

Formulas and definitions for drilling - METRIC

Penetration rate, mm/min

$$v_f = f_n \times n$$

Cutting speed, m/min

$$v_c = \frac{\pi \times D_c \times n}{1000}$$

Spindle speed, r/min

$$n = \frac{v_c \times 1000}{\pi \times D_c}$$

Feed force, N

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

Metal removal rate, cm³/min

$$Q = \frac{v_c \times D_c \times f_n}{4}$$

Net power, kW

$$P_c = \frac{v_c \times D_c \times f_n \times k_c}{240 \times 10^3}$$

Torque, Nm

$$M_c = \frac{P_c \times 30 \times 10^3}{\pi \times n}$$



Symbol	Designation/ definition	Unit
D_c	Drill diameter	mm
f_n	Feed per revolution	mm/r
n	Spindle speed	rpm
v_c	Cutting speed	m/min
v_f	Penetration rate	mm/min
F_f	Feed force	N
k_c	Specific cutting force	N/mm ²
M_c	Torque	Nm
P_c	Net power	kW
Q	Metal removal rate	cm ³ /min
K_r	Entering angle	degree