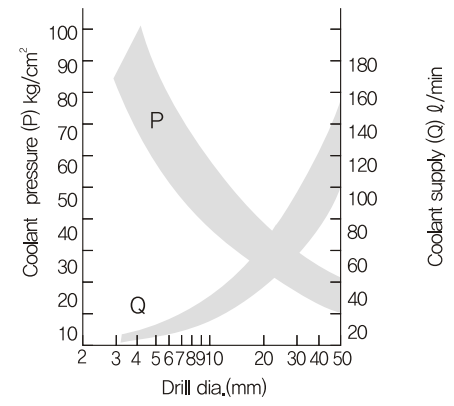


Gun Drilling Speeds and Feeds

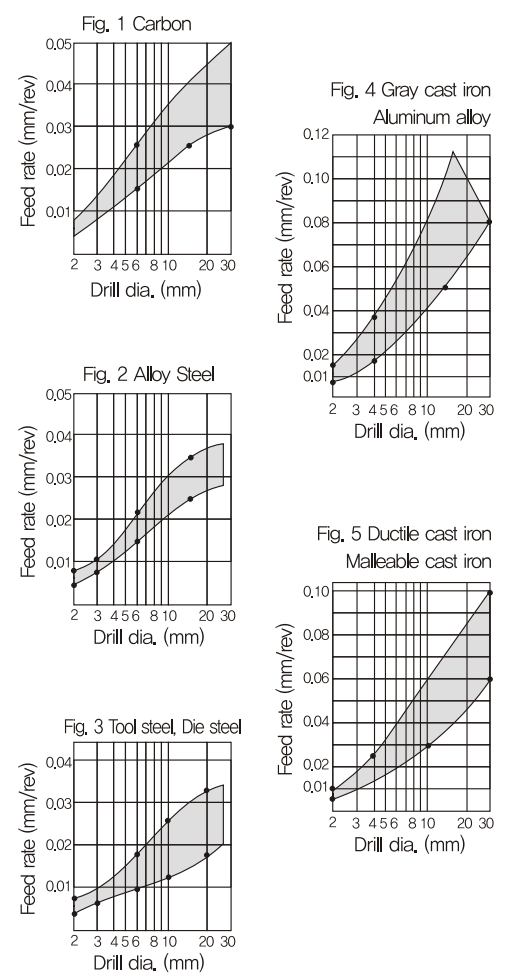
Recommended Cutting Conditions for Gundrilling

Machining variables					
Work material	Heat Treatment	Hardness		Feed Speed "V" (m/min)	Feed rate "f" (mm/rev)
		HB	HRC		
Free cutting carbon steel S10C~S15C S30C~S50C S24C~S50C	Cold drawn Cold drawn Quenched & tempered	160~190	(5) ~ (11)	130	Fig. 1
		200~230	(12) ~ 20	100	
		250~300	25~32	80	
Carbon steel S10C~S35C S10C~S50C S50C~	Annealed	110~120	~ (9)	130	Fig. 2
		120~185	(5) ~ (13)	120	
		170~200	(16) ~24	100	
S20C~S30C S30C~S55C S50C~ S55C~	Quenched & tempered	210~250	26~33	90	Fig. 2
		260~310	34~40	70	
		320~375	41~47	50	
Alloy steel SCr,SNC SNCM, SCM SMn etc,	Annealed	250~230	~ (20)	90	Fig. 2
Alloy steel SCr,SNC SNCM, SCM SMn etc,	Annealed or Quenched & tempered	240~310	23~33	70	Fig. 2
		315~370	34~40	50	Fig. 3
		280~440	40~47	40	
Cast steel SC etc,	Quenched & tempered	140~500	~ (8)	100	Fig. 2
		190~240	(11) ~22	90	
Tool steel SKS, SKD etc,	Annealed Annealed	150~200	~ (13)	70	Fig. 3
		210~300	(16) ~32	50	
Stainless steel Ferrite SUS405·430 Austenite SUS304·305 Martensite Sus 403·410	Annealed Annealed Annealed Quenched & tempered	150~200	~ (13)	70	Fig. 3
		160~220	~ (18)	50	
		160~220	~38	70	
		300~350	32~38	50	
Bearing steel	Annealed	150~210		70	
Bearing steel alloy steel	Annealed			20	
High speed steel	Annealed	210~285	(16) ~30	20	
Gray casting iron FC10~35		110~180		90	Fig. 4
		190~220		80	
		220~260		70	
Ductile casting iron FCD10~35		120~170		80	Fig. 5
		180~240		65	
		240~280		55	
		280~320		40	
Malleable casting iron FCMB FCMP		110~180		90	Fig. 5
		190~220		80	
		220~260		70	
Aluminum alloy casting Cast iron AC3A etc, Die casting ADC		} 500kg Load } 40~100		180	Fig. 4
				180	
Copper alloy				<105	Fig. 4
				<120	Fig. 5

Oil Flow Rate & Oil Pressure



Feed Rate Chart



Recommended Cutting Conditions for B.T.A. Drilling

Work Material				Cutting speed (m/min)	Drill diameter (mm)			
					16,00-20,00	20,01-31,00	31,01-43,00	43,01-65,00
HB				Feed rate (mm/rev)				
Unalloyed steel	Non-hardened	0,05~0,25% C	90~200	70~120	0,14~0,20	0,15~0,20	0,15~0,25	0,18~0,28
	Non-hardened	0,25~0,55% C	125~225					
	Non-hardened	0,55~0,80% C	150~220	70~120	0,14~0,20	0,17~0,25	0,20~0,30	0,24~0,32
	High carbon & carbon tool steel		180~225					
Low alloy steel	Non-hardened		150~260	70~100	0,14~0,20	0,17~0,25	0,20~0,30	0,24~0,32
	Hardened		220~400					
High alloy steel	Annealed	0,05~0,25% C	150~250	60~100	0,14~0,20	0,17~0,25	0,20~0,30	0,24~0,32
	Annealed HSS	0,25~0,55% C	150~250					
	Hardened tool steel	0,55~0,80% C	250~350	60~100	0,14~0,20	0,17~0,25	0,20~0,30	0,24~0,32
	Hardened steel		250~400					
Steel castings	Unalloyed		90~225	50~100	0,12~0,18	0,16~0,22	0,20~0,30	0,24~0,34
	Low alloyed (alloying elements <5%)		150~250					
Stainless steel	Ferritic, Martensitic	13~25% Cr	150~270	45~85	0,12~0,18	0,15~0,22	0,20~0,28	0,24~0,32
	Austenitic	Ni >8%, 18~25% Cr	150~270					
Heat resisting alloy steel	Fe-based		180~300	10~40	0,12~0,18	0,15~0,21	0,18~0,25	0,20~0,30
	Ni-based		220~300					
	Co-based		220~300					
Titanium	(Wrought or cast) Alpha and Alpha-beta alloys		300~450	30~50	0,14~0,16	0,16~0,22	0,18~0,26	0,20~0,30
Malleable cast iron	Ferritic (short chipping)		110~145	80~100	0,14~0,20	0,18~0,25	0,20~0,30	0,24~0,32
	Pearlitic (long chipping)		150~270					
Gray cast iron	Low tensile strength		150~220	70~100	0,12~0,18	0,15~0,25	0,20~0,28	0,24~0,32
	High tensile strength		200~330					
Nodular cast iron	Ferritic		125~230	50~100	0,12~0,18	0,15~0,25	0,20~0,28	0,24~0,32
	Pearlitic		200~300					
Aluminium alloys	Wrought and cold drawn		30~80	65~130	0,10~0,20	0,16~0,25	0,18~0,30	0,20~0,45
	Wrought solution treated and aged		75~150					
	Cast		40~100					
	Cast, solution treated and aged		70~125					
Copper and copper alloys	Free cutting alloys (Pb ≥ 1%)		50~160	65~130	0,10~0,20	0,16~0,25	0,18~0,30	0,20~0,45
	Brass and leaded bronzes (Pb ≤ 1%)		50~160					

