3.967	.1562				
11101575		4.	.1575				
11101654		4.2	.1654				
11101719	11/64	4.366	.1719				
11101772		4.5	.1772	2-1/2	64.	3/4	19.
11101875	3/16	4.763	.1875				
11101969		5.	.1969				
11102031	13/64	5.159	.2031				
11102087		5.3	.2087				
11102165		5.5	.2165				
11102188	7/32	5.558	.2188				
11102244		5.7	.2244				
11102344	15/64	5.954	.2344				
11102362		6.	.2362	2-1/2	64.	1	25.
11102500	1/4	6.35	.2500				
11102559		6.5	.2559				
11102656	17/64	6.746	.2656				
11102756		7.	.2756				
11102812	9/32	7.142	.2812				
11102953		7.5	.2953				
11102969	19/64	7.541	.2969				
11103125	5/16	7.938	.3125	2-3/4	70.	1-1/4	32.
11103150		8.	.3150				
11103281	21/64	8.334	.3281				

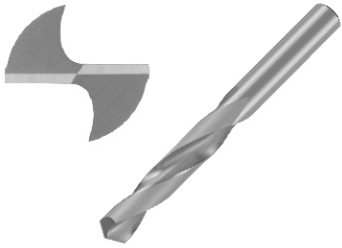
Shk Ø = Cut Ø

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
11103346		8.5	.3346				
11103438	11/32	8.733	.3438				
11103543		9.	.3543				
11103594	23/64	9.129	.3594				
11103740		9.5	.3740				
11103750	3/8	9.525	.3750				
11103906	25/64	9.921	.3906				
11103937		10.	.3937				
11104062	13/32	10.317	.4062				
11104219	27/64	10.716	.4219				
11104331		11.	.4331				
11104375	7/16	11.113	.4375				
11104531	29/64	11.509	.4531				
11104688	15/32	11.908	.4688				
11104844	31/64	12.304	.4844				
11105000	1/2	12.7	.5000				

Shk Ø = Cut Ø

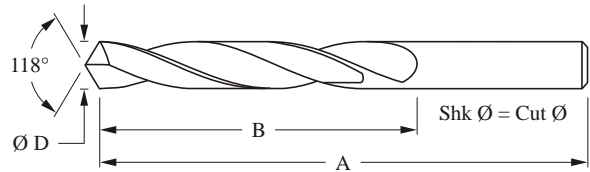
Style 124

Standard helix and self-centering four facet point provides efficient drilling of cast iron, cast aluminum, bronze, hard plastics and other abrasive and easily machined materials.



- Submicron carbide grade offers additional toughness.
- Special parabolic flute and high helix constructions, threaded shank adapters and aerospace split points available upon request.
- Right hand spiral, right hand cut.
- Allow 1.5 to 2 x Ø of flute for chip exit.

Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -0.005	+0.000 -0.013	+0.000 -0.020	+0.000 -0.051



EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"					
	Inch/Wire	mm		Inch	mm	Inch	mm				
12400400	60	1.016	.0400	1-1/2	38.	3/4	19.				
12400410	59	1.041	.0410								
12400420	58	1.067	.0420								
12400430	57	1.092	.0430								
12400465	56	1.181	.0465								
12400469	3/64	1.191	.0469								
12400520	55	1.321	.0520								
12400550	54	1.397	.0550								
12400591		1.5	.0591								
12400595	53	1.511	.0595								
12400625	1/16	1.588	.0625								
12400635	52	1.613	.0635								
12400670	51	1.702	.0670	1-3/4	44.	7/8	22.				
12400700	50	1.778	.0700								
12400730	49	1.854	.0730								
12400760	48	1.93	.0760								
12400781	5/64	1.984	.0781								
12400785	47	1.994	.0785								
12400787		2.	.0787								
12400810	46	2.057	.0810								
12400820	45	2.083	.0820								
12400827		2.1	.0827					2	51.	1	25.
12400860	44	2.184	.0860								
12400890	43	2.261	.0890								
12400925		2.35	.0925								
12400935	42	2.375	.0935								
12400938	3/32	2.383	.0938								
12400960	41	2.438	.0960								
12400980	40	2.489	.0980								
12400984		2.5	.0984								

Shk Ø = Cut Ø

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
12400995	39	2.527	.0995	2-1/4	57.	1-1/4	32.
12401015	38	2.578	.1015				
12401040	37	2.642	.1040				
12401065	36	2.705	.1065				
12401094	7/64	2.779	.1094				
12401100	35	2.794	.1100				
12401110	34	2.819	.1110				
12401130	33	2.87	.1130				
12401142		2.9	.1142				
12401160	32	2.946	.1160				
12401181		3.	.1181				
12401200	31	3.048	.1200				
12401250	1/8	3.175	.1250	2-1/2	64.	1-3/8	35.
12401285	30	3.264	.1285				
12401360	29	3.454	.1360				
12401378		3.5	.1378				
12401405	28	3.569	.1405				
12401406	9/64	3.571	.1406				
12401440	27	3.658	.1440				
12401470	26	3.734	.1470				
12401495	25	3.797	.1495				
12401520	24	3.861	.1520				
12401540	23	3.912	.1540				
12401562	5/32	3.967	.1562				
12401570	22	3.988	.1570				
12401575		4.	.1575				
12401590	21	4.039	.1590				
12401610	20	4.089	.1610				

Shk Ø = Cut Ø

Style 124

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
12401800	15	4.572	.1800	2-3/4	70.	1-5/8	41.
12401820	14	4.623	.1820				
12401850	13	4.7	.1850				
12401875	3/16	4.763	.1875				
12401890	12	4.801	.1890				
12401910	11	4.851	.1910				
12401935	10	4.915	.1935				
12401960	9	4.978	.1960				
12401969		5.	.1969				
12401990	8	5.055	.1990				
12402010	7	5.105	.2010				
12402031	13/64	5.159	.2031				
12402040	6	5.182	.2040				
12402055	5	5.22	.2055	3	76.	1-3/4	44.
12402090	4	5.309	.2090				
12402130	3	5.41	.2130				
12402165		5.5	.2165				
12402188	7/32	5.558	.2188				
12402210	2	5.613	.2210				
12402280	1	5.791	.2280				
12402340	A	5.944	.2340				
12402344	15/64	5.954	.2344				
12402362		6.	.2362				
12402380	B	6.045	.2380				
12402420	C	6.147	.2420				
12402460	D	6.248	.2460				
12402500	1/4	6.35	.2500				
12402559		6.5	.2559				
12402570	F	6.528	.2570				
12402610	G	6.629	.2610				
12402656	17/64	6.746	.2656				
12402660	H	6.756	.2660				
12402720	I	6.909	.2720				
12402756		7.	.2756	3-1/2	89.	2-1/8	54.
12402770	J	7.036	.2770				
12402810	K	7.137	.2810				
12402812	9/32	7.142	.2812				
12402900	L	7.366	.2900				
12402950	M	7.493	.2950				
12402953		7.5	.2953				
12402969	19/64	7.541	.2969				
12403020	N	7.671	.3020				
12403125	5/16	7.938	.3125				
12403150		8.	.3150				
12403160	O	8.026	.3160				
12403230	P	8.204	.3230				

Shk Ø = Cut Ø

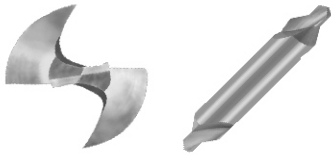
EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch/Wire	mm		Inch	mm	Inch	mm
12403281	21/64	8.334	.3281	4	102.	2-1/2	64.
12403320	Q	8.433	.3320				
12403346		8.5	.3346				
12403390	R	8.611	.3390				
12403438	11/32	8.733	.3438				
12403480	S	8.839	.3480				
12403543		9.	.3543				
12403580	T	9.093	.3580				
12403594	23/64	9.129	.3594				
12403680	U	9.347	.3680				
12403740		9.5	.3740				
12403750	3/8	9.525	.3750				
12403770	V	9.576	.3770				
12403860	W	9.804	.3860				
12403906	25/64	9.921	.3906				
12403937		10.	.3937				
12403970	X	10.084	.3970				
12404040	Y	10.262	.4040				
12404062	13/32	10.317	.4062				
12404130	Z	10.49	.4130				
12404134		10.5	.4134				
12404219	27/64	10.716	.4219				
12404331		11	.4331				
12404375	7/16	11.113	.4375				
12404528		11.5	.4528				
12404531	29/64	11.509	.4531				
12404688	15/32	11.908	.4688				
12404724		12.	.4724				
12404844	31/64	12.304	.4844				
12404921		12.5	.4921				
12405000	1/2	12.7	.5000				

Shk Ø = Cut Ø

Solid Carbide, Double End Drill/Countersink

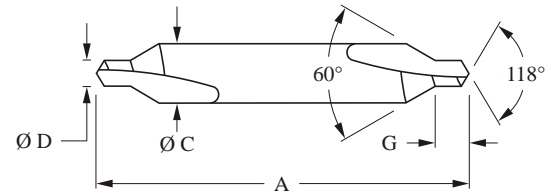
Style 144

Submicron solid carbide construction offers extreme rigidity.



- 118° four facet point.
- Right hand spiral, right hand cut.

Diameter Tolerances				
Nominal Size	Body Ø		Drill Ø	
	Inch	mm	Inch	mm
All	+0.0000 -0.0010	+0.000 -0.025	+0.0030 -0.0000	+0.076 -0.000

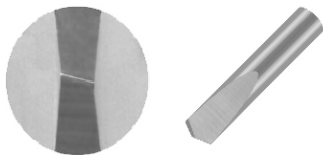


EDP #	Size Designation	Body Diameter "C"			Overall Length "A"		Drill Diameter "D"			Drill Length "G"	
	Inch	Inch	Decimal	mm	Inch	mm	Inch	Decimal	mm	Inch	mm
14400469	1	1/8	.1250	3.175	1-1/4	32.	3/64	.0469	1.191	3/64	1.2
14400781	2	3/16	.1875	4.763	1-7/8	48.	5/64	.0781	1.984	5/64	2.0
14401094	3	1/4	.2500	6.35	2	51.	7/64	.1094	2.779	7/64	2.8
14401250	4	5/16	.3125	7.938	2-1/8	54.	1/8	.1250	3.175	1/8	3.2
14401875	5	7/16	.4375	11.113	2-3/4	70.	3/16	.1875	4.763	3/16	4.8
14402188	6	1/2	.5000	12.7	3	76.	7/32	.2188	5.558	7/32	5.6

Solid Carbide, Spade Style, Die Drill

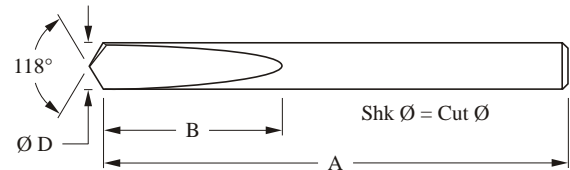
Style 151

Straight flute, right hand cut, heavy duty web reduces breakage drilling shallow holes in hardened steels.



- Solid carbide, 118° point.
- Also see drill Styles 150 & 155.
- Not recommended for more than 2 x Ø deep.

Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.0000 -0.0010	+0.000 -0.025	+0.0000 -0.0010	+0.000 -0.025



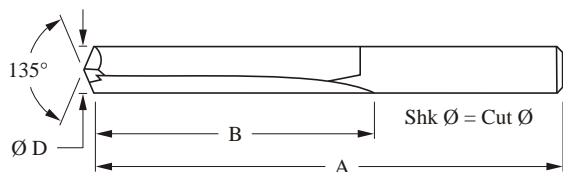
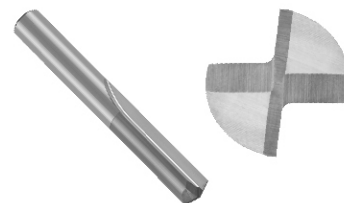
EDP #	Cutting Ø "D"		Decimal Equiv.	Overall Length "A"		Flute Length "B"			
	Inch	mm	Inch	Inch	mm	Inch	mm		
15100625	1/16	1.588	.0625	1-1/2	38.	3/8	10.		
15100781	5/64	1.984	.0781			7/16	11.		
15100938	3/32	2.383	.0938	1-1/2	38.	1/2	13.		
15101250	1/8	3.175	.1250			9/16	14.		
15101562	5/32	3.967	.1562			2	51.	11/16	17.
15101875	3/16	4.763	.1875	7/8	22.				
15102188	7/32	5.558	.2188	2-1/2	64.			7/8	22.
15102500	1/4	6.35	.2500					15/16	24.
15102812	9/32	7.142	.2812	2-1/2	64.	1-1/8	29.		
15103125	5/16	7.938	.3125			2-1/2	64.	1-3/16	30.
15103438	11/32	8.733	.3438	1-5/16	33.				
15103750	3/8	9.525	.3750	1/2	12.7			.5000	
15104062	13/32	10.317	.4062						
15104375	7/16	11.113	.4375	1/2	12.7	.5000			
15104688	15/32	11.908	.4688						
15105000	1/2	12.7	.5000						

Solid Carbide, Straight Flute, Die Drill

Straight flute, right hand cut, heavy web construction is ideal for high accuracy hole drilling in hard metal parts over 40 Rc/371 Hb and abrasive materials.

Style 155

- 135° modified four facet notched thinned point.
- Submicron carbide grade.
- Produces reamer like hole finish, accurate hole size and can be used for coring out pre-existing holes.
- Clear chips frequently and leave 2 x Ø for chip exit.
- Also see die drill Styles 150 & 151.



Depth $\approx 3 \times \text{Ø}$

Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -0.005	+0.000 -0.0254	+0.000 -0.0020	+0.000 -0.0508

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
15500469	3/64	1.191	.0469	1-1/2	38.	1/2	13.
15500625	1/16	1.588	.0625	1-1/2	38.	5/8	16.
15500781	5/64	1.984	.0781	1-11/16	43.	11/16	17.
15500938	3/32	2.383	.0938	1-3/4	44.	3/4	19.
15501094	7/64	2.779	.1094	1-13/16	46.	13/16	21.
15501250	1/8	3.175	.1250	1-7/8	48.	7/8	22.
15501406	9/64	3.571	.1406	1-15/16	49.	15/16	24.
15501562	5/32	3.967	.1562	2-1/16	52.	1	25.
15501719	11/64	4.366	.1719	2-1/8	54.	1-1/16	27.
15501875	3/16	4.763	.1875	2-3/16	56.	1-1/8	29.
15502031	13/64	5.159	.2031	2-1/4	57.	1-3/16	30.
15502188	7/32	5.558	.2188	2-3/8	60.	1-1/4	32.
15502344	15/64	5.954	.2344	2-7/16	62.	1-5/16	33.
15502500	1/4	6.35	.2500	2-1/2	64.	1-3/8	35.
15502656	17/64	6.746	.2656	2-5/8	67.	1-7/16	37.

Shk Ø = Cut Ø

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
15502812	9/32	7.142	.2812	2-11/16	68.	1-1/2	38.
15502969	19/64	7.541	.2969	2-3/4	70.	1-9/16	40.
15503125	5/16	7.938	.3125	2-13/16	71.	1-5/8	41.
15503281	21/64	8.334	.3281	2-15/16	75.	1-11/16	43.
15503438	11/32	8.733	.3438	3	76.	1-11/16	43.
15503594	23/64	9.129	.3594	3-1/16	78.	1-3/4	44.
15503750	3/8	9.525	.3750	3-1/8	79.	1-13/16	46.
15503906	25/64	9.921	.3906	3-1/4	83.	1-7/8	48.
15504062	13/32	10.317	.4062	3-5/16	84.	1-15/16	49.
15504219	27/64	10.716	.4219	3-3/8	86.	2	51.
15504375	7/16	11.113	.4375	3-7/16	87.	2-1/16	52.
15504688	15/32	11.908	.4688	3-5/8	92.	2-1/8	54.
15505000	1/2	12.7	.5000	3-3/4	95.	2-1/4	57.

Shk Ø = Cut Ø

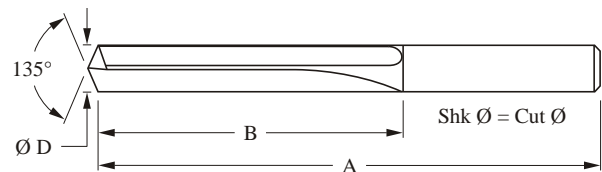
Style 153



Double margin, flat clearance construction produces reamer like finishes and resists walking when cutting aluminum castings, cast iron, cored holes and angular exits.

- Effective chip control up to 3.5 x Ø deep with flood coolant.
- High abrasion resistance carbide.
- Excellent tool life and easy to regrind four facet point.
- Straight flute, right hand cut.
- Step drill and coolant feeding designs available upon request.
- Allow 2.5 x Ø of flute for chip exit up to 1/4" (6.35mm), 2 x Ø up to 7/16" (11.1mm) and 1.5 x Ø over 7/16".

Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -0.005	+0.000 -0.013	+0.000 -0.020	+0.000 -0.025



EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
15300938	3/32	2.383	.0938	2	51.	1	25.
15300984		2.5	.0984				
15301094	7/64	2.779	.1094	2-1/4	57.	1-1/4	32.
15301181		3.	.1181				
15301250	1/8	3.175	.1250	2-1/2	64.	1-3/8	35.
15301378		3.5	.1378				
15301406	9/64	3.571	.1406	2-3/4	70.	1-5/8	41.
15301562	5/32	3.967	.1562				
15301575		4.	.1575	3	76.	1-3/4	44.
15301719	11/64	4.366	.1719				
15301772		4.5	.1772	3-1/4	83.	2	51.
15301875	3/16	4.763	.1875				
15301969		5.	.1969	3-3/4	95.	2-3/8	60.
15302031	13/64	5.159	.2031				
15302165		5.5	.2165	4	102.	2-1/2	64.
15302188	7/32	5.558	.2188				
15302344	15/64	5.954	.2344	4-1/4	108.	2-3/4	70.
15302362		6.	.2362				
15302500	1/4	6.35	.2500	3-1/2	89.	2-1/8	54.
15302559		6.5	.2559				
15302656	17/64	6.746	.2656	3-3/4	95.	2-3/8	60.
15302756		7.	.2756				
15302812	9/32	7.142	.2812	4	102.	2-1/2	64.
15302953		7.5	.2953				
15302969	19/64	7.541	.2969	4-1/4	108.	2-3/4	70.
15303125	5/16	7.938	.3125				
15303150		8.	.3150	3-1/2	89.	2-1/8	54.
15303281	21/64	8.334	.3281				
15303346		8.5	.3346	5-1/4	133.	3-1/2	89.
15303438	11/32	8.733	.3438				
15303543		9.	.3543	5-1/2	140.	3-5/8	92.
15303594	23/64	9.129	.3594				

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
15303740		9.5	.3740	4-1/4	108.	2-3/4	70.
15303750	3/8	9.525	.3750				
15303906	25/64	9.921	.3906	4-1/2	114.	2-7/8	73.
15303937		10.	.3937				
15304062	13/32	10.317	.4062	4-3/4	121.	3	76.
15304134		10.5	.4134				
15304219	27/64	10.716	.4219	5	127.	3-1/4	83.
15304331		11.	.4331				
15304375	7/16	11.113	.4375	5-1/4	133.	3-1/2	89.
15304528		11.5	.4528				
15304531	29/64	11.509	.4531	5-1/2	140.	3-5/8	92.
15304688	15/32	11.908	.4688				
15304724		12.	.4724	5-1/4	133.	3-1/2	89.
15304844	31/64	12.304	.4844				
15304921		12.5	.4921	5-1/2	140.	3-5/8	92.
15305000	1/2	12.7	.5000				
15305118		13.	.5118	5-1/4	133.	3-1/2	89.
15305156	33/64	13.096	.5156				
15305312	17/32	13.492	.5312	5-1/2	140.	3-5/8	92.
15305315		13.5	.5315				
15305469	35/64	13.891	.5469	5-1/4	133.	3-1/2	89.
15305512		14.	.5512				
15305625	9/16	14.288	.5625	5-1/2	140.	3-5/8	92.
15305709		14.5	.5709				
15305781	37/64	14.684	.5781	5-1/4	133.	3-1/2	89.
15305906		15.	.5906				
15305938	19/32	15.083	.5938	5-1/2	140.	3-5/8	92.
15306094	39/64	15.479	.6094				
15306102		15.5	.6102	5-1/4	133.	3-1/2	89.
15306250	5/8	15.875	.6250				
15306299		16	.6299	5-1/2	140.	3-5/8	92.
15306875	11/16	17.463	.6875				

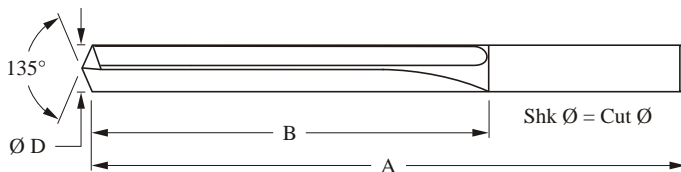
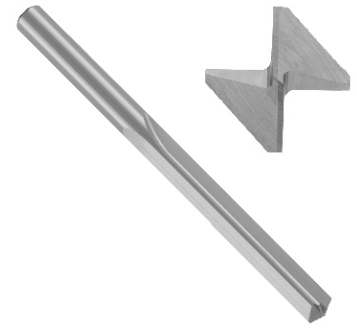
Shk Ø = Cut Ø

Solid Carbide, Long Length, Bore Drill/Burnisher

Style 154

Double margin, flat clearance construction produces reamer like finishes and resists walking when cutting aluminum castings, cast iron, cored holes and angular exits.

- Effective chip control up to 3.5 x Ø deep with flood coolant.
- High abrasion resistance carbide.
- Straight flute, right hand cut.
- Excellent tool life and easy to regrind four facet point.
- Step drill and coolant feeding designs available upon request.
- Allow 2.5 x Ø of flute for chip exit up to 1/4" (6.35mm),
2 x Ø up to 7/16" (11.1mm) and 1.5 x Ø over 7/16".



Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
All	+0.000 -.0005	+0.000 -0.013	+0.000 -.0010	+0.000 -0.025

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
15400938	3/32	2.383	.0938	2-15/16	75.	31/32	25.
15400984		2.5	.0984				
15401094	7/64	2.779	.1094	3-9/32	83.	1-9/32	33.
15401181		3.	.1181				
15401250	1/8	3.175	.1250				
15401378		3.5	.1378				
15401406	9/64	3.571	.1406	3-1/2	89.	1-9/16	40.
15401562	5/32	3.967	.1562				
15401575		4.	.1575				
15401719	11/64	4.366	.1719	3-29/32	99.	1-7/8	48.
15401772		4.5	.1772				
15401875	3/16	4.763	.1875				
15401969		5.	.1969				
15402031	13/64	5.159	.2031	3-29/32	99.	2-1/16	52.
15402165		5.5	.2165				
15402188	7/32	5.558	.2188				
15402344	15/64	5.954	.2344				
15402362		6.	.2362	5	127.	2-5/16	59.
15402500	1/4	6.35	.2500				
15402559		6.5	.2559				
15402656	17/64	6.746	.2656	5	127.	2-9/16	65.
15402756		7.	.2756				
15402812	9/32	7.142	.2812				
15402953		7.5	.2953				
15402969	19/64	7.541	.2969	5	127.	2-13/16	71.
15403125	5/16	7.938	.3125				
15403150		8.	.3150				
15403281	21/64	8.334	.3281	5-1/2	140.	3	76.
15403346		8.5	.3346				
15403438	11/32	8.733	.3438				
15403543		9.	.3543				
15403594	23/64	9.129	.3594	5-1/2	140.	3-3/16	81.

EDP #	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Flute Length "B"	
	Inch	mm		Inch	mm	Inch	mm
15403740		9.5	.3740				
15403750	3/8	9.525	.3750				
15403906	25/64	9.921	.3906	5-1/2	140.	3-7/16	87.
15403937		10.	.3937				
15404062	13/32	10.317	.4062				
15404134		10.5	.4134				
15404219	27/64	10.716	.4219	5-7/8	149.	3-11/16	94.
15404331		11.	.4331				
15404375	7/16	11.113	.4375				
15404528		11.5	.4528				
15404531	29/64	11.509	.4531	5-7/8	149.	3-29/32	99.
15404688	15/32	11.908	.4688				
15404724		12.	.4724				
15404844	31/64	12.304	.4844	6-5/16	160.	4-1/8	105.
15404921		12.5	.4921				
15405000	1/2	12.7	.5000				
15405118		13.	.5118				
15405156	33/64	13.096	.5156				
15405312	17/32	13.492	.5312				
15405315		13.5	.5315	6-5/8	168.	4-7/16	113.
15405469	35/64	13.891	.5469				
15405512		14.	.5512				
15405625	9/16	14.288	.5625				
15405709		14.5	.5709				
15405781	37/64	14.684	.5781				
15405906		15.	.5906				
15405938	19/32	15.083	.5938				
15406094	39/64	15.479	.6094	6-11/16	170.	4-7/8	124.
15406102		15.5	.6102				
15406250	5/8	15.875	.6250				
15406299		16.	.6299				
15406875	11/16	17.463	.6875				

Shk Ø = Cut Ø

End Mill Guidelines

Select the shortest possible length of cut and largest end mill permissible for the application. This will allow greater rigidity, increased feed rates and improved tool life. Deflection and chip load will be less with a larger diameter end mill. The feed per tooth (FPT) value is a critical factor in choosing the proper end mill because this will determine the amount of material removed per tooth, workpiece finish and tool life.

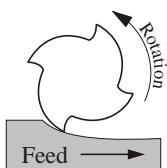
2-Flute end mills are excellent multi-purpose tools providing high feed rates with maximum chip volume and used for plunge milling, peripheral milling, roughing of slots and where dimensional accuracy and part finish is not critical. Use a two flute for milling softer materials at higher speeds & feeds when more chip space is needed or machine horsepower is not adequate.

4-Flute end mills are commonly used for finishing and dimensional accuracy. The added rigidity of a four flute makes it much stronger than a two flute allowing for greater metal removal rates, minimum deflection and improved workpiece finishes. Select a four flute for milling tougher materials at reduced speeds and feeds. Deep plunge cutting is not recommended.

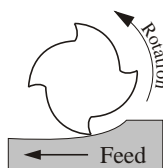
Speed/Feed

The proper selection of speed & feed are the two most important factors to be considered for the efficient and economical use of any style cutting tool. Approximate ranges of speeds & feeds can be found on page 25, and should be considered only a starting point as variations will be needed to achieve optimum results. Exact speed & feed will depend on machine condition, work holding fixture, type of tool material, material machinability, tool coatings, available coolant, etc. Solid carbide end mills should be run at greater speeds than high speed steel end mills so it is extremely important to maintain rigid set-ups and well maintained machinery.

Speeds should be increased when milling softer materials, lighter cuts or finishing. Decreased speeds should be used for a heavy or slotting cut and hard/tough materials. Reduce SFM as material hardness increases. Workpiece finish may improve with lighter cuts at higher speeds however a thick chip is desirable as a fine feed may cause rapid wear to the cutting edge. When milling hardened steels up to 60 Rc a tan colored chip indicates proper operating parameters. If chips are blue or dark blue the speeds are too high. White chips or no color change indicates the speeds are too low. Coolant is highly recommended when milling steel and high temperature alloys to improve performance and help prevent recutting of chips that may damage the tool cutting edge. The condition of the end mill should be monitored for the first sign of any dulling and be replaced or re-ground before permanent workpiece or tool damage occurs.



Climb Milling means the cutter revolves in the same direction as the table feed producing the thickest part of the chip first. Generally climb milling will improve surface finish and tool life.



Conventional Milling means the cutter revolves in the opposite direction of the table feed. The width of the chip starts at zero and increases to maximum at the end of the cut. Under some conditions this may lead to accelerated tool wear.

End Milling - Metal removal by feeding the workpiece into a revolving cutter.

Peripheral Milling - The machining of an edge surface of a part.

Plunge Cut - Direct plunging into the face of a part or feeding in an axial direction.

Tool Coatings

AlTiN (Aluminum Titanium Nitride) is a coating recommended for cutting all steels, cast iron, stainless steel, forming, die casting, hardened steel work-pieces, nickel based high temperature alloys and titanium alloys. AlTiN coating has excellent oxidation resistance in higher temperature conditions allowing dry or semi-dry machining with higher speed and feed rates.

TiCN (Titanium Carbonitride) is a high performance coating for improving wear resistance to abrasive or difficult to machine materials such as low carbon steel, cast iron and aluminum. TiCN coating is excellent for milling, forming and mechanically stressed cutting where high speed & feed rates are required and when low to moderate temperatures are generated at the cutting edge.

Solid Carbide Standard Length End Mills

SQUARE END



Style 304

Square end, four flute, center cutting, 30° right hand spiral, right hand cut. Also available with AlTiN or TiCN coating.

Page. 26



Style 302

Square end, two flute, center cutting, 30° right hand spiral, right hand cut. Also available with AlTiN or TiCN coating.

Page. 27

BALL NOSE



Style 314

Ball nose, four flute, center cutting, 30° right hand spiral, right hand cut. Also available with AlTiN or TiCN coating.

Page. 28



Style 312

Ball nose, two flute, center cutting, 30° right hand spiral, right hand cut. Also available with AlTiN or TiCN coating.

Page. 29

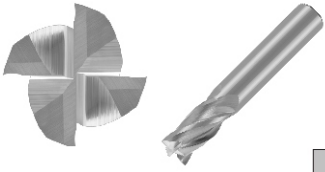
End Mill Speed and Feed Recommendations

MATERIAL	SPEED (SFM)	FEED PER TOOTH (FPT)				
		1/8"	1/4"	1/2"	3/4"	1"
Aluminum /Aluminum Alloys	1000-2000	.001	.002	.004	.006	.008
Magnesium	1000-min	.001	.002	.004	.006	.008
Brass	300-450	.001	.002	.003	.004	.005
Bronze	250-350	.001	.002	.003	.004	.005
Copper / Copper Alloys	500-1,100	.001	.002	.003	.005	.007
FRP Thermoset	200-600	.001	.002	.003	.004	.005
Thermoplastics	800-1600	.001	.003	.006	.010	.015
Graphite	200-400	.001	.005	.010	.015	.020
Cast Iron - (ductile)	250-500	.0005	.0015	.002	.004	.006
(grey)	350-500	.0005	.002	.004	.006	.008
(malleable)	250-500	.0005	.002	.004	.006	.008
Nickel Alloys	150-250	.0005	.001	.002	.003	.004
Steel - (low carbon)	350-500	.0005	.001	.002	.004	.006
(medium carbon)	200-400	.0005	.001	.002	.004	.006
Steel Alloys - (39-45 Rc)	200-250	.0003	.0005	.001	.002	.003
(46-51 Rc)	80-150	.0002	.0005	.001	.002	.003
(52-86 Rc)	35-100	.0002	.0005	.001	.002	.003
Stainless Steel - (free machining)	250-350	.0005	.001	.002	.004	.006
(work hardening)	200-350	.0005	.005	.001	.003	.005
Titanium - (soft)	150-300	.0005	.001	.002	.004	.006
(hard)	50-150	.0005	.0005	.001	.002	.004

Note: The suggested speed and feed rates should be considered only a starting point to be adjusted in order to achieve optimum results.

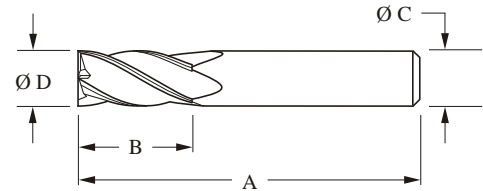
Solid Carbide, 4 Flute, Square End Mill (Center Cut)

Style 304^(Uncoated) / 304A^(AlTiN) / 304C^(TiCN)



- Standard length, 30° right hand spiral, right hand cut.
- For general purpose milling in a wide range of materials.
- Submicron carbide grade for increased wear resistance and toughness.
- Superior performance and tool life over H.S.S.

Diameter Tolerances					
Nominal Size	Cutting Ø		Shank Ø		
	Inch	mm	Inch	mm	
Through	.2500"	+0.000	+0.000		
	6.35mm	-.002	-0.051	+0.000	+0.000
.2501"	1.0000"	+0.000	+0.000	-.0005	-0.013
	6.352mm	-.003	-0.076		



EDP # For coating add the letter (A or C) after the EDP number.	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Length of Cut "B"		Shank Diameter "C"	
	Inch	mm		Inch	mm	Inch	mm	Inch	mm
30401250	1/8	3.175	.1250	1-1/2	38.	1/2	13.	1/8	3.175
30401562	5/32	3.967	.1562	2	51.	9/16	14.	3/16	4.763
30401875	3/16	4.763	.1875			5/8	16.		
30402188	7/32	5.558	.2188	2-1/2	64.	3/4	19.	1/4	6.35
30402500	1/4	6.35	.2500					5/16	7.938
30402812	9/32	7.142	.2812					7/8	22.
30403125	5/16	7.938	.3125	2-1/2	64.	1	25.	3/8	9.525
30403438	11/32	8.733	.3438						
30403750	3/8	9.525	.3750	2-3/4	70.	1	25.	7/16	11.113
30404062	13/32	10.317	.4062						
30404375	7/16	11.113	.4375	3	76.	1	25.	1/2	12.7
30404688	15/32	11.908	.4688						
30405000	1/2	12.7	.5000	3-1/2	89.	1-1/4	32.	9/16	14.288
30405625	9/16	14.288	.5625					5/8	15.875
30406250	5/8	15.875	.6250	4	102.	1-1/2	38.	3/4	19.05
30407500	3/4	19.05	.7500					7/8	22.225
30408750	7/8	22.225	.8750	4	102.	1-1/2	38.	1	25.4
30410000	1	25.4	1.0000					1	25.4

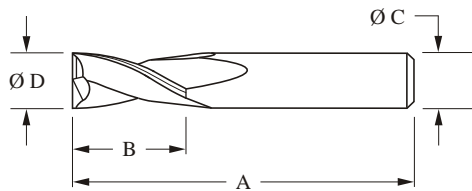
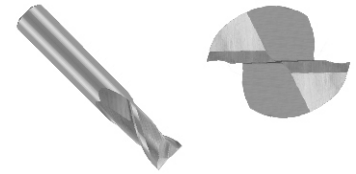
Metric Sizes

EDP # For coating add the letter (A or C) after the EDP number.	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Length of Cut "B"		Shank Diameter "C"
	mm	Inch		mm	Inch	mm	Inch	
30401181	3.	.1181	38.	1-1/2	12.	15/32	3.	
30401575	4.	.1575	51.	2	14.	35/64	4.	
30401969	5.	.1969				5/8	5.	
30402362	6.	.2362	64.	2-1/2	19.	3/4	6.	
30402756	7.	.2756					8.	
30403150	8.	.3150	64.	2-1/2	22.	55/64	8.	
30403543	9.	.3543					10.	
30403937	10.	.3937	76.	3	25.	63/64	10.	
30404724	12.	.4724					12.	
30405512	14.	.5512	89.	3-1/2	32.	1-17/64	14.	
30406299	16.	.6299					16.	
30407087	18.	.7087	102.	4	38.	1-1/2	18.	
30407874	20.	.7874					20.	
30408661	22.	.8661					22.	
30409843	25.	.9843					25.	

Solid Carbide, 2 Flute, Square End Mill (Center Cut)

302C ^(TiCN) / **302A** ^(AlTiN) / (Uncoated) **Style 302**

- Standard length, 30° right hand spiral, right hand cut.
- Two flute construction for maximum chip evacuation.
- Submicron carbide grade for increased wear resistance and toughness.
- Superior performance and tool life over H.S.S.



Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
Through	.2500"	+ .000	+0.000	
	6.35mm	- .002	-0.051	+0.000
.2501"	1.0000"	+ .000	+0.000	-0.013
	6.352mm To 25.4mm	- .003	-0.076	

EDP # For coating add the letter (A or C) after the EDP number.	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Length of Cut "B"		Shank Diameter "C"	
	Inch	mm		Inch	mm	Inch	mm	Inch	mm
30201250	1/8	3.175	.1250	1-1/2	38.	1/2	13.	1/8	3.175
30201562	5/32	3.967	.1562	2	51.	9/16	14.	3/16	4.763
30201875	3/16	4.763	.1875			5/8	16.		
30202188	7/32	5.558	.2188	2-1/2	64.	3/4	19.	1/4	6.35
30202500	1/4	6.35	.2500						
30202812	9/32	7.142	.2812						
30203125	5/16	7.938	.3125	2-1/2	64.	13/16	21.	5/16	7.938
30203438	11/32	8.733	.3438			7/8	22.	3/8	9.525
30203750	3/8	9.525	.3750			1	25.		
30204062	13/32	10.317	.4062	2-3/4	70.	1	25.	7/16	11.113
30204375	7/16	11.113	.4375						
30204688	15/32	11.908	.4688	3	76.	1	25.	1/2	12.7
30205000	1/2	12.7	.5000						
30205625	9/16	14.288	.5625	3-1/2	89.	1-1/4	32.	9/16	14.288
30206250	5/8	15.875	.6250					5/8	15.875
30207500	3/4	19.05	.7500					3/4	19.05
30208750	7/8	22.225	.8750	4	102.	1-1/2	38.	7/8	22.225
30210000	1	25.4	1.0000					1	25.4

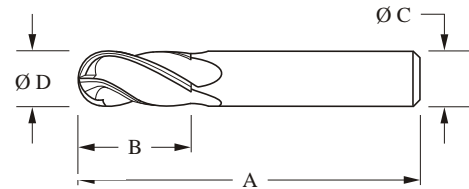
Solid Carbide, 4 Flute, Ball Nose End Mill (Center Cut)

Style 314^(Uncoated) / 314A^(AlTiN) / 314C^(TiCN)



- Standard length, 30° right hand spiral, right hand cut.
- Full radius ball for contour milling.
- Submicron carbide grade for increased wear resistance and toughness.
- Superior performance and tool life over H.S.S.

Diameter Tolerances					
Nominal Size	Cutting Ø		Shank Ø		
	Inch	mm	Inch	mm	
Through	.2500"	+0.000	+0.000		
	6.35mm	-.002	-0.051	+0.000	+0.000
To	1.0000"	+0.000	+0.000	-.0005	-0.013
	25.4mm	-.003	-0.076		

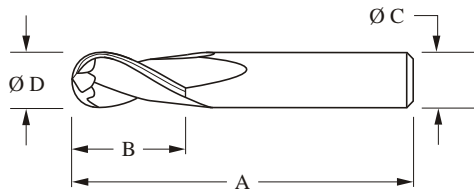
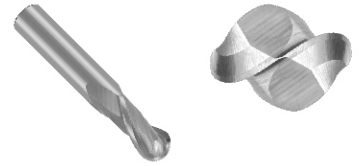


EDP # For coating add the letter (A or C) after the EDP number.	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Length of Cut "B"		Shank Diameter "C"	
	Inch	mm		Inch	mm	Inch	mm	Inch	mm
31401250	1/8	3.175	.1250	1-1/2	38.	1/2	13.	1/8	3.175
31401562	5/32	3.967	.1562	2	51.	9/16	14.	3/16	4.763
31401875	3/16	4.763	.1875			5/8	16.		
31402188	7/32	5.558	.2188	2-1/2	64.	3/4	19.	1/4	6.35
31402500	1/4	6.35	.2500						
31402812	9/32	7.142	.2812						
31403125	5/16	7.938	.3125	2-1/2	64.	13/16	21.	5/16	7.938
31403438	11/32	8.733	.3438						
31403750	3/8	9.525	.3750	2-3/4	70.	1	25.	7/16	11.113
31404062	13/32	10.317	.4062						
31404375	7/16	11.113	.4375						
31404688	15/32	11.908	.4688	3	76.	1	25.	1/2	12.7
31405000	1/2	12.7	.5000						
31405625	9/16	14.288	.5625	3-1/2	89.	1-1/4	32.	9/16	14.288
31406250	5/8	15.875	.6250					5/8	15.875
31407500	3/4	19.05	.7500	4	102.	1-1/2	38.	3/4	19.05
31408750	7/8	22.225	.8750					7/8	22.225
31410000	1	25.4	1.0000					1	25.4

Solid Carbide, 2 Flute, Ball Nose End Mill (Center Cut)

312C^(TiCN) / 312A^(AlTiN) / (Uncoated) Style 312

- Standard length, 30° right hand spiral, right hand cut.
- Two flute construction for maximum chip evacuation.
- Submicron carbide grade for increased wear resistance and toughness.
- Superior performance and tool life over H.S.S.



Diameter Tolerances				
Nominal Size	Cutting Ø		Shank Ø	
	Inch	mm	Inch	mm
Through .2500"	.2500"	+0.000	+0.000	+0.000
	6.35mm	-.002	-0.051	+0.000
.2501" To 6.352mm	1.0000"	+0.000	+0.000	-0.013
	25.4mm	-.003	-0.076	

EDP # For coating add the letter (A or C) after the EDP number.	Cutting Ø "D"		Dec. Equiv.	Overall Length "A"		Length of Cut "B"		Shank Diameter "C"	
	Inch	mm		Inch	mm	Inch	mm	Inch	mm
31201250	1/8	3.175	.1250	1-1/2	38.	1/2	13.	1/8	3.175
31201562	5/32	3.967	.1562	2	51.	9/16	14.	3/16	4.763
31201875	3/16	4.763	.1875			5/8	16.		
31202188	7/32	5.558	.2188	2-1/2	64.	3/4	19.	1/4	6.35
31202500	1/4	6.35	.2500						
31202812	9/32	7.142	.2812						
31203125	5/16	7.938	.3125	2-1/2	64.	13/16	21.	5/16	7.938
31203438	11/32	8.733	.3438			7/8	22.	3/8	9.525
31203750	3/8	9.525	.3750			1	25.		
31204062	13/32	10.317	.4062	2-3/4	70.	1	25.	7/16	11.113
31204375	7/16	11.113	.4375						
31204688	15/32	11.908	.4688	3	76.	1	25.	1/2	12.7
31205000	1/2	12.7	.5000						
31205625	9/16	14.288	.5625	3-1/2	89.	1-1/4	32.	9/16	14.288
31206250	5/8	15.875	.6250					5/8	15.875
31207500	3/4	19.05	.7500					3/4	19.05
31208750	7/8	22.225	.8750	4	102.	1-1/2	38.	7/8	22.225
31210000	1	25.4	1.0000					1	25.4