

Machining Recommendations for FINEBEAM Drills

ISO	Material	Condition	Tensile Strength [ksi]	Material Group No.	Hardness (HB)	Chipbreaker	Cutting speed V _c (SFM)	Feed : f (IPR)						
								Drill dia. (inch)						
								Ø.984 - 1.693	Ø1.6933 - 3.504					
P	Non-alloy steel and cast steel, free cutting steel	< 0.25% C	Annealed	61	1	125	HF	230 - 425	.004 - .016	.006 - .018				
							G	230 - 425	.004 - .012	.005 - .014				
		≥ 0.25% C	Annealed	94	2	190	HF	230 - 425	.004 - .016	.006 - .018				
							G	230 - 425	.004 - .012	.005 - .014				
		< 0.55% C	Quenched and tempered	123	3	250	HF	230 - 425	.004 - .016	.006 - .018				
							G	230 - 425	.004 - .012	.005 - .014				
		≥ 0.55% C	Annealed	109	4	220	HF	230 - 425	.004 - .016	.006 - .018				
							G	230 - 425	.004 - .012	.005 - .014				
	≥ 0.55% C	Quenched and tempered	145	5	300	HF	230 - 425	.004 - .016	.006 - .018					
						G	230 - 425	.004 - .012	.005 - .014					
	Low alloy and cast steel (less than 5% of alloying elements)	Annealed	87	6	200	HF	230 - 395	.004 - .016	.008 - .018					
						G	230 - 395	.004 - .012	.005 - .014					
						Quenched and tempered	135	7	275	HF	180 - 360	.004 - .016	.008 - .018	
										G	195 - 395	.004 - .012	.005 - .014	
145							8	300	HF	180 - 360	.004 - .016	.008 - .018		
									G	195 - 395	.004 - .012	.005 - .014		
174	9	350	HF	180 - 360	.004 - .016	.008 - .018								
			G	195 - 395	.004 - .012	.005 - .014								
High alloyed steel, cast steel and tool steel	Annealed	99	10	200	HF	180 - 360	.004 - .015	.008 - .016						
					G	230 - 425	.004 - .012	.005 - .014						
	Quenched and tempered	160	11	325	HF	180 - 360	.004 - .015	.008 - .016						
					G	230 - 425	.004 - .012	.005 - .014						
Stainless steel and cast steel	Ferritic/martensitic	99	12	200	HF	130 - 360	.004 - .016	.008 - .018						
					G	230 - 425	.004 - .012	.005 - .014						
	Martensitic	119	13	240	HF	130 - 360	.004 - .016	.008 - .018						
					G	230 - 425	.004 - .012	.005 - .014						
Stainless steel and cast steel	Austenitic, duplex	87	14	180	HF	130 - 360	.004 - .016	.008 - .018						
					G	230 - 425	.004 - .012	.005 - .014						
K	Grey cast iron (GG)	Ferritic/pearlitic		15	180	HF	165 - 360	.004 - .015	.009 - .016					
						G	165 - 360	.004 - .01	.005 - .014					
		Pearlitic/martensitic		16	260	HF	165 - 360	.004 - .015	.009 - .016					
						G	165 - 360	.004 - .01	.005 - .014					
	Nodular cast iron (GGG)	Ferritic		17	160	HF	165 - 360	.004 - .015	.009 - .016					
						G	165 - 360	.004 - .01	.005 - .014					
		Pearlitic		18	250	HF	165 - 360	.004 - .015	.009 - .016					
						G	165 - 360	.004 - .01	.005 - .014					
	Malleable cast iron	Ferritic		19	130	HF	165 - 360	.004 - .015	.009 - .016					
						G	165 - 360	.004 - .01	.005 - .014					
Pearlitic			20	230	HF	165 - 360	.004 - .015	.009 - .016						
					G	165 - 360	.004 - .01	.005 - .014						
N	Aluminum-wrought alloys	Not hardenable		21	60	HF	215 - 490	.004 - .013	.009 - .014					
						G	215 - 425	.004 - .01	.005 - .014					
		Hardenable		22	100	HF	215 - 490	.004 - .013	.009 - .014					
						G	215 - 425	.003 - .009	.005 - .011					
	Aluminum-cast alloys	≤ 12% Si	Not hardenable		23	75	HF	215 - 490	.004 - .013	.009 - .014				
							G	215 - 425	.003 - .009	.005 - .011				
		Hardenable		24	90	HF	215 - 490	.004 - .013	.009 - .014					
						G	215 - 425	.003 - .009	.005 - .011					
	>12% Si	High temperature		25	130	HF	215 - 490	.004 - .013	.009 - .014					
						G	215 - 425	.003 - .009	.005 - .011					
						>1% Pb	Free cutting		26	110	HF	215 - 490	.004 - .013	.009 - .014
											G	215 - 425	.003 - .009	.005 - .011
Copper alloys	Brass		27	90	HF						215 - 490	.004 - .013	.009 - .014	
					G						215 - 425	.003 - .009	.005 - .011	
	Electrolitic copper		28	100	HF	215 - 490	.004 - .013	.009 - .014						
					G	215 - 425	.003 - .009	.005 - .011						
S	High temp. alloys	Fe base	Annealed		31	200	HF	65 - 180	.004 - .012	.008 - .013				
							G	65 - 165	.003 - .009	.005 - .011				
		Hardened		32	280	HF	65 - 180	.004 - .012	.008 - .013					
						G	65 - 165	.003 - .009	.005 - .011					
		Ni / Co base	Annealed		33	250	HF	65 - 180	.004 - .012	.008 - .013				
							G	65 - 165	.003 - .009	.005 - .011				
	Hardened		34	350	HF	65 - 180	.004 - .012	.008 - .013						
					G	65 - 165	.003 - .009	.005 - .011						
	Titanium alloys	Cast		35	320	HF	65 - 180	.004 - .012	.008 - .013					
						G	65 - 165	.003 - .009	.005 - .011					
Pure			58	36		HF	100 - 195	.004 - .012	.008 - .013					
						G	100 - 195	.003 - .009	.005 - .011					
Alpha+beta alloys hardened		152	37		HF	100 - 195	.004 - .012	.008 - .013						
					G	100 - 195	.003 - .009	.005 - .011						
H	Hardened steel ≥ 40HRC	Hardened		38			HF	100 - 195	.004 - .012	.008 - .013				
							G	100 - 195	.003 - .009	.005 - .011				