



DRILLING APPLICATION GUIDE VOL.2

● = 1st Choice
○ = 2nd Choice

INSIST ON OSG

Work Material		Condition	Hardness		Carbide								Powdered Metal		HSS-Va & HSS-Co								
			BHN	HRC	List 2300 EXOCARB® Dia.	List 5170 EXOCARB® SH-DRL	List 5260 EXOCARB® Max *	List 5271 EXOCARB® Max *	List 5268 FT0-GDXL *	List 5270 FT0-GDXL *	List 5140 EXOCARB® T	List 5150 EXOCARB® T	List 5100 EXOCARB® S	List 5110 EXOCARB® S	List 2000 VP®-GDR	List 1900 VPH®-GDS	List 1950 VPH®-GDR	List 1700 V-HO-GDR *	List 1800 V-SELECT™	List 1100 EX-SUS-GDS	List 1600 EX-SUS-GDR	List 1000 EX-GDS	List 1500 EX-GDR
Aluminum Alloy	6061, 7075, 2011	Normalized	~150		●		○								○	○	○	○	○	○	○	○	○
Die Cast Aluminum	356AL, 390AL	As Cast	~150		●		○								○	○	○	○	○	○	○	○	○
Cast Iron	Nodular, Grey	As Cast	~208	~15			●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○
Low Carbon Steel	1010, 1018	Normalized	~190	~10			●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○
Medium Carbon Steel	1035, 1045	Normalized	~208	~15			●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○
High Carbon Steel	1065, 1095	Normalized	~253	~25			●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○
Alloy Steel	4140, 4340, 8620	Normalized	253~301	25~32			●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○
	4140, 4340, 8620	Hardened	327~390	35~42			●	●	●	○	●	●	●		○	○	○	○	○	○	○	○	○
Stainless Steel	303, 304, 316	Annealed	~253	~25			●	●	●	●						○	○	○	○	○	○	○	○
	410, 430	Hardened	327~390	35~42			●	●	●	○	○			○	○	○	○	○	○	○	○	○	○
	17-4, 15-5, A286	Annealed	~253	~25			●	●	○	○						○	○	○	○	○	○	○	○
	17-4, 15-5, A286	Hardened	327~390	35~42			●	●	○	○					○	○	○	○	○	○	○	○	○
Tool Steel	D2, H13, P20, S7	Annealed	190~253	10~25			●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○
	H13, P20	Hardened	327~450	35~48			●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	D2, A2	Hardened		55~63		●																	
Titanium Alloy	6AL4V	Annealed	253~301	25~32			●	●	○	○	○	○	○		○	○	○	○	○	○	○	○	○
	6AL4V, 6AL6V	Hardened	327~390	35~42			●	●	○	○	○	○	○		○	○	○	○	○	○	○	○	○
Nickel Base Alloy	Inconel 718, 625	Annealed	253~301	25~32			○	○							○	○							
	Inconel 718	Hardened	327~390	35~42			○	○							○	○							
	Hastelloy, Waspelloy	Normalized		25~40			●	●							○	○							
	Kovar	Normalized		25~40			○	○							○	○							
Magnesium			~100																				
Brass, Bronze			~150		●																		
Copper			~150		●																		
Beryllium Copper			~253	~25																			
Cobalt-Chrome	Stellite					○	●	●															
Fiber Filler Plastic	Fiberglass, REN				●		○	○															
MMC	Al-SiC70%				●		○																

*Coolant-Thru



TAPPING APPLICATION GUIDE VOL.2

INSIST ON OSG

● = 1st Choice
○ = 2nd Choice

Work Material	Condition	Hardness		Cutting Speed*	Carbide				Powdered Metal HSS				HSS-Va, HSS-Co, HSS												
		BHN	HRC		SFM	EXOCARB® VX-OT	EXOCARB® Cut Tap	EXOCARB® Form Tap	EXOCARB® Diamond Tap	EXOTAP® VCX	EXOTAP® DC & DC Oil	EXOTAP® VC-10	EXOTAP® VC-10NI	EXOTAP® VC-10TI	EXOTAP® NRT® Forming	EXOTAP VA-3®	EXOTAP Mold®	HY-PRO®	HY-PRO® AL	HY-PRO® DC	HY-PRO® NRT® Forming	HY-PRO® 7 Forming	HY-PRO® 7	101C Cast Iron	Standard Taps
Aluminum Alloy	6061, 7075, 2011	Normalized	~150		30~80		●	●	●					●											
Die Cast Aluminum	356AL, 390AL	As Cast	~150		40~65		●	●	●		●														
Cast Iron	Nodular, Grey	As Cast	~208	~15	25~75		●			●							○		●					●	○
Low Carbon Steel	1010, 1018	Normalized	~190	~10	25~80										●		○			●	○		●		○
Medium Carbon Steel	1035, 1045	Normalized	~208	~15	20~50												●			●	○		●		○
High Carbon Steel	1065, 1095	Normalized	~253	~25	20~45										○		●			●					○
Alloy Steel	4140, 4340, 8620	Normalized	253~301	25~32	20~50												●			●			○		
	4140, 4340, 8620	Hardened	327~393	35~42	15~20						○		●				○				●				
Stainless Steel	303, 304, 316	Annealed	~253	~25	20~45												●			●					
	410, 430	Hardened	327~393	35~42	12~20					○		●					○				○				
	17-4, 15-5, A286	Annealed	~253	~25	15~20						○		●				○				○				
	17-4, 15-5, A287	Hardened	327~393	35~42	8~20					○		●	○	●			○								
Tool Steel	D2, H13, P20, S7	Annealed	190~253	10~25	15~35												○	○			○				
	H13, P20	Hardened	327~450	35~48	8~15					●		○					○								
	D2, A2	Hardened		55~63	3~10	●					○														
Titanium Alloy	6AL4V	Annealed	253~301	25~32	15~20							○			●										
	6AL4V, 6AL6V	Hardened	327~393	35~42	8~15						○			●											
Nickel Base Alloy	Inconel 718, 625	Annealed	253~301	25~32	8~15							○		●	○										
	Inconel 718	Hardened	327~393	35~42	8~15					●		○	●	○											
	Hastelloy, Waspelloy	Normalized	253~390	25~40	8~15					●		○	●	○											
	Kovar	Normalized	253~390	25~40	8~15					●		○	●	○											
Magnesium			~100		40~80												○	●					○	○	
Brass, Bronze			~150		40~80		●	●									○	●					●	○	
Copper			~150		30~60		●	●	●								○	●				●	●	○	
Beryllium Copper			~253	~25	20~30											○	○					●	●	○	
Cobalt-Chrome	Stellite				8~25	○	●																		
Fiber Filler Plastic	Fiberglass, REN				20~30		○		●																○
MMC	Al-SiC70%				20~30				●																

* 1. Speeds can be increased when coatings, synchronized spindles, or coolant through taps are utilized.
2. Pipe taps should be run at half of these velocities.