Speeds and Feeds



- 1) Select your material in the ISO colored chart with respect to material description.
- 2) Start with a middle/average value for cutting speed, \dot{V}_c (ft/min) and feed, f_n (in/rev). Adjust the cutting speed and/or feed based on your cutting conditions.

Material						Recommended Cutting Values														
Group						Drill Diameter			Drill Diameter											
	_ '	Material Description	 HR	HRC	l	SFM	METRIC	1.0	2.0	SFM	METRIC	3.0	-	4.0	-	5.0	6.0	-		3.0
liso	VDI	Material Description	'"	111.0		(ft/min)	FRACTIONAL	-	-	(ft/min)	FRACTIONAL	-	1/8	-	3/16	-	-	1/4	5/16 -	-
100	3323						DECIMAL	.0394	.0787		DECIMAL	.1181	.1250	.1575		.1969			.3125 .31	
	2		190	13	0	263	RPM	25,460	12,730	362	RPM	11,6		8,750	7,0		5,84		4,380	
	_	Non-alloy steel		10	~	203	FEED	.00120020		002	FEED		0047	.00310055			.0063 -		.007100	
	3		250	25	0	263	RPM	25,460	12,730	362	RPM	11,6		8,750	7,0		5,84		4,380	
							FEED		.00200028		FEED			.00310055						
	4		270	28	0	263 230	RPM	25,460	12,730	362 296	RPM	11,6		8,750	7,0		5,84		4,380	
					_		FEED	.00120020	.00200028		FEED			.00280051					.005500	-
	5		300	32	0		RPM	22,280	11,140		RPM	9,5		7,160	5,7		4,7	-	3,580	
				02			FEED		.00200028		FEED			.00280051					.005500	
	6		180 275	10 29	0	263 230 230	RPM	25,460	12,730	362 296 296	RPM	11,6		8,750	7,0		5,84		4,380	
Р							FEED	.00120020			FEED		0047	.00310055					.007100	
	7				0		RPM	22,280	11,140		RPM	9,5		7,160	5,7		4,7		3,580	
		Low alloy steel					FEED	.00120020 22.280			FEED		0047	.00310055		0079			.006301	
	8		300	32	0		RPM FEED	,	11,140 .00120020		RPM FEED	9,5		7,160 .00280051	5,7		4,7	-	3,580 .005500	
			350			132	RPM			165	RPM				3,1				1,990	-
	9			38	0		FEED	12,730	6,370 .00120020		FEED	5,3	0031	3,980 .00200043	,	0055	2,69		.004700	
			200				RPM	19.100	9.550	263	RPM	8.4		6.370	5.0		4.2		3,180	-
	10 High alloyed steel	High alloyed steel, and		15	0	198	FEED	-,	.00200028		FEED	- ,		.00280051	- , -		,	-	,	
		High alloyed steel, and tool steel					RPM	12,730	6,370		RPM	4.7		3,580	2,8		2,39		1,790	
	11	1001 01001	325	35	0	132	FEED		.00120020	148	FEED	,	0031	.00200043					.004700	
			200			198	RPM	19.100	9.550	263	RPM	8.4		6.370	5.0		4.24		3,180	-
	12			15	0		FEED	.00120020	.00200028		FEED	- /	0047	.00310055	- , -	0079	,	-	.007100	
M		Stainless steel					RPM	14,320	7.160	181 362	RPM	5,8		4,380	3,5		2,92		2,190	
	13		240	23	0	148	FEED	,	.00120020		FEED			.00280051			.0047 -		.005500	
	4.5		400	4.0	_		RPM	25,460	12,730		RPM	11,6	670	8,750	7,0	00	5,84	40	4,380	
	15		180	10	0	263	FEED		.00160024		FEED	,		.00470071		0087			.008701	
	4.0	Grey cast iron 260	000	00		0.47	RPM	23,870	11,940	313	RPM	10,0	080	7,560	6,0	50	5,04	40	3,780	
	16		260	26	0	247	FEED	.00160024	.00160024		FEED	.0024	0047	.00310055	.0055	0079	.0063 -	.0087	.007100	094
	17		400	2	0	200	RPM	28,650	14,320	205	RPM	12,7	730	9,550	7,6	40	6,3	70	4,770	
K	17	Nodular and iron	160	3	0	296	FEED	.00160024	.00160024	395	FEED	.0031	0055	.00470071	.0059 -	0087	.0079 -	.0102	.008701	110
, r	18	Nodular cast iron	250	25	0	400	RPM	19,100	9,550	202	RPM	8,4	90	6,370	5,0	90	4,2	40	3,180	
	10		250	25	0	198	FEED	.00160024	.00160024	263	FEED	.0024	0047	.00310055	.0055	.0079	.0063 -	.0087	.007100	094
	19		130		0	230	RPM	22,280	11,140	296	RPM	9,5	50	7,160	5,7	30	4,7	70	3,580	
	19	Malleable cast iron	130				FEED	.00160024	.00160024		FEED	.0031	0055	.00470071	.0059 -	0087	.0079 -	.0102	.008701	110
	20	ividileable cast ifoff	230	21	0	198	RPM	19,100	9,550	263	RPM	8,4	90	6,370	5,0	90	4,2	40	3,180	
	- 20		230	21	O		FEED	.00120020	.00200028		FEED	.0024	0047	.00310055		0079	.0063 -	.0087	.007100	094
н	38	Hardened steel	550	55	0	82	RPM	7,960	3,980	98	RPM	3,1		2,390	1,9		1,59		1,190	
	30	rialucileu steel	550	33		02	FEED	.00040008	.00040012	30	FEED	.0004-	.0012	.00040016	.0008-	.0020	.0012-	.0024	.001200)24



Speeds and Feeds



- 1) Select your material in the ISO colored chart with respect to material description.
- Start with a middle/average value for cutting speed, \dot{V}_c (ft/min) and feed, f_n (in/rev). Adjust the cutting speed and/or feed based on your cutting conditions.

Material					Recommended Cutting Values													
Group						Drill Diameter												
	oup	Material Description	ᅵᄱ	HRC		SFM	METRIC	-	10.0	12.0	-	14.0	-	-	16.0	18.0	-	20.0
ISO	VDI	Material Description	ППР	пкс		(ft/min)	FRACTIONAL	3/8	-	-	1/2	-	9/16	5/8	-	-	3/4	-
130	3323						DECIMAL	.3750	.3937	.4724	.5000	.5512	.5625	.6250	.6299	.7087	.7500	.7874
	2		190	13	0	362	RPM	3,5	00	2,920	2,770	2,5	00	2,190		1,950	1,840	1,750
			190		9	302	FEED		0106	.00830114	.00830114		0122		0130	.01100150	.01100150	.01180157
	3		250	25	0	362	RPM	3,5	00	2,920	2,770	2,5	00	2,190		1,950	1,840	1,750
	3	Non-alloy steel					FEED		0106	.00830114	.00830114		.0122	.00980130		.01100150	.01100150	.01180157
	1		270	28	0	362	RPM	FEED .00590091		2,920	2,770	2,500		2,190		1,950	1,840	1,750
			210	20			FEED			.00670098	.00670098	.00710102		.00750106		.00790118	.00790118	.00870126
	5		300	32	0	296	RPM	2,8		2,390	2,260	2,050		1,790		1,590	1,510	1,430
	3		300	32	U		FEED	.00590091		.00670098	.00670098		0102		0106	.00790118	.00790118	.00870126
	6	6	180	10	0	362	RPM	3,500		2,920	2,770	2,500		2,190		1,950	1,840	1,750
Р				10			FEED	.00750106		.00830114	.00830114	.00910122		.00980130		.01100150	.01100150	.01180157
	7	Low alloy steel 300	275	29	0	296	RPM	2,860		2,390	2,260	2,050		1,790		1,590	1,510	1,430
					•		FEED	.00750106		.00830114	.00830114	.00910122		.00980130		.01100150	.01100150	.01180157
	8		300	32	0	296 165	RPM	2,860		2,390	2,260	2,050		1,790		1,590	1,510	1,430
							FEED	.00590091		.00670098	.00670098		0102	.00750106		.00790118	.00790118	.00870126
	9		350	38	0		RPM	1,590		1,330	1,260	1,140		990		880	840	800
							FEED	.00510075 2.550		.00550079	.00550079		0083	.00630087 1,590		.00670098	.00630102	.00710110
	10	High alloyed steel, and	200	15	0	263	RPM	, -		2,120	2,010	1,8	-	,		1,410	1,340	1,270
							FEED	.0059		.00670098	.00670098		0102		0106	.00790118	.00790118	.00870126
	11	tool steel	325	35	0	148	RPM	1,4		1,190	1,130	1,0		90		800	750	720
							FEED		0075	.00550079	.00550079		.0083		0087	.00670098	.00630102	.00710110
	12		200	15	0		RPM	2,5		2,120	2,010	1,8	-	1,5		1,410	1,340	1,270
M		Stainless steel					FEED RPM		0106	.00830114 1,460	.00830114 1,380		0122		0130	.01100150	.01100150 920	.01180157 880
	13		240	23	0	181	FEED	1,7		.00670098	.00670098	1,2	0102	1,0	0106	970	.00790118	.00870126
							RPM	.0059		2,920	2,770	2,5		.0075		.00790118 1,950	1,840	1,750
	15		180	10	0	362	FEED		0130	.01060138	.01060138	,	· .0146		0154	.01260165	.01260165	.01340173
		Grey cast iron					RPM	3,0		2.520	2,390	2.1		1.8		1.680	1,590	1,510
	16		260	26	0	313	FEED	,	0106	.00830114	.00830114	,	0122	, -	0130	.01100150	.01100150	.01180157
							RPM	3,8		3,180	3,020	2,7		2,3		2,120	2,010	1,910
	17		160	3	0	395	FEED		0130	.01060138	.01060138		0146		0154	.01260165	.01260165	.01340173
K		Nodular cast iron					RPM	2,5		2,120	2.010	1.8		1.5		1.410	1.340	1.270
	18		250	25	0	263	FEED	,	0106	.00830114	.00830114	, -	0122	, -	0130	.01100150	.01100150	.01180157
		Malleable cast iron	130		0	296	RPM	2,8		2,390	2,260	2,0		1,7		1,590	1,510	1,430
	19						FEED		0130	.01060138	.01060138		0146		0154	.01260165	.01260165	.01340173
			230		0	263	RPM	2,5		2,120	2,010	1,8		1,5		1,410	1,340	1,270
	20			21			FEED	,	0106	.00830114	.00830114	,	0122		0130	.01100150	.01100150	.01180157
			550				RPM	.0075		800	750	.0031		.0036		530	500	480
Н	38	38 Hardened steel		55	0	98	FEED	.0016-	-	.00160031	.00160031	.0020-			.0035	.00200039	.00200039	.00200039
							ILLD	.0010-	.0020	.00100031	.00100031	.0020-	.0033	.0020	.0033	.00200039	.00200033	.00200039



Speeds and Feeds



Penetration Rate (in/min)

$$v_f = f_n \cdot n$$

Feed Per Revolution (in/rev)

$$f_n = \frac{v_f}{n}$$

Cutting Speed (ft/min)

$$v_c = \frac{\pi \cdot D_{tool} \cdot n}{12}$$

Spindle Speed (rev/min)

$$n = \frac{v_c \cdot 12}{\pi \cdot D_{tool}}$$

Material Removal Rate (in³/min)

$$MRR = D_{tool} \cdot f_n \cdot v_c \cdot 3$$

Inch

Symbol	Definition	Unit				
V_f	Penetration rate	in/min				
f_n	Feed per revolution	in/rev				
V_{C}	Cutting speed	ft/min (SFM)				
n	Spindle speed	rev/min (RPM)				
D_{tool}	Tool cutting diameter	in				
MRR	Material removal rate	(in³/min)				