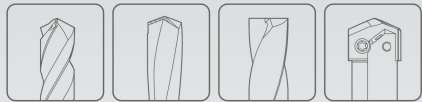




Leading Through Innovation



Global Cutting Tool Leader **YG-1**



SOLID CARBIDE & HSS Co8

NC-SPOTTING DRILLS

NC-ANBOHRER

- For Centering and Chamfering of Holes
- Zum Zentrieren und Anfasen von Bohrungen

HOLEMAKING

SELECTION GUIDE



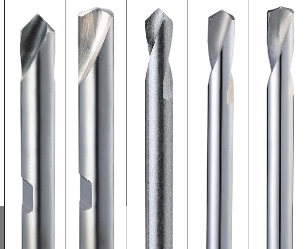
SERIES	D5306	D5320	D2306	D2307	D2320
	D5307	D2321	D2322	D2323	D2323
POINT ANGLE	90°/120°	142°	90°	120°	142°
SIZE MIN	D6.0	D3.0	D3.0	D3.0/D6.0	D3.0/D6.0
SIZE MAX	D20.0	D20.0	D20.0	D20.0/D12.0	D20.0/D12.0
PAGE	A281	A282	A283	A284	A285

SURFACE TREATMENT

Bright

SOLID CARBIDE & HSS Co8 NC-SPOTTING DRILLS

For Centering and Chamfering of Holes



Please visit global.yg1.com/mat for material search

⊙ : Excellent ○ : Good

Recommended cutting conditions : p.A286

ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment	HB	HRC	P	M	K	N	S	H	
P	1	Non-alloy steel	About 0.15% C Annealed	125		⊙	⊙	⊙	⊙			
	2		About 0.45% C Annealed	190	13	⊙	⊙	⊙	⊙			
	3		About 0.45% C Quenched & Tempered	250	25	⊙	⊙	⊙	⊙			
	4		About 0.75% C Annealed	270	28							
	5		About 0.75% C Quenched & Tempered	300	32							
	6	Low alloy steel	Annealed	180	10	⊙	⊙	⊙	⊙			
	7		Quenched & Tempered	275	29	○	○	○	○			
	8		Quenched & Tempered	300	32							
	9		Quenched & Tempered	350	38							
	10		High alloyed steel, and tool steel	Annealed	200	15						
	11			Quenched & Tempered	325	35						
M	12	Stainless steel	Ferritic / Martensitic Annealed	200	15	○	○	○	○			
	13		Martensitic Quenched & Tempered	240	23							
	14		Austenitic	180	10							
K	15	Grey cast iron	Pearlitic / ferritic	180	10	⊙	⊙	⊙	⊙			
	16		Pearlitic (Martensitic)	260	26	○	○	○	○			
	17		Nodular cast iron	Ferritic	160	3	○	○	○	○		
	18			Pearlitic	250	25						
	19			Ferritic	130		○	○	○	○		
20	Malleable cast iron	Pearlitic	230	21								
N	21	Aluminum-wrought alloy	Not Curable	60		○	○	○	○			
	22		Curable Hardened	100		○	○	○	○			
	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable	75		○	○	○	○			
	24		≤ 12% Si, Curable Hardened	90								
	25		> 12% Si, Not Curable	130								
	26		Copper and Copper Alloys (Bronze / Brass)	Cutting Alloys, PB>1%	110							
	27			CuZn, CuSnZn (Brass)	90							
	28			CuSn, lead-free copper and electrolytic copper	100							
	29		Non Metallic Materials	Duroplastic, Fiber Reinforced Plastic								
	30			Rubber, Wood, etc.								
S	31	Heat Resistant Super Alloys	Fe Based Annealed	200	15							
	32		Cured	280	30							
	33		Annealed	250	25							
	34		Ni or Co Based	Cured	350	38						
	35			Cast	320	34						
36	Titanium Alloys	Pure Titanium	400 Rm		○	○						
37		Alpha + Beta Alloys Hardened	1050 Rm									
H	38	Hardened steel	Hardened	550	55							
	39		Hardened	630	60							
	40		Cast	400	42							
41	Hardened Cast Iron	Hardened	550	55								



CARBIDE, NC-SPOTTING DRILLS 90°, 120°

- VOLLHARTMETALL NC-ANBOHRER 90°, 120°
- Forets carbure à pointer NC 90°, 120°
- PUNTE IN MD A CENTRARE NC 90°, 120°

▶Application : For more precise centering work on NC/CNC machines. The large diameter of the tool permits chamfering work after centering continuously.

▶Verwendung : Auf NC-Maschinen, Lehrenbohrwerken u.a. kapitalintensiven Bohrwerken, zum Zentrieren und Anfasen von Gewindebohrungen in einem Arbeitsgang. Besonders geeignet zum Anbohren von hochfesten Stählen, Stahlguß, Grauguß, Hartguß, Mangen-Hartstahl, CrNi-Stählen, Bronze, Leicht-und Buntmetallen.



NC-Spotting drills 90° NC-Anbohrer 90°

NC-Spotting drills 120° NC-Anbohrer 120°

EDP No.	Drill Diameter	Flute Length	Overall Length
	D1	L1	L2
D5306060	6.0	13	50
D5306080	8.0	23	60
D5306100	10.0	24	70
D5306120	12.0	24	70
D5306160	16.0	29	75
D5306200	20.0	35	100

EDP No.	Drill Diameter	Flute Length	Overall Length
	D1	L1	L2
D5307060	6.0	13	50
D5307080	8.0	23	60
D5307100	10.0	24	70
D5307120	12.0	24	70
D5307160	16.0	29	75
D5307200	20.0	35	100

Unit : mm

▶ TiN(D6306, D6307), TiCN(DG306, DG307) and TiAlN(DH306, DH307) are available on your request.

⊙ : Excellent ○ : Good

ISO	P				M				K												
Material Description	Non-alloy steel				Low alloy steel				High alloyed steel, and tool steel												
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
HRC																					
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	⊙	⊙	⊙			⊙	○			○		○			⊙	○	○			○	

ISO	N				S				H													
Material Description	Aluminum-wrought alloy				Aluminum-cast, alloyed				Copper and Copper Alloys (Bronze / Brass)				Non Metallic Materials									
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
HRC																						
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550	
Recommended	○	○	○													○						

YG NC-SPOTTING DRILLS

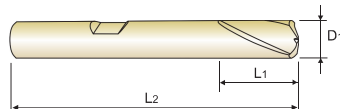
D5320 SERIES

CARBIDE, NC-SPOTTING DRILLS 142°

- VOLLHARTMETALL NC-ANBOHRER 142°
- Forets carbure à pointer NC 142°
- PUNTE IN MD A CENTRARE NC 142°

►Application : For more precise centering work on NC/CNC machines. The large diameter of the tool permits chamfering work after centering continuously.

►Verwendung : Auf NC-Maschinen, Lehrenbohrwerken u.a. kapitalintensiven Bohrwerken, zum Zentrieren und Anfasen von Gewindebohrungen in einem Arbeitsgang. Besonders geeignet zum Anbohren von hochfesten Stählen, Stahlguß, Grauguß, Hartguß, Mangan-Hartstahl, CrNi-Stählen, Leicht- und Buntmetallen.



CARBIDE DIN 6355HB h6 142° Bright p.A286

Plain Shank NC DRILL CHUCK & OTHER TOOL HOLDERS ER COLLET CHUCK Recommended Tool Holder

NC-Spotting drills 142° NC-Anbohrer 142°

Unit : mm

EDP No.	Drill Diameter	Flute Length	Overall Length
	D1	L1	L2
● D5320030	3.0	8	32
● D5320040	4.0	10	40
● D5320050	5.0	13	50
D5320060	6.0	13	50
D5320080	8.0	23	60
D5320100	10.0	24	70
D5320120	12.0	24	70
D5320160	16.0	29	75
D5320200	20.0	35	100

● with plain shank

◎ : Excellent ○ : Good

ISO	P										M				K					
	Non-alloy steel					Low alloy steel					High alloyed steel and tool steel				Stainless steel		Grey cast iron	Nodular cast iron	Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	13	25	28	32	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	240	180	260	160	160	260	160	250	130	230
Recommended	◎	◎	◎			◎	○				○				◎	○	○			

ISO	N								S					T							
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron		
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended	○	○	○													○					

YG NC-SPOTTING DRILLS

D2306 SERIES

D2321 SERIES

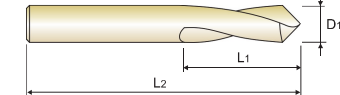
HSS Co8, NC-SPOTTING DRILLS 90°

- HSS Co8, NC-ANBOHRER 90°
- Forets HSS Co8 à pointer NC 90°
- PUNTE A CENTRARE NC 90°, HSS Co8

►Application : For more precise centering work on NC/CNC Machines.

The large diameter of the tool permits chamfering work after centering continuously.

►Verwendung : Für positionsgenaueres und schnelles Anbohren mit NC/CNC-Maschinen und Bearbeitungszentren, die Ausführung mit Spitzenwinkel 90° ermöglicht sowohl ein Zentrieren, als auch das Vorbohren für einen nächstgrößeren Durchmesser.



NC HSS Co8 h6 h6 90° Bright p.A286

Plain Shank NC DRILL CHUCK & OTHER TOOL HOLDERS ER COLLET CHUCK Recommended Tool Holder

LONG LENGTH

Unit : mm

EDP No.	Drill Diameter	Flute Length	Overall Length
	D1	L1	L2
D2306030	3.0	12	46
D2306040	4.0	12	55
D2306050	5.0	15	60
D2306060	6.0	20	66
D2306080	8.0	25	79
D2306100	10.0	25	89
D2306120	12.0	30	102
D2306160	16.0	35	115
D2306200	20.0	40	131

EDP No.	Drill Diameter	Flute Length	Overall Length
	D1	L1	L2
D2321030	3.0	12	80
D2321040	4.0	12	100
D2321050	5.0	15	120
D2321060	6.0	20	140
D2321080	8.0	25	140
D2321100	10.0	25	170
D2321120	12.0	30	170
D2321160	16.0	35	200
D2321200	20.0	40	200

► TiN, TiCN and TiAlN are available on your request.

◎ : Excellent ○ : Good

ISO	P										M				K					
	Non-alloy steel					Low alloy steel					High alloyed steel and tool steel				Stainless steel		Grey cast iron	Nodular cast iron	Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	13	25	28	32	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	240	180	260	160	160	260	160	250	130	230
Recommended	◎	◎	◎			◎	○				○				◎	○	○			

ISO	N								S					T							
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials	Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron		
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended	○	○	○													○					

YG NC-SPOTTING DRILLS

D2307 SERIES

D2322 SERIES

HSS Co8, NC-SPOTTING DRILLS 120°

- HSS Co8, NC-ANBOHRER 120°
- Forets HSS Co8 à pointer NC 120°
- PUNTE A CENTRARE NC 120°, HSS Co8

►Application : For more precise centering work on NC/CNC Machines. The large diameter of the tool permits chamfering work after centering continuously.

►Verwendung : Für positionsgenaueres und schnelles Anbohren mit NC/CNC-Maschinen und Bearbeitungszentren, die Ausführung mit Spitzenwinkel 90° ermöglicht sowohl ein Zentrieren, als auch das Vorbohren für einen nächstgrößeren Durchmesser.



NC HSS Co8 h6 h6 120° Bright p.A286

Plain Shank
 NC DRILL CHUCK & OTHER TOOL HOLDERS
 Recommended Tool-Holder
 ER COLLET CHUCK

LONG LENGTH

EDP No.	Drill Diameter D1	Flute Length L1	Overall Length
			L2
D2307030	3.0	12	46
D2307040	4.0	12	55
D2307050	5.0	15	60
D2307060	6.0	20	66
D2307080	8.0	25	79
D2307100	10.0	25	89
D2307120	12.0	30	102
D2307160	16.0	35	115
D2307200	20.0	40	131

EDP No.	Drill Diameter D1	Flute Length L1	Overall Length
			L2
D2322060	6.0	20	140
D2322080	8.0	25	140
D2322100	10.0	25	170
D2322120	12.0	30	170

► TiN, TiCN and TiAlN are available on your request.

◎ : Excellent ○ : Good

ISO	P										M				K					
	Non-alloy steel					Low alloy steel					High alloyed steel and tool steel		Stainless steel		Grey cast iron	Nodular cast iron	Malleable cast iron			
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	13	25	28	32	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	240	180	260	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO	N					S					T										
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)		Non Metallic Materials			Heat Resistant Super Alloys		Titanium Alloys	Hardened steel	Chilled Cast Iron	Hardened Cast Iron					
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	400 Rm	1050 Rm	55	60	42	55
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

YG NC-SPOTTING DRILLS

D2320 SERIES

D2323 SERIES

HSS Co8, NC-SPOTTING DRILLS 142°

- HSS Co8, NC-ANBOHRER 142°
- Forets HSS Co8 à pointer NC 142°
- PUNTE A CENTRARE NC 142°, HSS Co8

►Application : For more precise centering work on NC/CNC Machines. The large diameter of the tool permits chamfering work after centering continuously.

►Verwendung : Für positionsgenaueres und schnelles Anbohren mit NC/CNC-Maschinen und Bearbeitungszentren, die Ausführung mit Spitzenwinkel 90° ermöglicht sowohl ein Zentrieren, als auch das Vorbohren für einen nächstgrößeren Durchmesser.



NC HSS Co8 h6 h6 142° Bright p.A286

Plain Shank
 NC DRILL CHUCK & OTHER TOOL HOLDERS
 Recommended Tool-Holder
 ER COLLET CHUCK

LONG LENGTH

EDP No.	Drill Diameter D1	Flute Length L1	Overall Length
			L2
D2320030	3.0	12	46
D2320040	4.0	12	55
D2320050	5.0	15	60
D2320060	6.0	20	66
D2320080	8.0	25	79
D2320100	10.0	25	89
D2320120	12.0	30	102
D2320160	16.0	35	115
D2320200	20.0	40	131

EDP No.	Drill Diameter D1	Flute Length L1	Overall Length
			L2
D2323060	6.0	20	140
D2323080	8.0	25	140
D2323100	10.0	25	170
D2323120	12.0	30	170

► TiN, TiCN and TiAlN are available on your request.

◎ : Excellent ○ : Good

ISO	P										M				K					
	Non-alloy steel					Low alloy steel					High alloyed steel and tool steel		Stainless steel		Grey cast iron	Nodular cast iron	Malleable cast iron			
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	13	25	28	32	30	10	29	32	38	15	35	15	23	10	10	26	3	25	21	
HB	125	190	250	270	300	180	275	300	350	200	240	180	260	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO	N					S					T										
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)		Non Metallic Materials			Heat Resistant Super Alloys		Titanium Alloys	Hardened steel	Chilled Cast Iron	Hardened Cast Iron					
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc	60	100	75	90	130	110	90	100			15	30	25	38	34	400 Rm	1050 Rm	55	60	42	55
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎



RECOMMENDED CUTTING CONDITIONS
EMPFOLHENE SCHNEIDPARAMETER

D5306, D5307, D5320 SERIES

CARBIDE, NC-SPOTTING DRILLS

Vc = m/min.
RPM = rev./min.
FEED = mm/rev.

ISO	VDI 3323	Material Description	Vc	Parameter	Drill Diameter (mm)								
					2.0	3.0	4.0	6.0	8.0	10.0	12.0	16.0	20.0
P	1	Non-alloy steel	75	RPM	11940	7960	5970	3980	2980	2390	1990	1490	1190
				FEED	0.02-0.04	0.04-0.06	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19	0.15-0.21
			70	RPM	11140	7430	5570	3710	2790	2230	1860	1390	1110
	6	Low alloy steel	65	RPM	10350	6900	5170	3450	2590	2070	1720	1290	1030
				FEED	0.01-0.03	0.03-0.05	0.04-0.07	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19
			70	RPM	11140	7430	5570	3710	2790	2230	1860	1390	1110
			FEED	0.02-0.04	0.04-0.06	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19	0.15-0.21	
7		55	RPM	8750	5840	4380	2920	2190	1750	1460	1090	880	
			FEED	0.01-0.03	0.03-0.05	0.04-0.07	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19	
M	12	Stainless steel	35	RPM	5570	3710	2790	1860	1390	1110	930	700	560
K	15	Grey cast iron	90	RPM	14320	9550	7160	4770	3580	2860	2390	1790	1430
				FEED	0.03-0.05	0.05-0.07	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.16	0.15-0.20	0.18-0.24	0.22-0.28
	16		70	RPM	11140	7430	5570	3710	2790	2230	1860	1390	1110
				FEED	0.01-0.03	0.03-0.05	0.04-0.07	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19
	17	Nodular cast iron	90	RPM	14320	9550	7160	4770	3580	2860	2390	1790	1430
				FEED	0.03-0.05	0.05-0.07	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.16	0.15-0.20	0.18-0.24	0.22-0.28
	19	Malleable cast iron	60	RPM	9550	6370	4770	3180	2390	1910	1590	1190	950
				FEED	0.03-0.05	0.05-0.07	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.16	0.15-0.2	0.18-0.24	0.22-0.28
N	21	Aluminum-wrought alloy	165	RPM	26260	17510	13130	8750	6570	5250	4380	3280	2630
				FEED	0.04-0.06	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.15	0.15-0.19	0.18-0.23	0.21-0.27	0.25-0.31
	22		130	RPM	20690	13790	10350	6900	5170	4140	3450	2590	2070
FEED	0.04-0.06			0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.15	0.15-0.19	0.18-0.23	0.21-0.27	0.25-0.31		
23	Aluminum-cast, alloyed	110	RPM	17510	11670	8750	5840	4380	3500	2920	2190	1750	
			FEED	0.04-0.06	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.15	0.15-0.19	0.18-0.23	0.21-0.27	0.25-0.31	
S	36	Titanium Alloys	35	RPM	5570	3710	2790	1860	1390	1110	930	700	560
				FEED	0.01-0.03	0.03-0.05	0.04-0.06	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19

D2320, D2321, D2322, D2323, D2306, D2307 SERIES

HSS Co8, NC-SPOTTING DRILLS

Vc = m/min.
RPM = rev./min.
FEED = mm/rev.

ISO	VDI 3323	Material Description	Vc	Parameter	Drill Diameter (mm)								
					2.0	3.0	4.0	6.0	8.0	10.0	12.0	16.0	20.0
P	1	Non-alloy steel	25	RPM	3980	2650	1990	1330	990	800	660	500	400
				FEED	0.02-0.04	0.04-0.06	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19	0.15-0.21
			25	RPM	3980	2650	1990	1330	990	800	660	500	400
	6	Low alloy steel	15	RPM	2390	1590	1190	800	600	480	400	300	240
				FEED	0.01-0.03	0.03-0.05	0.04-0.07	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19
			20	RPM	3180	2120	1590	1060	800	640	530	400	320
				FEED	0.02-0.04	0.04-0.06	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19	0.15-0.21
7		15	RPM	2390	1590	1190	800	600	480	400	300	240	
			FEED	0.01-0.03	0.03-0.05	0.04-0.07	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19	
M	12	Stainless steel	15	RPM	2390	1590	1190	800	600	480	400	300	240
				FEED	0.02-0.04	0.04-0.06	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19	0.15-0.21
K	15	Grey cast iron	30	RPM	4770	3180	2390	1590	1190	950	800	600	480
				FEED	0.03-0.05	0.05-0.07	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.16	0.15-0.20	0.18-0.24	0.22-0.28
	16		25	RPM	3980	2650	1990	1330	990	800	660	500	400
				FEED	0.01-0.03	0.03-0.05	0.04-0.07	0.05-0.08	0.07-0.10	0.08-0.12	0.09-0.14	0.11-0.17	0.13-0.19
	17	Nodular cast iron	30	RPM	4770	3180	2390	1590	1190	950	800	600	480
				FEED	0.03-0.05	0.05-0.07	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.16	0.15-0.20	0.18-0.24	0.22-0.28
	19	Malleable cast iron	20	RPM	3180	2120	1590	1060	800	640	530	400	320
				FEED	0.03-0.05	0.05-0.07	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.16	0.15-0.20	0.18-0.24	0.22-0.28
N	21	Aluminum-wrought alloy	65	RPM	10350	6900	5170	3450	2590	2070	1720	1290	1030
				FEED	0.04-0.06	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.15	0.15-0.19	0.18-0.23	0.21-0.27	0.25-0.31
	22		60	RPM	9550	6370	4770	3180	2390	1910	1590	1190	950
FEED	0.04-0.06			0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.15	0.15-0.19	0.18-0.23	0.21-0.27	0.25-0.31		
23	Aluminum-cast, alloyed	50	RPM	7960	5310	3980	2650	1990	1590	1330	990	800	
			FEED	0.04-0.06	0.06-0.09	0.08-0.11	0.10-0.13	0.12-0.15	0.15-0.19	0.18-0.23	0.21-0.27	0.25-0.31	