

BLAST DESIGN RULES OF THUMB - Coal

(Given: Hole depth, Rock type, and Distance to structure)

HOLE DIAMETER (d) = hole depth (H) divided by 5 to 10.

$$d(\text{in}) = H(\text{ft}) / 5 \text{ to } H(\text{ft}) / 10 \quad (\text{Typically } H/7)$$

BURDEN (B) = 2 to 3 times the diameter.

$$B(\text{ft}) = 2 \times d(\text{in}) \text{ to } 3 \times d(\text{in}) \quad (\text{Typically } 2.5 \times d)$$

SPACING (S) = 1 to 2 times the burden.

$$S(\text{ft}) = 1 \times B(\text{ft}) \text{ to } 2 \times B(\text{ft}) \quad (\text{Typically } 1.5 \times B)$$

STEMMING (T) = 0.5 to 1.0 times the burden.

$$T(\text{ft}) = 0.5 \times B(\text{ft}) \text{ to } 1.0 \times B(\text{ft}) \quad (\text{Typically } 0.7 \times B)$$

POWDER COLUMN (PC) = hole depth minus stemming (T), backfill (F) and decking (Td)

$$PC(\text{ft}) = H(\text{ft}) - T(\text{ft}) - F(\text{ft}) - T_d(\text{ft})$$

LOADING DENSITY (LD) = 0.3405 times the explosive density times the hole diameter squared.

$$LD(\text{lb/ft}) = 0.3405 \times \text{density}(\text{gm/cc}) \times d^2(\text{in}) \quad (\text{or Mfg design guide})$$

CHARGE WEIGHT (CW) = powder column times the loading density.

$$CW(\text{lb}) = PC(\text{ft}) \times LD(\text{lb/ft})$$

POWDER FACTOR (PF) = powder per hole divided by rock volume per hole.

$$PF(\text{lb/yd}^3) = CW(\text{lb}) / (B(\text{ft}) \times S(\text{ft}) \times H(\text{ft}) / 27)$$

SCALED DISTANCE (SD₂) = Distance to structure divided by square root of the charge weight.

$$SD_2(\text{ft/lb}^{1/2}) = \text{distance}(\text{ft}) / CW^{1/2}(\text{lb}^{1/2}) \quad (\text{Greater than } 55)$$

PEAK PARTICLE VELOCITY (PPV) = 119 or 438 times scaled distance to the -1.52 power.

$$\begin{aligned} PPV(\text{in/s}) &= 438 \times (SD_2)^{-1.52} && (\text{Compliance}) \\ PPV(\text{in/s}) &= 119 \times (SD_2)^{-1.52} && (\text{Expected}) \end{aligned}$$