

Formulas and definitions for drilling - INCH

Penetration rate, inch/min

$$v_f = f_n \times n$$

Cutting speed, ft/min

$$v_c = \frac{\pi \times D_c \times n}{12}$$

Spindle speed, rpm

$$n = \frac{v_c \times 12}{\pi \times D_c}$$

Feed force, N

$$F_f \approx 0.5 \times k_c \times \frac{D_c}{2} \times f_n \times \sin \kappa_r$$

Metal removal rate, inch³/min

$$Q = v_c \times D_c \times f_n \times 3$$

Net power, HP

$$P_c = \frac{v_c \times D_c \times f_n \times k_c}{132 \times 10^3}$$

Torque, lbf ft

$$M_c = \frac{P_c \times 16501}{\pi \times n}$$



Symbol	Designation/ definition	Unit
D_c	Drill diameter	inch
f_n	Feed per revolution	inch/r
n	Spindle speed	rpm
v_c	Cutting speed	ft/min
v_f	Penetration rate	inch/min
F_f	Feed force	N
k_c	Specific cutting force	lbs/inch ²
M_c	Torque	lbf ft
P_c	Net power	HP
Q	Metal removal rate	inch ³ /min
Ψ_r	Lead angle	degree