



ISO	MATERIAL	HARDNESS	Vc (SFM)*		DRILL DIAMETER (INCH)						
					≤ 1/16"	1/16"-1/8"	1/8"-1/4"	1/4"-3/8"	3/8"-1/2"	1/2"-3/4"	3/4"-1"
					Fz = IPR (INCH PER REVOLUTION)*						
			HSS/Cobalt	Carbide							
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 BHN or ≤ 28 HRC	70-200	150-350	.0005 - .0030	.0010 - .0050	.0020 - .0075	.0030 - .0100	.0060 - .0120	.0080 - .0140	.0100 - .0170
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 17-4 PH	≤ 375 BHN or ≤ 40 HRC	60-150	100-280	.0007 - .0030	.0012 - .0040	.0020 - .0060	.0040 - .0080	.0060 - .0110	.0070 - .0135	.0070 - .0155
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 BHN or ≤ 28 HRC	60-120	110-190	.0006 - .0025	.0008 - .0030	.0012 - .0060	.0025 - .0085	.0040 - .0110	.0060 - .0140	.0080 - .0170
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 BHN or ≤ 28 HRC	40-110	90-140	.0004 - .0018	.0006 - .0020	.0009 - .0040	.0010 - .0060	.0030 - .0080	.0040 - .0110	.0050 - .0140
K	GRAY IRONS Class 20, 30, 40, 50, 60, G3000, G3500	≤ 220 BHN or ≤ 19 HRC	60-180	140-400	.0006 - .0025	.0008 - .0030	.0012 - .0060	.0025 - .0085	.0040 - .0110	.0060 - .0140	.0080 - .0190
	DUCTILE IRONS D&M series, 250, 300, 350, 400, 60-40-18, 65-45-12	≤ 260 BHN or ≤ 26 HRC	50-90	110-280	.0006 - .0025	.0008 - .0030	.0012 - .0060	.0025 - .0085	.0040 - .0110	.0060 - .0140	.0080 - .0170
N	NON-FERROUS Aluminum, Aluminum cast, Brass, Copper, Bronze, Non Metallic	≤ 271 BHN or ≤ 28 HRC	90-300	180-500	.0003 - .0010	.0006 - .0021	.0010 - .0030	.0025 - .0040	.0028 - .0065	.0030 - .0090	.0050 - .0150
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 555 BHN or ≤ 55 HRC	40-80	70-160	.0005 - .0030	.0010 - .0040	.0020 - .0055	.0040 - .0080	.0060 - .0100	.0080 - .0120	.0100 - .0140
S	HR SUPER ALLOYS Inconel 718, Waspaloy, Hastelloy, Inconel 625, Stellite 31, Haynes 25, Rene 41	≤ 275 BHN or ≤ 28 HRC	15-55	50-110	.0007 - .0020	.00012 - .0025	.0018 - .0040	.0025 - .0060	.0030 - .0075	.0040 - .0085	.0050 - .0100
	TITANIUM 6AL-4V, ASTM 1, 2, 3, 6AL-2S	≤ 275 BHN or ≤ 28 HRC	30-75	70-160	.0006 - .0025	.0008 - .0035	.0012 - .0060	.0025 - .0085	.0040 - .0100	.0060 - .0120	.0080 - .0140

Factors affecting optimized drill speeds and feeds:

- Depth of Hole
- Machinability of Material
- Coolant delivery method

Drill depths > 4X diameter require 15%-30% reduction in suggested drill feed rates.

*Speeds & feeds are starting recommendations only. Factors such as machine type, fixture, tooling rigidity, available horsepower, coolant delivery method and others will affect the performance significantly.