

GARR TOOL Drilling Guide

Fractional

TECHNICAL

Type	Rc Hardness	RECOMMENDED SFM BY SERIES						
		1100, 1120	4000	1200, 1205, 1520, 1600, 1400	1500, 1510, 1300	1700	1700K	1800H
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	80 - 120	80 - 120	100 - 150	100 - 150	-	-	-
	> 35	-	-	80 - 110	80 - 110	-	-	-
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	100 - 125	100 - 125	100 - 150	125 - 175	-	-	-
	> 35	-	-	90 - 125	90 - 125	-	-	-
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	100 - 125	100 - 125	100 - 150	125 - 175	-	-	-
	> 35	-	-	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		125 - 175	125 - 175	150 - 200	150 - 200	-	-	-
STAINLESS STEELS								
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35	-	125 - 150	125 - 175	150 - 200	-	-	-
	> 35	-	-	80 - 125	100 - 150	-	-	-
(Austenitic) Inox, 200 Series, 300 Series	< 35	-	125 - 150	100 - 175	150 - 200	-	-	-
	> 35	-	-	100 - 125	125 - 150	-	-	-
(Austenitic) 304L, 316L, Nitronic 50, Inox	< 35	-	100 - 125	80 - 100	90 - 125	-	-	-
	> 35	-	-	60 - 90	80 - 100	-	-	-
(Martensitic) 400 Series	< 35	-	125 - 150	100 - 150	125 - 175	-	-	-
	> 35	-	-	80 - 125	100 - 140	-	-	-
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35	-	125 - 150	100 - 175	125 - 175	-	-	-
	35 - 50	-	-	80 - 130	80 - 130	-	-	-
Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	-	70 - 90	-	-	-
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35	-	125 - 150	125 - 175	125 - 175	-	-	-
	> 35	-	-	100 - 150	100 - 150	-	-	-
CARBON STEELS								
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	-	125 - 150	125 - 175	150 - 200	-	-	-
	> 35	-	-	100 - 125	100 - 175	-	-	-
CAST MATERIAL								
Steel		150 - 200	150 - 200	125 - 175	-	100 - 150	125 - 225	-
Ductile Iron		200 - 400	200 - 300	125 - 200	150 - 250	100 - 175	150 - 300	-
Gray Iron		175 - 300	150 - 250	100 - 200	150 - 250	150 - 250	150 - 300	-
Aluminum		200 - 400	175 - 300	150 - 250	-	175 - 300	200 - 350	250 - 400
ALUMINUM								
Aircraft Grade (6061, 7075)		-	200	250 - 350	-	-	-	250 - 400
MAGNESIUM								
		-	200	200 - 300	-	-	-	200 - 400
COPPER								
Copper Alloys		-	200	150 - 250	-	-	-	-
BRASS, BRONZE								
Brass, Aluminum/Bronze, Low Silicon Bronze		-	-	150 - 300	-	-	-	200 - 400
		-	-	125 - 200	-	-	-	200 - 400
COMPOSITE MATERIAL								
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		200	200	150 - 300	150 - 300	-	-	-

INCREASE SFM 20%-40% FOR HARDLUBE COATING

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

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Fractional

Type	Rc Hardness	CHIPLOAD PER FLUTE (Fz)				
		1/16" - 1/8"	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"
COBALT BASE ALLOYS						
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	.0004" - .0010"	.0008" - .0020"	.0015" - .0025"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0005" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0030"
NICKEL BASE ALLOYS						
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	.0005" - .0015"	.0010" - .0015"	.0015" - .0025"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
IRON BASE ALLOYS						
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	.0010" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0050"	.0030" - .0060"
	> 35	.0008" - .0015"	.0010" - .0020"	.0015" - .0025"	.0020" - .0040"	.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"
STAINLESS STEELS						
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
(Austenitic) Inox, 200 Series, 300 Series	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
(Austenitic) 304L, 316L, Nitronic 50, Inox	< 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
	> 35	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0030"
(Martensitic) 400 Series	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0025"	.0015" - .0030"	.0020" - .0040"
	35 - 50	.0004" - .0010"	.0008" - .0020"	.0010" - .0020"	.0015" - .0030"	.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	< 35	.0010" - .0015"	.0015" - .0025"	.0020" - .0030"	.0020" - .0040"	.0025" - .0050"
	> 35	.0005" - .0010"	.0010" - .0020"	.0010" - .0025"	.0015" - .0030"	.0020" - .0040"
CARBON STEELS						
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	.0010" - .0015"	.0015" - .0025"	.0020" - .0030"	.0020" - .0040"	.0025" - .0050"
	> 35	.0005" - .0010"	.0010" - .0020"	.0010" - .0025"	.0015" - .0035"	.0020" - .0040"
CAST MATERIAL						
Steel		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
Ductile Iron		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
Gray Iron		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
Aluminum		.0010" - .0020"	.0015" - .0040"	.0020" - .0050"	.0030" - .0060"	.0035" - .0070"
ALUMINUM						
Aircraft Grade (6061, 7075)		.0010" - .0020"	.0015" - .0040"	.0020" - .0050"	.0030" - .0060"	.0035" - .0070"
MAGNESIUM						
		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
COPPER						
Copper Alloys		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
BRASS, BRONZE						
Brass, Aluminum/Bronze, Low Silicon Bronze		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
COMPOSITE MATERIAL						
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.0006" - .0015"	.0008" - .0020"	.0010" - .0025"	.0015" - .0030"	.0020" - .0040"

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