Detonation Pressure, Load Factor and Strengths of an Explosive

Detonation pressure from density and velocity of detonation, load factor of a column, and absolute and relative weight and bulk strengths against ANFO.

Input parameters

Unit system: SI

Parameter	Value	Unit
Explosive specific gravity	1.2000	
Detonation velocity	16,000	ft/s
Explosive column diameter	5.0000	in
Absolute weight strength	750.00	kcal/kg

Calculated results

Parameter	Value	Unit
Detonation pressure	71.350	kbar
Load factor	10.215	lb/ft
Absolute bulk strength	3,768,120	kJ/Nm³
Relative weight strength (ANFO = 100)	82.237	
Relative bulk strength (ANFO = 100)	121.79	

Notes for this case

• Detonation pressure, not energy, decides how well a charge initiates the next: a primer or booster should have a higher detonation pressure than the column it fires. ANFO's 912 cal/g and 739 cal/cc are the reference strengths.

Formula and method

$$P = \frac{\rho D^2}{4} \quad (= 2.32 \times 10^{-7} \rho D^2 \text{ kbar},\ D \text{ in ft/s})$$

$$LF = 0.34\,\rho d^2, \quad ABS = AWS\,\rho, \quad RWS = \frac{AWS}{912}, \quad RBS = \frac{ABS}{739}$$

Variables

ρ	Explosive specific gravity	-
D	Detonation velocity	m/s
d	Explosive column diameter	m
AWS	Absolute weight strength	J/kg
P	Detonation pressure	Pa
LF	Load factor	kg/m
ABS	Absolute bulk strength	J/m³
RWS	Relative weight strength (ANFO = 100)	-
RBS	Relative bulk strength (ANFO = 100)	-

Method and standards

Chapman-Jouguet detonation pressure and explosive strength ratios.

Assumptions and limits

- Ideal detonation; velocity depends on charge diameter and confinement.

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/detonation-pressure-explosive

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.