

VALUE AT THE SPINDLE®



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HIGH PERFORMANCE CARBIDE DRILLS

The key features designed into the Hi-PerCarb[®] Series 146U and 136U Drills allow the product to offer application benefits not only beyond that of standard carbide drills, but also other High Performance drills. Each feature of the Hi-PerCarb[®] Series 146U and 136U Drills was uniquely engineered as a solution towards addressing the issues commonly encountered during high production drilling.

NEW SERIES

SERIES 146U / 136U

ECCENTRIC 4-MARGIN DESIGN

- a unique coolant channel design allows repositioning of the trailing margins for improved stability over conventional two and four margin drills
- eccentric style clearance reduces margin contact with the workpiece without reducing strength

END GEOMETRY

В

- the primary only relief allows the trailing margins to help stabilize the drill up to three times faster than conventional designs
- high shear corner geometry minimizes exit bur
- computer controlled edge hone protects against edge chipping in difficult applications

COOLANT CHANNELS

 the two-channel design provides additional coolant in the hole when thru-tool coolant is not available

D COATING AND CARBIDE

- proprietary SGS Ti-NAMITE[®]-X coating and post-coat polishing combine to minimize material adhesion and maximize wear resistance in a wide range of workpiece materials
- all Series 146U and 136U drills are manufactured from lab certified premium quality carbide

PERFORMANCE. PRECISION. PASSION. HI-PERCARB[®] SERIES 146U/136U FLAT BOTTOM DRILLS



PERFORMANCE.

HOLE DIAMETER VARIATION

4140 alloy steel / 19 HRc 2700 rpm / 25.4 ipm straight blind holes with flood coolant

CMM diameter measurement of ten random holes shows the size variation produced by the Series 136U is ten times better than the competition.

TOOL LIFE

4140 alloy steel / 19 HRc 2700 rpm / 25.4 ipm straight blind holes with flood coolant

Tool life testing was performed until each drill exhibited sufficient damage to stop the test. Results show the Series 136U lasts 40 percent longer than competitor 2 and 250 percent longer than competitor 1.

WALL STRAIGHTNESS 4140 alloy steel / 19 HRc

2700 rpm / 25.4 ipm 30° angle with flood coolant

Wall straightness of holes drilled on a 30° angle show the Series 136U produced 39 percent less deflection than competitor 3 and 57 percent less than competitor 2. During this test all tools were extended from the holder at an equal amount.



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146U 3xD FRACTIONAL & METRIC SERIES

• 4 margin dasign				inch & mm					EDP NO.	TOLERANCES (inch)
improves accuracy and surface finish along with	DECIMAL DC	METRIC DC	FRACTIONAL/ Letter/wire DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE®-X (TX)	≤.1181 DIAMETER DC = +.00008/+.00047
aggressive drilling	0.1181	3,000 mm		6,0	55,0	13,0	9,0	34,0	67705	DCON = h ₆
Specialized self-	0.1220	3,100 mm		6,0	55,0	14,0	9,0	34,0	67706	>.1181–.2362 DIAMETER
eliminates the need for	0.1250	3,175 mm	1/8	6,0	55,0	14,0	10,0	34,0	58800	DC = +.00016/+.00063
spot drilling decreasing	0.1260	3,200 mm		6,0	55,0	14,0	10,0	34,0	67707	DCON = h ₆
Engineered edge	0.1299	3,300 mm		6,0	55,0	15,0	10,0	34,0	67708	>.2362–.3937 DIAMETER
protection improves edge	0.1339	3,400 mm		6,0	55,0	15,0	10,0	34,0	67709	DC = +.00024/+.00083
edge fatigue allowing for	0.1360	3,454 mm	#29	6,0	55,0	16,0	10,0	34,0	58801	
increased feed rates	0.1378	3,500 mm		6,0	55,0	16,0	11,0	34,0	67710	>.39377087 DIAMETER
 Recommended for materials ≤ 56 HRc 	0.1405	3,569 mm	#28	6,0	55,0	16,0	11,0	34,0	58802	DCON = h ₆
(≤ 577 Bhn)	0.1406	3,571 mm	9/64	6,0	55,0	16,0	11,0	34,0	58803	> 7087-1 1811 DIAMETER
	0.1417	3,600 mm		6,0	55,0	16,0	11,0	34,0	67711	DC = +.00031/+.00114
	0.1457	3,700 mm		6,0	60,0	17,0	11,0	34,0	67712	DCON = h ₆
	0.1470	3,734 mm	#26	6,0	60,0	17,0	11,0	34,0	58804	
	0.1495	3,797 mm	#25	6,0	60,0	17,0	11,0	34,0	58805	TOLERANCES (mm)
	0.1496	3,800 mm		6,0	60,0	17,0	11,0	34,0	67713	≤ 3 DIAMETER
	0.1520	3,861 mm	#24	6,0	60,0	17,0	12,0	34,0	58806	DC = +0,002/+0,012
	0.1535	3,900 mm		6,0	60,0	18,0	12,0	34,0	67714	DCON = h ₆
	0.1562	3,967 mm	5/32	6,0	60,0	18,0	12,0	34,0	58807	>3–6 DIAMETER
	0.1570	3,988 mm	#22	6,0	60,0	18,0	12,0	34,0	58808	DC = +0,004/+0,016
	0.1575	4,000 mm		6,0	60,0	18,0	12,0	34,0	67715	DCON = h ₆
	0.1590	4,039 mm	#21	6,0	60,0	18,0	12,0	34,0	58809	>6–10 DIAMETER
	0.1610	4,089 mm	#20	6,0	60,0	18,0	12,0	34,0	58810	DC = +0,006/+0,021
	0.1614	4,100 mm		6,0	60,0	18,0	12,0	34,0	67716	
	0.1654	4,200 mm		6,0	60,0	19,0	13,0	34,0	67717	>1U-18 DIAMETER
	0.1693	4,300 mm		6,0	60,0	19,0	13,0	34,0	67718	DCON = h_6
	0.1719	4,366 mm	11/64	6,0	60,0	20,0	13,0	34,0	58811	18-30 DIAMETER
	0.1732	4,400 mm		6,0	60,0	20,0	13,0	34,0	67719	DC = +0,008/+0,029
	0.1770	4,496 mm	#16	6,0	60,0	20,0	13,0	34,0	58812	DCON = h ₆
	0.1772	4,500 mm		6,0	60,0	20,0	14,0	34,0	67720	
	0.1811	4,600 mm		6,0	60,0	21,0	14,0	34,0	67721	STEELS
	0.1850	4,699 mm	#13	6,0	60,0	21,0	14,0	34,0	58813	STAINI ESS STEELS
	0.1875	4,763 mm	3/16	6,0	60,0	21,0	14,0	34,0	58814	
	0.1890	4,801 mm	#12	6,0	65,0	22,0	14,0	33,0	58815	CAST IRON
	0.1929	4,900 mm		6,0	65,0	22,0	15,0	33,0	67724	NON-FERROUS
	0.1935	4,915 mm	#10	6,0	65,0	22,0	15,0	33,0	58816	HIGH TEMP ALLOYS
	0.1969	5,000 mm		6,0	65,0	23,0	15,0	33,0	67725	
	0.2008	5,100 mm		6,0	65,0	23,0	15,0	33,0	67726	HANDENED STEELS
	0.2010	5,105 mm	#7	6,0	65,0	23,0	15,0	33,0	58817	For patent
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Fractional & Metric

Series 146U 3xD

information visit www.ksptpatents.com



146U 3xD FRACTIONAL & METRIC SERIES

			inch & mm					EDP NO.	CONTIN
DECIMAL DC	METRIC DC	FRACTIONAL/ Letter/Wire DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE®-X (TX)	CONTIN
0.2031	5,159 mm	13/64	6,0	65,0	23,0	15,0	33,0	58818	
0.2047	5,200 mm		6,0	65,0	23,0	16,0	33,0	67727	
0.2087	5,300 mm		6,0	65,0	24,0	16,0	33,0	67728	
0.2090	5,309 mm	#4	6,0	65,0	24,0	16,0	33,0	58819	
0.2126	5,400 mm		6,0	65,0	24,0	16,0	33,0	67729	
0.2130	5,410 mm	#3	6,0	65,0	24,0	16,0	33,0	58820	
0.2165	5,500 mm		6,0	65,0	25,0	16,0	33,0	67730	
0.2188	5,558 mm	7/32	6,0	65,0	25,0	17,0	33,0	58821	
0.2205	5,600 mm		6,0	65,0	25,0	17,0	33,0	67731	
0.2244	5,700 mm		6,0	65,0	26,0	17,0	33,0	67732	
0.2283	5.800 mm		6.0	65.0	26.0	17.0	33.0	67733	
0.2323	5.900 mm		6.0	65 <i>.</i> 0	27.0	18.0	33.0	67734	
0.2344	5.954 mm	15/64	6.0	65.0	27.0	18.0	33.0	58822	
0.2362	6.000 mm	,	6.0	65.0	27.0	18.0	33.0	67735	
0.2402	6,100 mm		8.0	70.0	28.0	19.0	34.0	67736	
0.2441	6,200 mm		8.0	70.0	28.0	19.0	34.0	67737	
0 2461	6 250 mm		8.0	70.0	28.0	19.0	34.0	67738	
0 2480	6 300 mm		8.0	70.0	28.0	19.0	34.0	67739	
0 2500	6 350 mm	1/4 F #0	8.0	70.0	29.0	19.0	34.0	58823	
0.2520	6 400 mm	1,12,0	8.0	70.0	29.0	19.0	34.0	67740	
0 2559	6 500 mm		8.0	70.0	29.0	19.0	34.0	67741	
0.2570	6 528 mm	F	8.0	70.0	29.0	20.0	34.0	58824	
0 2598	6 600 mm	•	8.0	70.0	30.0	20.0	34.0	67742	
0.2638	6,700 mm		8.0	70.0	30.0	20.0	34.0	67743	
0 2656	6 746 mm	17/64	8.0	70.0	30.0	20.0	34.0	58825	
0.2677	6.800 mm	,•.	8.0	70.0	31.0	20.0	34.0	67744	
0.2717	6.900 mm		8.0	70.0	31.0	21.0	34.0	67745	
0.2720	6.909 mm	1	8.0	70.0	31.0	21.0	34.0	58826	
0.2756	7.000 mm	·	8.0	75.0	32.0	21.0	34.0	67746	
0.2795	7.100 mm		8.0	75.0	32.0	21.0	34.0	67747	
0.2812	7.142 mm	9/32	8.0	75.0	32.0	21.0	34.0	58827	
0.2835	7.200 mm	0,01	8.0	75.0	32.0	22.0	34.0	67748	
0.2854	7.250 mm		8.0	75.0	33.0	22.0	34.0	67749	
0.2874	7,300 mm		8.0	75.0	33.0	22.0	34.0	67750	
0.2913	7,400 mm		8.0	75.0	33.0	22.0	34.0	67751	
0.2953	7,500 mm		8.0	75.0	34.0	23.0	34.0	67752	
0.2969	7.541 mm	19/64	8.0	75.0	34.0	23.0	34.0	58828	
0.2992	7 <i>.</i> 600 mm	,	8.0	75.0	34.0	23.0	34.0	67753	
0.3031	7,700 mm		8.0	75.0	35.0	23.0	34.0	67754	
0.3071	7,800 mm		8.0	75.0	35.0	23.0	34.0	67755	
0.3110	7,900 mm		8.0	75.0	36.0	24.0	34.0	67756	
0.3125	7.938 mm	5/16	8.0	75.0	36.0	24.0	34.0	58829	
0.3150	8,000 mm	-, . •	8.0	75.0	36.0	24.0	34.0	67757	
0.3189	8,100 mm		10.0	80.0	36.0	24.0	34.0	67758	
0.3228	8,200 mm		10.0	80.0	37.0	25.0	34.0	67759	
0.3268	8.300 mm		10.0	80.0	37.0	25.0	34.0	67760	







146U 3xD **FRACTIONAL & METRIC SERIES**

Fractional & Metric

Series 146U 3xD

• 1 margin dosign				inch & mm					EDP NO.	TOLERANCES (inch)
improves accuracy and surface finish along with increased strength for	DECIMAL DC	METRIC DC	FRACTIONAL/ Letter/Wire DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE [®] -X (TX)	≤.1181 DIAMETER DC = +.00008/+.00047
aggressive drilling	0.3281	8,334 mm	21/64	10,0	80,0	38,0	25,0	34,0	58830	DCON = h ₆
 Specialized self- centering potched point 	0.3307	8,400 mm		10,0	80,0	38,0	25,0	34,0	67761	>.1181–.2362 DIAMETER
eliminates the need for	0.3320	8,433 mm	۵	10,0	80,0	38,0	25,0	34,0	58831	DC = +.00016/+.00063
spot drilling decreasing thrust and deflection	0.3346	8,500 mm		10,0	80,0	38,0	25,0	34,0	67762	DCUN = n ₆
Engineered edge	0.3386	8,600 mm		10,0	80,0	39,0	26,0	34,0	67763	>.23623937 DIAMETER
protection improves edge	0.3425	8,700 mm		10,0	80,0	39,0	26,0	34,0	67764	DC = +.00024/+.00083
edge fatigue allowing for	0.3438	8,733 mm	11/32	10,0	80,0	39,0	26,0	34,0	58832	2007 7007 DIAMETER
increased feed rates	0.3465	8,800 mm		10,0	80,0	40,0	26,0	34,0	67765	>.39377087 DIAMETER
 Recommended for materials ≤ 56 HRc 	0.3504	8,900 mm		10,0	80,0	40,0	27,0	34,0	67766	DCON = h ₆
(≤ 577 Bhn)	0.3543	9,000 mm		10,0	80,0	40,0	27,0	34,0	67767	> 7087_1 1811 DIAMETER
	0.3583	9,100 mm		10,0	80,0	41,0	27,0	34,0	67768	DC = +.00031/+.00114
	0.3594	9,129 mm	23/64	10,0	80,0	41,0	27,0	34,0	58833	DCON = h ₆
	0.3622	9,200 mm		10,0	80,0	41,0	28,0	35,0	67769	
	0.3661	9,300 mm		10,0	85,0	42,0	28,0	35,0	67770	TOLERANCES (mm)
	0.3680	9,347 mm	U	10,0	85,0	42,0	28,0	35,0	58834	≤ 3 DIAMETER
	0.3701	9,400 mm		10,0	85,0	42,0	28,0	35,0	67771	DC = +0,002/+0,012
	0.3740	9,500 mm		10,0	85,0	43,0	28,0	35,0	67772	DCON = h ₆
	0.3750	9,525 mm	3/8	10,0	85,0	43,0	29,0	35,0	58835	>3–6 DIAMETER
	0.3780	9,600 mm		10,0	85,0	43,0	29,0	35,0	67773	DC = +0,004/+0,016
	0.3819	9,700 mm		10,0	85,0	44,0	29,0	35,0	67774	DCUN = n ₆
	0.3858	9,800 mm		10,0	85,0	44,0	29,0	35,0	67775	>6–10 DIAMETER
	0.3898	9,900 mm		10,0	85,0	45,0	30,0	35,0	67776	DC = +0,006/+0,021
	0.3906	9,921 mm	25/64	10,0	85,0	45,0	30,0	35,0	58836	
	0.3937	10,000 mm		10,0	85,0	45,0	30,0	35,0	67777	
	0.3970	10,084 mm	Х	12,0	90,0	46,0	31,0	36,0	58837	DCON = h_6
	0.3976	10,100 mm		12,0	90,0	46,0	31,0	36,0	67778	18_30 DIAMETER
	0.4016	10,200 mm		12,0	90,0	46,0	31,0	36,0	67779	DC = +0,008/+0,029
	0.4040	10,262 mm	Y	12,0	90,0	46,0	31,0	36,0	58838	DCON = h ₆
	0.4055	10,300 mm		12,0	90,0	46,0	31,0	36,0	67780	
	0.4062	10,317 mm	13/32	12,0	90,0	46,0	31,0	36,0	58839	STEELS
	0.4094	10,400 mm		12,0	90,0	47,0	31,0	36,0	67781	STAINI ESS STEELS
	0.4134	10,500 mm		12,0	90,0	47,0	32,0	36,0	67782	
	0.4173	10,600 mm		12,0	90,0	48,0	32,0	36,0	67783	CAST IRON
	0.4213	10,700 mm		12,0	90,0	48,0	32,0	36,0	67784	NON-FERROUS
	0.4219	10,716 mm	27/64	12,0	90,0	48,0	32,0	36,0	58840	HIGH TEMP ALLOYS
	0.4252	10,800 mm		12,0	90,0	49,0	32,0	36,0	67785	
	0.4291	10,900 mm		12,0	90,0	49,0	33,0	36,0	67786	HARDENED STEELS
	0.4331	11,000 mm		12,0	95,0	50,0	33,0	36,0	67787	For patent

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CONTINUED

								TIAU
			inch & mm					EDP NO.
DECIMAL DC	METRIC DC	FRACTIONAL/ Letter/wire DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE"-X (TX)
0.4370	11,100 mm		12,0	95,0	50,0	33,0	36,0	67788
0.4375	11,113 mm	7/16	12,0	95,0	50,0	33,0	36,0	58841
0.4409	11,200 mm		12,0	95,0	50,0	34,0	36,0	67789
0.4449	11.300 mm		12.0	95.0	51.0	34.0	36.0	67790
0.4488	11.400 mm		12.0	95.0	51.0	34.0	36.0	67791
0.4528	11.500 mm		12.0	95.0	52.0	35.0	36.0	67792
0.4531	11.509 mm	29/64	12.0	95.0	52.0	35.0	36.0	58842
0.4567	11.600 mm	,	12.0	95.0	52.0	35.0	36.0	67793
0.4606	11.700 mm		12.0	95.0	53.0	35.0	36.0	67794
0.4646	11.800 mm		12.0	95.0	53.0	35.0	36.0	67795
0.4685	11.900 mm		12.0	95.0	54.0	36.0	36.0	67796
0.4688	11.908 mm	15/32	12.0	95.0	54.0	36.0	36.0	58843
0.4724	12.000 mm	.0,01	12.0	95.0	54.0	36.0	36.0	67797
0.4844	12.304 mm	31/64	14.0	105.0	55.0	37.0	37.0	58844
0 4921	12 500 mm	01,01	14.0	105.0	56.0	37.0	37.0	67798
0 5000	12,000 mm	1/2	14.0	105,0	57.0	38.0	37.0	58845
0 5039	12,800 mm	•, =	14.0	105.0	58.0	38.0	37.0	67799
0.5118	13 000 mm		14.0	105,0	58.0	39.0	37.0	67800
0.5156	13 096 mm	33/64	14.0	105,0	59.0	39.0	37.0	58846
0.5312	13 492 mm	17/32	14.0	105,0	61.0	40.0	37.0	58847
0.5315	13 500 mm	17/02	14,0	105,0	61.0	40,0	37.0	67801
0.5469	13 891 mm	35/64	14.0	105,0	63.0	42.0	37.0	58848
0.5405	1/ 000 mm	55/04	1/1 0	105,0	63.0	42,0 //2 0	37,0	67802
0.5625	14,000 mm	9/16	16.0	115.0	64 0	42,0	38.0	58849
0.5025	1/1 500 mm	5/10	16.0	115.0	65.0	40,0	38 D	67803
0.5781	14,500 mm	37/64	16.0	115.0	66 0	44,0	38.0	58850
0 5906	15 000 mm	07/01	16.0	115.0	68.0	45.0	38.0	67804
0.5038	15,000 mm	19/32	16.0	115.0	68.0	45.0	38.0	58851
0.0000	15,000 mm	39/64	16.0	115.0	70.0	46.0	38.0	58852
0.6102	15,170 mm	00,01	16.0	115.0	70.0	46.0	38.0	67805
0.6250	15,300 mm	5/8	16.0	115.0	71.0	48.0	38.0	58853
0.6299	16 000 mm	5/0	16.0	115.0	72 0	48.0	38.0	67806
0.6205	16 271 mm	41/64	18.0	130.0	73.0	49 N	44 N	58854
0.6496	16 500 mm		18.0	130.0	74 0	49.0	44.0	67807
0.0450	16 667 mm	21/32	18.0	130,0	75.0	-5,0 50.0	44,0 // 0	58855
0.0302	17 000 mm	21/32	18.0	130,0	73,0	51.0	44,0	67808
0.0000	17,000 mm	13/61	18.0	130,0	77,0	51.0	44,0 // 0	58856
0.6275	17,000 mm	11/16	18.0	130,0	79.0	52.0	44,0 11 0	58857
0.0075	17,403 IIIII 17,500 mm	11/10	18.0	130,0	73,0 70 N	52,0	44,0 // 0	67800
0.0030	17,500 mm	15/61	18.0	130,0	80 0	54.0	44,0 // 0	58858
0.7031	18 000 mm	+J/U4	10,0	120.0	Q1 0	54,0	44,0 11 0	67810
0.7007	18 259 mm	22/22	20.0	1/0 0	01,0 82.0	54,0	44,0	58850
0.7100	10,200 IIIIII	23/32	20,0	140,0	02,U 02.0	55,0	40,0 4E 0	50039
0.7203	10,000 mm	17/61	20,0	140,0	03,0	55,0	45,0	50060
0.7344		47/04	20,0	140,0	04,U	30,U	45,0	50000
0.7460	10,000 mm	2//	20,0	140,0	00,0	57,0	45,U	500C1
0.7000	19,000 mm	3/4	20,0	140,0	00,U	0,VC	43,0	10000

Series 146U 3xD





METRIC

DC

19,446 mm

19,500 mm

19,842 mm

20,000 mm

20,241 mm

20,500 mm

20,638 mm

DECIMAL

DC

0.7656

0.7677

0.7812

0.7874

0.7969

0.8071

0.8125

inch & mm

LETTER/WIRE DIAMETER LENGTH

FRACTIONAL/

DC

49/64

25/32

51/64

13/16

SHANK

DCON

20,0

20,0

20,0

20,0

22,0

22,0

22,0

OVERALL

0AL

140,0

140,0

140,0

140,0

150,0

150,0

150,0

FLUTE

LENGTH

LCF

88,0

88,0

89,0

90,0

91,0

92,0

93,0



SHANK

LENGTH

LS

45,0

45,0

45,0

45,0

52,0

52,0

52,0

USABLE

LENGTH

10

58,0

58,0

60,0

60,0

61,0

62,0

62,0

146U 3xD **FRACTIONAL & METRIC SERIES**

• 4-margin design

- thrust and deflection • Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
 - · Recommended for materials ≤ 56 HRc (≤ 577 Bhn)



EDP NO.

Ti-NAMITE[®]-X

(TX)

58862

67813

58863

67814

58864

67815

58865

TOLERANCES (inch)

```
≤.1181 DIAMETER
DC = +.00008/+.00047
DCON = h_6
```

>.1181-.2362 DIAMETER DC = +.00016/+.00063 $DCON = h_6$

>.2362-.3937 DIAMETER **DC** = +.00024/+.00083 $DCON = h_6$

>.3937-.7087 DIAMETER **DC** = +.00028/+.00098 $DCON = h_6$

>.7087-1.1811 DIAMETER **DC** = +.00031/+.00114 **DCON** = h_6

TOLERANCES (mm)

≤3 DIAMETER

DC = +0,002/+0,012 $DCON = h_6$

>3-6 DIAMETER **DC** = +0,004/+0,016 DCON = he

>6-10 DIAMETER

DC = +0,006/+0,021 $DCON = h_6$

>10-18 DIAMETER **DC** = +0,007/+0,025 DCON = he

>18-30 DIAMETER DC = +0,008/+0,029

 $DCON = h_6$



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2

Flutes











146U 5xD FRACTIONAL & METRIC SERIES

TOLERANCES (inch)				inch 9 mm						
≤.1181 DIAMETER DC = +.00008/+.00047	DECIMAL	METRIC	FRACTIONAL/ LETTER/WIRE DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH	SHANK LENGTH LS	Ti-NAMITE®-X (TX)	4-margin design improves accuracy and surface finish along
DCON = h ₆	0.1181	3,000 mm		6,0	75,0	19,0	15,0	51,0	67816	for aggressive drilling
>.1181–.2362 DIAMETER	0.1220	3,100 mm		6,0	80,0	20,0	15,0	49,0	67817	 Specialized self-
DC = +.00016/+.00063	0.1250	3.175 mm	1/8	6.0	80.0	21.0	16.0	49.0	58866	centering notched point
DCON = h ₆	0.1260	3,200 mm	, -	6,0	80,0	21,0	16,0	49,0	67818	spot drilling decreasing
>.2362–.3937 DIAMETER	0.1299	3.300 mm		6.0	80.0	21.0	16.0	49.0	67819	thrust and deflection
DC = +.00024/+.00083	0.1339	3.400 mm		6.0	80.0	22.0	17.0	49.0	67820	Engineered edge
DCON = h ₆	0.1360	3,454 mm	#29	6,0	80,0	22,0	17,0	49,0	58867	edge strength and
>.3937–.7087 DIAMETER	0.1378	3,500 mm		6,0	80,0	23,0	18,0	49,0	67821	reduces edge fatigue
DC = +.00028/+.00098	0.1405	3,569 mm	#28	6,0	80,0	23,0	18,0	49,0	58868	allowing for increased
DCON = h ₆	0.1406	3,571 mm	9/64	6,0	80,0	23,0	18,0	49,0	58869	Recommended for
>.7087–1.1811 DIAMETER	0.1417	3,600 mm		6,0	80,0	23,0	18,0	49,0	67822	materials ≤ 56 HRc
DC = +.00031/+.00114	0.1457	3,700 mm		6,0	80,0	24,0	19,0	49,0	67823	(≤ 577 Bhn)
DCON = h ₆	0.1470	3,734 mm	#26	6,0	80,0	24,0	19,0	49,0	58870	
	0.1495	3,797 mm	#25	6,0	80,0	25,0	19,0	49,0	58871	
TOLERANCES (mm)	0.1496	3,800 mm		6,0	80,0	25,0	19,0	49,0	67824	
<3 DIAMETER	0.1520	3,861 mm	#24	6,0	80,0	25,0	19,0	49,0	58872	
DC = +0.002/+0.012	0.1535	3,900 mm		6,0	80,0	25,0	19,0	49,0	67825	
DCON = h ₆	0.1562	3,967 mm	5/32	6,0	80,0	26,0	20,0	49,0	58873	
S-6 DIAMETER	0.1570	3,988 mm	#22	6,0	80,0	26,0	20,0	49,0	58874	
DC = +0.004/+0.016	0.1575	4,000 mm		6,0	80,0	26,0	20,0	49,0	67826	
$DCON = h_6$	0.1590	4,039 mm	#21	6,0	80,0	26,0	20,0	49,0	58875	
	0.1610	4,089 mm	#20	6,0	90,0	27,0	20,0	53,0	58876	
DC = +0.006/+0.021	0.1614	4,100 mm		6,0	90,0	27,0	20,0	53,0	67827	
DCON = h ₆	0.1654	4,200 mm		6,0	90,0	27,0	21,0	53,0	67828	
	0.1693	4,300 mm		6,0	90,0	28,0	22,0	53,0	67829	
	0.1719	4,366 mm	11/64	6,0	90,0	28,0	22,0	53,0	58877	
DC = +0,007/+0,025 DCON = hc	0.1732	4,400 mm		6,0	90,0	29,0	22,0	53,0	67830	
	0.1770	4,496 mm	#16	6,0	90,0	29,0	22,0	53,0	58878	
>18-3U DIAMETER	0.1772	4,500 mm		6,0	90,0	29,0	23,0	53,0	67831	
DC = +0,008/+0,029	0.1811	4,600 mm		6,0	90,0	30,0	23,0	53,0	67832	
	0.1850	4,699 mm	#13	6,0	90,0	31,0	23,0	53,0	58879	
	0.1875	4,763 mm	3/16	6,0	90,0	31,0	24,0	53,0	58880	
STEELS	0.1890	4,801 mm	#12	6,0	90,0	31,0	24,0	53,0	58881	
STAINLESS STEELS	0.1929	4,900 mm		6,0	90,0	32,0	24,0	53,0	67835	
CACTIDON	0.1935	4,915 mm	#10	6,0	90,0	32,0	25,0	53,0	58882	
CASTIKON	0.1969	5,000 mm		6,0	95,0	33,0	25,0	51,0	67836	
HIGH TEMP ALLOYS	0.2008	5,100 mm		6,0	95,0	33,0	26,0	51,0	67837	
NON-FERROUS	0.2010	5,105 mm	#7	6,0	95,0	33,0	26,0	51,0	58883	
	0.2031	5,159 mm	13/64	6,0	95,0	34,0	26,0	51,0	58884	
For notont	0.2047	5,200 mm		6,0	95,0	34,0	26,0	51,0	67838	
information visit	0.2087	5,300 mm		6,0	95,0	34,0	27,0	51,0	67839	
www.ksptpatents.com	0.2090	5,309 mm	#4	6,0	95,0	35,0	27,0	51,0	58885	







146U 5xD FRACTIONAL & METRIC SERIES

• A morain dooian				inch & mm					EDP NO.	TOLERANCES (inch)
 4-inargin design improves accuracy and surface finish along with inargaged strength for 	DECIMAL DC	METRIC DC	FRACTIONAL/ Letter/wire DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE®-X (TX)	≤.1181 DIAMETER DC = +.00008/+.00047
aggressive drilling	0.2126	5,400 mm		6,0	95,0	35,0	27,0	51,0	67840	DCON = h ₆
Specialized self-	0.2130	5,410 mm	#3	6,0	95,0	35,0	27,0	51,0	58886	>.1181–.2362 DIAMETER
centering notched point	0.2165	5,500 mm		6,0	95,0	36,0	27,0	51,0	67841	DC = +.00016/+.00063
spot drilling decreasing	0.2188	5,558 mm	7/32	6,0	95,0	36,0	28,0	51,0	58887	DCON = h ₆
thrust and deflection	0.2205	5,600 mm		6,0	95,0	36,0	28,0	51,0	67842	>.23623937 DIAMETER
Engineered edge protoction improves edge	0.2244	5,700 mm		6,0	95,0	37,0	28,0	51,0	67843	DC = +.00024/+.00083
strength and reduces	0.2283	5,800 mm		6,0	95,0	38,0	29,0	51,0	67844	DCON = h ₆
edge fatigue allowing for	0.2323	5,900 mm		6,0	95,0	38,0	30,0	51,0	67845	> 3937- 7087 DIAMETER
Bocommonded for	0.2344	5,954 mm	15/64	6,0	95,0	39,0	30,0	51,0	58888	DC = +.00028/+.00098
materials ≤ 56 HRc	0.2362	6,000 mm		6,0	95,0	39,0	30,0	51,0	67846	DCON = h ₆
(≤ 577 Bhn)	0.2402	6,100 mm		8,0	100,0	40,0	31,0	49,0	67847	5 7007 1 1011 DIAMETED
	0.2441	6,200 mm		8,0	100,0	40,0	31,0	49,0	67848	DC = + 0.0031/+ 0.0114
	0.2461	6,250 mm		8,0	100,0	41,0	31,0	49,0	67849	DCON = h_6
	0.2480	6,300 mm		8,0	100,0	41,0	31,0	49,0	67850	-
	0.2500	6,350 mm	1/4 E #0	8,0	100,0	41,0	32,0	49,0	58889	TOLERANCES (mm)
	0.2520	6,400 mm		8,0	100,0	42,0	32,0	49,0	67851	
	0.2559	6,500 mm		8,0	100,0	42,0	32,0	49,0	67852	DC = $\pm 0.002/\pm 0.012$
	0.2570	6,528 mm	F	8,0	100,0	42,0	33,0	49,0	58890	DC = +0,002/+0,012 DCON = h ₆
	0.2598	6,600 mm		8,0	100,0	43,0	33,0	49,0	67853	
	0.2638	6,700 mm		8,0	100,0	44,0	34,0	49,0	67854	
	0.2656	6,746 mm	17/64	8,0	100,0	44,0	34,0	49,0	58891	DC = +0,004/+0,010 DCON = hc
	0.2677	6,800 mm		8,0	100,0	44,0	34,0	49,0	67855	
	0.2717	6,900 mm		8,0	100,0	45,0	35,0	49,0	67856	>b-1U DIAMETER
	0.2720	6,909 mm		8,0	100,0	45,0	35,0	49,0	58892	DC = +0,000/+0,021
	0.2756	7,000 mm		8,0	100,0	46,0	35,0	49,0	67857	
	0.2795	7,100 mm		8,0	100,0	46,0	35,0	49,0	67858	>10-18 DIAMETER
	0.2812	7,142 mm	9/32	8,0	100,0	46,0	36,0	49,0	58893	DC = +0,00//+0,025
	0.2835	7,200 mm		8,0	110,0	47,0	36,0	53,0	67859	
	0.2854	7,250 mm		8,0	110,0	47,0	36,0	53,0	67860	>18–30 DIAMETER
	0.2874	7,300 mm		8,0	110,0	47,0	36,0	53,0	67861	DC = +0,008/+0,029
	0.2913	7,400 mm		8,0	110,0	48,0	37,0	53,0	67862	DCON = N ₆
	0.2953	7,500 mm		8,0	110,0	49,0	38,0	53,0	67863	
	0.2969	7,541 mm	19/64	8,0	110,0	49,0	38,0	53,0	58894	STEELS
	0.2992	7,600 mm		8,0	110,0	49,0	38,0	53,0	67864	STAINLESS STEELS
	0.3031	7,700 mm		8,0	110,0	50,0	38,0	53,0	67865	CASTIDON
	0.3071	7,800 mm		8,0	110,0	51,0	39,0	53,0	67866	CASTINON
	0.3110	7,900 mm	- // -	8,0	110,0	51,0	39,0	53,0	6/86/	NON-FERROUS
	0.3125	7,938 mm	5/16	8,0	110,0	52,0	40,0	53,0	58895	HIGH TEMP ALLOYS
	0.3150	8,000 mm		8,0	110,0	52,0	40,0	53,0	67868	
	0.3189	8,100 mm		10,0	115,0	53,0	41,0	51,0	67869	HARDENED STEELS
	0.3228	8,200 mm		10,0	115,0	53,0	41,0	51,0	67870	
	0.3268	8,300 mm		10.0	115.0	54 <i>.</i> 0	42,0	51,0	67871	For natent

continued on next page

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CONTINUED

Determe Decimal BL DECIMALFerr FERTER/VING SMARTER SMARTER SMARTER NOALVERAL FURCTH SCA NAMATER<									111/10
DECIMAL DC METRC EPRACTIONAL/ UC SHANK OVERAL DC PARLE EVENT EVEN EVANT DC DABLE SHANK TFAAMITE'X 0.2811 8.333 mm 10.0 115.0 55.0 42.0 51.0 58896 0.3302 8,433 mm 0 10.0 115.0 55.0 42.0 51.0 67873 0.3346 8,600 mm 10.0 115.0 56.0 43.0 51.0 67873 0.3348 8,600 mm 10.0 115.0 57.0 44.0 51.0 67875 0.3348 8,800 mm 10.0 115.0 57.0 44.0 51.0 67876 0.3465 8,800 mm 10.0 115.0 59.0 46.0 51.0 67871 0.3543 9.000 mm 10.0 115.0 59.0 46.0 51.0 67878 0.3543 9.000 mm 10.0 125.0 60.0 46.0 55.0 67881 0.3543 9.000 mm 10.0 125.				inch & mm					EDP NO.
0.3281 8.334 mm 21/64 10,0 115,0 54,0 42,0 51,0 58896 0.3200 8,433 mm 0 10,0 115,0 55,0 42,0 51,0 58897 0.3320 8,433 mm 0 10,0 115,0 55,0 42,0 51,0 67873 0.3326 8,500 mm 10,0 115,0 57,0 43,0 51,0 67873 0.3425 8,700 mm 10,0 115,0 57,0 44,0 51,0 67875 0.3438 8,733 mm 11/32 10,0 115,0 58,0 45,0 51,0 67875 0.3543 9,000 mm 10,0 115,0 58,0 45,0 51,0 67878 0.3524 9,120 mm 10,0 125,0 60,0 46,0 55,0 67881 0.3622 9,200 mm 10,0 125,0 61,0 47,0 55,0 67882 0.3710 9,500 mm 10,0 125,0 62,0	DECIMAL DC	METRIC DC	FRACTIONAL/ LETTER/WIRE DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE®-X (TX)
0.3307 8,400 mm 10,0 115,0 55,0 42,0 51,0 67872 0.3246 8,500 mm 10,0 115,0 55,0 42,0 51,0 67873 0.3346 8,600 mm 10,0 115,0 57,0 43,0 51,0 67874 0.3428 8,700 mm 10,0 115,0 57,0 44,0 51,0 67876 0.3438 8,733 mm 11/32 10,0 115,0 57,0 44,0 51,0 67876 0.3453 9,000 mm 10,0 115,0 58,0 45,0 51,0 67877 0.3584 9,000 mm 10,0 125,0 60,0 46,0 51,0 67878 0.3621 9,200 mm 10,0 125,0 61,0 47,0 55,0 67881 0.3661 9,347 mm U 10,0 125,0 61,0 47,0 55,0 67881 0.3710 9,400 mm 10,0 125,0 64,0 50,0 67884	0.3281	8,334 mm	21/64	10,0	115,0	54,0	42,0	51,0	58896
0.3320 8,433 mm 0 10,0 115,0 55,0 42,0 51,0 57873 0.3346 8,600 mm 10,0 115,0 55,0 42,0 51,0 67873 0.3348 8,700 mm 10,0 115,0 57,0 43,0 51,0 67874 0.3425 8,700 mm 10,0 115,0 57,0 44,0 51,0 67875 0.3438 8,300 mm 10,0 115,0 57,0 44,0 51,0 67876 0.3445 8,000 mm 10,0 115,0 58,0 45,0 51,0 67877 0.3544 9,000 mm 10,0 115,0 59,0 46,0 51,0 67879 0.3561 9,300 mm 10,0 125,0 60,0 46,0 55,0 67881 0.3661 9,300 mm 10,0 125,0 61,0 47,0 55,0 67882 0.3760 9,600 mm 10,0 125,0 62,0 48,0 55,0 67884 <	0.3307	8,400 mm		10,0	115,0	55,0	42,0	51,0	67872
0.3346 8,500 mm 10.0 115.0 55.0 42.0 51.0 67873 0.3386 8,600 mm 10.0 115.0 56.0 43.0 51.0 67875 0.3425 8,700 mm 10.0 115.0 57.0 44.0 51.0 67875 0.3465 8,800 mm 10.0 115.0 57.0 44.0 51.0 67877 0.3543 9,000 mm 10.0 115.0 58.0 45.0 51.0 67878 0.3583 9,000 mm 10.0 115.0 59.0 46.0 51.0 67878 0.3622 9.200 mm 10.0 125.0 61.0 47.0 55.0 67881 0.3661 9.300 mm 10.0 125.0 61.0 47.0 55.0 67882 0.3701 9,400 mm 10.0 125.0 62.0 47.0 55.0 67884 0.3780 9,525 mm 378 10.0 125.0 63.0 49.0 55.0 67885	0.3320	8,433 mm	Q	10,0	115,0	55,0	42,0	51,0	58897
0.3386 8,600 mm 10,0 115,0 56,0 43,0 51,0 67874 0.3428 8,700 mm 10,0 115,0 57,0 43,0 51,0 67875 0.3438 8,733 mm 11/32 10,0 115,0 57,0 44,0 51,0 67876 0.3455 8,800 mm 10,0 115,0 57,0 44,0 51,0 67877 0.3543 9,000 mm 10,0 115,0 58,0 45,0 51,0 67877 0.3583 9,100 mm 10,0 115,0 59,0 46,0 51,0 67878 0.3621 9,200 mm 10,0 125,0 60,0 46,0 55,0 67880 0.3661 9,300 mm 10,0 125,0 61,0 47,0 55,0 67882 0.3701 9,400 mm 10,0 125,0 62,0 48,0 55,0 67882 0.3740 9,600 mm 10,0 125,0 64,0 50,0 55,0 67884	0.3346	8.500 mm		10.0	115.0	55.0	42.0	51.0	67873
0.3425 8,700 mm 10.0 115.0 57.0 43.0 51.0 67875 0.3438 8,733 mm 11/32 10.0 115.0 57.0 44.0 51.0 67876 0.3544 8,800 mm 10.0 115.0 57.0 44.0 51.0 67876 0.3544 9,000 mm 10.0 115.0 58.0 45.0 51.0 67877 0.3543 9,000 mm 10.0 115.0 59.0 46.0 51.0 67879 0.3584 9,100 mm 10.0 125.0 60.0 46.0 51.0 67881 0.3622 9,200 mm 10.0 125.0 61.0 47.0 55.0 67881 0.3661 9,300 mm 10.0 125.0 61.0 47.0 55.0 67881 0.3701 9,400 mm 10.0 125.0 62.0 48.0 55.0 67883 0.3760 9,600 mm 10.0 125.0 64.0 49.0 55.0 67886	0.3386	8.600 mm		10.0	115.0	56.0	43.0	51.0	67874
0.3438 8,733 mm 11/32 10,0 115,0 57,0 44,0 51,0 57876 0.3504 8,900 mm 10,0 115,0 57,0 44,0 51,0 67876 0.3504 8,900 mm 10,0 115,0 58,0 45,0 51,0 67877 0.3543 9,000 mm 10,0 115,0 59,0 46,0 51,0 67878 0.3522 9,200 mm 10,0 125,0 60,0 46,0 55,0 67880 0.3661 9,300 mm 10,0 125,0 61,0 47,0 55,0 67881 0.3710 9,400 mm 10,0 125,0 62,0 47,0 55,0 67882 0.3740 9,500 mm 10,0 125,0 62,0 48,0 55,0 67884 0.3819 9,000 mm 10,0 125,0 64,0 49,0 55,0 67885 0.3828 9,800 mm 10,0 125,0 64,0 50,0 55,0 67885	0.3425	8.700 mm		10.0	115.0	57.0	43.0	51.0	67875
0.3465 6,800 nm 10,0 115,0 57,0 44,0 51,0 67376 0.3465 8,900 nm 10,0 115,0 58,0 45,0 51,0 67376 0.3543 9,000 nm 10,0 115,0 58,0 45,0 51,0 67378 0.3583 9,100 nm 10,0 115,0 59,0 46,0 51,0 67378 0.3583 9,129 nm 23/64 10,0 115,0 59,0 46,0 55,0 67880 0.3660 9,300 nm 10,0 125,0 60,0 46,0 55,0 67881 0.3680 9,307 nm U 10,0 125,0 61,0 47,0 55,0 67883 0.3760 9,500 nm 10,0 125,0 62,0 47,0 55,0 67884 0.3780 9,600 nm 10,0 125,0 63,0 49,0 55,0 67886 0.3898 9,800 nm 10,0 125,0 64,0 50,0 55,0	0.3438	8 733 mm	11/32	10.0	115.0	57.0	44.0	51.0	58898
10.00 10.00 11.00 <th< td=""><td>0.3465</td><td>8 800 mm</td><td>,•=</td><td>10.0</td><td>115.0</td><td>57.0</td><td>44.0</td><td>51.0</td><td>67876</td></th<>	0.3465	8 800 mm	,•=	10.0	115.0	57.0	44.0	51.0	67876
Close Close Flob Sign Sign Sign <	0.3504	8 900 mm		10.0	115.0	58.0	45.0	51.0	67877
Both min	0.3543	9 000 mm		10,0	115.0	58.0	45.0	51.0	67878
0.3594 9,105 11,05 15,05 50,05 51,05 51,05 58899 0.3622 9,200 mm 10,0 1125,0 60,0 46,0 55,0 67880 0.3661 9,300 mm 10,0 125,0 60,0 46,0 55,0 67881 0.3680 9,347 mm U 10,0 125,0 61,0 47,0 55,0 67882 0.3710 9,400 mm 10,0 125,0 62,0 48,0 55,0 67883 0.3750 9,525 mm 3/8 10,0 125,0 62,0 48,0 55,0 67884 0.3819 9,700 mm 10,0 125,0 64,0 49,0 55,0 67885 0.3828 9,800 mm 10,0 125,0 64,0 50,0 55,0 67886 0.3937 10,000 mm 12,0 135,0 66,0 50,0 55,0 67888 0.3937 10,000 mm 12,0 135,0 66,0 50,0 57,0	0.3583	9 100 mm		10,0	115.0	59.0	46.0	51.0	67879
Classe Field Field <t< td=""><td>0.0000</td><td>9 129 mm</td><td>23/6/</td><td>10,0</td><td>115.0</td><td>59,0</td><td>40,0 /6 0</td><td>51,0</td><td>58899</td></t<>	0.0000	9 129 mm	23/6/	10,0	115.0	59,0	40,0 /6 0	51,0	58899
0.3661 9,300 mm 10,0 125,0 60,0 46,0 55,0 67881 0.3680 9,347 mm U 10,0 125,0 61,0 47,0 55,0 67882 0.3701 9,400 mm 10,0 125,0 62,0 47,0 55,0 67882 0.3740 9,500 mm 10,0 125,0 62,0 48,0 55,0 67883 0.3780 9,525 mm 3/8 10,0 125,0 62,0 48,0 55,0 67884 0.3819 9,700 mm 10,0 125,0 64,0 49,0 55,0 67885 0.3888 9,800 mm 10,0 125,0 64,0 49,0 55,0 67886 0.3937 10,000 mm 10,0 125,0 64,0 50,0 55,0 67888 0.3970 10,044 mm X 12,0 135,0 66,0 51,0 57,0 58902 0.3976 10,100 mm 12,0 135,0 66,0 51,0	0.3334	9 200 mm	25/04	10,0	125.0	60.0	40,0 /6.0	55.0	67880
0.3680 9,347 mm U 10,0 123,0 60,0 47,0 55,0 58900 0.3701 9,400 mm 10,0 125,0 61,0 47,0 55,0 67882 0.3740 9,500 mm 10,0 125,0 62,0 47,0 55,0 67883 0.3750 9,525 mm 3/8 10,0 125,0 62,0 48,0 55,0 67884 0.3858 9,800 mm 10,0 125,0 64,0 49,0 55,0 67886 0.3858 9,800 mm 10,0 125,0 64,0 49,0 55,0 67886 0.3896 9,900 mm 10,0 125,0 64,0 50,0 55,0 67887 0.3976 10,000 mm 10,0 125,0 64,0 50,0 57,0 58903 0.3977 10,004 mm X 12,0 135,0 66,0 51,0 57,0 57893 0.4040 10,262 mm Y 12,0 135,0 67,0 <t< td=""><td>0.3022</td><td>9,200 mm</td><td></td><td>10,0</td><td>125,0</td><td>60.0</td><td>-10,0 //6 0</td><td>55,0</td><td>67881</td></t<>	0.3022	9,200 mm		10,0	125,0	60.0	-10,0 //6 0	55,0	67881
0.3000 5,347 mm 0 10,0 123,0 61,0 47,0 55,0 67882 0.3740 9,500 mm 10,0 125,0 62,0 47,0 55,0 67883 0.3750 9,525 mm 3/8 10,0 125,0 62,0 48,0 55,0 67884 0.3819 9,000 mm 10,0 125,0 62,0 48,0 55,0 67886 0.3888 9,800 mm 10,0 125,0 64,0 49,0 55,0 67886 0.3906 9,921 mm 25/64 10,0 125,0 64,0 50,0 55,0 67888 0.3970 10,004 mm X 12,0 135,0 66,0 50,0 57,0 58902 0.3976 10,100 mm 12,0 135,0 66,0 51,0 57,0 58904 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 58904 0.4055 10,300 mm 12,0 13	0.3001	9,300 IIIII 9,317 mm		10,0	125,0	61.0	40,0	55,0	52000
0.3740 9,500 mm 10,0 125,0 62,0 47,0 55,0 67883 0.3750 9,525 mm 3/8 10,0 125,0 62,0 48,0 55,0 67884 0.3780 9,600 mm 10,0 125,0 62,0 48,0 55,0 67884 0.3819 9,700 mm 10,0 125,0 64,0 49,0 55,0 67885 0.3838 9,800 mm 10,0 125,0 64,0 49,0 55,0 67886 0.3906 9,921 mm 25/64 10,0 125,0 64,0 50,0 55,0 67888 0.3970 10,004 mm X 12,0 135,0 66,0 50,0 57,0 67890 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 67891 0.4042 10,300 mm 12,0 135,0 67,0 51,0 57,0 67891 0.4042 10,300 mm 12,0 135,0 67,0 51,0 57,0 67891 0.4040 10,262 mm Y 12,	0.3000	9,347 11111 0,400 mm	U	10,0	125,0	61.0	47,0	55,0	67000
0.3740 5,300 10,00 125,0 62,0 47,0 35,0 58831 0.3750 9,525 mm 3/8 10,0 125,0 62,0 48,0 55,0 58901 0.3780 9,600 mm 10,0 125,0 63,0 48,0 55,0 67884 0.3819 9,700 mm 10,0 125,0 64,0 49,0 55,0 67886 0.3898 9,900 mm 10,0 125,0 64,0 50,0 55,0 67887 0.3937 10,000 mm 10,0 125,0 66,0 50,0 57,0 58903 0.3976 10,000 mm 12,0 135,0 66,0 50,0 57,0 58903 0.3976 10,000 mm 12,0 135,0 66,0 51,0 57,0 67888 0.4016 10,200 mm 12,0 135,0 67,0 51,0 57,0 58904 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0	0.3701	9,400 mm		10,0	120,0	01,0	47,0	55,U	0/002
0.3780 9,325 min 3/8 10,0 125,0 62,0 48,0 55,0 67884 0.3819 9,700 mm 10,0 125,0 63,0 49,0 55,0 67885 0.3888 9,800 mm 10,0 125,0 64,0 49,0 55,0 67885 0.3898 9,900 mm 10,0 125,0 64,0 50,0 55,0 67887 0.3906 9,921 mm 25/64 10,0 125,0 64,0 50,0 55,0 67888 0.3977 10,000 mm 10,0 125,0 66,0 50,0 57,0 67889 0.4016 10,200 mm 12,0 135,0 66,0 51,0 57,0 67890 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 67891 0.4055 10,300 mm 12,0 135,0 67,0 51,0 57,0 67892 0.4134 10,600 mm 12,0 135,0 68,0 52,0 57,0 67893 0.4134 10,700 mm 12,0 135,0	0.3740	9,500 mm	2/0	10,0	125,0	62,0	47,0	55,0	07883
0.3760 3,00 10,0 125,0 62,0 48,0 53,0 67884 0.3819 9,700 mm 10,0 125,0 63,0 49,0 55,0 67885 0.3858 9,800 mm 10,0 125,0 64,0 50,0 55,0 67886 0.3996 9,921 mm 25/64 10,0 125,0 64,0 50,0 55,0 67888 0.3970 10,084 mm X 12,0 135,0 66,0 50,0 57,0 67890 0.4016 10,200 mm 12,0 135,0 66,0 51,0 57,0 67890 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 67890 0.4042 10,300 mm 12,0 135,0 67,0 51,0 57,0 67891 0.4055 10,300 mm 12,0 135,0 67,0 51,0 57,0 67892 0.4134 10,500 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4213 10,700 mm 12,0 135,0	0.3750	9,525 mm	3/8	10,0	125,0	62,0	48,0	55,0	58901
0.3819 9,00 mm 10,0 125,0 63,0 49,0 55,0 67885 0.3858 9,800 mm 10,0 125,0 64,0 50,0 55,0 67886 0.3898 9,900 mm 10,0 125,0 64,0 50,0 55,0 67887 0.3906 9,921 mm 25/64 10,0 125,0 65,0 50,0 55,0 67888 0.3970 10,084 mm X 12,0 135,0 66,0 50,0 57,0 67889 0.4016 10,200 mm 12,0 135,0 67,0 51,0 57,0 67890 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 67891 0.4055 10,300 mm 12,0 135,0 67,0 51,0 57,0 67892 0.4044 10,400 mm 12,0 135,0 68,0 52,0 57,0 67892 0.4044 10,400 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4134 10,500 mm 12,0 135,0 <	0.3780	9,600 mm		10,0	125,0	62,0	48,0	55,0	07884
0.3895 9,800 mm 10,0 125,0 64,0 49,0 55,0 67887 0.3896 9,900 mm 10,0 125,0 64,0 50,0 55,0 67887 0.3906 9,921 mm 25/64 10,0 125,0 64,0 50,0 55,0 67888 0.3970 10,008 mm X 12,0 135,0 66,0 50,0 57,0 67889 0.3976 10,100 mm 12,0 135,0 66,0 51,0 57,0 67890 0.4016 10,200 mm 12,0 135,0 67,0 51,0 57,0 67891 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 67892 0.4055 10,300 mm 12,0 135,0 67,0 52,0 57,0 67892 0.4062 10,400 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4134 10,500 mm 12,0 135,0 69,0 53,0 57,0 67893 0.4131 10,700 mm 12,0 135,0	0.3819	9,700 mm		10,0	125,0	63,0	49,0	55,0	67885
0.3898 9,900 mm 10,0 125,0 64,0 50,0 55,0 67887 0.3906 9,921 mm 25/64 10,0 125,0 65,0 50,0 55,0 67888 0.3937 10,000 mm 10,0 125,0 65,0 50,0 57,0 58903 0.3976 10,100 mm 12,0 135,0 66,0 50,0 57,0 67889 0.4016 10,200 mm 12,0 135,0 67,0 51,0 57,0 67890 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 67891 0.4055 10,300 mm 12,0 135,0 67,0 51,0 57,0 67892 0.4042 10,317 mm 13/32 12,0 135,0 68,0 53,0 57,0 67893 0.4094 10,400 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 70,0 54,0 57,0 67894 0.4213 10,700 mm 12,0 135,0	0.3858	9,800 mm		10,0	125,0	64,0	49,0	55,0	67886
0.3906 9.921 mm 25/64 10,0 125,0 64,0 50,0 55,0 67888 0.3970 10,000 mm 10,0 125,0 65,0 50,0 55,0 67888 0.3976 10,100 mm 12,0 135,0 66,0 50,0 57,0 67899 0.4016 10,200 mm 12,0 135,0 66,0 51,0 57,0 67890 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 67891 0.4055 10,300 mm 12,0 135,0 67,0 51,0 57,0 58905 0.4062 10,317 mm 13/32 12,0 135,0 68,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 69,0 53,0 57,0 67894 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67894 0.4221 10,900 mm 12,0 135,0	0.3898	9,900 mm		10,0	125,0	64,0	50,0	55,0	6/88/
0.3937 10,000 mm 10,0 125,0 65,0 50,0 55,0 67888 0.3970 10,084 mm X 12,0 135,0 66,0 50,0 57,0 67889 0.4016 10,200 mm 12,0 135,0 66,0 51,0 57,0 67890 0.4016 10,200 mm 12,0 135,0 67,0 51,0 57,0 67891 0.4005 10,300 mm 12,0 135,0 67,0 51,0 57,0 67891 0.4062 10,317 mm 13/32 12,0 135,0 68,0 52,0 57,0 67892 0.4134 10,600 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 68,0 53,0 57,0 67894 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4221 10,800 mm 12,0 135,0 70,0 54,0 57,0 67896 0.4231 10,700 mm 12,0 135,0 70,0	0.3906	9,921 mm	25/64	10,0	125,0	64,0	50,0	55,0	58902
0.3970 10,084 mm X 12,0 135,0 66,0 50,0 57,0 58903 0.3976 10,100 mm 12,0 135,0 66,0 50,0 57,0 67889 0.4016 10,200 mm 12,0 135,0 66,0 51,0 57,0 67890 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 67891 0.4055 10,300 mm 12,0 135,0 67,0 52,0 57,0 67891 0.4062 10,317 mm 13/32 12,0 135,0 68,0 52,0 57,0 67892 0.4134 10,500 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67896 0.4222 10,800 mm 12,0 135,0 72,0 55,0 <td>0.3937</td> <td>10,000 mm</td> <td></td> <td>10,0</td> <td>125,0</td> <td>65,0</td> <td>50,0</td> <td>55,0</td> <td>67888</td>	0.3937	10,000 mm		10,0	125,0	65,0	50,0	55,0	67888
0.3976 10,100 mm 12,0 135,0 66,0 50,0 57,0 67889 0.4016 10,200 mm 12,0 135,0 66,0 51,0 57,0 67890 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 67891 0.4055 10,300 mm 12,0 135,0 67,0 52,0 57,0 67892 0.4062 10,317 mm 13/32 12,0 135,0 68,0 52,0 57,0 67892 0.4094 10,400 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4134 10,500 mm 12,0 135,0 69,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67896 0.4252 10,800 mm 12,0 135,0 72,0 55,0 57,0 67897 0.4331 11,000 mm 12,0 135,0 72,0	0.3970	10,084 mm	Х	12,0	135,0	66,0	50,0	57,0	58903
0.4016 10,200 mm 12,0 135,0 66,0 51,0 57,0 67890 0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 58904 0.4055 10,300 mm 12,0 135,0 67,0 51,0 57,0 67891 0.4062 10,317 mm 13/32 12,0 135,0 67,0 52,0 57,0 67892 0.4134 10,500 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 69,0 53,0 57,0 67894 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4219 10,716 mm 27/64 12,0 135,0 70,0 54,0 57,0 67896 0.4291 10,900 mm 12,0 135,0 72,0 55,0 57,0 67898 0.4331 11,000 mm 12,0 135,0 72,0 55,0 57,0 67901 0.43475 11,113 mm 7/16 12,0 <td>0.3976</td> <td>10,100 mm</td> <td></td> <td>12,0</td> <td>135,0</td> <td>66,0</td> <td>50,0</td> <td>57,0</td> <td>67889</td>	0.3976	10,100 mm		12,0	135,0	66,0	50,0	57,0	67889
0.4040 10,262 mm Y 12,0 135,0 67,0 51,0 57,0 58904 0.4055 10,300 mm 12,0 135,0 67,0 51,0 57,0 67891 0.4062 10,317 mm 13/32 12,0 135,0 67,0 52,0 57,0 67892 0.4094 10,400 mm 12,0 135,0 68,0 52,0 57,0 67893 0.4134 10,500 mm 12,0 135,0 69,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 69,0 53,0 57,0 67894 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4219 10,716 mm 27/64 12,0 135,0 71,0 54,0 57,0 67897 0.4331 11,000 mm 12,0 135,0 72,0 55,0 57,0 67899 0.4375 11,113 mm 7/16 12,0 135,0 73,0	0.4016	10,200 mm		12,0	135,0	66,0	51,0	57,0	67890
0.4055 10,300 mm 12,0 135,0 67,0 51,0 57,0 67891 0.4062 10,317 mm 13/32 12,0 135,0 67,0 52,0 57,0 58905 0.4094 10,400 mm 12,0 135,0 68,0 52,0 57,0 67892 0.4134 10,500 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 69,0 53,0 57,0 67894 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4219 10,716 mm 27/64 12,0 135,0 70,0 54,0 57,0 67897 0.4252 10,800 mm 12,0 135,0 71,0 54,0 57,0 67898 0.4370 11,100 mm 12,0 135,0 72,0 55,0 57,0 67901 0.4409 11,200 mm 12,0 135,0 73,0 56,0 57,0 67901 0.4448 11,400 mm 12,0 135,0 73,0<	0.4040	10,262 mm	Y	12,0	135,0	67,0	51,0	57,0	58904
0.4062 10,317 mm 13/32 12,0 135,0 67,0 52,0 57,0 58905 0.4094 10,400 mm 12,0 135,0 68,0 52,0 57,0 67892 0.4134 10,500 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 69,0 53,0 57,0 67894 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4219 10,716 mm 27/64 12,0 135,0 70,0 54,0 57,0 67896 0.4252 10,800 mm 12,0 135,0 71,0 54,0 57,0 67897 0.4331 11,000 mm 12,0 135,0 72,0 55,0 57,0 67899 0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 67900 0.4409 11,200 mm 12,0 135,0 73,0 56,0 57,0 67901 0.4488 11,400 mm 12,0 145,0<	0.4055	10,300 mm		12,0	135,0	67,0	51,0	57,0	67891
0.4094 10,400 mm 12,0 135,0 68,0 52,0 57,0 67892 0.4134 10,500 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 69,0 53,0 57,0 67894 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4219 10,716 mm 27/64 12,0 135,0 70,0 54,0 57,0 67896 0.4291 10,900 mm 12,0 135,0 71,0 54,0 57,0 67897 0.4331 11,000 mm 12,0 135,0 72,0 55,0 57,0 67898 0.4370 11,100 mm 12,0 135,0 72,0 56,0 57,0 67909 0.4375 11,113 mm 7/16 12,0 135,0 73,0 56,0 57,0 67901 0.4409 11,200 mm 12,0 135,0 73,0 57,0 67901 64901 0.4458 11,400 mm 12,0 145,0 75,0<	0.4062	10,317 mm	13/32	12,0	135,0	67,0	52,0	57,0	58905
0.4134 10,500 mm 12,0 135,0 68,0 53,0 57,0 67893 0.4173 10,600 mm 12,0 135,0 69,0 53,0 57,0 67894 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4219 10,716 mm 27/64 12,0 135,0 70,0 54,0 57,0 67896 0.4252 10,800 mm 12,0 135,0 70,0 54,0 57,0 67897 0.4331 10,900 mm 12,0 135,0 71,0 54,0 57,0 67898 0.4370 11,100 mm 12,0 135,0 72,0 55,0 57,0 67899 0.4375 11,113 mm 7/16 12,0 135,0 73,0 56,0 57,0 67900 0.4409 11,200 mm 12,0 135,0 73,0 56,0 57,0 67901 0.4488 11,400 mm 12,0 145,0 74,0 57,0 62,0 67903 0.4567 11,600 mm 12,0 145,0 75,0 </td <td>0.4094</td> <td>10,400 mm</td> <td></td> <td>12,0</td> <td>135,0</td> <td>68,0</td> <td>52,0</td> <td>57,0</td> <td>67892</td>	0.4094	10,400 mm		12,0	135,0	68,0	52,0	57,0	67892
0.4173 10,600 mm 12,0 135,0 69,0 53,0 57,0 67894 0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4219 10,716 mm 27/64 12,0 135,0 70,0 54,0 57,0 67896 0.4252 10,800 mm 12,0 135,0 70,0 54,0 57,0 67897 0.4331 10,900 mm 12,0 135,0 71,0 54,0 57,0 67898 0.4370 11,000 mm 12,0 135,0 72,0 55,0 57,0 67898 0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 67900 0.4409 11,200 mm 12,0 135,0 73,0 56,0 57,0 67901 0.4488 11,400 mm 12,0 135,0 73,0 57,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4567 11,600 mm 12,0 145,0 75,0 58,0 </td <td>0.4134</td> <td>10,500 mm</td> <td></td> <td>12,0</td> <td>135,0</td> <td>68,0</td> <td>53,0</td> <td>57,0</td> <td>67893</td>	0.4134	10,500 mm		12,0	135,0	68,0	53,0	57,0	67893
0.4213 10,700 mm 12,0 135,0 70,0 54,0 57,0 67895 0.4219 10,716 mm 27/64 12,0 135,0 70,0 54,0 57,0 58906 0.4252 10,800 mm 12,0 135,0 70,0 54,0 57,0 67897 0.4291 10,900 mm 12,0 135,0 71,0 54,0 57,0 67898 0.4331 11,000 mm 12,0 135,0 72,0 55,0 57,0 67898 0.4370 11,100 mm 12,0 135,0 72,0 55,0 57,0 67899 0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 67900 0.4409 11,200 mm 12,0 135,0 73,0 56,0 57,0 67901 0.4449 11,300 mm 12,0 135,0 73,0 57,0 67902 0.4528 11,500 mm 12,0 145,0 74,0 57,0 62,0 67903 0.4567 11,600 mm 12,0 145,0 75,0 58,0 </td <td>0.4173</td> <td>10,600 mm</td> <td></td> <td>12,0</td> <td>135,0</td> <td>69,0</td> <td>53,0</td> <td>57,0</td> <td>67894</td>	0.4173	10,600 mm		12,0	135,0	69,0	53,0	57,0	67894
0.4219 10,716 mm 27/64 12,0 135,0 70,0 54,0 57,0 58906 0.4252 10,800 mm 12,0 135,0 70,0 54,0 57,0 67896 0.4291 10,900 mm 12,0 135,0 71,0 54,0 57,0 67897 0.4331 11,000 mm 12,0 135,0 72,0 55,0 57,0 67898 0.4370 11,100 mm 12,0 135,0 72,0 55,0 57,0 67899 0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 67900 0.4409 11,200 mm 12,0 135,0 73,0 56,0 57,0 67901 0.4449 11,300 mm 12,0 135,0 73,0 57,0 67901 0.4488 11,400 mm 12,0 145,0 74,0 57,0 62,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67	0.4213	10,700 mm		12,0	135,0	70,0	54,0	57,0	67895
0.4252 10,800 mm 12,0 135,0 70,0 54,0 57,0 67896 0.4291 10,900 mm 12,0 135,0 71,0 54,0 57,0 67897 0.4331 11,000 mm 12,0 135,0 72,0 55,0 57,0 67898 0.4370 11,100 mm 12,0 135,0 72,0 55,0 57,0 67899 0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 67909 0.4409 11,200 mm 72,0 135,0 73,0 56,0 57,0 67900 0.4449 11,300 mm 12,0 135,0 73,0 57,0 67901 0.4488 11,400 mm 12,0 145,0 74,0 57,0 62,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 <td>0.4219</td> <td>10,716 mm</td> <td>27/64</td> <td>12,0</td> <td>135,0</td> <td>70,0</td> <td>54,0</td> <td>57,0</td> <td>58906</td>	0.4219	10,716 mm	27/64	12,0	135,0	70,0	54,0	57,0	58906
0.4291 10,900 mm 12,0 135,0 71,0 54,0 57,0 67897 0.4331 11,000 mm 12,0 135,0 72,0 55,0 57,0 67898 0.4370 11,100 mm 12,0 135,0 72,0 55,0 57,0 67899 0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 67899 0.4409 11,200 mm 71,0 135,0 72,0 56,0 57,0 67900 0.4449 11,300 mm 12,0 135,0 73,0 56,0 57,0 67901 0.4488 11,400 mm 12,0 135,0 73,0 57,0 62,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 75,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 77,0 59,0 <td>0.4252</td> <td>10,800 mm</td> <td></td> <td>12,0</td> <td>135,0</td> <td>70,0</td> <td>54,0</td> <td>57,0</td> <td>67896</td>	0.4252	10,800 mm		12,0	135,0	70,0	54,0	57,0	67896
0.4331 11,000 mm 12,0 135,0 72,0 55,0 57,0 67898 0.4370 11,100 mm 12,0 135,0 72,0 55,0 57,0 67899 0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 58907 0.4409 11,200 mm 72,0 135,0 73,0 56,0 57,0 67900 0.4449 11,300 mm 12,0 135,0 73,0 56,0 57,0 67901 0.4488 11,400 mm 12,0 135,0 73,0 57,0 62,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4531 11,509 mm 29/64 12,0 145,0 75,0 58,0 62,0 67904 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67905 0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 77,0 </td <td>0.4291</td> <td>10,900 mm</td> <td></td> <td>12,0</td> <td>135,0</td> <td>71,0</td> <td>54,0</td> <td>57,0</td> <td>67897</td>	0.4291	10,900 mm		12,0	135,0	71,0	54,0	57,0	67897
0.4370 11,100 mm 12,0 135,0 72,0 55,0 57,0 67899 0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 58907 0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 58907 0.4409 11,200 mm 12,0 135,0 73,0 56,0 57,0 67900 0.4449 11,300 mm 12,0 135,0 73,0 57,0 57,0 67901 0.4488 11,400 mm 12,0 145,0 74,0 57,0 62,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4531 11,509 mm 29/64 12,0 145,0 75,0 58,0 62,0 67903 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 </td <td>0.4331</td> <td>11,000 mm</td> <td></td> <td>12,0</td> <td>135,0</td> <td>72,0</td> <td>55,0</td> <td>57,0</td> <td>67898</td>	0.4331	11,000 mm		12,0	135,0	72,0	55,0	57,0	67898
0.4375 11,113 mm 7/16 12,0 135,0 72,0 56,0 57,0 58907 0.4409 11,200 mm 12,0 135,0 73,0 56,0 57,0 67900 0.4449 11,300 mm 12,0 135,0 73,0 57,0 57,0 67901 0.4488 11,400 mm 12,0 145,0 74,0 57,0 62,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4531 11,509 mm 29/64 12,0 145,0 75,0 58,0 62,0 58908 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 75,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 77,0 59,0 62,0 67905 0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67907 0.4688 11,908 mm 12,0 145,0 77,0 </td <td>0.4370</td> <td>11,100 mm</td> <td></td> <td>12,0</td> <td>135,0</td> <td>72,0</td> <td>55,0</td> <td>57,0</td> <td>67899</td>	0.4370	11,100 mm		12,0	135,0	72,0	55,0	57,0	67899
0.4409 11,200 mm 12,0 135,0 73,0 56,0 57,0 67900 0.4449 11,300 mm 12,0 135,0 73,0 57,0 57,0 67901 0.4449 11,300 mm 12,0 135,0 73,0 57,0 57,0 67901 0.4488 11,400 mm 12,0 145,0 74,0 57,0 62,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4531 11,509 mm 29/64 12,0 145,0 75,0 58,0 62,0 58908 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 77,0 59,0 62,0 67906 0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67	0.4375	11,113 mm	7/16	12,0	135,0	72,0	56,0	57,0	58907
0.4449 11,300 mm 12,0 135,0 73,0 57,0 57,0 67901 0.4488 11,400 mm 12,0 145,0 74,0 57,0 62,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4531 11,509 mm 29/64 12,0 145,0 75,0 58,0 62,0 58908 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 77,0 59,0 62,0 67905 0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67907 0.4688 11,908 mm 15/32 12,0 145,0 77,0 59,0 62,0 67907	0.4409	11,200 mm		12,0	135,0	73,0	56,0	57,0	67900
0.4488 11,400 mm 12,0 145,0 74,0 57,0 62,0 67902 0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4531 11,509 mm 29/64 12,0 145,0 75,0 58,0 62,0 58908 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 77,0 59,0 62,0 67905 0.4645 11,900 mm 12,0 145,0 77,0 59,0 62,0 67906 0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67907 0.4688 11,908 mm 15/32 12,0 145,0 77,0 60,0 62.0 58909	0.4449	11,300 mm		12,0	135,0	73,0	57,0	57,0	67901
0.4528 11,500 mm 12,0 145,0 75,0 58,0 62,0 67903 0.4531 11,509 mm 29/64 12,0 145,0 75,0 58,0 62,0 58908 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 77,0 59,0 62,0 67905 0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67906 0.4688 11,908 mm 12,0 145,0 77,0 59,0 62,0 67907	0.4488	11,400 mm		12,0	145,0	74,0	57,0	62,0	67902
0.4531 11,509 mm 29/64 12,0 145,0 75,0 58,0 62,0 58908 0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 77,0 59,0 62,0 67906 0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67907 0.4688 11,908 mm 15/32 12,0 145,0 77,0 60,0 62,0 67907	0.4528	11,500 mm		12,0	145,0	75,0	58,0	62,0	67903
0.4567 11,600 mm 12,0 145,0 75,0 58,0 62,0 67904 0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 67905 0.4606 11,800 mm 12,0 145,0 77,0 59,0 62,0 67906 0.4646 11,800 mm 12,0 145,0 77,0 59,0 62,0 67906 0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67907 0.4688 11,908 mm 15/32 12,0 145,0 77.0 60.0 62.0 58909	0.4531	11,509 mm	29/64	12,0	145,0	75,0	58,0	62,0	58908
0.4606 11,700 mm 12,0 145,0 76,0 58,0 62,0 67905 0.4646 11,800 mm 12,0 145,0 77,0 59,0 62,0 67906 0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67906 0.4688 11,908 mm 15/32 12,0 145,0 77.0 60.0 62.0 58909	0.4567	11,600 mm		12,0	145,0	75,0	58,0	62,0	67904
0.4646 11,800 mm 12,0 145,0 77,0 59,0 62,0 67906 0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67907 0.4688 11,908 mm 15/32 12,0 145.0 77.0 60.0 62.0 58909	0.4606	11,700 mm		12,0	145,0	76,0	58,0	62,0	67905
0.4685 11,900 mm 12,0 145,0 77,0 59,0 62,0 67907 0.4688 11,908 mm 15/32 12,0 145.0 77.0 60.0 62.0 58909	0.4646	11,800 mm		12.0	145.0	77.0	59.0	62.0	67906
0.4688 11,908 mm 15/32 12,0 145.0 77.0 60.0 62.0 58909	0.4685	11,900 mm		12.0	145.0	77.0	59.0	62.0	67907
	0.4688	11,908 mm	15/32	12.0	145.0	77.0	60.0	62.0	58909







146U 5xD **FRACTIONAL & METRIC SERIES**

• A margin design				inch & mm					EDP NO.	TOLERANCE
improves accuracy and surface finish along with	DECIMAL DC	METRIC DC	FRACTIONAL/ Letter/Wire DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE®-X (TX)	≤.1181 DIAME DC = +.000
aggressive drilling	0.4724	12,000 mm		12,0	145,0	78,0	60,0	62,0	67908	DCON = h ₆
Specialized self-	0.4844	12,304 mm	31/64	14,0	155,0	80,0	62,0	59,0	58910	>.11812362
centering notched point	0.4921	12,500 mm		14,0	155,0	81,0	62,0	59,0	67909	DC = +.000
spot drilling decreasing	0.5000	12,700 mm	1/2	14,0	155,0	83,0	64,0	59,0	58911	DCON = h ₆
thrust and deflection	0.5039	12,800 mm		14,0	155,0	83,0	64,0	59,0	67910	>.23623937
Engineered edge protoction improvos odgo	0.5118	13,000 mm		14,0	155,0	84,0	65,0	59,0	67911	DC = +.000
strength and reduces	0.5156	13,096 mm	33/64	14,0	155,0	85,0	65,0	59,0	58912	DCON = h ₆
edge fatigue allowing for	0.5312	13,492 mm	17/32	14,0	155,0	88,0	67,0	59,0	58913	> 3937- 7087
Possemmonded for	0.5315	13,500 mm		14,0	155,0	88,0	68,0	59,0	67912	DC = +.000
materials ≤ 56 HRc	0.5469	13,891 mm	35/64	14,0	155,0	90,0	69,0	59,0	58914	DCON = h ₆
(≤ 577 Bhn)	0.5512	14,000 mm		14,0	155,0	91,0	70,0	59,0	67913	\$ 7007 1 1011
	0.5625	14,288 mm	9/16	16,0	175,0	93,0	71,0	66,0	58915	DC = +000
	0.5709	14,500 mm		16,0	175,0	94,0	73,0	66,0	67914	DCON = h ₆
	0.5781	14,684 mm	37/64	16,0	175,0	95,0	73,0	66,0	58916	
	0.5906	15,000 mm		16,0	175,0	98,0	75,0	66,0	67915	TOLEBANCE
	0.5938	15,083 mm	19/32	16,0	175,0	98,0	75,0	66,0	58917	
	0.6094	15,479 mm	39/64	16,0	175,0	101,0	77,0	66,0	58918	
	0.6102	15,500 mm		16,0	175,0	101,0	77,0	66,0	67916	DC = +0,00
	0.6250	15,875 mm	5/8	16,0	175,0	103,0	79,0	66,0	58919	0.0
	0.6299	16,000 mm		16,0	175,0	104,0	80,0	66,0	67917	>3-6 DIAMET
	0.6406	16,271 mm	41/64	18,0	195,0	106,0	81,0	73,0	58920	DC = +0,00
	0.6496	16,500 mm		18,0	195,0	107,0	82,0	73,0	67918	DCON = 116
	0.6562	16,667 mm	21/32	18,0	195,0	108,0	83,0	73,0	58921	>6–10 DIAMI
	0.6693	17,000 mm		18,0	195,0	111,0	85,0	73,0	67919	DC = +0,00
	0.6719	17,066 mm	43/64	18,0	195,0	111,0	85,0	73,0	58922	DCON = n ₆
	0.6875	17,463 mm	11/16	18,0	195,0	114,0	87,0	73,0	58923	>10–18 DIAN
	0.6890	17,500 mm		18,0	195,0	114,0	88,0	73,0	67920	DC = +0,00
	0.7031	17,859 mm	45/64	18,0	195,0	116,0	89,0	73,0	58924	DCON = h ₆
	0.7087	18,000 mm		18,0	195,0	117,0	90,0	73,0	67921	>18-30 DIAN
	0.7188	18,258 mm	23/32	20,0	215,0	119,0	91,0	80,0	58925	DC = +0,00
	0.7283	18,500 mm		20,0	215,0	120,0	92,0	80,0	67922	DCON = h ₆
	0.7344	18,654 mm	47/64	20,0	215,0	121,0	93,0	80,0	58926	
	0.7480	19,000 mm		20,0	215,0	123,0	95,0	80,0	67923	STEELS
	0.7500	19,050 mm	3/4	20,0	215,0	124,0	95,0	80,0	58927	STAINLESS
	0.7656	19,446 mm	49/64	20,0	215,0	126,0	97,0	80,0	58928	
	0.7677	19,500 mm		20,0	215,0	127,0	97,0	80,0	67924	CAST IRON
	0.7812	19,842 mm	25/32	20,0	215,0	129,0	99,0	80,0	58929	NON-FERR
	0.7874	20,000 mm		20,0	215,0	130,0	100,0	80,0	67925	
	0.7969	20,241 mm	51/64	22,0	220,0	132,0	101,0	81,0	58930	
	0.8071	20,500 mm		22,0	220,0	133,0	103,0	81,0	67926	HARDENED
	0.8125	20.638 mm	13/16	22.0	220.0	134.0	103.0	81.0	58931	

S (inch)

TER 008/+.00047 DIAMETER 016/+.00063 DIAMETER 024/+.00083 DIAMETER 28/+.00098 DIAMETER 31/+.00114 **S** (mm) 02/+0,012 TER 04/+0,016 ETER 6/+0,021 IETER 07/+0,025 METER 08/+0,029 STEELS ous ALLOYS STEELS For patent information visit www.ksptpatents.com

Fractional & Metric

Series 146U 5xD



Margins

2

Flutes

180°

Point Angle

External Coolant







<u>15</u>°

1

136U 2xD FRACTIONAL & METRIC SERIES

TOLERANCES (inch)

TOLERANCES (inch)				inch & mm					EDP NO.	• A margin design
<pre>≤.1181 DIAMETER DC = +.00008/+.00047 DCON - b</pre>	DECIMAL DC	METRIC DC	FRACTIONAL/ Letter/Wire DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE®-X (TX)	 4-inargin design improves accuracy and surface finish along with increased strength
DCON = 116	0.0591	1,500 mm		6,0	45,0	5,0	3,0	33,0	67060	for aggressive drilling
>.1181–.2362 DIAMETER	0.0625	1,588 mm	1/16	6,0	45,0	6,0	3,0	33,0	58480	 Specialized self- centering notched point
DC = +.00010/+.00003 DCON = h ₆	0.0630	1,600 mm		6,0	45,0	6,0	3,0	33,0	67061	eliminates the need for
2262 2027 DIAMETED	0.0669	1,700 mm		6,0	45,0	6,0	3,0	33,0	67062	spot drilling decreasing thrust and deflection
DC = +.00024/+.00083	0.0709	1,800 mm		6,0	45,0	6,0	4,0	33,0	67063	 Engineered edge
DCON = h ₆	0.0748	1,900 mm		6,0	45,0	7,0	4,0	33,0	67064	protection improves
>.3937–.7087 DIAMETER	0.0781	1,984 mm	5/64	6,0	45,0	7,0	4,0	33,0	58481	reduces edge fatigue
DC = +.00028/+.00098	0.0787	2,000 mm		6,0	45,0	7,0	4,0	33,0	67065	allowing for increased feed rates
DCON = h ₆	0.0827	2,100 mm		6,0	45,0	7,0	4,0	33,0	67066	Recommended for
>.7087–1.1811 DIAMETER	0.0866	2,200 mm		6,0	50,0	8,0	4,0	31,0	67067	materials \leq 56 HRc
DC = +.00031/+.00114	0.0906	2,300 mm		6,0	50,0	8,0	5,0	31,0	67068	
DCON = h ₆	0.0938	2,383 mm	3/32	6,0	50,0	8,0	5,0	31,0	58482	
	0.0945	2,400 mm		6,0	50,0	8,0	5,0	31,0	67069	
TOLERANCES (mm)	0.0984	2,500 mm		6,0	50,0	9,0	5,0	31,0	67070	
≤ 3 DIAMETER	0.1015	2,578 mm	#38	6,0	50,0	9,0	5,0	31,0	58483	
DC = +0,002/+0,012	0.1024	2,600 mm		6,0	50,0	9,0	5,0	31,0	67071	
DCON = N ₆	0.1040	2,642 mm	#37	6,0	50,0	9,0	5,0	31,0	58484	
>3-6 DIAMETER	0.1063	2,700 mm		6,0	50,0	9,0	5,0	31,0	67072	
DC = +0,004/+0,016 DCON = hc	0.1065	2,705 mm	#36	6,0	50,0	9,0	5,0	31,0	58485	
. C. 10 putters	0.1094	2,779 mm	7/64	6,0	50,0	10,0	6,0	31,0	58486	
>0-IU DIAMETER	0.1102	2,800 mm		6,0	50,0	10,0	6,0	31,0	67073	
DCON = h_6	0.1130	2,870 mm	#33	6,0	50,0	10,0	6,0	31,0	58487	
	0.1142	2,900 mm		6,0	50,0	10,0	6,0	31,0	67074	
DC = $+0,007/+0,025$	0.1181	3,000 mm		6,0	50,0	10,0	6,0	31,0	67075	
DCON = h ₆	0.1220	3,100 mm		6,0	50,0	11,0	6,0	31,0	67076	
>18–30 DIAMETER	0.1250	3,175 mm	1/8	6,0	50,0	11,0	6,0	31,0	58488	
DC = +0,008/+0,029	0.1260	3,200 mm		6,0	50,0	11,0	6,0	31,0	67077	
DCON = h ₆	0.1299	3,300 mm		6,0	50,0	12,0	7,0	31,0	67078	
	0.1339	3,400 mm		6,0	50,0	12,0	7,0	31,0	67079	
STEELS	0.1360	3,454 mm	#29	6,0	50,0	12,0	7,0	31,0	58489	
STAINI ESS STEELS	0.1378	3,500 mm		6,0	50,0	12,0	7,0	31,0	67080	
	0.1405	3,569 mm	#28	6,0	50,0	12,0	7,0	31,0	58490	
CAST IRON	0.1406	3,571 mm	9/64	6,0	50,0	12,0	7,0	31,0	58491	
HIGH TEMP ALLOYS	0.1417	3,600 mm		6,0	50,0	13,0	7,0	31,0	67081	
NON-FERROUS	0.1457	3,700 mm		6,0	50,0	13,0	7,0	31,0	67082	
	0.1470	3,734 mm	#26	6,0	50,0	13,0	7,0	31,0	58492	
For natent	0.1495	3,797 mm	#25	6,0	50,0	13,0	8,0	31,0	58493	
information visit	0.1496	3,800 mm		6,0	50,0	13,0	8,0	31,0	67083	
www.ksptpatents.com								continued	l on next page	

136U 2xD







inch & mm

OAL

FRACTIONAL & METRIC SERIES • 4-margin design improves accuracy and surface finish along with increased strength for aggressive drilling • Specialized selfcentering notched point eliminates the need for spot drilling decreasing thrust and deflection • Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates Recommended for materials ≤ 56 HRc (≤ 577 Bhn)

DECIMAL DC	METRIC DC	LETTER/WIRE DC	SHANK DIAMETER DCON	UVERALL LENGTH OAL	LENGTH LCF	LENGTH LU	SHANK LENGTH LS	TI-NAMITE°-X (TX)
0.1520	3,861 mm	#24	6,0	50,0	14,0	8,0	31,0	58494
0.1535	3,900 mm		6,0	50,0	14,0	8,0	31,0	67084
0.1562	3,967 mm	5/32	6,0	50,0	14,0	8,0	31,0	58495
0.1570	3,988 mm	#22	6,0	50,0	14,0	8,0	31,0	58496
0.1575	4,000 mm		6,0	50,0	14,0	8,0	31,0	67085
0.1590	4,039 mm	#21	6,0	50,0	14,0	8,0	31,0	58497
0.1610	4,089 mm	#20	6,0	50,0	14,0	8,0	31,0	58498
0.1614	4,100 mm		6,0	50,0	14,0	8,0	31,0	67086
0.1654	4,200 mm		6,0	60,0	15,0	8,0	34,0	67087
0.1693	4,300 mm		6,0	60,0	15,0	9,0	34,0	67088
0.1719	4,366 mm	11/64	6,0	60,0	15,0	9,0	34,0	58499
0.1732	4,400 mm		6,0	60,0	15,0	9,0	34,0	67089
0.1770	4,496 mm	#16	6,0	60,0	16,0	9,0	34,0	58500
0.1772	4,500 mm		6,0	60,0	16,0	9,0	34,0	67090
0.1811	4,600 mm		6,0	60,0	16,0	9,0	34,0	67091
0.1850	4,699 mm	#13	6,0	60,0	16,0	9,0	34,0	58501
0.1875	4,763 mm	3/16	6,0	60,0	17,0	10,0	34,0	58502
0.1890	4,801 mm	#12	6,0	60,0	17,0	10,0	34,0	58503
0.1929	4,900 mm		6,0	60,0	17,0	10,0	34,0	67094
0.1935	4,915 mm	#10	6,0	60,0	17,0	10,0	34,0	58504
0.1969	5,000 mm		6,0	60,0	18,0	10,0	34,0	67095
0.2008	5,100 mm		6,0	60,0	18,0	10,0	34,0	67096
0.2010	5,105 mm	#7	6,0	60,0	18,0	10,0	34,0	58505
0.2031	5,159 mm	13/64	6,0	60,0	18,0	10,0	34,0	58506
0.2047	5,200 mm		6,0	60,0	18,0	10,0	34,0	67097
0.2087	5,300 mm		6,0	60,0	19,0	11,0	34,0	67098
0.2090	5,309 mm	#4	6,0	60,0	19,0	11,0	34,0	58507
0.2126	5,400 mm		6,0	60,0	19,0	11,0	34,0	67099
0.2130	5,410 mm	#3	6,0	60,0	19,0	11,0	34,0	58508
0.2165	5,500 mm		6,0	60,0	19,0	11,0	34,0	67100
0.2188	5,558 mm	7/32	6,0	60,0	19,0	11,0	34,0	58509
0.2205	5,600 mm		6,0	60,0	20,0	11,0	34,0	67101
0.2244	5,700 mm		6,0	60,0	20,0	11,0	34,0	67102
0.2283	5,800 mm		6,0	60,0	20,0	12,0	34,0	67103
0.2323	5,900 mm		6,0	60,0	21,0	12,0	34,0	67104
0.2344	5,954 mm	15/64	6,0	60,0	21,0	12,0	34,0	58510
0.2362	6,000 mm		6,0	60,0	21,0	12,0	34,0	67105
0.2402	6,100 mm		8,0	70,0	22,0	13,0	37,0	67106
0.2441	6,200 mm		8,0	70,0	22,0	12,0	37,0	67107
0.2461	6,250 mm		8,0	70,0	22,0	13,0	37,0	67108
							continued	on next page

TOLERANCES (inch)

EDP NO.

≤.1181 DIAMETER
DC = +.00008/+.00047
DCON = h_6
>.1181–.2362 DIAMETER
DC = +.00016/+.00063
DCUN = n ₆
>.23623937 DIAMETER
DC = +.00024/+.00083 DCON = he
2027 7007 DIAMETER
DC = +.00028/+.00098
DCON = h ₆
>.7087–1.1811 DIAMETER
DC = +.00031/+.00114
DCON = h ₆
≤3 DIAMETER
DC = +0,002/+0,012 DCON = he
>3-0 DIAMETER DC = +0.004/+0.016
DCON = h_6
>6–10 DIAMETER
DC = +0,006/+0,021
DCON = h ₆
>10–18 DIAMETER
DC = +0,007/+0,025
>18-30 DIAMETER
DCON = h_6
DCON = h_6
DCON = h ₆
$DCON = h_6$ STEELS STAINI ESS STEELS
DCON = h ₆ STEELS STAINLESS STEELS
STEELS CAST IRON
DCON = h ₆ STEELS STAINLESS STEELS CAST IRON NON-FERROUS
DCON = h ₆ STEELS STAINLESS STEELS CAST IRON NON-FERROUS HIGH TEMP ALLOYS
DCON = h ₆ STEELS STAINLESS STEELS CAST IRON NON-FERROUS HIGH TEMP ALLOYS HARDENED STEELS
DCON = h ₆ STEELS STAINLESS STEELS CAST IRON NON-FERROUS HIGH TEMP ALLOYS HARDENED STEELS
DCON = h ₆ STEELS STAINLESS STEELS CAST IRON NON-FERROUS HIGH TEMP ALLOYS HARDENED STEELS For patent
DCON = h ₆ STEELS STAINLESS STEELS CAST IRON NON-FERROUS HIGH TEMP ALLOYS HARDENED STEELS For patent information visit

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CONTINUED

			inch & mm					FDP NO
DECIMAL DC	METRIC DC	FRACTIONAL/ LETTER/WIRE DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE®-X (TX)
0.2480	6,300 mm		8,0	70,0	22,0	13,0	37,0	67109
0.2500	6.350 mm	1/4 E #0	8.0	70.0	22.0	13.0	37.0	58511
0.2520	6,400 mm	, -	8,0	70,0	22,0	13,0	37,0	67110
0.2559	6.500 mm		8.0	70.0	23.0	13.0	37.0	67111
0.2570	6,528 mm	F	8,0	70,0	23,0	13,0	37,0	58512
0.2598	6,600 mm		8,0	, 70,0	23,0	13,0	37,0	67112
0.2638	6,700 mm		8,0	70,0	23,0	13,0	37,0	67113
0.2656	6,746 mm	17/64	8,0	70,0	24,0	13,0	37,0	58513
0.2677	6,800 mm		8,0	70,0	24,0	14,0	37,0	67114
0.2717	6,900 mm		8,0	70,0	24,0	14,0	37,0	67115
0.2720	6,909 mm	I	8,0	70,0	24,0	14,0	37,0	58514
0.2756	7,000 mm		8,0	70,0	25,0	14,0	37,0	67116
0.2795	7,100 mm		8,0	70,0	25,0	14,0	37,0	67117
0.2812	7,142 mm	9/32	8,0	70,0	25,0	14,0	37,0	58515
0.2835	7,200 mm		8,0	70,0	25,0	14,0	37,0	67118
0.2854	7,250 mm		8,0	70,0	25,0	14,0	37,0	67119
0.2874	7,300 mm		8,0	70,0	26,0	15,0	37,0	67120
0.2913	7,400 mm		8,0	70,0	26,0	15,0	37,0	67121
0.2953	7,500 mm		8,0	70,0	26,0	15,0	37,0	67122
0.2969	7,541 mm	19/64	8,0	70,0	26,0	15,0	37,0	58516
0.2992	7,600 mm		8,0	70,0	27,0	15,0	37,0	67123
0.3031	7,700 mm		8,0	70,0	27,0	15,0	37,0	67124
0.3071	7,800 mm		8,0	70,0	27,0	16,0	37,0	67125
0.3110	7,900 mm		8,0	70,0	28,0	16,0	37,0	67126
0.3125	7,938 mm	5/16	8,0	70,0	28,0	16,0	37,0	58517
0.3150	8,000 mm		8,0	70,0	28,0	16,0	37,0	67127
0.3189	8,100 mm		10,0	80,0	29,0	17,0	40,0	67128
0.3228	8,200 mm		10,0	80,0	29,0	16,0	40,0	67129
0.3268	8,300 mm		10,0	80,0	29,0	17,0	40,0	67130
0.3281	8,334 mm	21/64	10,0	80,0	29,0	17,0	40,0	58518
0.3307	8,400 mm		10,0	80,0	29,0	17,0	40,0	67131
0.3320	8,433 mm	Q	10,0	80,0	30,0	17,0	40,0	58519
0.3346	8,500 mm		10,0	80,0	30,0	17,0	40,0	67132
0.3386	8,600 mm		10,0	80,0	30,0	17,0	40,0	67133
0.3425	8,700 mm		10,0	80,0	30,0	17,0	40,0	67134
0.3438	8,733 mm	11/32	10,0	80,0	31,0	17,0	40,0	58520
0.3465	8,800 mm		10,0	80,0	31,0	18,0	40,0	67135
0.3504	8,900 mm		10,0	80,0	31,0	18,0	40,0	67136
0.3543	9,000 mm		10,0	80,0	31,0	18,0	40,0	67137
0.3583	9,100 mm		10,0	80,0	32,0	18,0	40,0	67138
0.3594	9,129 mm	23/64	10,0	80,0	32,0	18,0	40,0	58521
0.3622	9,200 mm		10,0	80,0	32,0	18,0	40,0	67139
0.3661	9,300 mm		10,0	80,0	33,0	19,0	40,0	67140
0.3680	9,347 mm	U	10,0	80,0	33,0	19,0	40,0	58522
0.3701	9,400 mm		10,0	80,0	33,0	19,0	40,0	67141
0.3740	9.500 mm		10.0	80.0	33.0	19.0	40.0	67142

136U 2xD

FRACTIONAL & METRIC SERIES







OAL

osian				inch & mm					EDP NO.
ccuracy and sh along with	DECIMAL DC	METRIC DC	FRACTIONAL/ Letter/Wire DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE®-X (TX)
drilling	0.3750	9,525 mm	3/8	10,0	80,0	33,0	19,0	40,0	58523
self-	0.3780	9,600 mm		10,0	80,0	34,0	19,0	40,0	67143
the need for	0.3819	9,700 mm		10,0	80,0	34,0	19,0	40,0	67144
g decreasing	0.3858	9,800 mm		10,0	80,0	34,0	20,0	40,0	67145
edae	0.3898	9,900 mm		10,0	80,0	35,0	20,0	40,0	67146
improves edge	0.3906	9,921 mm	25/64	10,0	80,0	35,0	20,0	40,0	58524
e allowing for	0.3937	10,000 mm		10,0	80,0	35,0	20,0	40,0	67147
ed rates	0.3970	10,084 mm	Х	12,0	90,0	36,0	21,0	43,0	58525
Jed for 56 HRc	0.3976	10,100 mm		12,0	90,0	36,0	21,0	43,0	67148
	0.4016	10,200 mm		12,0	90,0	36,0	20,0	43,0	67149
	0.4040	10,262 mm	Y	12,0	90,0	36,0	21,0	43,0	58526
	0.4055	10,300 mm		12,0	90,0	36,0	21,0	43,0	67150
	0.4062	10,317 mm	13/32	12,0	90,0	36,0	21,0	43,0	58527
	0.4094	10,400 mm		12,0	90,0	36,0	21,0	43,0	67151
	0.4134	10,500 mm		12,0	90,0	37,0	21,0	43,0	67152
	0.4173	10,600 mm		12,0	90,0	37,0	21,0	43,0	67153
	0.4213	10,700 mm		12,0	90,0	37,0	21,0	43,0	67154
	0.4219	10,716 mm	27/64	12,0	90,0	38,0	21,0	43,0	58528
	0.4252	10,800 mm		12,0	90,0	38,0	22,0	43,0	67155
	0.4291	10,900 mm		12,0	90,0	38,0	22,0	43,0	67156
	0.4331	11,000 mm		12,0	90,0	39,0	22,0	43,0	67157
	0.4370	11,100 mm		12,0	90,0	39,0	22,0	43,0	67158
	0.4375	11,113 mm	7/16	12,0	90,0	39,0	22,0	43,0	58529
	0.4409	11,200 mm		12,0	90,0	39,0	22,0	43,0	67159
	0.4449	11,300 mm		12,0	90,0	40,0	23,0	43,0	67160
	0.4488	11,400 mm		12,0	90,0	40,0	23,0	43,0	67161
	0.4528	11,500 mm		12,0	90,0	40,0	23,0	43,0	67162
	0.4531	11,509 mm	29/64	12,0	90,0	40,0	23,0	43,0	58530
	0.4567	11,600 mm		12,0	90,0	41,0	23,0	43,0	67163
	0.4606	11,700 mm		12,0	90,0	41,0	23,0	43,0	67164
	0.4646	11,800 mm		12,0	90,0	41,0	24,0	43,0	67165
	0.4685	11,900 mm		12,0	90,0	42,0	24,0	43,0	67166
	0.4688	11,908 mm	15/32	12,0	90,0	42,0	24,0	43,0	58531
	0.4724	12,000 mm		12,0	90,0	42,0	24,0	43,0	67167
	0.4844	12,304 mm	31/64	14,0	100,0	43,0	25,0	46,0	58532
	0.4921	12,500 mm		14,0	100,0	44,0	25,0	46,0	67168
	0.5000	12,700 mm	1/2	14,0	100,0	44,0	25,0	46,0	58533
	0.5039	12,800 mm		14,0	100,0	45,0	26,0	46,0	67169

TOLERANCES (inch)

≤.1181 DIAMETER
DC = +.00008/+.00047
DCON = h ₆
>.1181–.2362 DIAMETER
DC = +.00016/+.00063
DCON = h ₆
. 0000 - 0007 DUAMETED
>.23023937 DIAMETER
DC = +.00024/+.00003
>.3937–.7087 DIAMETER
DC = +.00028/+.00098
DCON = h ₆
>.7087–1.1811 DIAMETER
DC = +.00031/+.00114
DCON = h ₆
TOLERANCES (mm)
≤ 3 DIAMETER
DC = +0,002/+0,012
DCON = h ₆
>3-6 DIAMETER
DC = +0.004/+0.016
DCON = h ₆
$DCON = h_6$
DC = +0,007/+0,025
10, 00
>18-30 DIAMETER
DC = +0,008/+0,029
STEELS
STAINLESS STEELS
CAST IRON
NON-FERROUS
HIGH TEMP ALLOYS
HARDENED STEELS
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CONTINUED

			inch & mm					EDP NO.
DECIMAL DC	METRIC DC	FRACTIONAL/ Letter/wire DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	USABLE LENGTH LU	SHANK LENGTH LS	Ti-NAMITE®-X (TX)
0.5118	13,000 mm		14,0	100,0	45,0	26,0	46,0	67170
0.5156	13,096 mm	33/64	14,0	100,0	46,0	26,0	46,0	58534
0.5312	13,492 mm	17/32	14,0	100,0	47,0	27,0	46,0	58535
0.5315	13,500 mm		14,0	100,0	47,0	27,0	46,0	67171
0.5469	13,891 mm	35/64	14,0	100,0	49,0	28,0	46,0	58536
0.5512	14,000 mm		14,0	100,0	49,0	28,0	46,0	67172
0.5625	14,288 mm	9/16	16,0	110,0	50,0	29,0	49,0	58537
0.5709	14,500 mm		16,0	110,0	51,0	29,0	49,0	67173
0.5781	14,684 mm	37/64	16,0	110,0	51,0	29,0	49,0	58538
0.5906	15,000 mm		16,0	110,0	53,0	30,0	49,0	67174
0.5938	15,083 mm	19/32	16,0	110,0	53,0	30,0	49,0	58539
0.6094	15,479 mm	39/64	16,0	110,0	54,0	31,0	49,0	58540
0.6102	15,500 mm		16,0	110,0	54,0	31,0	49,0	67175
0.6250	15,875 mm	5/8	16,0	110,0	56,0	32,0	49,0	58541
0.6299	16,000 mm		16,0	110,0	56,0	32,0	49,0	67176
0.6406	16,271 mm	41/64	18,0	125,0	57,0	33,0	57,0	58542
0.6496	16,500 mm		18,0	125,0	58,0	33,0	57,0	67177
0.6562	16,667 mm	21/32	18,0	125,0	58,0	33,0	57,0	58543
0.6693	17,000 mm		18,0	125,0	60,0	34,0	57,0	67178
0.6719	17,066 mm	43/64	18,0	125,0	60,0	34,0	57,0	58544
0.6875	17,463 mm	11/16	18,0	125,0	61,0	35,0	57,0	58545
0.6890	17,500 mm		18,0	125,0	61,0	35,0	57,0	67179
0.7031	17,859 mm	45/64	18,0	125,0	63,0	36,0	57,0	58546
0.7087	18,000 mm		18,0	125,0	63,0	36,0	57,0	67180
0.7188	18,258 mm	23/32	20,0	135,0	64,0	37,0	60,0	58547
0.7283	18,500 mm		20,0	135,0	65,0	37,0	60,0	67181
0.7344	18,654 mm	47/64	20,0	135,0	65,0	37,0	60,0	58548
0.7480	19,000 mm		20,0	135,0	66,0	38,0	60,0	67182
0.7500	19,050 mm	3/4	20,0	135,0	67,0	38,0	60,0	58549
0.7656	19,446 mm	49/64	20,0	135,0	68,0	39,0	60,0	58550
0.7677	19,500 mm		20,0	135,0	68,0	39,0	60,0	67183
0.7812	19,842 mm	25/32	20,0	135,0	69,0	40,0	60,0	58551
0.7874	20,000 mm		20,0	135,0	70,0	40,0	60,0	67184
0.7969	20,241 mm	51/64	22,0	145,0	71,0	40,0	68,0	58552
0.8071	20,500 mm		22,0	145,0	72,0	41,0	68,0	67185
0.8125	20,638 mm	13/16	22,0	145,0	72,0	41,0	68,0	58553

FRACTIONAL Series 146U • Series 136U



	Series 146U 136U		Vc					DC • in					
	Fractional	Hardness	(sfm)		1/16	1/8	1/4	3/8	1/2	5/8	3/4	13/16	
		< 175 Bhn	285	RPM	17419	8710	4355	2903	2177	1742	1452	1340	
		≤ 1/5 Bhn — or < 7 µPo ('	(220, 242)	Fr	0.0016	0.0031	0.0062	0.0093	0.0124	0.0155	0.0186	0.0202	
		≤ / HKC	(220-342)	Feed (ipm)	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	
	CARBON STEELS	< 275 Bhn	255	RPM	15586	7793	3896	2598	1948	1559	1299	1199	
	1018, 1040, 1080, 1090, 10L50,	or	(204, 206)	Fr	0.0013	0.0027	0.0054	0.0081	0.0108	0.0135	0.0162	0.0175	
	1140, 1212, 12L15, 1525, 1536	≤ 28 HRc	(204-300)	Feed (ipm)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	
		< 425 Bhn	145	RPM	8862	4431	2216	1477	1108	886	739	682	
			(116 174)	Fr	0.0011	0.0023	0.0045	0.0068	0.0090	0.0113	0.0135	0.0147	
		≤ 45 HKC	(110-174)	Feed (ipm)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
		< 275 Bhn	220	RPM	13446	6723	3362	2241	1681	1345	1121	1034	
Р		Or	(176-264)	Fr	0.0015	0.0030	0.0059	0.0089	0.0119	0.0149	0.0178	0.0193	
	ALLOY STEELS 4140 4150 4320 5120	S 20 MMC	(170 204)	Feed (ipm)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
	5150, 8630, 86L20, 50100	≤ 375 Bhn	135	RPM	8251	4126	2063	1375	1031	825	688	635	
		Or	(108-162)	Fr	0.0013	0.0027	0.0053	0.0080	0.0107	0.0133	0.0160	0.0173	
		≤ 40 nnc	(100 102)	Feed (ipm)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	
		≤200 Bhn –	125	RPM	7640	3820	1910	1273	955	764	637	588	
		or ≤ 13 HRc ≤ 375 Bhn - or	Or	(100-150)	Fr	0.0012	0.0025	0.0050	0.0075	0.0099	0.0124	0.0149	0.0162
	TOOL STEELS A2 D2 H13 L2 M2		(100 100)	Feed (ipm)	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	
	P20, S7, T15, W2		< 375 Bhn	90	RPM	5501	2750	1375	917	688	550	458	423
			(72-108)	Fr	0.0005	0.0011	0.0022	0.0033	0.0044	0.0055	0.0065	0.0071	
		≤ 40 HHC	(72 100)	Feed (ipm)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
		≤ 185 Bhn	265	RPM	16197	8098	4049	2699	2025	1620	1350	1246	
		Or	(212-318)	Fr	0.0008	0.0016	0.0032	0.0048	0.0064	0.0080	0.0096	0.0104	
	STAINLESS STEELS (FREE MACHINING)	5 J IIIC	(212 010)	Feed (ipm)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	
	303, 416, 420F, 430F, 440F	≤ 275 Bhn	170	RPM	10390	5195	2598	1732	1299	1039	866	799	
		or < 28 HBc	(136-204)	Fr	0.0006	0.0013	0.0025	0.0038	0.0050	0.0063	0.0075	0.0081	
м		5 20 mil	(100 201)	Feed (ipm)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	
		≤ 275 Bhn	130	RPM	7946	3973	1986	1324	993	795	662	611	
	STAINI FSS STEELS	≤ 28 HRc ≤ 375 Bhn or ≤ 40 HRc	(104-156)	Fr	0.0006	0.0013	0.0025	0.0038	0.0050	0.0063	0.0076	0.0082	
	(DIFFICULT)		(Feed (ipm)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
	304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450		95	RPM	5806	2903	1452	968	726	581	484	447	
			(76-114)	Fr	0.0006	0.0011	0.0023	0.0034	0.0045	0.0057	0.0068	0.0074	
	1			Feed (ipm)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
		≤ 220 Bhn	250	RPM	15280	7640	3820	2547	1910	1528	1273	1175	
	GRAY CAST IRONS	or < 19 HRc	(200-300)	Fr	0.0016	0.0031	0.0063	0.0094	0.0126	0.0157	0.0188	0.0204	
к			/	Feed (ipm)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
		≤ 260 Bhn	220	RPM	13446	6723	3362	2241	1681	1345	1121	1034	
	DUCTILE CAST IRONS	or < 26 HBc	(176-264)	Fr	0.0015	0.0030	0.0059	0.0089	0.0119	0.0149	0.0178	0.0193	
		_ L 0 IIII0	201110 (170 204)	Feed (ipm)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	



FRACTIONAL Series 146U • Series 136U

DC • in

	Sorios 14611 13611		Ve					00.1									
	Fractional	Hardness	(sfm)		1/16	1/8	1/4	3/8	1/2	5/8	3/4	13/16					
		< 150 Bhn	475	RPM	29032	14516	7258	4839	3629	2903	2419	2233					
	(WROUGHT)		(200 570)	Fr	0.0016	0.0031	0.0062	0.0093	0.0124	0.0155	0.0186	0.0202					
N	2024, 6061, 7075	≤ 88 HKb	(360-370)	Feed (ipm)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0					
N		< 140 Bhn	380	RPM	23226	11613	5806	3871	2903	2323	1935	1787					
	(CAST)	Or	(204 456)	Fr	0.0014	0.0028	0.0055	0.0083	0.0110	0.0138	0.0165	0.0179					
	A356, A380, 390	≤ 3 HRC	(304-430)	Feed (ipm)	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0					
		< 275 Bhn	175	RPM	10696	5348	2674	1783	1337	1070	891	823					
								(140.210)	Fr	0.0007	0.0014	0.0028	0.0042	0.0055	0.0069	0.0083	0.0090
		≤ 28 HRc ≤ 350 Bhn or	≤ Zŏ HKC	(140-210)	Feed (ipm)	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4				
	TITANIUM ALLOYS		≤ 350 Bhn	130	RPM	7946	3973	1986	1324	993	795	662	611				
S	Ti6Al2Sn4Zr2Mo,			(104-156)	Fr	0.0006	0.0013	0.0025	0.0038	0.0050	0.0063	0.0076	0.0082				
	Ti-6Al4V	≤ 38 HRC	10+130/	Feed (ipm)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0					
		< 440 Bhn	70	RPM	4278	2139	1070	713	535	428	357	329					
			(56 94)	Fr	0.0005	0.0009	0.0019	0.0028	0.0037	0.0047	0.0056	0.0061					
		≤ 4/ HKC	(30-64)	Feed (ipm)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0					
	Allov Steels	< 450 Bhn	95	RPM	5806	2903	1452	968	726	581	484	447					
	4140, 4150, 4320, 5120, 5150,	5 430 BHH - 4150, 4320, 5120, 5150, or 86L20, 50100 ≤ 48 HRc	(76-114)	Fr	0.0008	0.0016	0.0031	0.0047	0.0062	0.0078	0.0093	0.0101					
ц	8630, 86L20, 50100		(70-114)	Feed (ipm)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5					
	TOOL STEELS	< 475 Bhn	80	RPM	4890	2445	1222	815	611	489	407	376					
	A2, D2, H13, L2, M2,		(64-96)	Fr	0.0007	0.0014	0.0029	0.0043	0.0057	0.0072	0.0086	0.0093					
	P20, S7, T15, W2	≤ 50 HRc	(04-30)	Feed (ipm)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5					

reduce rates when material is harder than listed, when drilling conditions are not optimum, or coolant is not available

rates shown are for drilling into a flat surface and should be lowered using the reducion multiplier when the workpiece is angled or curved

reduce rates 10 to 20 percent when using drills without internal coolant

always use the shortest overhang possible

Ionger drills may require a spot drill operation to avoid walking on entry internal coolant required in ISO S and M material groups or when drilling depth exceeds 3xD Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B) rpm = Vc x 3.82 / DC

ipm = Fr x rpm

speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

	reduction multiplier						
angle °	speed x	feed x					
up to 30	1.0	0.6					
over 30	0.7	0.4					

METRIC Series 146U • Series 136U



	Series 14611 13611		Ve	_				DC • mm				
	Metric	Hardness	(m/mm)		1.5	3	6	8	10	12	16	20
		< 175 Bhn	87	RPM	18419	9209	4605	3454	2763	2302	1727	1381
		or	≤ 175 Bhn or ≤ 7 HRc (69-104) F	Fr	0.037	0.074	0.149	0.199	0.248	0.298	0.397	0.496
		≤ / HKC		Feed (mm/min)	686	686	686	686	686	686	686	686
	CARBON STEELS	< 275 Bhn	78	RPM	16480	8240	4120	3090	2472	2060	1545	1236
	1018, 1040, 1080, 1090, 10L50,	or	(62.02)	Fr	0.032	0.065	0.129	0.173	0.216	0.259	0.345	0.432
	1140, 1212, 12L15, 1525, 1536	≤ 28 HRC	(02-93)	Feed (mm/min)	533	533	533	533	533	533	533	533
		< 425 Bhn	44	RPM	9371	4686	2343	1757	1406	1171	879	703
			(25 52)	Fr	0.027	0.054	0.108	0.145	0.181	0.217	0.289	0.361
		≤ 45 HKC	(33-33)	Feed (mm/min)	254	254	254	254	254	254	254	254
		< 275 Bhn	67	RPM	14218	7109	3555	2666	2133	1777	1333	1066
Р		Or Or	(54-80)	Fr	0.036	0.071	0.143	0.191	0.238	0.286	0.381	0.476
	ALLOY STEELS 4140 4150 4320 5120	≤ 28 HKC	(34-00)	Feed (mm/min)	508	508	508	508	508	508	508	508
	5150, 8630, 86L20, 50100	< 375 Bhn	41	RPM	8725	4362	2181	1636	1309	1091	818	654
		Or or	(22-40)	Fr	0.032	0.064	0.128	0.171	0.213	0.256	0.342	0.427
		≤ 40 HRc	(33-43)	Feed (mm/min)	279	279	279	279	279	279	279	279
		< 200 Bhn	38	RPM	8078	4039	2020	1515	1212	1010	757	606
		≤ 13 HRc ≤ 375 Bhn	(30-46)	Fr	0.030	0.060	0.119	0.159	0.199	0.239	0.319	0.398
	TOOL STEELS		(30-40)	Feed (mm/min)	241	241	241	241	241	241	241	241
	P20, S7, T15, W2		27	RPM	5816	2908	1454	1091	872	727	545	436
			(22-22)	Fr	0.013	0.026	0.052	0.070	0.087	0.105	0.140	0.175
		≤ 40 HKC	(22-33)	Feed (mm/min)	76	76	76	76	76	76	76	76
		≤ 185 Bhn	81	RPM	17126	8563	4282	3211	2569	2141	1606	1284
		Or	(65-97)	Fr	0.019	0.039	0.077	0.103	0.129	0.154	0.206	0.257
	STAINLESS STEELS	S 9 ⊓nc	(03 37)	Feed (mm/min)	330	330	330	330	330	330	330	330
	303, 416, 420F, 430F, 440F	≤ 275 Bhn	52	RPM	10987	5493	2747	2060	1648	1373	1030	824
		Or	(41-62)	Fr	0.015	0.030	0.060	0.080	0.100	0.120	0.160	0.200
м		S 20 mile		Feed (mm/min)	165	165	165	165	165	165	165	165
		≤ 275 Bhn	40	RPM	8402	4201	2100	1575	1260	1050	788	630
	STAINI ESS STEELS	≤ 275 Bhn ≤ 28 HRc (5 ≤ 375 Bhn or ≤ 40 HRc (5	(32-48)	Fr	0.015	0.030	0.060	0.081	0.101	0.121	0.161	0.202
	(DIFFICULT)		(02 10)	Feed (mm/min)	127	127	127	127	127	127	127	127
	304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450		29	RPM	6140	3070	1535	1151	921	767	576	460
			(23-35)	Fr	0.014	0.027	0.055	0.073	0.091	0.109	0.146	0.182
			(20 00)	Feed (mm/min)	84	84	84	84	84	84	84	84
		≤ 220 Bhn or	76	RPM	16157	8078	4039	3029	2424	2020	1515	1212
	GRAY CAST IRONS		(61-91)	Fr	0.038	0.075	0.151	0.201	0.252	0.302	0.402	0.503
к		2 IV IIIU	,. . .,	Feed (mm/min)	610	610	610	610	610	610	610	610
		≤ 260 Bhn	67	RPM	14218	7109	3555	2666	2133	1777	1333	1066
	DUCTILE CAST IRONS	0r < 26 HRc	(54-80)	Fr	0.036	0.071	0.143	0.191	0.238	0.286	0.381	0.476
		≥ 20 MNC	(J4-00)	Feed (mm/min)	508	508	508	508	508	508	508	508



METRIC Series 146U • Series 136U

DC • mm

Series 14611 13611		Vc	_														
Metric	Hardness	(m/mm)		1.5	3	6	8	10	12	16	20						
	< 150 Bhn	145	RPM	30698	15349	7675	5756	4605	3837	2878	2302						
(WROUGHT) or 2024, 6061, 7075 ≤ 88 HRb		(116 174)	Fr	0.037	0.074	0.149	0.199	0.248	0.298	0.397	0.496						
	(110-174)	Feed (mm/min)	1143	1143	1143	1143	1143	1143	1143	1143							
	< 1/0 Bhn	116	RPM	24559	12279	6140	4605	3684	3070	2302	1842						
(CAST)	or Or	(02.120)	Fr	0.033	0.066	0.132	0.177	0.221	0.265	0.353	0.441						
A356, A380, 390	≤ 3 HKc	(93-139)	Feed (mm/min)	813	813	813	813	813	813	813	813						
	< 275 Bhn	53	RPM	11310	5655	2827	2121	1696	1414	1060	848						
	≤ 2/5 DIII 0r		Or			Or		(42.04)	Fr	0.017	0.033	0.066	0.089	0.111	0.133	0.177	0.222
	$\leq 28 \text{ HKc}$ (43-64 4V, $\leq 350 \text{ Bhn}$ (40 $\circ r$ (22.40	(43-64)	Feed (mm/min)	188	188	188	188	188	188	188	188						
TITANIUM ALLOYS		< 350 Bhn	40	RPM	8402	4201	2100	1575	1260	1050	788	630					
Ti6Al2Sn4Zr2Mo,		(22.40)	Fr	0.015	0.030	0.060	0.081	0.101	0.121	0.161	0.202						
114A14Mo2Sn0.5S1, Ti-6A14V	≤ 38 HRc	(32-40)	Feed (mm/min)	127	127	127	127	127	127	127	127						
	< 110 Bhn	21	RPM	4524	2262	1131	848	679	565	424	339						
	Or Or	(17.06)	Fr	0.011	0.022	0.045	0.060	0.075	0.090	0.120	0.150						
	≤ 4/ HKC	(17-20)	Feed (mm/min)	51	51	51	51	51	51	51	51						
Allov Steels	< 450 Bhn	29	RPM	6140	3070	1535	1151	921	767	576	460						
4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 ≤ 48 HRc	(22.25)	Fr	0.019	0.037	0.074	0.099	0.124	0.149	0.199	0.248							
	(23-33)	Feed (mm/min)	114	114	114	114	114	114	114	114							
	< 475 Bhn	24	RPM	5170	2585	1293	969	776	646	485	388						
A2, D2, H13, L2, M2,		(20, 20)	Fr	0.017	0.034	0.069	0.092	0.115	0.138	0.183	0.229						
P20, S7, T15, W2 ≤ 50 HRc	≤ 50 HRc	≤ 50 HRc	≤ 50 HRc	≤ 50 HRc	≤ 50 HRc	≤ 50 HRc	≤ 50 HRc	(20-29)	Feed (mm/min)	89	89	89	89	89	89	89	89
	Series 1460, 1360 Metric ALUMINUM ALLOYS (WROUGHT) 2024, 6061, 7075 ALUMINUM ALLOYS (CAST) A356, A380, 390 TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V Alloy Steels 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Series 146U, 136U Hardness ALUMINUM ALLOYS (WROUGHT) ≤ 150 Bhn or ≤ 88 HRb ALUMINUM ALLOYS (CAST) ≤ 140 Bhn or ≤ 3 HRc ALUMINUM ALLOYS (CAST) ≤ 140 Bhn or ≤ 3 HRc TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V ≤ 275 Bhn or ≤ 28 HRc Stop Bhn or ≤ 47 HRc ≤ 350 Bhn or ≤ 38 HRc Alloy Steels 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 ≤ 450 Bhn or ≤ 48 HRc TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 ≤ 475 Bhn or ≤ 50 HRc	Series 146U, 136U Vc Metric Hardness (m/mm) ALUMINUM ALLOYS (WROUGHT) $\leq 150 \text{ Bhn}$ or $\leq 88 \text{ HRb}$ 145 ALUMINUM ALLOYS (CAST) $\leq 140 \text{ Bhn}$ or $\leq 3 \text{ HRc}$ 116 ALUMINUM ALLOYS (CAST) $\leq 140 \text{ Bhn}$ or $\leq 3 \text{ HRc}$ 116 Junctrian $(93-139)$ $\leq 140 \text{ Bhn}$ or $\leq 28 \text{ HRc}$ 116 Junctrian $(93-139)$ $\leq 140 \text{ Bhn}$ or $\leq 28 \text{ HRc}$ 116 Junctrian $(93-139)$ $\leq 140 \text{ Bhn}$ or $\leq 28 \text{ HRc}$ 116 Junctrian $(93-139)$ $\leq 140 \text{ Bhn}$ or $\leq 38 \text{ HRc}$ 116 Junctrian $(93-139)$ $\leq 140 \text{ Bhn}$ or $\leq 28 \text{ HRc}$ 116 Junctrian $(93-139)$ $\leq 350 \text{ Bhn}$ or $\leq 38 \text{ HRc}$ 116 Junctrian $(93-139)$ $\leq 350 \text{ Bhn}$ or $\leq 440 \text{ Bhn}$ or $\leq 440 \text{ Bhn}$ 21 Junctrian $(116-174)$ $(17-26)$ $(17-26)$ Alloy Steels 4140, 4150, 4320, 5120, 5150, 8630, 86120, 50100 $\leq 475 \text{ Bhn}$ or $\leq 50 \text{ HRc}$ 24 or (20-29) Junctrian $(24-20)$ $(22-29)$ $(22-29)$ <	Series 146U, 136UVc HardnessALUMINUM ALLOYS (WROUGHT) 2024, 6061, 7075 150 Bnn or $\leq 88 \text{ HRb}$ 145 RPMALUMINUM ALLOYS (CAST) A356, A380, 390 $\leq 150 \text{ Bnn}$ or $\leq 3 \text{ HRc}$ 116 RPMALUMINUM ALLOYS (CAST) A356, A380, 390 $\leq 140 \text{ Bnn}$ or $\leq 3 \text{ HRc}$ 116 RPM $IIIANIUM ALLOYS(CAST)A356, A380, 390\leq 140 \text{ Bnn}or\leq 3 \text{ HRc}116RPMIIIANIUM ALLOYS(CAST)(A36, A380, 390\leq 140 \text{ Bnn}or\leq 28 \text{ HRc}53RPMIIIANIUM ALLOYS(CAST)(A36, A380, 390\leq 275 \text{ Bnn}or\leq 28 \text{ HRc}53RPMIIIANIUM ALLOYSPure Titanium, Ti6AI4V,Ti6AI2Sn4Zr2M0,Ti4AI4Mo2Sn0.5Si,Ti-6AI4V\leq 350 \text{ Bnn}or\leq 380 \text{ BRc}40RPMIIIANIUM ALLOYSPure Titanium, Ti6AI4V,Ti6AI2Sn4Zr2M0,Ti4AI4Mo2Sn0.5Si,Ti-6AI4V\leq 350 \text{ Bnn}or\leq 38 \text{ HRc}40RPMIIION Steels4140, 4150, 4320, 5120, 5150,8630, 86L20, 50100\leq 450 \text{ Bnn}or\leq 440 \text{ Bnn}or\leq 440 \text{ Bnn}or\leq 440 \text{ Bnn}or\leq 440 \text{ Bnn}or\leq 450 \text{ Bnn}or\leq 450 \text{ Bnn}or\leq 450 \text{ Bnn}or\leq 400 \text{ Bnn}or\leq 450 \text{ Bnn}or\leq 450 \text{ Bnn}or\leq 440 \text{ Bnn}or\leq 430 \text{ Bnn}or\leq 440 \text{ Bnn}or\leq 450 \text{ Bnn}or\leq 400 \text{ Bnn}or\leq 440 \text{ Bnn}or\leq 50 \text{ Hnc}29RPMTOOL STEELSP20, S7, T15, W2\leq 475 \text{ Bnn}\leq 50 \text{ Hnc}24RPMIIIIONIIIIONII$	Series 146U, 136U Vc I.5 Metric Hardness (m/mm) 145 RPM 30698 ALUMINUM ALLOYS (WROUGHT) ≤ 150 Bhn or 2024, 6061, 7075 ≤ 140 Bhn or ≤ 38 HRb 116 RPM 24559 ALUMINUM ALLOYS (CAST) ≤ 140 Bhn or ≤ 3 HRc 116 RPM 24559 ALUMINUM ALLOYS (CAST) ≤ 140 Bhn or ≤ 3 HRc 116 RPM 24559 Marce ≤ 140 Bhn or ≤ 3 HRc 116 RPM 24559 Freed (mm/min) 813 1310 1310 1310 Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V ≤ 350 Bhn or ≤ 38 HRc 40 RPM 8402 ≤ 440 Bhn or ≤ 47 HRc ≤ 350 Bhn or ≤ 48 HRc 21 RPM 4524 $Alloy Steels$ $4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 \leq 450 Bhnor\leq 48 HRc 29 RPM 6140 TOOL STEELSA2, D2, H13, L2, M2, P2, P2, S7, T15, W2 \leq 475 Bhnor\leq 50 HRc 24 RPM 5170 Freed (mm/min) 114 5170 50 HRc 76 Fr $	$ \begin{array}{ c c c c c c } \hline \text{Metric} & \text{Mardness} & (m/mm) & 1.5 & 3 \\ \hline \text{Metric} & (m/mm) & 115 & 150 & 9 \\ \hline \text{Metric} & (m/mm) & 115 & 15349 \\ \hline \text{ALUMINUM ALLOYS} & $150 & Bnn & $0^{\text{or}} \\ $\leq 150 & Bnn & $0^{\text{or}} \\ $\leq 150 & Bnn & $0^{\text{or}} \\ $\leq 88 & HRb & $0^{\text{or}} \\ $\leq 88 & HRb & $0^{\text{or}} \\ $\leq 3 & HRc & $0^{\text{or}} \\ $\leq 3 & RPM & 1143 & 1143 \\ \hline \text{Fr} & 0.033 & 0.066 \\ \hline \text{Feed (mm/min)} & 813 & 813 \\ \hline \text{Fr} & 0.033 & 0.066 \\ \hline \text{Feed (mm/min)} & 813 & 813 \\ \hline \text{Fr} & 0.033 & 0.066 \\ \hline \text{Feed (mm/min)} & 813 & 813 \\ \hline \text{Fr} & 0.033 & 0.066 \\ \hline \text{Feed (mm/min)} & 813 & 813 \\ \hline \text{Fr} & 0.017 & 0.033 \\ \hline \text{Feed (mm/min)} & 188 & 188 \\ \hline \text{So Bnn} & $0^{\text{or}} \\ $\leq 28 & HRc & $0^{\text{or}} \\ $\leq 28 & HRc & $0^{\text{or}} \\ $\leq 28 & HRc & $0^{\text{or}} \\ $\leq 350 & Bnn \\ $0^{\text{or}} \\ $\leq 350 & Bnn \\ $0^{\text{or}} \\ $\leq 350 & Bnn \\ $0^{\text{or}} \\ $\leq 440 & Bnn \\ $0^{\text{or}} \\ $\leq 440 & Bnn \\ $0^{\text{or}} \\ $\leq 440 & Bnn \\ $0^{\text{or}} \\ $\leq 47 & HRc & $0^{\text{or}} \\ $\leq 470 & HRc \\ \hline \end (mm/min) & 127 & 127 \\ \hline \end (mm/min) & 114 & 114 \\ \hline \end (mm/min) & 51 & 51 \\ \hline \end (mm/min) & 114 & 114 \\ \hline \end (mm/min) & 89 & 89 \\ \hline \end (mm/min) & 80 & 80 $		$\begin{array}{ c c c c c c c } \hline \text{Metric} & \text{Margence} & \text{Metric} & \text{Margence} & \text{Metric} & \text{Margence} & \text{Margence} & \text{Metric} & \text{Margence} & \text$	Series 1460, 136U Hardness Vc 1.5 3 6 8 10 ALUMINUM ALLOYS (WROUGHT) 2024, 6061, 7075 5150 Bh or 588 HRb 145 RPM 30698 15349 7675 5756 4605 2024, 6061, 7075 588 HRb 116 RPM 30698 1143 1145 1161	Series 1460, 1360 Hardness Vc 15 3 6 8 10 12 ALUMINUM ALLOYS (WROUGHT) 2024, 6061, 7075 410 Bhn 5 88 HRb 145 RPM 30698 15349 7675 5756 4605 3837 ALUMINUM ALLOYS(CRAST)A356, A380, 390 410 Bhn S 3 HRc 116 RPM 24559 12279 6140 4605 3684 3070 ALUMINUM ALLOYS (CAST) A356, A380, 390 410 Bhn S 3 HRc 116 RPM 24559 12279 6140 4605 3684 3070 (CAST) A356, A380, 390 510 Bhn S 3 HRc 116 RPM 24559 12279 6140 4605 3684 3070 (CAST) A356, A380, 390 510 Bhn S 3 HRc 116 RPM 24559 12279 6140 4605 3684 3070 (CAST) A356, A380, 390 510 Bhn S 3 HRc 116 RPM 24559 1227 121 1666 1414 116 S40 Bhn S 3 613 Bhn 1131 913 913 1	Series 1480, 1380 Hardness (m/m) Vac m 15 3 6 8 10 12 16 ALUMINUM ALLOYS (WROUGHT) 2024, 6061, 7075 5150 Bhn or 588 HRb 145 RPM 30698 15349 7675 5756 4605 3837 2878 ALUMINUM ALLOYS (WROUGHT) 588 HRb 116 RPM 30698 1143 1144 1060 1151						

reduce rates when material is harder than listed, when drilling conditions are not optimum, or coolant is not available

rates shown are for drilling into a flat surface and should be lowered using the reducion multiplier when the workpiece is angled or curved

reduce rates 10 to 20 percent when using drills without internal coolant

always use the shortest overhang possible

longer drills may require a spot drill operation to avoid walking on entry

internal coolant required in ISO S and M material groups or when drilling depth exceeds 3xD Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B) rpm = (Vc x 1000) / (DC x 3.14)

mm/min = Fr x rpm

speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

	reduction multiplier							
angle °	speed x	feed x						
up to 30	1.0	0.6						
over 30	0.7	0.4						

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