



THE
BLASTER'S GUIDE
A Resource for the
Explosives and Blasting Industry

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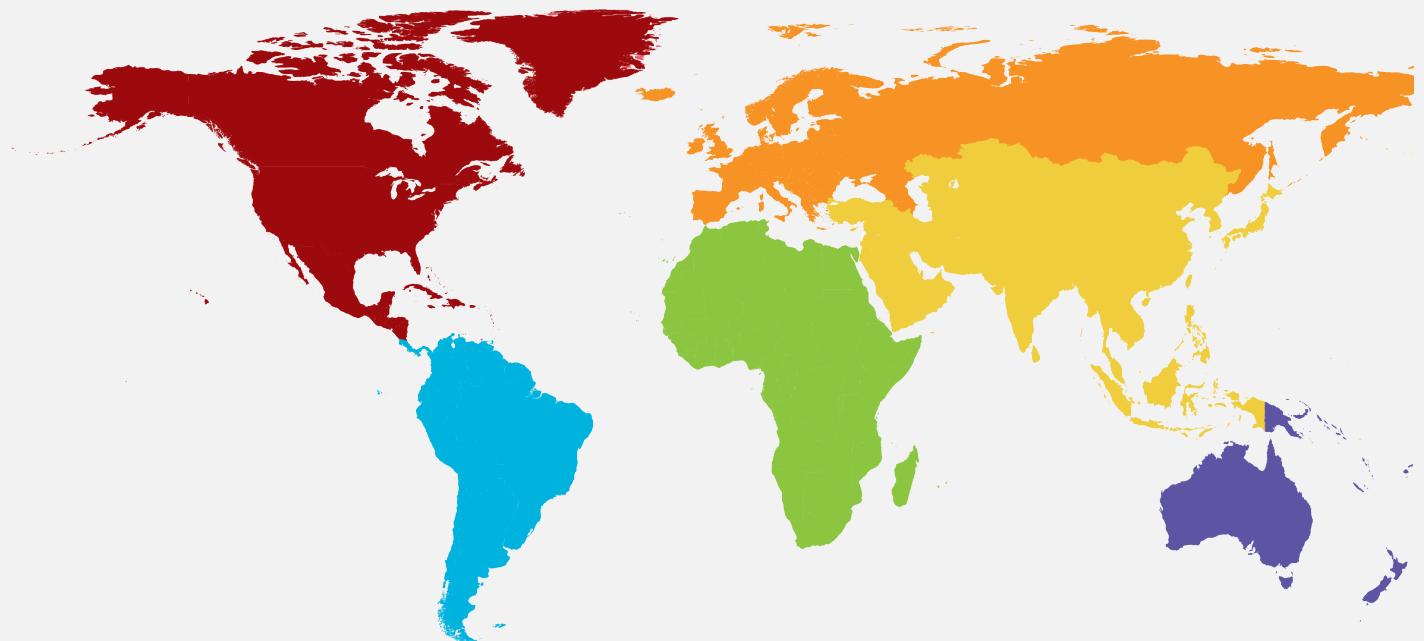
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[Blasters Guide – Austin Powder Company](#)

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**USED IN 1833
& EVER SINCE**





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Blaster's Tips

CHECK the availability of blasting shelters, your blasting equipment, the face, the drill pattern, exposure within and around the blast area, availability of adequate stemming.

DIAGRAM the shot as drilled, delay timings

MEASURE burden, spacing and depth, noting any deviations

CALCULATE the powder factor

INSURE adequate trained personnel on blast crew

LOAD so shot can be fired prior to completion of loading in case of emergency (weather, equipment break-down, etc.)

CLEAN shot area prior to hook-up

CLEAR blast area after hook-up

UTILIZE blasting shelter and adequate cover for all in blast area

RECEIVE distinct "clear to fire" signal

CHECK post blast area for safe re-entry

GIVE "clear to re-enter" signal

COMPLETE shot report with diagram

EVACUATE BLAST AREA WHEN ELECTRICAL STORMS THREATEN AND ALWAYS USE COMMON SENSE!

Blaster's Rules

1. Check blasting equipment for condition, capacity, etc. prior to loading the shot.
2. Arrive at the blast site early. Allow yourself ample time to load and connect shots. Misfires are caused by hurrying.
3. Observe the formation and drill pattern prior to loading. Look for mud seams, soft material, light burdens and spacing.
4. Diagram the shot as drilled. Time your shot using MS numbers, rather than cap numbers. Review timings before caps are laid out.
5. Calculate powder factors prior to loading. Measure burden, spacing and depth. Don't use the driller's measurements!
6. Keep the number of people to a minimum when loading and connecting up. Idle people can be dangerous.
7. Assign duties to specific people during loading and be sure they carry out those duties.

8. Start loading your shot in such a manner that you could shoot in the event of equipment failure.
9. When loading bulk explosives, a 1-ft. to 2-ft. column of bulk explosives should be loaded prior to the primer.
10. When loading packaged explosives, load one stick prior to the primer. This ensures that the primer is not driven into cuttings at the bottom of the borehole.
11. Be certain that stemming is adequate. Avoid using wet or muddy stemming material. Crushed stone is recommended.
12. Always clean the shot area of bags, wire, boxes, etc. prior to the connecting up.
13. Always have adequate cover at the blasting point.
14. Make sure you understand the signal to fire the shot. If in doubt, delay firing.
15. Complete your shot report before leaving the site.
16. Evacuate blast area when threatened with electrical storms.
17. Always use common sense!

Austin Powder Company's Safety Policy

The SAFETY of our employees, customers, suppliers and the public is our first priority.

A 'ZERO' accident and incident rate is our primary objective.

All employees must think, act and work SAFELY at all times in all work environments.

All employees are accountable for the SAFETY of their fellow employees, customers, suppliers, and all others in their work environment.

The management of the company will provide proper equipment and training, and will ensure a SAFE work environment.

Austin Powder Company's Commitment

We will face the issues that impact our customers and our company with:

- Safety
- Security
- Compliance
- Respect for all individuals
- Quality in all our products and services
- Integrity
- A fair return

Austin Powder Company's Misfire Procedures

When a misfire occurs, use the one-half hour waiting time to clear your mind and think about the condition that has been created. Document the hole or area that contains the misfire completely, while this is still fresh in your mind.

Do not permit any work in the misfire area. "Danger" off the area. Notify the permittee of the misfire. Contact your supervisor for assistance. We recommend that prior to refiring a misfire, another blaster familiar with the mine/quarry be brought in to assist with the decision to fire or render inert the explosive.

Proper misfire handling should be conducted by experienced individuals familiar with the initiation systems and explosives used, as well as the proper techniques to handle, neutralize and render safe the explosive materials. Specific recommendations cannot be made concerning misfires as every misfire is unique and very site specific. Each misfire must be handled individually.

All information regarding the misfire must be analyzed completely and a plan of action established with a method to "Make Safe" the area. Specific Federal/State or Local laws may also dictate additional procedures.

When a misfire occurs, the power source used to initiate the blast must be disconnected, the firing line shunted or made safe before entering the blast area to inspect the misfire. All personnel must stay out of the blast area for at least 1/2 (30 minutes) hour. Access to the blast area must remain blocked and guarded.

Once a determination is made by the blaster in charge and another blaster familiar with the area of the stability of the area, such as adequate burdens, spacing, stemming, etc., a decision may be made to refire the misfire. Refiring a misfire is usually the safest and best way to eliminate the danger. Extra care must be taken, as the designed pattern HAS changed.

Once a determination has been made to refire, the blast area must be cleared to double the initial perimeter (at a minimum). If this is not possible, alternate methods of handling should be considered.

The Federal Mine Safety and Health Administration (MSHA)

IN 30 CFR (CODE OF FEDERAL REGULATIONS), PART 57.6000, DEFINES A MISFIRE AS:

"The complete or partial failure of explosive material to detonate as planned. The term also is used to describe the explosive material itself that has failed to detonate.

A misfire is described as the failure of an explosive charge to detonate. The best advice that can be given regarding the handling of misfires is to take every

precaution to prevent their occurrence.

Anytime misfired holes, portions of a misfired hole, or unexploded explosive material remains after a blast is fired, a hazardous situation is created that will exist until the proper handling of unfired explosive material. A misfire requires sound judgement and a comprehensive understanding of explosives. Most misfires occur because of improper techniques or short cuts, and sometimes because of the geological formation.

It is important that any investigation into a misfire be conducted with a fair and open mind. Any preconceived idea of the cause may mask the true cause, and prevent a future occurrence."

MSHA - 30 CFR. PART 57.6311 ADDRESSES THE HANDLING OF MISFIRES AS:

(a) Faces and muck piles shall be examined for misfires after each blasting operation.

(b) Only work necessary to remove a misfire and protect the safety of miners engaged in the removal shall be permitted in the affected area until the misfire is disposed of in a safe manner.

(c) When a misfire cannot be disposed of safely, each approach to the area affected by the misfire shall be posted with a warning sign at a conspicuous location to prohibit entry, and the condition shall be reported immediately to mine management.

(d) Misfires occurring during the shift shall be reported to mine management not later than the end of the shift.

MSHA - 30 CFR. PART 57.6310 DEFINES THE MISFIRE WAITING PERIOD AS:

When a misfire is suspected, persons shall not enter the blast area until:

(a) For 30 minutes if safety fuse and blasting caps are used; or

(b) For 15 minutes if any other type detonators are used.

The Occupational Safety and Health Administration (OSHA)

(a) If a misfire is found, the blaster shall provide proper safeguards for excluding all employees from the danger zone.

(b) No other work shall be done except that necessary to remove the hazard of the misfire and only those employees necessary to do the work shall remain in the danger zone.

(c) No attempt shall be made to extract explosives from any charged or misfired hole; a new primer shall be put in and the hole reblasted. If refiring of the misfired hole presents a hazard, the explosives may be removed by washing out with water or, where the misfire is under water, blown out with air.

(d) If there are any misfires while using cap and fuse, all employees shall remain away from the charge for at least 1 hour. Misfires shall be handled under the direction of the person in charge of the blasting. All wires shall be carefully traced and a search made for unexploded charges.

(e) No drilling, digging, or picking shall be permitted until all missed holes have been detonated or the authorized representative has approved that work can proceed.

OSHA Regulations (Standards - 29 CFR) Misfires. - 1926.911

- Standard Number: 1926.911
- Standard Title: Misfires.
- SubPart Number: U
- SubPart Title: Blasting and the Use of Explosives



REFERENCES

Avey, L. 1990. *Pre-Split Economics and Practice at Gold Fields Operating Co. - Gold Fields Mine*. Proceedings of the Sixteenth Conference on Explosives and Blasting Technique. Orlando, FL: International Society of Explosives Engineers.

Chiapetta, F., Borg, D. and Sterner, V. (Eds.) 1987. *Explosives and Rock Blasting*. Dallas, TX: Atlas Powder Company Field Technical Operations.

Hopler, R. (Ed.) 1998. *Blasters' Handbook 17th Edition*. Cleveland, OH: International Society of Explosives Engineers.

Konya, C. and Walter, E. 1991. *Rock Blasting and Overbreak Control*. McClean, VA: United States Department of Transportation Federal Highway Administration.

Siskind, D., Stachura, V., Stagg, M. and Kopp, J. 1980. *Structure Response and Damage Produced by Airblast from Surface Mining*. United States Bureau of Mines Report of Investigations 8485. Washington, D.C.: United States Department of the Interior.



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HOW TO READ FORMULAS

FORMULA NAME

FORMULA

VARIABLES and [UNITS]

Variables used in formula and required units in [brackets]. If input variables are not in required units, then you must use the unit conversion tables.

Absolute Bulk Strength (ABS)

$$ABS_E = AWS_E \times d_E$$

VARIABLES and [UNITS]

ABS_E = Absolute bulk strength of the explosive [cal/cc]

AWS_E = Absolute weight strength of the explosive [cal/g]

d_E = Density of the explosive [g/cm³]

Absolute Weight Strength (AWS)

$$AWS_E = \frac{RBS_E \times 7.462}{d_E}$$

VARIABLES and [UNITS]

AWS_E = Absolute weight strength of the explosive [cal/g]

RBS_E = Relative bulk strength of the explosive [ANFO = 100]

d_E = Density of the explosive [g/cm³]

Base-Charge Length Formula

$$E_b = [(0.3 \rightarrow 0.5) \times B] + J$$

VARIABLES and [UNITS]

E_b = Length of base charge of high density explosives [ft]

B = Average burden [ft]

J = Sub-drilling depth [ft]

Actual Scaled Distance Formula

Actual Scaled Distance

$$SD = \frac{D}{\sqrt{W}}$$

Maximum Charge Weight per Delay

$$W = \left(\frac{D}{SD} \right)^2$$

Minimum Distance

$$D = SD \times \sqrt{W}$$

VARIABLES and [UNITS]

SD = Scaled distance factor

W = Charge weight per delay [lb]

D = Distance [ft]

Burden Formula

$$B = D_e \times \left(2 \times \left[\frac{d_e}{d_r} \right] + 1.5 \right)$$

VARIABLES and [UNITS]

B = Burden [ft]
 d_e = Density of the explosives [g/cm³]
 d_r = Density of the rock [g/cm³]
 D_e = Diameter of fully coupled explosive column [in]

Deck Stemming Formula

For Dry Holes $T_d = 0.5 \times D$

For Wet Holes $T_d = 1.0 \times D$

VARIABLES and [UNITS]

T_d = Minimum length of stone deck consisting of particles of size T_s [ft]
 D = Blast-hole diameter [in]

Face Height Formula

$$H = (5 \rightarrow 10) \times D$$

VARIABLES and [UNITS]

H = Face Height [ft]
 D = Blast-hole Diameter [in]

Hole-to-Hole Delay Time Formula

$$D_{hth} = (0 \rightarrow 5) \times S$$

ms/ft

VARIABLES and [UNITS]

D_{hth} = Delay time between holes in a row [ms]
 S = Spacing between holes in a row [ft]

Hole-to-Hole Delay Times to Improve Fragmentation

Rock Type	ms/ft
Sands, Loams, Marls and Coals	1.8 - 2.1
Some Limestones, Rock Shale and some Shales	1.5 - 1.8
Compact Limestones and Marbles, some Granites and Basalts, Quartzite Rocks and some Gneisses and Gabbros	1.2 - 1.5
Diabase, Diabase Porphyrites, Compact Gneisses, and Mica Schists and Magnetites	0.9 - 1.2



Leading underground mining technology

Loading Density Formula

$$d_l = 0.3404 \times D_e^2 \times d_e$$

VARIABLES and [UNITS]

d_l = Explosives loading density [lb/ft]
 D_e = Diameter of explosives column [in]
 d_e = Density of explosives [g/cm³]



Loading a blast on an iron ore range

Maximum Charge Weight per Delay

$$W = \left(\frac{D}{SD} \right)^2$$

VARIABLES and [UNITS]

SD = Scaled distance factor
 W = Charge weight per delay [lb]
 D = Distance [ft]

Minimum Distance Formula

$$D = SD \times \sqrt{W}$$

VARIABLES and [UNITS]

SD = Scaled distance factor
 W = Charge weight per delay [lb]
 D = Distance [ft]

Powder Factor Formula

Volume of Rock

$$PF = \frac{W_e}{V}$$

VARIABLES and [UNITS]

PF = Powder factor [lb/yd³]
 W_e = Total weight of explosives used in blast [lb]
 V = Total volume of rock generated in blast [yd³]

Weight of Rock

$$PF = \frac{W_r}{W_e}$$

VARIABLES and [UNITS]

PF = Powder factor [t/lb]
 W_r = Total weight of rock generated in blast [t]
 W_e = Total weight of explosives used in blast [lb]

Pre-Splitting Formulas for Air-Decked Charges

Spacing of Air-Decked Charges

$$S = (1.5 \rightarrow 2.0) \times D$$

VARIABLES and [UNITS]

S = Spacing between air-decked holes [ft]
D = Diameter of blast-hole [in]

Weight of Air-Decked Charges

$$W = (0.08 \rightarrow 0.12) \times S \times L_h$$

VARIABLES and [UNITS]

W = Weight of air-deck charge [lb]
S = Spacing between blast-holes [ft]
L_h = Length of blast-hole [ft]

Stemming Column Length

$$T = (1.0 \rightarrow 1.2) \times D$$

VARIABLES and [UNITS]

T = Stemming column length [ft]
D = Diameter of blast-hole [in]

Pre-Splitting Formulas for De-Coupled Charges

Linear Charge Weight

$$W_l = \frac{D^2}{28}$$

VARIABLES and [UNITS]

W_l = Linear charge weight for
pre-splitting explosive [lb/ft]
D = Diameter of blast-hole [in]

Spacing between Pre-Split Holes

$$S = \frac{D^2}{2.8}$$

VARIABLES and [UNITS]

S = Spacing between pre-split holes [ft]
D = Diameter of blast-hole [in]

Pressure Formula

$$P = 0.000000233 \times VOD^2 \times d_E$$

VARIABLES and [UNITS]

P = Pressure [kbar]
VOD = Velocity of detonation of explosive [ft/sec]
d_E = Density of explosive [g/cm³]

Relative Weight Strength (RWS)

$$RWS_E = \frac{AWS_E}{91,000}$$

VARIABLES and [UNITS]

RWS_E = Relative weight strength of the explosive
[ANFO = 100]

AWS_E = Absolute weight strength of
the explosive [cal/g]

Resistance Formulas

For Parallel Circuits

$$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_n}$$

For Series Circuits

$$R_{total} = R_1 + R_2 + R_3 + \dots + R_n$$

VARIABLES and [UNITS]

R_{total} = Total resistance of the electrical circuit [Ω]

$R_1 \dots R_n$ = Resistance of individual blasting caps or
circuit branches [Ω]



Bulk trucks preparing for another day on the job

Row-to-Row Delay Time Formula

$$D_{rtr} = (2 \rightarrow 15) \times B$$

ms/ft

VARIABLES and [UNITS]

D_{rtr} = Delay time between consecutive rows [ms]

B = Maximum burden in front of a row of holes [ft]

Effects of Various Row-to-Row Delays

Effects	ms/ft
Violent excessive air-blast and back-break	2
High pile close to face, moderate air-blast and back-break	2 - 3
Average pile height, average air-blast and back-break	3 - 4
Scattered pile with minimum back-break	4 - 6

Stone Stemming Particle Size Formula

$$T_s = \frac{D}{12 \rightarrow 20}$$

VARIABLES and [UNITS]

T_s = Clean crushed stone stemming particle size [in]

D = Blast-hole diameter [in]

Sub-Drilling Formula

$$J = (0.2 \rightarrow 0.5) \times B$$

VARIABLES and [UNITS]

B = Burden [ft]
J = Sub-drilling [ft]



Industry's leading Detonating Cord

"Supersonic" Face Velocity Formula

$$D_{min} = \frac{S}{1.127}$$

VARIABLES and [UNITS]

D_{min} = In order to avoid air-blast from "supersonic" lateral face velocity, the delay between holes must be more than D_{min} [ms]

S = Spacing between blast holes [ft]

Spacing Formulas

	If: $\frac{H}{B} \geq 4$	If: $\frac{H}{B} < 4$
Instant	$S = 2.0 \times B$	$S = \frac{H + (2 \times B)}{3}$
Delayed	$S = 1.4 \times B$	$S = \frac{H + (7 \times B)}{8}$

VARIABLES and [UNITS]

H = Face height [ft]
B = Burden [ft]
S = Blast-hole spacing [ft]

Top Stemming Length Formula

$$T = (0.7 \rightarrow 1.3) \times B$$

VARIABLES and [UNITS]

B = Burden [ft]
T = Top stemming length [ft]

Water Displacement Formula

$$C = \frac{L_w \div L_c}{1 - \left(\frac{D_c}{D_h} \right)^2}$$

VARIABLES and [UNITS]

C = Number of explosives cartridges required to rise above standing water
 L_w = Length of the standing water column [ft]
 L_c = Length of one explosives cartridge [ft]
 D_c = Diameter of explosives cartridges [in]
 D_h = Diameter of blast-hole [in]



HEET Truck on display at an open house in 2001

Weight of Rock per Blast Hole Formula

$$W = V \times d_r$$

VARIABLES and [UNITS]

W = Weight of rock generated per blast-hole [t]
 V = Bank volume of rock generated per blast-hole [yd³]
 d_r = Bank density of rock [t/yd³]

Vibration Level Prediction Formulas

Peak Particle Velocity Prediction

$$PPV = K \times SD^{-1.6}$$

VARIABLES and [UNITS]

PPV = Peak particle velocity [in/s]
 K = Ground transmission constant [K=160 if no other seismic data is available]
 SD = Scaled distance factor

Site Specific Ground Transmission Constant

$$K = PPV \times SD^{1.6}$$

VARIABLES and [UNITS]

K = Ground transmission constant
 PPV = Peak particle velocity [in/s]
 SD = Scaled distance factor

Volume of Rock per Blast Hole Formula

$$V = \frac{B \times S \times H}{27}$$

VARIABLES and [UNITS]

V = Bank volume of rock per blast-hole [yd³]
 B = Burden [ft]
 S = Spacing [ft]
 H = Face height [ft]



CONVERSIONS AND TABLES

Unit Conversions Figure 1

Loading Density Tables

- Pounds of Explosives per Foot of Borehole Figure 2
- Kilograms of Explosives per Foot of Borehole Figure 3

Volume of Rock Tables

- Cubic Yards per Foot of Borehole Figure 4
- Cubic Meters per Meter of Borehole Figure 5

Rock Density Table Figure 6



LENGTH

Meter [m]	39.37	Inch [in]
Meter [m]	3.281	Feet [ft]
Millimeter [mm]	0.001	Meter [m]
Centimeter [cm]	0.3937	Inch [in]
Inch [in]	25.40	Millimeter [mm]
Foot [ft]	0.305	Meter [m]
Mile (statute) [mi]	1609.0	Meter [m]
Mile (statute) [mi]	5280.0	Foot [ft]
Mile (nautical) [mi]	1.15	Mile (statute) [mi]

PRESSURE

Pound Per Square Inch [psi]	6.8948	Kilopascals [kPa]
Atmosphere [atm]	4.696	Pound Per Square Inch [psi]
One ft of H2O (@15°C)	0.4335	Pound Per Square Inch [psi]

MASS (WEIGHT)

Kilogram [kg]	2.2	Pound [lb]
Grain [gr]	0.0648	Gram [g]
Grain [gr]	0.000143	Pound [lb]
Ounce [oz]	28.35	Gram [g]
Pound [lb]	0.4536	Kilogram [kg]
Tonne (metric ton)	1.1023	Tons (short)

VOLUME

Cubic Centimeter [cm³]	0.061	Cubic Inch [in³]
Cubic Inch [in³]	16.39	Cubic Centimeter [cm³]
Cubic Meter [m³]	1.31	Cubic Yards [yd³]
Cubic Feet [ft³]	0.028	Cubic Meter [m³]
U.S. Gallon	3.785	Liter [L]
U.S. Gallon	0.1337	Cubic Feet [ft³]
Ounce (U.S. fluid)	29.57	Cubic Centimeter [cm³]
Cubic Yards [yd³]	0.7646	Cubic Meter [m³]

POWDER FACTOR / SPECIFIC CHARGE

Pounds Per Cubic Yard [lb/yd³]	0.593	Kilograms Per Cubic Meter [kg/m³]
Kilograms Per Cubic Meter [kg/m³]	1.686	Pounds Per Cubic Yard [lb/yd³]

VELOCITY

Meters Per Second [m/sec]	3.281	Feet Per Second [ft/sec]
Feet Per Second [ft/sec]	0.3048	Meters Per Second [m/sec]
Inches Per Second [in/sec]	25.4	Millimeters Per Second [cm/sec]
Inches Per Second [in/sec]	2.54	Centimeters Per Second [cm/sec]
Millimeters Per Second [cm/sec]	0.03937	Inches Per Second [in/sec]

AREA

Square Centimeter [cm²]	0.155	Square Inch [in²]
Square Meter [m²]	1550.0	Square Inch [in²]
Square Inch [in²]	6.45	Square Centimeter [cm²]
Square Feet [ft²]	0.0929	Square Meter [m²]
Acre	43560.0	Square Feet [ft²]
Square Mile [mi²]	640.0	Acre

DENSITY

Pounds Per Cubic Feet [lbs/ft³]	16.0	Kilograms Per Cubic Meter [g/m³]
Pounds Per Cubic Feet [lbs/ft³]	0.01602	Grams Per Cubic Centimeter [g/cm³]
Grams Per Cubic Centimeter [g/cm³]	62.43	Pounds Per Cubic Feet [lbs/ft³]



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Pounds of Explosive per Foot of Blasthole

(Fig 2)

Product or Loading Density [g/cc]

Dia. Hole [in]	Product or Loading Density [g/cc]																Dia. Hole [mm]		
	0.50	0.75	0.80	0.82	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40		1.45	1.50
3/4	0.01	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30
7/8	0.13	0.20	0.21	0.21	0.22	0.23	0.25	0.26	0.27	0.29	0.30	0.31	0.33	0.34	0.35	0.37	0.38	0.39	0.40
1	0.17	0.26	0.27	0.28	0.29	0.31	0.32	0.34	0.36	0.37	0.39	0.41	0.43	0.44	0.46	0.48	0.49	0.51	0.52
1 1/4	0.27	0.40	0.43	0.44	0.45	0.48	0.51	0.53	0.56	0.59	0.61	0.64	0.67	0.69	0.72	0.74	0.77	0.80	0.82
1 3/8	0.32	0.48	0.52	0.53	0.55	0.58	0.61	0.64	0.68	0.71	0.74	0.77	0.80	0.84	0.87	0.90	0.93	0.97	0.99
1 1/2	0.38	0.57	0.61	0.63	0.65	0.69	0.73	0.77	0.80	0.84	0.88	0.92	0.96	1.00	1.03	1.07	1.11	1.15	1.18
1 5/8	0.45	0.67	0.72	0.74	0.76	0.81	0.85	0.90	0.94	0.99	1.03	1.08	1.12	1.17	1.21	1.26	1.30	1.35	1.38
1 3/4	0.52	0.78	0.83	0.86	0.89	0.94	0.99	1.04	1.01	1.15	1.20	1.25	1.30	1.36	1.41	1.46	1.51	1.56	1.61
1 7/8	0.60	0.90	0.96	0.98	1.02	1.08	1.14	1.20	1.26	1.32	1.38	1.44	1.50	1.56	1.62	1.68	1.74	1.80	1.84
2	0.68	1.02	1.09	1.12	1.16	1.23	1.29	1.36	1.43	1.50	1.57	1.63	1.70	1.77	1.84	1.91	1.98	2.04	2.01
2 1/4	0.86	1.29	1.38	1.41	1.47	1.55	1.64	1.72	1.81	1.90	1.98	2.07	2.15	2.24	2.33	2.41	2.50	2.59	2.65
2 1/2	1.06	1.60	1.70	1.75	1.81	1.92	2.02	2.13	2.23	2.34	2.45	2.55	2.66	2.77	2.87	2.98	3.09	3.19	3.28
2 3/4	1.29	1.93	2.06	2.11	2.19	2.32	2.45	2.58	2.70	2.83	2.96	3.09	3.22	3.35	3.48	3.61	3.73	3.86	3.97
3	1.53	2.30	2.45	2.51	2.60	2.76	2.91	3.06	3.22	3.37	3.52	3.68	3.83	3.98	4.14	4.29	4.44	4.60	4.72
3 1/2	2.09	3.13	3.34	3.42	3.55	3.75	3.96	4.17	4.38	4.59	4.80	5.01	5.21	5.42	5.63	5.84	6.05	6.26	6.42
4	2.72	4.09	4.36	4.47	4.63	4.90	5.18	5.45	5.72	5.99	6.27	6.54	6.81	7.08	7.35	7.63	7.90	8.17	8.39
4 1/4	3.08	4.61	4.92	5.04	5.23	5.54	5.84	6.15	6.46	6.77	7.07	7.38	7.69	8.00	8.30	8.61	8.92	9.23	9.47
4 1/2	3.45	5.17	5.52	5.65	5.86	6.21	6.55	6.90	7.24	7.58	7.93	8.27	8.62	8.96	9.31	9.65	10.00	10.34	10.62
5	4.26	6.38	6.81	6.98	7.24	7.66	8.09	8.51	8.94	9.36	9.79	10.22	10.64	11.07	11.49	11.92	12.34	12.77	13.11
5 1/2	5.15	7.73	8.24	8.45	8.76	9.27	9.79	10.30	10.82	11.33	11.85	12.36	12.88	13.39	13.91	14.42	14.94	15.45	15.86
5 5/8	5.39	8.08	8.62	8.83	9.16	9.70	10.24	10.77	11.31	11.85	12.39	12.93	13.47	14.01	14.54	15.08	15.62	16.16	16.59
6	6.13	9.19	9.81	10.05	10.42	11.03	11.65	12.26	12.87	13.48	14.01	14.71	15.32	15.94	16.55	17.16	17.77	18.39	18.88
6 1/4	6.65	9.98	10.64	10.91	11.31	11.97	12.64	13.30	13.97	14.63	15.30	15.96	16.63	17.29	17.96	18.62	19.29	19.95	20.48
6 1/2	7.19	10.79	11.51	11.80	12.23	12.95	13.67	14.39	15.11	15.82	16.54	17.26	17.98	18.70	19.42	20.14	20.86	21.58	22.15
6 3/4	7.76	11.64	12.41	12.72	13.19	13.96	14.74	15.51	16.29	17.07	17.84	18.62	19.39	20.17	20.94	21.72	22.50	23.27	23.89
7 3/8	9.26	13.89	14.82	15.19	15.74	16.67	17.59	18.52	19.45	20.37	21.30	22.22	23.15	24.08	25.00	25.93	26.85	27.78	28.52
7 7/8	10.56	15.84	16.89	17.32	17.95	19.01	20.06	21.12	22.17	23.23	24.28	25.34	26.40	27.45	28.51	29.56	30.62	31.67	32.52
8	10.90	16.34	17.43	17.87	18.52	19.61	20.70	21.79	22.88	23.97	25.06	26.15	27.24	28.33	29.42	30.51	31.60	32.69	33.56
9	13.79	20.69	22.06	22.62	23.44	24.82	26.20	27.58	28.96	30.34	31.72	33.01	34.48	35.85	37.23	38.61	39.99	41.37	42.47
9 7/8	16.60	24.90	26.56	27.23	28.22	29.88	31.54	33.20	34.86	36.52	38.18	39.84	41.51	43.17	44.83	46.49	48.15	49.81	51.13
10 5/8	19.22	28.83	30.75	31.52	32.67	34.60	36.52	38.44	40.36	42.28	44.21	46.13	48.05	49.97	51.89	53.82	55.74	57.66	59.20
12 1/4	25.55	38.32	40.88	41.90	43.43	45.99	48.54	51.01	53.65	56.21	58.76	61.32	63.87	66.43	68.98	71.53	74.09	76.64	78.69
13 3/4	32.19	48.28	51.50	52.79	54.72	57.94	61.16	64.38	67.59	70.81	74.03	77.25	80.47	83.69	86.91	90.13	93.34	96.56	99.14
15	38.31	57.46	61.29	62.82	65.12	68.95	72.78	76.61	80.44	84.27	88.10	91.94	95.77	99.60	103.43	107.26	111.09	114.92	117.98
17 1/2	52.14	78.21	83.42	85.51	88.64	93.85	99.06	104.28	109.49	114.71	119.92	125.13	130.35	135.56	140.78	145.99	151.20	156.42	160.59

Pounds of Explosives per Foot of Blasthole = 0.3405 x Loading Density [g/cc] x Explosive Diameter²



Kilograms of Explosive per Meter of Blasthole

(Fig.3) THE BLASTER'S GUIDE

Dia. Hole [in]	Product or Loading Density [g/cc]															Dia. Hole [mm]		
	0.50	0.75	0.80	0.82	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35		1.40	1.45
3/4	0.14	0.21	0.23	0.23	0.24	0.26	0.27	0.28	0.30	0.31	0.33	0.34	0.36	0.37	0.38	0.40	0.41	0.43
7/8	0.19	0.29	0.31	0.32	0.33	0.35	0.37	0.39	0.41	0.43	0.45	0.46	0.48	0.50	0.52	0.54	0.56	0.58
1	0.25	0.38	0.40	0.42	0.43	0.46	0.48	0.51	0.53	0.56	0.58	0.61	0.63	0.66	0.68	0.71	0.73	0.76
1 1/4	0.40	0.59	0.63	0.65	0.67	0.71	0.75	0.79	0.83	0.87	0.91	0.95	0.99	1.03	1.07	1.11	1.15	1.19
1 3/8	0.48	0.72	0.77	0.78	0.81	0.86	0.91	0.96	1.01	1.05	1.10	1.15	1.20	1.24	1.29	1.34	1.39	1.44
1 1/2	0.57	0.85	0.91	0.93	0.97	1.02	1.08	1.14	1.20	1.25	1.31	1.37	1.42	1.48	1.54	1.59	1.65	1.71
1 5/8	0.67	1.00	1.07	1.01	1.14	1.20	1.27	1.34	1.40	1.47	1.54	1.60	1.67	1.74	1.80	1.87	1.94	2.00
1 3/4	0.77	1.16	1.24	1.27	1.32	1.39	1.47	1.55	1.63	1.70	1.78	1.86	1.94	2.01	2.09	2.17	2.25	2.32
1 7/8	0.89	1.33	1.42	1.46	1.51	1.60	1.69	1.78	1.87	1.96	2.05	2.13	2.22	2.31	2.40	2.49	2.58	2.67
2	1.01	1.52	1.62	1.66	1.72	1.82	1.92	2.02	2.13	2.23	2.33	2.43	2.53	2.63	2.73	2.83	2.93	3.04
2 1/4	1.28	1.92	2.05	2.10	2.18	2.31	2.43	2.56	2.69	2.82	2.95	3.07	3.20	3.33	3.46	3.59	3.71	3.84
2 1/2	1.58	2.37	2.53	2.59	2.69	2.85	3.00	3.16	3.32	3.48	3.64	3.80	3.95	4.11	4.27	4.43	4.59	4.74
2 3/4	1.91	2.87	3.06	3.14	3.25	3.44	3.64	3.83	4.02	4.21	4.40	4.59	4.78	4.97	5.17	5.36	5.55	5.74
3	2.28	3.42	3.64	3.73	3.87	4.01	4.33	4.55	4.78	5.00	5.24	5.46	5.69	5.92	6.15	6.38	6.60	6.83
3 1/2	3.01	4.65	4.96	5.08	5.27	5.58	5.89	6.20	6.51	6.82	7.13	7.44	7.75	8.06	8.37	8.68	8.99	9.30
4	4.05	6.07	6.48	6.64	6.88	7.29	7.69	8.01	8.50	8.91	9.31	9.72	10.12	10.52	10.93	11.33	11.74	12.14
4 1/4	4.57	6.85	7.31	7.49	7.77	8.23	8.68	9.14	9.60	10.05	10.51	10.97	11.42	11.88	12.34	12.80	13.25	13.71
4 1/2	5.12	7.68	8.20	8.40	8.71	9.22	9.73	10.25	10.76	11.27	11.78	12.30	12.81	13.32	13.83	14.35	14.86	15.37
5	6.33	9.49	10.12	10.37	10.75	11.39	12.02	12.65	13.28	13.92	14.55	15.18	15.81	16.45	17.08	17.71	18.34	18.98
5 1/2	7.65	11.48	12.25	12.55	13.01	13.78	14.54	15.31	16.07	16.84	17.60	18.37	19.13	19.90	20.66	21.43	22.19	22.96
5 5/8	8.01	12.01	12.81	13.13	13.61	14.41	15.21	16.01	16.81	17.61	18.41	19.21	20.01	20.81	21.61	22.41	23.21	24.02
6	9.11	13.66	14.57	14.94	15.48	16.39	17.31	18.22	19.13	20.04	20.95	21.86	22.77	23.68	24.59	25.50	26.41	27.32
6 1/4	9.88	14.82	15.81	16.21	16.80	17.79	18.78	19.77	20.75	21.74	22.73	23.72	24.71	25.70	26.68	27.67	28.66	29.65
6 1/2	10.69	16.03	17.10	17.53	18.17	19.24	20.31	21.38	22.45	23.52	24.59	25.65	26.72	27.79	28.86	29.93	31.00	32.07
6 3/4	11.53	17.29	18.44	18.90	19.60	20.75	21.90	23.05	24.21	25.36	26.51	27.67	28.82	29.97	31.12	32.28	33.43	34.58
7 3/8	13.76	20.64	22.02	22.57	23.39	24.77	26.15	27.52	28.90	30.27	31.65	33.03	34.40	35.78	37.15	38.53	39.91	41.28
7 7/8	15.69	23.54	25.10	25.73	26.67	28.24	29.81	31.38	32.95	34.52	36.09	37.66	39.22	40.79	42.36	43.93	45.50	47.07
8	16.19	24.29	25.91	26.55	27.53	29.15	30.76	32.38	34.00	35.62	37.24	38.86	40.48	42.01	43.72	45.34	46.96	48.58
9	20.49	30.74	32.79	33.61	34.84	36.89	38.94	40.99	43.04	45.08	47.13	49.18	51.23	53.28	55.33	57.38	59.43	61.48
9 7/8	24.67	37.01	39.47	40.46	41.94	44.41	46.88	49.34	51.81	54.28	56.74	59.21	61.68	64.15	66.61	69.08	71.55	74.01
10 5/8	28.56	42.84	45.70	46.84	48.55	51.41	54.27	57.12	59.98	62.84	65.69	68.55	71.40	74.26	77.12	79.97	82.83	85.68
12 1/4	37.97	56.95	60.75	62.26	64.54	68.34	72.14	75.93	79.73	83.52	87.32	91.12	94.91	98.71	102.51	106.30	110.10	113.90
13 3/4	47.83	71.75	76.53	78.45	81.32	86.01	90.88	95.67	100.45	105.23	110.02	114.80	119.58	124.37	129.15	133.93	138.72	143.50
15	56.93	85.39	91.08	93.36	96.77	102.47	108.16	113.85	119.54	125.24	130.93	136.62	142.31	148.01	153.70	159.39	165.08	170.78
17 1/2	77.48	116.22	123.97	127.07	131.72	139.47	147.21	154.96	162.71	170.46	178.21	185.96	193.70	201.45	209.20	216.95	224.70	232.44

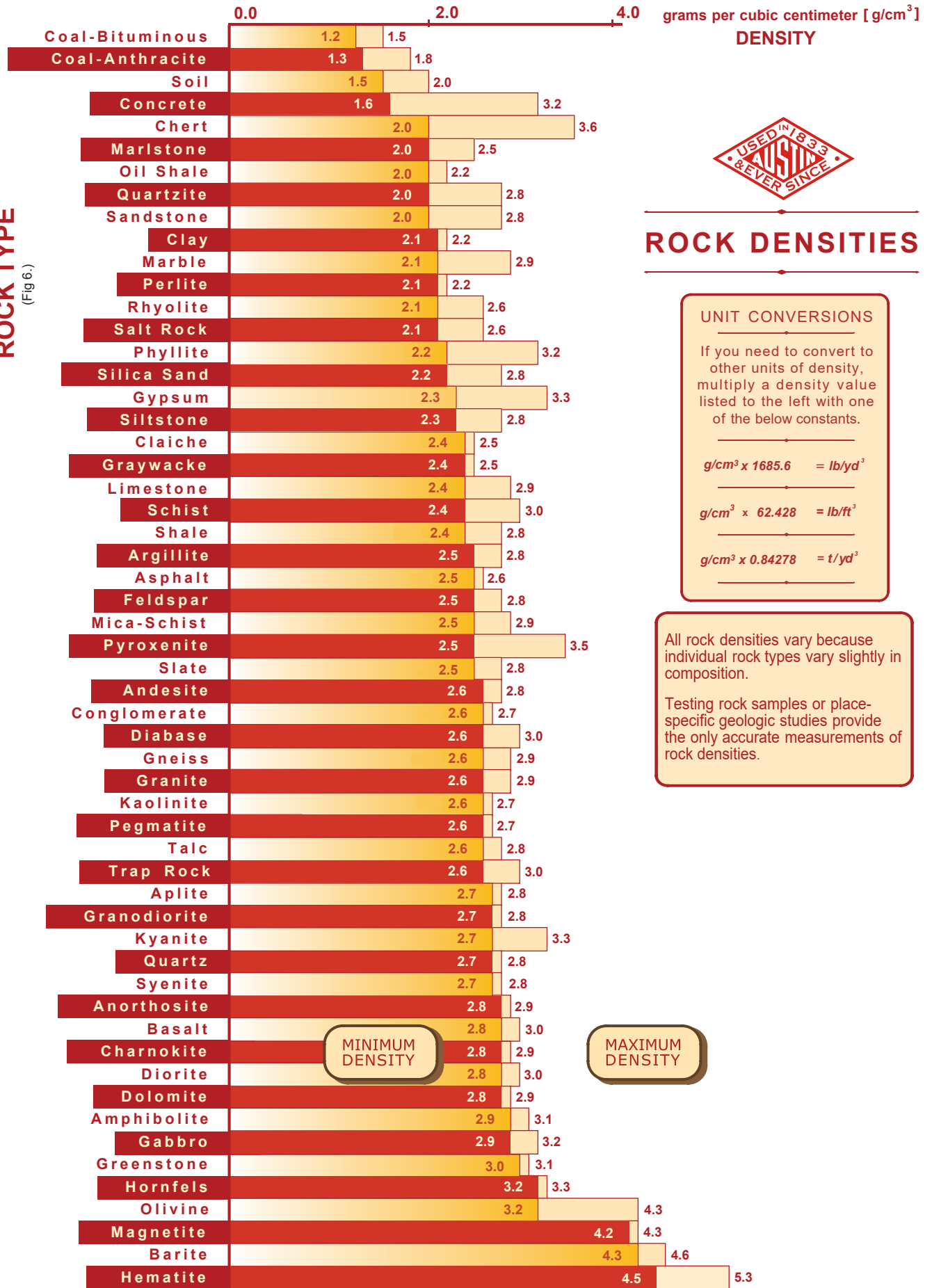
Kilograms of Explosive per Meter of Blasthole = 0.506 x Loading Density [g/cc] x Explosive Diameter²

Cubic Yards per Foot of Borehole

(Fig 4) THE BLASTER'S GUIDE

	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Burden [ft]		
4	0.59	0.74	0.89	1.04	1.19	1.33	1.48	1.63	1.78	1.93	2.07	2.22	2.37	2.52	2.67																									
5	0.74	0.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78	2.96	3.15	3.33	3.52	3.70																							
6	0.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33	3.56	3.78	4.00	4.22	4.44	4.67	4.89																					
7	1.04	1.30	1.56	1.81	2.07	2.33	2.59	2.85	3.11	3.37	3.63	3.89	4.15	4.41	4.67	4.93	5.19	5.44	5.70	5.96	6.22																			
8	1.19	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44	4.74	5.04	5.33	5.63	5.93	6.22	6.52	6.81	7.11	7.41	7.70																	
9	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00	5.33	5.67	6.00	6.33	6.67	7.00	7.33	7.67	8.00	8.33	8.67	9.00	9.33															
10	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.19	5.56	5.93	6.30	6.67	7.04	7.41	7.78	8.15	8.52	8.89	9.26	9.63	10.00	10.37	10.74	11.11													
11	1.63	2.04	2.44	2.85	3.26	3.67	4.07	4.48	4.89	5.30	5.70	6.11	6.52	6.93	7.33	7.74	8.15	8.56	8.96	9.37	9.78	10.19	10.59	11.00	11.41	11.81	12.22	12.63	13.04											
12	1.78	2.22	2.67	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67	7.11	7.56	8.00	8.44	8.89	9.33	9.78	10.22	10.67	11.11	11.56	12.00	12.44	12.89	13.33	13.78	14.22	14.67	15.11									
13	1.93	2.41	2.89	3.37	3.85	4.33	4.81	5.30	5.78	6.26	6.74	7.22	7.70	8.19	8.67	9.15	9.63	10.11	10.59	11.07	11.56	12.04	12.52	13.00	13.48	13.96	14.44	14.93	15.41	15.89	16.37	16.85	17.33							
14	2.07	2.59	3.11	3.63	4.15	4.67	5.19	5.70	6.22	6.74	7.26	7.78	8.30	8.81	9.33	9.85	10.37	10.89	11.41	11.93	12.44	12.96	13.48	14.00	14.52	15.04	15.56	16.07	16.59	17.11	17.63	18.15	18.67	19.19	19.70					
15	2.22	2.78	3.33	3.89	4.44	5.00	5.56	6.11	6.67	7.22	7.78	8.33	8.89	9.44	10.00	10.56	11.11	11.67	12.22	12.78	13.33	13.89	14.44	15.00	15.56	16.11	16.67	17.22	17.78	18.33	18.89	19.44	20.00	20.56	21.11	21.67	22.22			
16	2.37	2.96	3.56	4.15	4.74	5.33	5.93	6.52	7.11	7.70	8.30	8.89	9.48	10.07	10.67	11.26	11.85	12.44	13.04	13.63	14.22	14.81	15.41	16.00	16.59	17.19	17.78	18.37	18.96	19.56	20.15	20.74	21.33	21.93	22.52	23.11	23.70			
17	3.15	3.78	4.41	5.04	5.67	6.30	6.93	7.56	8.19	8.81	9.44	10.07	10.70	11.33	11.96	12.59	13.22	13.85	14.48	15.11	15.74	16.37	17.00	17.63	18.26	18.89	19.52	20.15	20.78	21.41	22.04	22.67	23.30	23.93	24.56	25.19				
18	3.33	4.00	4.67	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00	10.67	11.33	12.00	12.67	13.33	14.00	14.67	15.33	16.00	16.67	17.33	18.00	18.67	19.33	20.00	20.67	21.33	22.00	22.67	23.33	24.00	24.67	25.33	26.00	26.67				
19	4.22	4.93	5.63	6.33	7.04	7.74	8.44	9.15	9.85	10.56	11.26	11.96	12.67	13.37	14.07	14.78	15.48	16.19	16.89	17.59	18.30	19.00	19.70	20.41	21.11	21.81	22.52	23.22	23.93	24.63	25.33	26.04	26.74	27.44	28.15					
20	4.44	5.19	5.93	6.67	7.41	8.15	8.89	9.63	10.37	11.11	11.85	12.59	13.33	14.07	14.81	15.56	16.30	17.04	17.78	18.52	19.26	20.00	20.74	21.48	22.22	22.96	23.70	24.44	25.19	25.93	26.67	27.41	28.15	28.89	29.63					
21	5.44	6.22	7.00	7.78	8.56	9.33	10.11	10.89	11.67	12.44	13.22	14.00	14.78	15.56	16.33	17.11	17.89	18.67	19.44	20.22	21.00	21.78	22.56	23.33	24.11	24.89	25.67	26.44	27.22	28.00	28.78	29.56	30.33	31.11						
22	5.70	6.52	7.33	8.15	8.96	9.78	10.59	11.41	12.22	13.04	13.85	14.67	15.48	16.30	17.11	17.93	18.74	19.56	20.37	21.19	22.00	22.81	23.63	24.44	25.26	26.07	26.89	27.70	28.52	29.33	30.15	30.96	31.78	32.59						
23	6.81	7.67	8.52	9.37	10.22	11.07	11.93	12.78	13.63	14.48	15.33	16.19	17.04	17.89	18.74	19.59	20.44	21.30	22.15	23.00	23.85	24.70	25.56	26.41	27.26	28.11	28.96	29.81	30.67	31.52	32.37	33.22	34.07							
24	7.11	8.00	8.89	9.78	10.67	11.56	12.44	13.33	14.22	15.11	16.00	16.89	17.78	18.67	19.56	20.44	21.33	22.22	23.11	24.00	24.89	25.78	26.67	27.56	28.44	29.33	30.22	31.11	32.00	32.89	33.78	34.67	35.56							
25	8.33	9.26	10.19	11.11	12.04	12.96	13.89	14.81	15.74	16.67	17.59	18.52	19.44	20.37	21.30	22.22	23.15	24.07	25.00	25.93	26.85	27.78	28.70	29.63	30.56	31.48	32.41	33.33	34.26	35.19	36.11	37.04								
26	9.63	10.59	11.56	12.52	13.48	14.44	15.41	16.37	17.33	18.30	19.26	20.22	21.19	22.15	23.11	24.07	25.04	26.00	26.96	27.93	28.89	29.85	30.81	31.78	32.74	33.70	34.67	35.63	36.59	37.56	38.52									
27	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00	31.00	32.00	33.00	34.00	35.00	36.00	37.00	38.00	39.00	40.00									
28	11.41	12.44	13.48	14.52	15.56	16.59	17.63	18.67	19.70	20.74	21.78	22.81	23.85	24.89	25.93	26.96	28.00	29.04	30.07	31.11	32.15	33.19	34.22	35.26	36.30	37.33	38.37	39.41	40.44	41.48										
29	11.81	12.89	13.96	15.04	16.11	17.19	18.26	19.33	20.41	21.48	22.56	23.63	24.70	25.78	26.85	27.93	29.00	30.07	31.15	32.22	33.30	34.37	35.44	36.52	37.59	38.67	39.74	40.81	41.89	42.96										
30	12.22	13.33	14.44	15.56	16.67	17.78	18.89	20.00	21.11	22.22	23.33	24.44	25.56	26.67	27.78	28.89	30.00	31.11	32.22	33.33	34.44	35.56	36.67	37.78	38.89	40.00	41.11	42.22	43.33	44.44										
31	13.78	14.93	16.07	17.22	18.37	19.52	20.67	21.81	22.96	24.11	25.26	26.41	27.56	28.70	29.85	31.00	32.15	33.30	34.44	35.59	36.74	37.89	39.04	40.19	41.33	42.48	43.63	44.78	45.93											
32	14.22	15.41	16.59	17.78	18.96	20.15	21.33	22.52	23.70	24.89	26.07	27.26	28.44	29.63	30.81	32.00	33.19	34.37	35.56	36.74	37.93	39.11	40.30	41.48	42.67	43.85	45.04	46.22	47.41											
33	15.89	17.11	18.33	19.56	20.78	22.00	23.22	24.44	25.67	26.89	28.11	29.33	30.56	31.78	33.00	34.22	35.44	36.67	37.89	39.11	40.33	41.56	42.78	44.00	45.22	46.44	47.67	48.89												
34	16.37	17.63	18.89	20.15	21.41	22.67	23.93	25.19	26.44	27.70	28.96	30.22	31.48	32.74	34.00	35.26	36.52	37.78	39.04	40.30	41.56	42.81	44.07	45.33	46.59	47.85	49.11	50.37												
35	18.15	19.44	20.74	22.04	23.33	24.63	25.93	27.22	28.52	29.81	31.11	32.41	33.70	35.00	36.30	37.59	38.89	40.19	41.48	42.78	44.07	45.37	46.67	47.96	49.26	50.56	51.85													
36	18.67	20.00	21.33	22.67	24.00	25.33	26.67	28.00	29.33	30.67	32.00	33.33	34.67	36.00	37.33	38.67	40.00	41.33	42.67	44.00	45.33	46.67	48.00	49.33	50.67	52.00	53.33													
37	20.56	21.93	23.30	24.67	26.04	27.41	28.78	30.15	31.52	32.89	34.26	35.63	37.00	38.37	39.74	41.11	42.48	43.85	45.22	46.59	47.96	49.33	50.70	52.07	53.44	54.81														
38	21.11	22.52	23.93	25.33	26.74	28.15	29.56	30.96	32.37	33.78	35.19	36.59	38.00	39.41	40.81	42.22	43.63	45.04	46.44	47.85	49.26	50.67	52.07	53.48	54.89	56.30														
39	23.11	24.56	26.00	27.44	28.89	30.33	31.78	33.22	34.67	36.11	37.56	39.00	40.44	41.89	43.33	44.78	46.22	47.67	49.11	50.56	52.00	53.44	54.89	56.33	57.78															
40	23.70	25.19	26.67	28.15	29.63	31																																		

ROCK TYPE
(Fig 6.)



grams per cubic centimeter [g/cm³]
DENSITY



ROCK DENSITIES

UNIT CONVERSIONS

If you need to convert to other units of density, multiply a density value listed to the left with one of the below constants.

$$g/cm^3 \times 1685.6 = lb/yd^3$$

$$g/cm^3 \times 62.428 = lb/ft^3$$

$$g/cm^3 \times 0.84278 = t/yd^3$$

All rock densities vary because individual rock types vary slightly in composition.

Testing rock samples or place-specific geologic studies provide the only accurate measurements of rock densities.

MINIMUM DENSITY

MAXIMUM DENSITY