Powder Factor of a Blast from the Pattern and Charge

Rock broken per hole and per blast from burden, spacing and bench height, and the powder factor by volume and by mass with tonnes broken per kilogram.

Input parameters

Unit system: SI

Parameter	Value	Unit
Burden	15.000	ft
Spacing	18.000	ft
Bench height (hole depth less subdrill)	30.000	ft
Explosive per hole	300.00	lb
Number of holes	40.000	
Rock bank density	2,650.0	kg/m³

Calculated results

Parameter	Value	Unit
Rock per hole (bank)	300.00	yd³
Powder factor by volume	1.00000	lb/yd³
Powder factor by mass	0.22388	kg/t
Rock broken per unit of explosive	4.4667	t/kg
Rock broken by the blast	9,174.7	m³
Rock mass broken by the blast	24,313	t
Explosive in the blast	5,443.1	kg

Notes for this case

- The volume uses the bench height, not the hole depth: the subdrill breaks rock below the next bench floor. Surface mines usually quote lb/yd³ or kg/m³; metal mines quote tonnes broken per kilogram.

Formula and method

$$V = BSH, \quad P_f = \frac{W_e}{V}, \quad P_f' = \frac{W_e}{\rho_r V}$$

Variables

B	Burden	m
S	Spacing	m
H	Bench height (hole depth less subdrill)	m
W_e	Explosive per hole	kg
n	Number of holes	-
ρ_r	Rock bank density	kg/m³
V	Rock per hole (bank)	m³
P_f	Powder factor by volume	kg/m³
P_f'	Powder factor by mass	kg/kg
W_r/W_e	Rock broken per unit of explosive	kg/kg
V_{tot}	Rock broken by the blast	m³
W_r	Rock mass broken by the blast	kg

W_{tot}	Explosive in the blast	kg

Method and standards

Powder factor from the blast geometry.

Assumptions and limits

- Geometric; assumes full breakage to the floor.

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/civil/mine-design/blast-powder-factor-from-pattern

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.