Operating Guidelines

Materials				Condition	Tensile Strength (N/mm2)	HB Hard-ness	Vc Cutting Speed SFM	Feed vs. Drill Diameter (inches/rev)			
ISO	Mtl Group No.	Type						Inch (mm) 2.125-2.188 (53.9-55.5)	Inch (mm) 2.250-2.563 (57.1-65.1)	Inch (mm) 2.625-2.813 (66.7-71.5)	Inch (mm) 2.875-3.125 (73.0-79.4)
P	1	Non-alloy steel , cast steel, free cutting steel	< 0.25 %C	Annealed	420	125	590-825	.002-.005	.002-.005	.002-.005	.002-.005
	2		>= 0.25 %C	Annealed	650	190	530-825	.002-.006	.002-.006	.002-.006	.002-.006
	3		< 0.55 %C	Quenched and Tempered	850	250	460-790	.003-.006	.003-.006	.003-.007	.003-.007
	4		>= 0.55 %C	Annealed	750	220	460-790	.003-.006	.003-.006	.003-.007	.003-.007
	5		> 0.55 %C	Quenched and Tempered	1000	300	460-790	.003-.006	.003-.006	.003-.007	.003-.007
	6	Low alloy steel and cast steel (less than 5% of alloying elements)		Annealed	600	200	460-790	.003-.007	.003-.007	.003-.007	.003-.007
	7			Quenched and Tempered	930	275	330-590	.003-.007	.003-.007	.003-.007	.003-.007
	8				1000	300	330-590	.003-.007	.003-.007	.003-.007	.003-.007
	9				1200	350	330-590	.003-.007	.003-.007	.003-.007	.003-.007
	10	High alloy steel, cast steel, and tool steel		Annealed	680	200	460-660	.003-.007	.003-.007	.003-.007	.003-.007
	11			Quenched and Tempered	1100	325	330-530	.003-.006	.003-.006	.003-.006	.003-.006
M	12	Stainless steel & Cast iron		Ferritic/Martensitic	680	200	560-790	.002-.005	.003-.006	.003-.006	.003-.006
	13			Martensitic	820	240	560-790	.002-.005	.003-.006	.003-.006	.003-.006
	14			Austenitic	600	180	560-790	.002-.005	.003-.006	.003-.006	.003-.006
K	15	Grey cast iron (GG)		Ferritic		160	590-825	.005-.008	.005-.008	.005-.009	.005-.009
	16			Pearlitic		250	590-825	.005-.008	.005-.008	.005-.009	.005-.009
	17	Cast iron nodular (GGG)		Ferritic		180	590-825	.005-.008	.005-.008	.005-.009	.005-.009
	18			Pearlitic		260	590-825	.005-.008	.005-.008	.005-.009	.005-.009
	19	Malleable cast iron		Ferritic		130	390-730	.004-.007	.004-.007	.005-.008	.005-.008
	20			Pearlitic		230	390-730	.004-.007	.004-.007	.005-.008	.005-.008
N	21	Aluminum - Wrought alloy		Not cureable		60	660-1155	.002-.007	.002-.007	.002-.007	.002-.007
	22			Cured		100	660-1155	.002-.007	.002-.007	.002-.007	.002-.007
	23	Aluminum-cast, alloyed	<=12 %Si	Not cureable		75	660-1155	.002-.007	.002-.007	.002-.007	.002-.007
	24			Cured		90	660-1155	.002-.007	.002-.007	.002-.007	.002-.007
	25		>12% Si	High temp		130	660-1155	.002-.007	.002-.007	.002-.007	.002-.007
	26	Copper alloys	>1% Pb	Free cutting		110	495-825	.004-.007	.004-.007	.004-.007	.004-.007
	27			Brass		90	495-825	.004-.007	.004-.007	.004-.007	.004-.007
	28			Electrolitic copper		100	495-825	.004-.007	.004-.007	.004-.007	.004-.007
	29	Non-metallic		Duroplastics, fiber plastics			495-825	.004-.007	.004-.007	.004-.007	.004-.007
	30			Hard rubber			495-825	.004-.007	.004-.007	.004-.007	.004-.007
S	31	High temp alloys	Fe based	Annealed		200	100-200	.002-.004	.002-.004	.002-.004	.002-.004
	32			Cured		280	100-200	.002-.004	.002-.004	.002-.004	.002-.004
	33		Ni or Co based	Annealed		250	100-200	.002-.004	.002-.004	.002-.004	.002-.004
	34			Cured		350	100-200	.002-.004	.002-.004	.002-.004	.002-.004
	35			Cast		320	100-200	.002-.004	.002-.004	.002-.004	.002-.004
	36	Titanium, Ti alloys			Rm 400		165-265	.002-.004	.002-.004	.002-.004	.002-.004
	37			Alpha+Beta alloys cured	Rm 1050		165-265	.002-.004	.002-.004	.002-.004	.002-.004
H	38	Hardened Steel		Hardened		55 HRC	100-200	.002-.004	.002-.004	.002-.004	.002-.004
	39			Hardened		60 HRC	100-200	.002-.004	.002-.004	.002-.004	.002-.004
	40	Chilled cast iron		Cast		400	100-200	.002-.004	.002-.004	.002-.004	.002-.004
	41	Cast iron nodular		Hardened		55 HRC	100-200	.002-.004	.002-.004	.002-.004	.002-.004

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.