

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, V_c (m/min) and feed, f_n (mm/rev). Adjust the cutting speed and/or feed based on your cutting conditions.

ISO	VDI 3323	Material	Composition Structure Heat Treatment	Condition	HB	SMM	Drill Diameter											
							METRIC	3.0	-	4.0	-	5.0	6.0	-	8.0	-	10.0	
							FRACTIONAL	-	1/8	-	3/16	-	-	1/4	5/16	-	3/8	-
							DECIMAL	.1181	.1250	.1575	.1875	.1969	.2362	.2500	.3125	.3150	.3750	.3937
N	21	Aluminum-wrought alloy	Not Curable		60	200.6	RPM	21220	15920	12730	10610	7960	6370					
						FEED	0.119 - 0.18	0.14 - 0.221	0.15 - 0.231	0.17 - 0.249	0.211 - 0.279	0.239 - 0.3						
N	22		Curable	Hardened	100	160.6	RPM	16980	12730	10190	8490	6370	5090					
						FEED	0.119 - 0.18	0.14 - 0.221	0.15 - 0.231	0.17 - 0.249	0.211 - 0.279	0.239 - 0.3						
N	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable		75	150.6	RPM	15920	11940	9550	7960	5970	4770					
						FEED	0.15 - 0.211	0.17 - 0.249	0.191 - 0.269	0.211 - 0.279	0.239 - 0.31	0.29 - 0.45						
N	24		≤ 12% Si, Curable	Hardened	90	140.5	RPM	14850	11140	8910	7430	5570	4460					
						FEED	0.15 - 0.211	0.17 - 0.249	0.191 - 0.269	0.211 - 0.279	0.239 - 0.31	0.29 - 0.45						

ISO	VDI 3323	Material	Composition Structure Heat Treatment	Condition	HB	SMM	Drill Diameter									
							METRIC	12.0	-	14.0	-	16.0	18.0	-	20.0	
							FRACTIONAL	-	1/2	-	9/16	5/8	-	3/4	-	
							DECIMAL	.4724	.5000	.5512	.5625	.6250	.6299	.7087	.7500	.7874
N	21	Aluminum-wrought alloy	Not Curable		60	200.6	RPM	5310	5030	4550	3980	3540	3350	3180		
						FEED	0.239 - 0.3	0.239 - 0.3	0.249 - 0.351	0.249 - 0.351	0.279 - 0.381	0.279 - 0.381	0.3 - 0.399			
N	22		Curable	Hardened	100	160.6	RPM	4240	4030	3640	3180	2830	2680	2550		
						FEED	0.239 - 0.3	0.239 - 0.3	0.249 - 0.351	0.249 - 0.351	0.279 - 0.381	0.279 - 0.381	0.3 - 0.399			
N	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable		75	150.6	RPM	3980	3770	3410	2980	2650	2520	2390		
						FEED	0.33 - 0.551	0.33 - 0.551	0.351 - 0.599	0.351 - 0.599	0.391 - 0.729	0.391 - 0.729	0.391 - 0.851			
N	24		≤ 12% Si, Curable	Hardened	90	140.5	RPM	3710	3520	3180	2790	2480	2350	2230		
						FEED	0.33 - 0.551	0.33 - 0.551	0.351 - 0.599	0.351 - 0.599	0.391 - 0.729	0.391 - 0.729	0.391 - 0.851			



Speeds and Feeds



**Penetration Rate
(mm/min)**

$$v_f = f_n \cdot n$$

**Feed Per Revolution
(mm/rev)**

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

**Cutting Speed
(m/min)**

$$v_c = \frac{\pi \cdot D_{tool} \cdot n}{1000}$$

**Spindle Speed
(rev/min)**

$$n = \frac{v_c \cdot 1000}{\pi \cdot D_{tool}}$$

**Material Removal Rate
(cm³/min)**

$$MRR = \frac{D_{tool} \cdot f_n \cdot v_c}{4}$$

Metric

Symbol	Definition	Unit
v_f	Penetration rate	mm/min
f_n	Feed per revolution	mm/rev
v_c	Cutting speed	m/min (SMM)
n	Spindle speed	rev/min (RPM)
D_{tool}	Tool cutting diameter	mm
MRR	Material removal rate	(cm ³ /min)