Blast Vibration: Scaled Distance, PPV and Charge per Delay

Square-root scaled distance, predicted peak particle velocity from site constants, and the largest charge per delay for a scaled distance or PPV limit.

Input parameters

Unit system: SI

Parameter	Value	Unit
Distance from blast to the nearest structure	1,500.0	ft
Largest charge per 8 ms delay	500.00	lb
Site constant k (PPV in in/s at a scaled distance of 1 ft/lb½)	156.00	
Site constant m (slope, negative)	-1.6420	
Scaled-distance limit	55.000	
PPV limit	1.0000	in/s

Calculated results

Parameter	Value	Unit
Scaled distance (ft/lb½)	67.082	
Scaled distance (m/kg½)	30.359	
Predicted peak particle velocity	0.15626	in/s
Charge per delay allowed by the scaled-distance limit	743.80	lb
Charge per delay allowed by the PPV limit	4,796.2	lb

Notes for this case

• The site constants come from a regression of measured PPV against scaled distance at the site; the defaults are the USBM average for the vertical component (k 156, m −1.642). Damage limits depend on frequency as well as PPV.

Formula and method

$$S = \frac{D}{\sqrt{W}}, \quad V = kS^{m}, \quad W_{max} = \left(\frac{D}{D_s}\right)^{2}$$

Variables

D	Distance from blast to the nearest structure	m
W	Largest charge per 8 ms delay	kg
k	Site constant k (PPV in in/s at a scaled distance of 1 ft/lb½)	-
m	Site constant m (slope, negative)	-
D_s	Scaled-distance limit	-
V_{lim}	PPV limit	m/s
S	Scaled distance (ft/lb½)	-
S_{SI}	Scaled distance (m/kg½)	-
V	Predicted peak particle velocity	m/s
W_{D_s}	Charge per delay allowed by the scaled-distance limit	kg
W_V	Charge per delay allowed by the PPV limit	kg

Method and standards

Square-root scaled distance and the PPV attenuation law.

Assumptions and limits

- Empirical regression; wide scatter about the mean line.

Report details

Report reference	FCC-KMPT-428M (the same inputs always give the same reference)
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Calculator	Blast Vibration: Scaled Distance, PPV and Charge per Delay
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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-scaled-distance-ppv

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.