GARR TOOL Drilling Guide

ISO Material		HRC	M/Min. (by Series)			
			1100, 1120	1200, 1205, 1520	1500, 1510	1800H
S	**COBALT BASE ALLOYS**					
	Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 40 > 40	- -	30 - 45 25 - 35	30 - 45 25 - 35	- -
	NICKEL BASE ALLOYS					
	Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286	< 40 > 40	- -	30 - 45 25 - 40	40 - 50 25 - 40	- -
	IRON BASE ALLOYS					
	Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 40 > 40	- -	40 - 50 30 - 40	40 - 50 30 - 45	- -
	MONEL					
	Monel - 65% Nickel		-	30 - 45	30 - 45	-
	TITANIUM ALLOYS					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	45 - 60	45 - 60	-
M	**STAINLESS STEELS**					
	(Precipitation) 13/8, 15/5, 17-4, pH Types	< 40 > 40	-	40 - 50 25 - 40	45 - 60 30 - 45	- -
	(Austentic) 200 Series, 300 Series	< 40 > 40	-	30 - 50 30 - 40	45 - 60 40 - 45	- -
	(Austentic) 304L, 316L, Nitronic 50	< 40 > 40	-	25 - 30 20 - 30	30 - 40 25 - 30	- -
	(Martensitic) 400 Series	< 40 > 40	-	30 - 45 25 - 40	40 - 55 30 - 45	- -
P	**HIGH STRENGTH TOOL STEELS**					
	4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 40 > 40	- -	30 - 55 25 - 40	40 - 55 25 - 40	- -
	Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	20 - 30	- -
	MEDIUM ALLOY TOOL STEELS					
	200, 250, 300, 8620	< 40 > 40	-	40 - 55 30 - 45	40 - 55 30 - 45	- -
	LOW CARBON STEELS					
	Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 40 > 40	-	40 - 55 30 - 40	45 - 60 30 - 55	- -
	CAST STEELS					
	Steel		45 - 60	40 - 55	-	-
K	**CAST MATERIAL**					
	Ductile Iron		60 - 120	40 - 60	45 - 75	-
	Gray Iron		50 - 90	30 - 60	45 - 75	-
N	**NON-FERROUS**					
	Aluminum (6061, 7075)		-	75 - 100	-	70 - 120
	Magnesium		-	60 - 90	-	60 - 120
	Copper		-	45 - 70	-	-
	Brass, Bronze		-	40 - 90	-	60 - 120
O	**COMPOSITE (non-ISO)**					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		60	45 - 90	45 - 90	-

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

	ISO Material	HRC	CHIPLOAD PER TOOTH (Fz)				
			2.0 - 3.0mm	3.0 - 6.0mm	6.0 - 10.0mm	10.0 - 13.0mm	13.0 - 16.0mm
S	**COBALT BASE ALLOYS**						
	Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-4. L-605	< 40 > 40	.010 - .025 .010 - .025	.020 - .050 .013 - .025	.040 - .065 .025 - .040	.050 - .100 .025 - .050	.065 - .125 .040 - .075
	NICKEL BASE ALLOYS						
	Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286	< 40 > 40	.013 - .040 .010 - .025	.025 - .040 .020 - .040	.040 - .065 .025 - .040	.050 - .100 .040 - .075	.065 - .125 .050 - .100
	IRON BASE ALLOYS						
	Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 40 > 40	.025 - .040 .020 - .040	.025 - .050 .025 - .050	.040 - .090 .040 - .065	.050 - .100 .040 - .075	.075 - .150 .065 - .125
	MONEL						
	Monel - 65% Nickel		.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
	TITANIUM ALLOYS						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		.020 - .040	.025 - .050	.040 - .075	.050 - .100	.065 - .125
M	**STAINLESS STEELS**						
	(Precipitation) 13/8, 15/5, 17-4, pH Types	< 40 > 40	.013 - .040 .010 - .025	.025 - .050 .020 - .040	.040 - .090 .025 - .040	.050 - .100 .040 - .075	.065 - .125 .050 - .100
	(Austentic) 200 Series, 300 Series	< 40 > 40	.013 - .040 .010 - .025	.025 - .050 .020 - .040	.040 - .090 .025 - .040	.050 - .100 .040 - .075	.065 - .125 .050 - .100
	(Austentic) 304L, 316L, Nitronic 50	< 40 > 40	.010 - .025 .008 - .020	.020 - .040 .013 - .025	.025 - .040 .025 - .040	.040 - .075 .025 - .050	.050 - .100 .040 - .075
	(Martensitic) 400 Series	< 40 > 40	.013 - .040 .010 - .025	.025 - .050 .020 - .040	.040 - .090 .025 - .040	.050 - .100 .040 - .075	.065 - .125 .050 - .100
P	**HIGH STRENGTH TOOL STEELS**						
	4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 40 > 40	.013 - .040 .010 - .025	.025 - .050 .020 - .050	.040 - .065 .025 - .050	.050 - .100 .030 - .075	.075 - .125 .040 - .100
	Thompson Shaft, Armor Plate (Class 1)	> 50	.008 - .020	.010 - .030	.015 - .040	.020 - .060	.030 - .080
	MEDIUM ALLOY TOOL STEELS						
	200, 250, 300, 8620	< 40 > 40	.025 - .040 .013 - .040	.040 - .065 .025 - .050	.050 - .075 .025 - .065	.050 - .100 .040 - .075	.065 - .125 .050 - .100
	LOW CARBON STEELS						
	Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 40 > 40	.025 - .040 .013 - .040	.040 - .065 .025 - .050	.050 - .075 .025 - .065	.050 - .100 .040 - .090	.065 - .125 .050 - .100
	CAST STEELS						
	Steel		.020 - .040	.025 - .050	.040 - .075	.050 - .100	.065 - .125
K	**CAST MATERIAL**						
	Ductile Iron		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
	Gray Iron		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
N	**NON-FERROUS**						
	Aluminum (6061, 7075)		.025 - .050	.025 - .100	.050 - .125	.075 - .150	.090 - .180
	Magnesium		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
	Copper		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
	Brass, Bronze		.020 - .050	.025 - .075	.040 - .090	.050 - .100	.065 - .125
O	**COMPOSITE (non-ISO)**						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.015 - .040	.020 - .050	.025 - .065	.040 - .075	.050 - .100

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