

GARR TOOL Drilling Guide

	ISO Material	HRC	SFM (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	-	100 - 150	100 - 150	-
		> 40	-	80 - 110	80 - 110	-
	NICKEL BASE ALLOYS					
	Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286	< 40	-	100 - 150	125 - 175	-
		> 40	-	90 - 125	90 - 125	-
	IRON BASE ALLOYS					
	Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 40	-	100 - 150	125 - 175	-
> 40		-	90 - 125	90 - 150	-	
MONEL						
Monel - 65% Nickel		-	100 - 150	100 - 150	-	
TITANIUM ALLOYS						
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	150 - 200	150 - 200	-	
M	STAINLESS STEELS					
	(Precipitation) 13/8, 15/5, 17-4, pH Types	< 40	-	125 - 175	150 - 200	-
		> 40	-	80 - 125	100 - 150	-
	(Austenitic) 200 Series, 300 Series	< 40	-	100 - 175	150 - 200	-
		> 40	-	100 - 125	125 - 150	-
	(Austenitic) 304L, 316L, Nitronic 50	< 40	-	80 - 100	90 - 125	-
		> 40	-	60 - 90	80 - 100	-
	(Martensitic) 400 Series	< 40	-	100 - 150	125 - 175	-
> 40		-	80 - 125	100 - 140	-	
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 40	-	100 - 175	125 - 175	-	
	> 40	-	80 - 130	80 - 130	-	
Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	70 - 90	-	
MEDIUM ALLOY TOOL STEELS						
200, 250, 300, 8620	< 40	-	125 - 175	125 - 175	-	
	> 40	-	100 - 150	100 - 150	-	
LOW CARBON STEELS						
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 40	-	125 - 175	150 - 200	-	
	> 40	-	100 - 125	100 - 175	-	
CAST STEELS						
Steel			150 - 200	125 - 175	-	
CAST MATERIAL						
K	Ductile Iron		200 - 400	125 - 200	150 - 250	
	Gray Iron		175 - 300	100 - 200	150 - 250	
N	NON-FERROUS					
	Aluminum (6061, 7075)		-	250 - 350	-	250 - 400
	Magnesium		-	200 - 300	-	200 - 400
	Copper		-	150 - 250	-	-
Brass, Bronze		-	125 - 300	-	200 - 400	
O	COMPOSITE (non-ISO)					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		200	150 - 300	150 - 300	-

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

ISO Material	HRC	CHIPLOAD PER TOOTH (Fz)				
		1/16" - 1/8"	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"
S						
COBALT BASE ALLOYS						
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 40 > 40	.0004" - .0010" .0004" - .0010"	.0008" - .0020" .0005" - .0010"	.0015" - .0025" .0010" - .0015"	.0020" - .0040" .0010" - .0020"	.0025" - .0050" .0015" - .0030"
NICKEL BASE ALLOYS						
Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286	< 40 > 40	.0005" - .0015" .0004" - .0010"	.0010" - .0015" .0008" - .0015"	.0015" - .0025" .0010" - .0015"	.0020" - .0040" .0015" - .0030"	.0025" - .0050" .0020" - .0040"
IRON BASE ALLOYS						
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 40 > 40	.0010" - .0015" .0008" - .0015"	.0010" - .0020" .0010" - .0020"	.0015" - .0035" .0015" - .0025"	.0020" - .0050" .0020" - .0040"	.0030" - .0060" .0025" - .0050"
MONEL						
Monel - 65% Nickel		.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
TITANIUM ALLOYS						
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
M						
STAINLESS STEELS						
(Precipitation)	< 40 > 40	.0005" - .0015" .0004" - .0010"	.0010" - .0020" .0008" - .0015"	.0015" - .0035" .0010" - .0015"	.0020" - .0040" .0015" - .0030"	.0025" - .0050" .0020" - .0040"
13/8, 15/5, 17-4, pH Types	< 40 > 40	.0005" - .0015" .0004" - .0010"	.0010" - .0020" .0008" - .0015"	.0015" - .0035" .0010" - .0015"	.0020" - .0040" .0015" - .0030"	.0025" - .0050" .0020" - .0040"
(Austenitic)	< 40 > 40	.0005" - .0015" .0004" - .0010"	.0010" - .0020" .0008" - .0015"	.0015" - .0035" .0010" - .0015"	.0020" - .0040" .0015" - .0030"	.0025" - .0050" .0020" - .0040"
200 Series, 300 Series	< 40 > 40	.0004" - .0010" .0004" - .0010"	.0008" - .0015" .0008" - .0015"	.0010" - .0015" .0010" - .0015"	.0015" - .0030" .0015" - .0030"	.0020" - .0040" .0020" - .0040"
(Austenitic)	< 40 > 40	.0004" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0015" .0010" - .0015"	.0015" - .0030" .0010" - .0020"	.0020" - .0040" .0015" - .0030"
304L, 316L, Nitronic 50	< 40 > 40	.0005" - .0015" .0004" - .0010"	.0010" - .0020" .0008" - .0015"	.0015" - .0035" .0010" - .0015"	.0020" - .0040" .0015" - .0030"	.0025" - .0050" .0020" - .0040"
(Martensitic)	< 40 > 40	.0005" - .0015" .0004" - .0010"	.0010" - .0020" .0008" - .0015"	.0015" - .0035" .0010" - .0015"	.0020" - .0040" .0015" - .0030"	.0025" - .0050" .0020" - .0040"
400 Series						
P						
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 40 > 40	.0005" - .0015" .0004" - .0010"	.0010" - .0020" .0008" - .0020"	.0015" - .0025" .0010" - .0020"	.0015" - .0030" .0015" - .0030"	.0020" - .0040" .0020" - .0040"
Thompson Shaft, Armor Plate (Class 1)	> 50	.0003" - .0006"	.0005" - .0010"	.0008" - .0015"	.0010" - .0020"	.0015" - .0030"
MEDIUM ALLOY TOOL STEELS						
200, 250, 300, 8620	< 40 > 40	.0010" - .0015" .0005" - .0010"	.0015" - .0025" .0010" - .0020"	.0020" - .0030" .0010" - .0025"	.0020" - .0040" .0015" - .0030"	.0025" - .0050" .0020" - .0040"
LOW CARBON STEELS						
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 40 > 40	.0010" - .0015" .0005" - .0010"	.0015" - .0025" .0010" - .0020"	.0020" - .0030" .0010" - .0025"	.0020" - .0040" .0015" - .0035"	.0025" - .0050" .0020" - .0040"
CAST STEELS						
Steel		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
K						
CAST MATERIAL						
Ductile Iron		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
Gray Iron		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
N						
NON-FERROUS						
Aluminum (6061, 7075)		.0010" - .0020"	.0015" - .0040"	.0020" - .0050"	.0030" - .0060"	.0035" - .0070"
Magnesium		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
Copper		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
Brass, Bronze		.0008" - .0020"	.0010" - .0030"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
O						
COMPOSITE (non-ISO)						
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.0006" - .0015"	.0008" - .0020"	.0010" - .0025"	.0015" - .0030"	.0020" - .0040"

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