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Vibration Control in Blasting Formulas

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List of 39 Vibration Control in Blasting Formulas

Vibration Control in Blasting

1) Acceleration of Particles disturbed by Vibrations

Open Calculator

fx $$a = \left(4 \cdot (\pi \cdot f)^2 \cdot A\right)$$

ex $$1.580716\text{m/s}^2 = \left(4 \cdot (\pi \cdot 2.001\text{Hz})^2 \cdot 10\text{mm}\right)$$

2) Diameter of Borehole using Minimum Length of Borehole

Open Calculator

fx $$D_h = \left(\frac{L}{2}\right)$$

ex $$10.1\text{ft} = \left(\frac{20.2\text{ft}}{2}\right)$$

3) Diameter of Drill Bit using Burden Suggested in Langefors' Formula

Open Calculator

fx $$d_b = (B_L \cdot 33) \cdot \sqrt{\frac{c \cdot D_f \cdot EV}{D_p \cdot s}}$$

ex $$97.71256\text{mm} = (0.01\text{m} \cdot 33) \cdot \sqrt{\frac{1.3 \cdot 2.03 \cdot 0.50}{3.01\text{kg/dm}^3 \cdot 5}}$$

4) Diameter of Explosive using Burden Suggested in Konya Formula

Open Calculator

fx $$D_e = \left(\frac{B}{3.15}\right) \cdot \left(\frac{SG_r}{SG_e}\right)^{\frac{1}{3}}$$

ex $$56.84036\text{in} = \left(\frac{14\text{ft}}{3.15}\right) \cdot \left(\frac{2.3}{1.9}\right)^{\frac{1}{3}}$$

5) Distance from Blast Hole to Nearest Perpendicular Free Face or Burden

Open Calculator

fx $$B = \sqrt{D_h \cdot L}$$

ex $$14.28356\text{ft} = \sqrt{10.1\text{ft} \cdot 20.2\text{ft}}$$

6) Distance of Particle One from Site of Explosion

Open Calculator

fx $$D_1 = D_2 \cdot \left(\frac{v_2}{v_1}\right)^{\frac{2}{3}}$$

ex $$2.163374\text{m} = 2\text{m} \cdot \left(\frac{1.8\text{m/s}}{1.6\text{m/s}}\right)^{\frac{2}{3}}$$

7) Distance of Particle Two from Site of Explosion given Velocity

Open Calculator

fx $$D_2 = D_1 \cdot \left(\frac{v_1}{v_2} \right)^{\frac{2}{3}}$$

ex $$1.941412\text{m} = 2.1\text{m} \cdot \left(\frac{1.6\text{m/s}}{1.8\text{m/s}} \right)^{\frac{2}{3}}$$

8) Distance to Exposure given Scaled Distance for Vibration Control

Open Calculator

fx $$D = \sqrt{W} \cdot \left(\frac{D_{scaled}}{H} \right)^{-\frac{1}{\beta}}$$

ex $$5.065376\text{m} = \sqrt{62\text{kg}} \cdot \left(\frac{4.9\text{m}}{2.01} \right)^{-\frac{1}{2.02}}$$

9) Maximum Weight of Explosives given Scaled Distance for Vibration Control

Open Calculator

fx $$W = \left((D)^{-\beta} \cdot \left(\frac{H}{D_{scaled}} \right) \right)^{-\frac{2}{\beta}}$$

ex $$60.65181\text{kg} = \left((5.01\text{m})^{-2.02} \cdot \left(\frac{2.01}{4.9\text{m}} \right) \right)^{-\frac{2}{2.02}}$$

10) Overburden given Stemming at Top of Borehole

Open Calculator

fx $$OB = 2 \cdot (S - (0.7 \cdot B))$$

ex $$3ft = 2 \cdot (11.3ft - (0.7 \cdot 14ft))$$

11) Scaled Distance for Vibration Control

Open Calculator

fx $$D_{scaled} = H \cdot \left(\frac{D}{\sqrt{W}} \right)^{-\beta}$$

ex $$5.01002m = 2.01 \cdot \left(\frac{5.01m}{\sqrt{62kg}} \right)^{-2.02}$$

12) Sound Pressure Level in Decibels

Open Calculator

fx $$dB = \left(\frac{P}{6.95 \cdot 10^{-28}} \right)^{0.084}$$

ex $$245.7875dB = \left(\frac{20kPa}{6.95 \cdot 10^{-28}} \right)^{0.084}$$

13) Spacing for Multiple Simultaneous Blasting

Open Calculator

fx $$S_b = \sqrt{B \cdot L}$$

ex $$16.81666ft = \sqrt{14ft \cdot 20.2ft}$$

14) Specific Gravity of Explosive using Burden Suggested in Konya Formula

Open Calculator

fx $$SG_e = SG_r \cdot \left(\frac{B}{3.15 \cdot D_e} \right)^3$$

ex $$2.097181 = 2.3 \cdot \left(\frac{14\text{ft}}{3.15 \cdot 55\text{in}} \right)^3$$

15) Specific Gravity of Rock using Burden Suggested in Konya Formula

Open Calculator

fx $$SG_r = SG_e \cdot \left(\frac{3.15 \cdot D_e}{B} \right)^3$$

ex $$2.083749 = 1.9 \cdot \left(\frac{3.15 \cdot 55\text{in}}{14\text{ft}} \right)^3$$

16) Stemming at Top of Borehole to Prevent Explosive Gases from Escaping

Open Calculator

fx $$S = (0.7 \cdot B) + \left(\frac{OB}{2} \right)$$

ex $$11.31\text{ft} = (0.7 \cdot 14\text{ft}) + \left(\frac{3.02\text{ft}}{2} \right)$$

17) Velocity of Particle One at Distance from Explosion

Open Calculator

fx $$v_1 = v_2 \cdot \left(\frac{D_2}{D_1} \right)^{1.5}$$

ex $$1.672972\text{m/s} = 1.8\text{m/s} \cdot \left(\frac{2\text{m}}{2.1\text{m}} \right)^{1.5}$$

18) Velocity of Particle Two at distance from Explosion

Open Calculator

fx $$v_2 = v_1 \cdot \left(\frac{D_1}{D_2} \right)^{1.5}$$

ex $$1.721488\text{m/s} = 1.6\text{m/s} \cdot \left(\frac{2.1\text{m}}{2\text{m}} \right)^{1.5}$$

19) Velocity of Particles disturbed by Vibrations

Open Calculator

fx $$v = (2 \cdot \pi \cdot f \cdot A)$$

ex $$125.7265\text{mm/s} = (2 \cdot \pi \cdot 2.001\text{Hz} \cdot 10\text{mm})$$

20) Velocity of Vibrations caused by Blasting

Open Calculator

fx $$V = (\lambda_v \cdot f)$$

ex $$5.0025\text{m/s} = (2.5\text{m} \cdot 2.001\text{Hz})$$

21) Wavelength of Vibrations caused by Blasting

Open Calculator

fx $$\lambda_v = \left(\frac{V}{f}\right)$$

ex $$2.498751\text{m} = \left(\frac{5\text{m/s}}{2.001\text{Hz}}\right)$$

22) Weight Strength of Explosive using Burden Suggested in Langefors' Formula

Open Calculator

fx $$s = \left(33 \cdot \frac{B_L}{d_b}\right)^2 \cdot \left(\frac{EV \cdot c \cdot D_f}{D_p}\right)$$

ex $$5.021825 = \left(33 \cdot \frac{0.01\text{m}}{97.5\text{mm}}\right)^2 \cdot \left(\frac{0.50 \cdot 1.3 \cdot 2.03}{3.01\text{kg/dm}^3}\right)$$

Parameters of Vibration Control in Blasting

23) Amplitude of Vibrations given Acceleration of Particles

Open Calculator

fx $$A = \left(\frac{a}{4 \cdot (\pi \cdot f)^2}\right)$$

ex $$19.61136\text{mm} = \left(\frac{3.1\text{m/s}^2}{4 \cdot (\pi \cdot 2.001\text{Hz})^2}\right)$$

24) Amplitude of Vibrations using Velocity of Particle

Open Calculator

fx $$A = \left(\frac{v}{2 \cdot \pi \cdot f}\right)$$

ex $$9.942213\text{mm} = \left(\frac{125\text{mm/s}}{2 \cdot \pi \cdot 2.001\text{Hz}}\right)$$

25) Burden given Spacing for Multiple Simultaneous Blasting

Open Calculator

fx $$B = \frac{(S_b)^2}{L}$$

ex $$12.67327\text{ft} = \frac{(16\text{ft})^2}{20.2\text{ft}}$$

26) Burden given Stemming at Top of Borehole

Open Calculator

fx $$B = \frac{S - \left(\frac{OB}{2}\right)}{0.7}$$

ex $$13.98571\text{ft} = \frac{11.3\text{ft} - \left(\frac{3.02\text{ft}}{2}\right)}{0.7}$$

27) Burden Suggested in Konya Formula

Open Calculator

fx $$B = (3.15 \cdot D_e) \cdot \left(\frac{SG_e}{SG_r}\right)^{\frac{1}{3}}$$

ex $$13.54671\text{ft} = (3.15 \cdot 55\text{in}) \cdot \left(\frac{1.9}{2.3}\right)^{\frac{1}{3}}$$

28) Burden Suggested in Langefors' Formula

Open Calculator

fx $$B_L = \left(\frac{d_b}{33}\right) \cdot \sqrt{\frac{D_p \cdot s}{c \cdot D_f \cdot EV}}$$

ex $$0.009978\text{m} = \left(\frac{97.5\text{mm}}{33}\right) \cdot \sqrt{\frac{3.01\text{kg/dm}^3 \cdot 5}{1.3 \cdot 2.03 \cdot 0.50}}$$

29) Diameter of Borehole using Burden

Open Calculator

fx $$D_h = \frac{(B)^2}{L}$$

ex $$9.70297\text{ft} = \frac{(14\text{ft})^2}{20.2\text{ft}}$$

30) Distance from Explosion to Exposure given Overpressure

Open Calculator

fx $$D = \left(\left(\frac{226.62}{P}\right)\right)^{\frac{1}{1.407}} \cdot (W)^{\frac{1}{3}}$$

ex $$22.22113\text{m} = \left(\left(\frac{226.62}{20\text{kPa}}\right)\right)^{\frac{1}{1.407}} \cdot (62\text{kg})^{\frac{1}{3}}$$

31) Frequency of Vibration given Acceleration of Particles

Open Calculator

fx $$f = \sqrt{\frac{a}{4 \cdot (\pi)^2 \cdot A}}$$

ex $$2.802212\text{Hz} = \sqrt{\frac{3.1\text{m/s}^2}{4 \cdot (\pi)^2 \cdot 10\text{mm}}}$$

32) Frequency of Vibration given Velocity of Particle

Open Calculator

fx $$f = \left(\frac{v}{2 \cdot \pi \cdot A}\right)$$

ex $$1.989437\text{Hz} = \left(\frac{125\text{mm/s}}{2 \cdot \pi \cdot 10\text{mm}}\right)$$

33) Frequency of Vibrations caused by Blasting

Open Calculator

fx $$f = \left(\frac{V}{\lambda_v}\right)$$

ex $$2\text{Hz} = \left(\frac{5\text{m/s}}{2.5\text{m}}\right)$$

34) Length of Borehole given Spacing for Multiple Simultaneous Blasting

Open Calculator

fx $$L = \frac{(S_b)^2}{B}$$

ex $$18.28571\text{ft} = \frac{(16\text{ft})^2}{14\text{ft}}$$

35) Length of Borehole using Burden

Open Calculator

fx $$L = \frac{(B)^2}{D_h}$$

ex $$19.40594\text{ft} = \frac{(14\text{ft})^2}{10.1\text{ft}}$$

36) Minimum Length of Borehole in Feet

Open Calculator

fx $$L = (2 \cdot D_h)$$

ex $$20.2\text{ft} = (2 \cdot 10.1\text{ft})$$

37) Minimum Length of Borehole in Meter

Open Calculator

fx $$L = (2 \cdot 25.4 \cdot D_{pith})$$

ex $$16.66667\text{ft} = (2 \cdot 25.4 \cdot 0.1\text{m})$$

38) Overpressure due to Charge Exploded on Ground Surface

Open Calculator

fx $$P = 226.62 \cdot \left(\frac{(W)^{\frac{1}{3}}}{D} \right)^{1.407}$$

ex $$0.162652\text{kPa} = 226.62 \cdot \left(\frac{(62\text{kg})^{\frac{1}{3}}}{5.01\text{m}} \right)^{1.407}$$

39) Overpressure given Sound Pressure Level in Decibels

Open Calculator

fx $$P = (\text{dB})^{\frac{1}{0.084}} \cdot \left(6.95 \cdot 10^{-28}\right)$$

ex $$3\text{E}\hat{}\text{-}14\text{kPa} = (25\text{dB})^{\frac{1}{0.084}} \cdot \left(6.95 \cdot 10^{-28}\right)$$

Variables Used

- **a** Acceleration of Particles *(Meter per Square Second)*
- **A** Amplitude of Vibration *(Millimeter)*
- **B** Burden *(Foot)*
- B_L Burden in Langefors' Formula *(Meter)*
- **c** Rock Constant
- **D** Distance from Explosion to Exposure *(Meter)*
- D_1 Distance of Particle 1 from Explosion *(Meter)*
- D_2 Distance of Particle 2 from Explosion *(Meter)*
- d_b Diameter of Drill Bit *(Millimeter)*
- D_e Diameter of Explosive *(Inch)*
- D_f Degree of Fraction
- D_h Diameter of Borehole *(Foot)*
- D_p Degree of Packing *(Kilogram per Cubic Decimeter)*
- D_{pith} Diameter of Bore Pith Circle *(Meter)*
- D_{scaled} Scaled Distance *(Meter)*
- **dB** Sound Pressure Level *(Decibel)*
- **EV** Ratio of Spacing to Burden
- **f** Frequency of Vibration *(Hertz)*
- **H** Constant of Scaled Distance
- **L** Length of Borehole *(Foot)*
- **OB** Overburden *(Foot)*
- **P** Overpressure *(Kilopascal)*

- **s** Weight Strength of Explosive
- **S** Stemming at Top of Borehole *(Foot)*
- S_b Blasting Space *(Foot)*
- SG_e Specific Gravity of Explosive
- SG_r Specific Gravity of Rock
- **v** Velocity of Particle *(Millimeter per Second)*
- **V** Velocity of Vibration *(Meter per Second)*
- v_1 Velocity of Particle with Mass m1 *(Meter per Second)*
- v_2 Velocity of Particle with Mass m2 *(Meter per Second)*
- **W** Maximum Weight of Explosives per Delay *(Kilogram)*
- **β** Constant of Scaled Distance β
- λ_v Wavelength of Vibration *(Meter)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Millimeter (mm), Foot (ft), Meter (m), Inch (in)
  Length Unit Conversion
- Measurement: **Weight** in Kilogram (kg)
  Weight Unit Conversion
- Measurement: **Pressure** in Kilopascal (kPa)
  Pressure Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s), Millimeter per Second (mm/s)
  Speed Unit Conversion
- Measurement: **Acceleration** in Meter per Square Second (m/s^2)
  Acceleration Unit Conversion
- Measurement: **Frequency** in Hertz (Hz)
  Frequency Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Decimeter (kg/dm^3)
  Density Unit Conversion
- Measurement: **Sound** in Decibel (dB)
  Sound Unit Conversion

Check other formula lists

- Bearing Capacity for Strip Footing for C-Φ Soils Formulas
- Bearing Capacity of Cohesive Soil Formulas
- Bearing Capacity of Non-cohesive Soil Formulas
- Bearing Capacity of Soils: Meyerhof's Analysis Formulas
- Foundation Stability Analysis Formulas
- Atterberg Limits Formulas
- Bearing Capacity of Soil: Terzaghi's Analysis Formulas
- Compaction of Soil Formulas
- Earth Moving Formulas
- Lateral Pressure for Cohesive and Non Cohesive Soil Formulas
- Minimum Depth of Foundation by Rankine's Analysis Formulas
- Pile Foundations Formulas
- Vibration Control in Blasting Formulas
- Void Ratio of Soil Sample Formulas
- Water Content of Soil and Related Formulas

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