

ISO	Material	Condition	Tensile Strength RM (N/mm2)	Hardness (HB)	Matl No.	Cutting Speed Vc (SFM)	Feed vs Drill Dia. (Drill Length 2XD, 3XD, 4XD* & 5XD*)						
							.500 - .594	.625 - .813	.843 - 1.063	1.094 - 1.312	1.343 - 1.625	1.687 - 2.000	
							IPR (inches/rev)						
P	Non-Alloy Steel <0.25% C & Cast Steel, Free Cutting Steel	<0.25% C	Annealed	420	125	1	800-1000	.002 - .004	.0025 - .004	.0025 - .005	.003 - .005	.003 - .006	.0035 - .0065
		>= 0.25% C	Annealed	650	190	2	800-1000	.002 - .004	.0025 - .004	.0025 - .005	.003 - .005	.003 - .006	.0035 - .0065
		<0.55% C	Quenched & Tempered	850	250	3	500-800	.002 - .004	.003 - .006	.004 - .007	.005 - .0085	.005 - .0095	.005 - .010
		>= 0.55% C	Annealed	750	220	4	800-1000	.002 - .004	.003 - .006	.004 - .007	.005 - .0085	.005 - .0095	.005 - .010
			Quenched & Tempered	1000	300	5	600-800	.002 - .004	.003 - .006	.004 - .007	.005 - .0085	.005 - .0095	.005 - .010
	Low Alloy Steel & Cast Steel (less than 5% alloying elements)	Annealed	600	200	6	500-800	.002 - .004	.003 - .0055	.004 - .007	.005 - .0085	.005 - .009	.005 - .0095	
		Quenched & Tempered	930	275	7	400-700	.002 - .005	.003 - .006	.004 - .007	.005 - .008	.006 - .009	.0065 - .010	
			1000	300	8	400-600	.002 - .005	.003 - .006	.004 - .007	.005 - .008	.006 - .009	.0065 - .010	
			1200	350	9	300-550	.002 - .005	.003 - .006	.004 - .007	.005 - .008	.006 - .009	.0065 - .010	
	High Alloy Steel, Cast Steel & Tool Steel	Annealed	680	200	10	400-600	.002 - .005	.003 - .006	.004 - .007	.005 - .008	.006 - .009	.0065 - .010	
		Quenched & Tempered	1100	325	11	400-550	.002 - .005	.003 - .006	.004 - .008	.005 - .009	.006 - .0095	.0065 - .010	
M	Stainless Steel & Cast Stainless Steel	Ferritic/Martensitic	680	200	12	550-800	.002 - .004	.003 - .006	.003 - .006	.0035 - .0065	.004 - .007	.0045 - .0075	
		Martensitic	820	240	13	500-700	.002 - .004	.003 - .006	.003 - .006	.0035 - .0065	.004 - .007	.0045 - .0075	
		Austenitic	600	180	14	500-700	.002 - .004	.003 - .006	.003 - .006	.0035 - .0065	.004 - .007	.0045 - .0075	
K	Grey Cast Iron (GG)	Ferritic		160	15	500-800	.002 - .004	.003 - .0065	.005 - .008	.006 - .010	.006 - .011	.007 - .012	
		Pearlitic		250	16	500-800	.002 - .004	.003 - .0065	.005 - .008	.006 - .010	.006 - .011	.007 - .012	
	Cast Iron Nodular (GGG)	Ferritic		180	17	600-800	.002 - .004	.003 - .0065	.005 - .008	.006 - .010	.006 - .011	.007 - .012	
		Pearlitic		260	18	600-800	.002 - .004	.003 - .0065	.005 - .008	.006 - .010	.006 - .011	.007 - .012	
	Malleable Cast Iron	Ferritic		130	19	600-800	.002 - .004	.003 - .0065	.005 - .008	.006 - .010	.006 - .011	.007 - .012	
		Pearlitic		230	20	500-700	.002 - .004	.003 - .0065	.005 - .008	.006 - .010	.006 - .011	.007 - .012	
N	Aluminum - Wrought Alloy	Not cureable		60	21	1300-2000	.002 - .005	.003 - .006	.004 - .008	.005 - .009	.0055 - .009	.006 - .010	
		Cured		100	22	1000-1300	.002 - .005	.003 - .006	.004 - .008	.005 - .009	.0055 - .009	.006 - .010	
	Aluminum -Cast, Alloyed	<=12% Si	Not cureable		75	23	1300-2000	.002 - .005	.003 - .006	.004 - .008	.005 - .009	.0055 - .009	.006 - .010
		Cured		90	24	1000-1300	.002 - .005	.003 - .006	.004 - .008	.005 - .009	.0055 - .009	.006 - .010	
	>12% Si	High Temperature		130	25	1000-1300	.002 - .005	.003 - .006	.004 - .008	.005 - .009	.0055 - .009	.006 - .010	
	Copper Alloys > 1% Pb	Free cutting		110	26	800-1000	.002 - .005	.003 - .006	.004 - .008	.005 - .009	.0055 - .009	.006 - .010	
		Brass		90	27	750-900	.002 - .005	.003 - .006	.004 - .008	.005 - .009	.0055 - .009	.006 - .010	
		Electrolytic Copper		100	28	800-1000	.002 - .005	.003 - .006	.004 - .008	.005 - .009	.0055 - .009	.006 - .010	
	Non-Metallic	Duro & Fiber Plastics			29								
		Hard rubber			30								
S	High Temp Alloys	Fe based	Annealed		200	31	100-250	.002 - .004	.0025 - .0055	.003 - .007	.004 - .0085	.0055 - .009	.006 - .0095
			Cured		280	32	100-250	.002 - .004	.0025 - .0055	.003 - .007	.004 - .0085	.0055 - .009	.006 - .0095
		Ni or Co Based	Annealed		250	33	100-250	.002 - .004	.0025 - .0055	.003 - .007	.004 - .0085	.0055 - .009	.006 - .0095
			Cured		350	34	100-250	.002 - .004	.0025 - .0055	.003 - .007	.004 - .0085	.0055 - .009	.006 - .0095
			Cast		320	35	100-250	.002 - .004	.0025 - .0055	.003 - .007	.004 - .0085	.0055 - .009	.006 - .0095
	Titanium, Ti Alloys		Rm 400		36	100-250	.002 - .004	.0025 - .0055	.003 - .007	.004 - .0085	.0055 - .009	.006 - .0095	
		Alpha+Beta Alloys Cured	Rm 1050		37	100-200	.002 - .004	.0025 - .0055	.003 - .007	.004 - .0085	.0055 - .009	.006 - .0095	
H	Hardened Steel	Hardened		55 HRC	38	50-150	.001 - .002	.001 - .002	.001 - .003	.002 - .003	.002 - .003	.002 - .004	
		Hardened		60 HRC	39	50-150	.001 - .002	.001 - .002	.001 - .003	.002 - .003	.002 - .003	.002 - .004	
	Chilled Cast Iron	Cast		400	40	50-150	.001 - .002	.001 - .002	.001 - .003	.002 - .003	.002 - .003	.002 - .004	
	Cast Iron Nodular	Hardened		55 HRC	41	50-150	.001 - .002	.001 - .002	.001 - .003	.002 - .003	.002 - .003	.002 - .004	

*For 4XD and 5XD bodies, reduce feed rate by 40% for the first .150 to stabilize, then up to 100% feed for remainder of DOC.