Blast Pattern from a Powder Factor: Burden, Spacing and Charge

Load factor, stemming, subdrill, powder column, charge per hole and the burden and spacing that give a chosen powder factor (rectangular or square pattern).

Input parameters

Unit system: SI

Parameter	Value	Unit
Blasthole diameter	6.7500	in
Explosive density (specific gravity)	0.85000	
Bench height	30.000	ft
Powder factor (explosive per bank volume)	1.0000	lb/yd³
Pattern	Rectangular, S = 1.5B	

Calculated results

Parameter	Value	Unit
Load factor (explosive per length of hole)	13.187	lb/ft
Stemming	13.500	ft
Subdrill	4.5000	ft
Powder column	21.000	ft
Explosive per hole	276.92	lb
Rock broken per hole	276.92	yd³
Burden	12.890	ft
Spacing	19.335	ft

Notes for this case

- Stemming is 24 hole diameters and subdrill one third of the stemming, in the powder-factor method; the burden and spacing then hold the volume per hole that the powder factor allows. Treat the pattern as a first approximation to be tuned in the field.

Formula and method

$$LF = 0.34\,SG_e D_e^2, \quad T = 24 D_e, \quad J = \frac{1}{3}T, \quad C = H + J - T$$

$$W_E = C \cdot LF, \quad V_r = \frac{W_E}{P_f}, \quad B = \sqrt{\frac{V_r}{kH}}, \quad S = kB$$

Variables

D_e	Blasthole diameter	m
SG_e	Explosive density (specific gravity)	-
H	Bench height	m
P_f	Powder factor (explosive per bank volume)	kg/m³
$\mathrm{pattern}$	Pattern	-
LF	Load factor (explosive per length of hole)	kg/m
T	Stemming	m
J	Subdrill	m

C	Powder column	m
W_E	Explosive per hole	kg
V_r	Rock broken per hole	m³
B	Burden	m
S	Spacing	m

Method and standards

Powder factor method.

Assumptions and limits

- Empirical; adjust burden for geology and confinement.

Report details

Report reference	FCC-JEP4-P6WQ (the same inputs always give the same reference)
Generated	23 November 2026, 17:26 UTC
Calculator	Blast Pattern from a Powder Factor: Burden, Spacing and Charge
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
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-design

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.