

Glossary of Blasting Terms

Air Blast - the airborne shock wave or acoustic transient generated by an explosion.

American Table of Distances - the quantity-distance table, prepared and approved by IME, for storage of explosive materials to determine safe distances from inhabited buildings, public highways, passenger railways, and other stored explosive materials.

Ammonium Nitrate - The ammonium salt of nitric acid represented by the NH_4NO_3 .

Ampere - A unit of electrical current produced by 1 volt acting through a resistance of 1 ohm.

ANFO - An explosive material ideally consisting of 94% ammonium nitrate and 6% fuel oil by weight. ANFO is used as a blasting agent.

Artificial Barricade - An artificial mound or revetted wall of earth of a minimum thickness of 3 ft.

Back Break - Rock broken beyond the limits of the rear row of holes in a blast pattern.

Barricaded - The effective screening of a building containing explosives from a magazine or other building, railway, or highway by a natural or an artificial barrier. A straight line from the top of any sidewall of the building containing explosives to the eave line of any magazine or other building or to a point 12 ft above the center of a railway or highway shall pass through such barrier.

Base Charge - The main explosive charge in the base of a detonator.

Bench - The horizontal ledge in an excavation or mining operation along which holes are drilled vertically.

Binary Explosive - An explosive prepared by mixing 2 non-explosive materials which when combined form a cap-sensitive explosive

Blast - The action of breaking and displacing rock by means of explosives. SHOT also means blast.

Blast Area - The area of a blast within the influence of flying rock missiles, gases, and concussion.

Blast Site - The immediate area where the blast holes are located and explosive materials are handled during loading of the shot.

Blaster - That licensed, qualified person in charge of, and responsible for the loading and firing of a blast.

Blasting Agent - A material or mixture consisting of a fuel and oxidizer used for blasting, but not classified as a high explosive, in which none of the ingredients are classified as an explosive. The finished product is not cap-sensitive.

Blasting Cap - (see detonators) - A metallic tube closed at one end, containing a charge of one or more detonating compounds, and designed to initiate detonation.

Blasting Galvanometer - An electrical resistance instrument designed specifically for testing electric detonators and circuits containing them. Along with blasting ohmmeters and blaster's multimeters, it is used to measure resistance or to check electrical continuity.

Blast Hole - A hole drilled in rock or other material for the placement of explosive.

Blaster Log - A written record of information about a specific blast as maybe required by law or regulation.

Blasting Machine - An electrical or electromechanical device that provides electrical energy for the purpose of energizing detonators in an electric blasting circuit.

Blockhole - A hole drilled into a boulder to allow the placement of an explosive charge.

Blasting Vibration - The energy from a blast that manifests itself in airborne and earth borne vibrations that are transmitted through the earth and atmosphere away from the immediate blast site.

Blend - A mixture consisting of (a) A water-based explosive material matrix and ammonium nitrate or ANFO; or (b) A water-based oxidizer matrix and ammonium nitrate or ANFO.

Booster - An explosive charge, usually of high strength and high detonation velocity, used to improve the initiation of less sensitive explosive materials.

Bridgewire - A resistance wire connecting the ends of the legwires inside an electric detonator and which is imbedded in the ignition charge of the detonator.

Bureau of Alcohol, Tobacco, and Firearms (BATF) - A bureau of the Department of Treasury having responsibility for the promulgation and enforcement of regulations related to the unlawful use of explosive materials.

Burden - The distance in feet from an explosive charge, in the direction of relief, to the nearest free or open face.

Bus Wire - Expendable heavy-gauge bare copper wire used detonators or series of detonators in parallel.

Cap Crimper - A mechanical device for crimping the metallic shell of a fuse detonator or igniter cord connector securely to a section of inserted safety fuse. A mechanical device for crimping the metallic shell of detonator.

Cap Sensitivity - An explosive material is considered to be cap sensitive if it detonates with an IME No. 8 Test Detonator.

Capacitor-Discharge Blasting Machine - A blasting machine in which electrical energy, stored on a capacitor, is discharged into a blasting circuit containing electric detonators.

Cartridge - An individual closed shell, bag, or tube of circular cross section containing explosive material.

Cartridge Count (Stick Count) - The number of cartridges in a standard case. A standard case typically contains about 50 lb of explosive material.

Cartridge Punch - A wooden, plastic, or nonsparking metallic device used to punch an opening in an explosive cartridge to accept a detonator or a section of detonating cord.

Case - An outer substantial shipping container meeting DOT specifications for explosive materials.

Case Insert - A set of printed, precautionary instructions, including the IME Do's and Don'ts, which is inserted into a case of explosive materials.

Cast, Extrude, or Pressed Booster - A cast, extruded, or pressed solid high explosive used to detonate less sensitive explosive materials.

Circuit - A completed path for conveying electrical current.

Commercial Explosives - Explosives designed, produced, and used for commercial or industrial applications rather than for military purposes.

Connecting Wire - Wire used to extend the firing line or legwires in an electric blasting circuit.

Continuity Check (Circuit Continuity Check) - A determination made by instrumentation where possible, and visually in all cases, show that an initiation system is continuous and contains no breaks or improper connections that could cause stoppage or failure of the initiation process.

Core Load - The explosive core of detonating cord, expressed as the number of grains of explosive per foot.

Crimp - The folded ends of paper explosive cartridge, the circumferential depression at the open end of a fuse cap or igniter cord connector that serves to secure the fuse; or the circumferential depression in the blasting cap shell that secures a sealing plug or sleeve into electric or nonelectric detonators.

Crimping - The act of securing a fuse cap or igniter cord connector to a section of a safety fuse by compressing the metal shell of the cap against the fuse by means of a cap crimper.

Cushion Blasting - The technique of firing a single row of holes along a neat excavation line to shear the web between the closely drilled holes.

Cutoff - A break in a path of detonation or initiation caused by extraneous interference, such as flyrock or shifting ground.

Date-Shift-Code - A code applied by manufacturers to the outside shipping containers, and, in many instances, to the immediate containers of explosive materials to aid in their identification and tracing.

DC - Direct current.

Decibel - A unit of air overpressure commonly used to measure air blast.

Deflagration - An explosive reaction such as a rapid combustion that moves through an explosive material at a velocity less than the speed of sound in the material.

Delay - A distinct pause of predetermined time between detonation or initiation impulses, to permit the firing of explosive charges separately.

Delay Detonator - An electric or nonelectric detonator used to introduce a predetermined lapse of time between the application of a firing signal and the detonation of the base charge.

Delay Element - The device in a delay detonator that produces the predetermined time lapse between the application of a firing signal and detonation.

Delay Interval - The nominal time between the detonations of delay detonators of adjacent periods in a delay series; the nominal time between successive detonations in a blast.

Delay Series - A series of delay detonators designed to satisfy specific blasting requirements. There are basically two types of delay series: millisecond (MS) with delay intervals on the order of milliseconds, and long period (LP) with delay times on the order of seconds.

Delay Tag - A tag, band, or marker on a delay detonator that denotes the delay series, delay period, and /or delay time of the detonator.

Delay Time - The lapse of time between the application of a firing signal and the detonation of the base charge of a delay detonator.

Density - The mass of an explosive per unit of volume, usually expressed in grams per cubic centimeter or pounds per cubic foot.

DEP - Commonwealth of Pennsylvania Department of Environmental Protection. Aka, the Department.

Department of Transportation (DOT) - A cabinet-level agency of the federal government. It has the responsibility for the comprehensive regulation of transportation safety and issues regulations governing interstate shipments of explosives and other hazardous materials.

Detonating Cord - A flexible cord containing a center core of high explosive and used to initiate other explosives.

Detonating Cord MS Connectors - Nonelectric, short-interval (millisecond) delay devices for use in delaying blasts that are initiated by detonating cord.

Detonating Cord Trunkline - The line of detonating cord that is used to connect and initiate other lines of detonating cord. Detonating cord trunkline must be buried.

Detonating Primer - A name applied for transportation purposes to a device consisting of a detonator and an additional charge of explosives, assembled as a unit.

Detonation - An explosive reaction that moves through an explosive material at a velocity greater than the speed of sound in the material.

Detonation Velocity - The velocity at which a detonation progresses through an explosive.

Detonator - Any device containing any initiating or primary explosive that is used for initiating detonation. A detonator may not contain more than 10 grams of total explosives by weight, excluding ignition or delay charges. The term includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses, detonating cord delay connectors, and nonelectric instantaneous and delay blasting caps that use detonating cord, shock tube, or any other replacement for electric legwires

Donor - An exploding charge producing an impulse that impinges upon an explosive "acceptor" charge.

Electric Blasting Circuit - An electric circuit containing electric detonators and associated wiring.

Electric Detonator - A detonator designed for, and capable of, initiation by means of an electric current.

Electronic Programmable Detonators - Blasting caps that are variably and individually programmable.

Emulsion - An explosive material containing substantial amounts of oxidizers dissolved in water droplets, surrounded by an immiscible fuel.

Energy - A measure of the potential for the explosive to do work.

Explode - To react chemically to a rapid manner to produce heat and pressure. The term encompasses both deflagration and detonation.

Explosion - A chemical reaction involving an extremely rapid expansion of gases, usually with the liberation of heat.

Explosive - Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion.

Explosive Materials - These include explosives, blasting agents, and detonators. The term includes, but is not limited to, dynamite and other high explosives; slurries, emulsions, and water gels; black powder and pellet powder; initiating explosives; detonators (blasting caps); safety fuse; squibs; detonating cord; igniter cord; and igniters.

Explosive Strength - The amount of energy released by an explosive upon detonation that is an indication of the capacity of the explosive to do work.

Extraneous Electricity - Electrical energy, other than actual firing current or the test current from a blasting galvanometer, that is present at a blast site and that could enter an electric blasting circuit. It includes stray current, static electricity, RF (electro-magnetic) waves, and time-varying electric and magnetic fields

Fire Extinguisher Rating - A rating set forth in the National Fire Code that may be identified on an extinguisher by a number (5,20,30, etc.) indicating the extinguisher's relative effectiveness followed by a letter (A, B, C, etc.) indicating the class or classes of fires for which the extinguisher has been found to be effective.

Fire-Resistant - Construction designed to offer reasonable protection against fire.

Firing Current - An electric current of recommended magnitude and duration to sufficiently energize an electric detonator or a circuit of electric detonators.

Firing Line - The wire(s) connecting the electrical power source with the electric blasting circuit.

Flammability - The ease with which an explosive material may be ignited by flame and heat.

Flyrock - Rocks or any other debris propelled from the blast area by the force of an explosion.

Frequency - The number of vibration waves that pass through a given point during one second, measured in Hertz (Hz) aka cycles per second.

Fuel - A substance that may react with oxygen to produce combustion.

Fumes - The gaseous products of an explosion. For the purpose of fume classification, only poisonous or toxic gases, such as carbon monoxide, hydrogen sulfide, and nitrogen oxides are considered.

Gauge (Wire) - A series of standard sizes such as the American Wire Gauge (AWG), used to specify the diameter of wire.

Galvanometer (See Blasting Galvanometer)

Gap Sensitivity - The maxim distance for propagation between standard charge sizes of explosive donor and acceptor.

Ground Fault - An electrical contact between part of the blasting circuit and earth.

Ground Vibration - Shaking of the ground, by elastic waves emanating from a blast, usually measured in inches per second of particle velocity.

Hangfire - The detonation of an explosive charge at some non-determined time after its normally designed firing time.

Hardwood - Red oak, white oak, hard maple, ash, or hickory, free from loose knots, windshakes, or similar defects.

Heading - Refers to the driving of openings of the various exploration and development passageways.

Hertz (Hz) - synonym for "cycles per second"

High Explosives - Explosives that are characterized by a very high rate of reaction, high-pressure development, and the presence of a detonation wave in the explosive.

IME-22 Container (Compartment) - A container (portable), or a compartment (permanently affixed to a vehicle), which is constructed in accordance with IME SLP-22 specifications and is authorized by the Department of Transportation for the transport of certain types of detonators on the same vehicle with other explosives.

Incendivity - The property of an igniting agent (e.g., spark, flame, or hot solid) whereby the agent can cause ignition.

Inhabited Building - A building regularly occupied in whole or part as a habitation for human beings or any church, schoolhouse, railroad station, store, or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the manufacture, transportation, storage, or use of explosive materials.

Initiation - The act of causing an explosive material to detonate or deflagrate.

Initiator - A detonator or detonating cord used to start detonation in an explosive material.

Institute of Makers of Explosives No. 8 Test Detonator - IME No.8 test detonator has 0.40 - 0.45 g of PETN base charge pressed to a specific gravity of 1.4 g/cc and primed with standard weights of primer, depending on manufacturer.

Inventory - A listing of all explosive materials stored in a magazine.

Lead Line or Leading Wires - The wire(s) connecting the electrical power source with the circuit containing electric detonators.

Leakage Resistance - The resistance between the blasting circuit (including lead wires) and the ground.

Legwires - The two single wires or one duplex wire extending out from an electric detonator.

Lift Shot - A blast that is confined on all sides and has no free face to provide relief.

Liquid Fuels - Fuels in a liquid state. They may be used with oxidizers to form explosive materials.

Loading - Placing explosive material in a blasthole or against the material to be blasted.

Loading factor - Weight of explosive per foot in a borehole. (Can be determined by $.34 \times \text{Borehole diameter squared} \times \text{density of explosives product}$).

Low Explosive - Explosives that are characterized by deflagration or a low rate of reaction and the development of low pressure.

Magazine - Any building, structure, or container, other than an explosives manufacturing building, approved for the storage of explosive material.

Main Explosive Charge - The explosive material that performs the major work of blasting.

Manufacturing Codes - Code markings stamped on explosive materials packages, indicating, among other information, the date of manufacture.

Mass Detonate (Mass Explode) - Explosive materials mass detonate (mass explode) when a unit or any part of a larger quantity of explosive material explodes and causes all or a substantial part of the remaining material to detonate or explode simultaneously. With respect to detonators, "a substantial part" means 90% or more.

Mat - Used to cover a blast to hold down ejected debris, usually made of woven wire cable or rope.

Maximum Recommended Firing Current - The highest recommended electric current to ensure safe and effective performance of an electric detonator.

Millisecond - One thousandth of a second.

Mine Safety and Health Administration (MSHA) - An agency of the Department of Labor concerned with promulgation and enforcement of health and safety regulations in the mining field.

Misfire - A blast that fails to detonate completely after an attempt at initiation; also the explosive material itself that failed to detonate as planned.

MS Connectors - Nonelectric, short-interval (millisecond) delay devices for use in delaying blasts that are initiated by detonating cord.

Mud Capping - (sometimes known as "bulldozing", "adobe blasting", or "dobyng") The breaking of boulders by placing a quantity of explosives against a rock or boulder without confining the explosives in a drill hole.

Natural Barricade - Natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures that require protection cannot be seen from the magazine when the trees are bare of leaves.

Nonelectric Detonator - A detonator that does not require the use of electric energy or safety fuse to function.

Nonsparking Metal - A metal that will not produce a spark when struck with other tools, rock, or hard surfaces.

Occupational Safety and Health Administration (OSHA) - An agency of the Department of Labor active in eliminating occupational hazards and promoting employee health and safety.

Oxidizer or Oxidizing Material - A substance, such as a nitrate, that readily yields oxygen or other oxidizing substances to stimulate the combustion of organic matter or other fuel.

Parallel Blasting Circuit - An electric blasting circuit in which the legwires of each detonator are connected across the firing line directly or through buswire.

Particle Velocity - A measure of the intensity of ground vibration, specifically the time rate of change of the amplitude of ground vibration.

PETN - An abbreviation for the name of the explosive, pentaerythritol - tetranitrate.

Placards - Signs placed on vehicles transporting hazardous materials (including explosive materials) indicating the nature of the cargo.

Powder - A generic term describing any explosive.

Powder Column - A continuous length of explosives loaded into a borehole.

Powder Factor - The ratio of weight of explosive to tons or cubic yards of material blasted.

Premature Firing - The detonation of an explosive charge before the intended time.

Pre-Blast Survey - An inspection and documentation of the condition of a structure prior to blasting.

Pre-Splitting - Stress relief involving a single row of holes drilled along a neat excavation line, where detonation of explosives in the holes causes shearing of the web or rock between the holes. Pre-split holes may be fired in advance of production holes.

Prilled Ammonium Nitrate - Ammonium nitrate in a pelleted or prilled form.

Primary Explosive - A sensitive explosive that nearly always detonates by simple ignition from such means as spark, flame, impact, friction, or other primary heat sources of appropriate magnitude.

Primer - A unit, package, or cartridge of explosives used to initiate other explosives or blasting agents, and which contains: 1.) A detonator, or 2.) Detonating cord to which is attached a detonator designed to initiate the detonating cord.

Propagation - The detonation of explosive charges by an impulse received from adjacent or nearby explosive charges.

Quantity-distance - A table-listing minimum recommended distances from explosive materials stores of various weights to a specific location.

Receptor (Acceptor) - A charge of explosive materials receiving an impulse from an exploding donor charge.

Resistance - The measure of opposition to the flow of electrical current, expressed in ohms.

Seismograph - An instrument, useful in monitoring blasting operations, that records ground vibration. Particle velocity, displacement, or acceleration is generally measured and recorded in three mutually perpendicular directions.

Sensitiveness - A measure of an explosive's cartridge-to-cartridge propagating ability under certain test conditions. It is expressed as the distance through air at which a primed half-cartridge (donor) will detonate an unprimed half-cartridge (receptor).

Sensitivity - A physical characteristic of an explosive material classifying its ability to be initiated upon receiving an external impulse such as impact, shock, flame, friction, or other influences that can cause explosive decomposition.

Separation Distances - Minimum recommended distances from explosive materials accumulations to certain specific locations.

Series Blasting Circuit - An electric blasting circuit that provides one continuous path for the current through all caps in the circuit.

Series in Parallel Blasting Circuit - An electric blasting circuit in which the ends of two or more series of electric detonators are connected across the firing line directly or through buswire.

Shelf Life - The length of time of storage during which an explosive material retains adequate performance characteristics.

Shock Wave - A transient pressure pulse that propagates at supersonic velocity.

Shunt - The shorting together of the free ends of; 1.) Electric detonator legwires, or 2.) The wire ends of an electric blasting circuit or part thereof, the name of an electrical shorting device applied to the free ends of electric detonators by the manufacturer.

Signs-Explosive (Placards) - Signs, called placards, placed on vehicles transporting explosives denoting the character of the cargo, or signs placed near storage areas as a warning to unauthorized personnel.

Silver Chloride Cell - A special battery of relatively low current output used in a blasting galvanometer.

Specific Gravity - The ratio of the weight of any volume of substance to the weight of an equal volume of pure water.

Stability - The ability of an explosive material to retain chemical and physical properties specified by the manufacturer when exposed to specific environmental conditions over a particular period of time.

Static Electricity - Electric charge at rest on a person or object. It is most often produced by the contact and separation of dissimilar insulating materials.

Storage - The safekeeping of explosive materials, usually in specially designed structures called magazines.

Stray Current - A flow of electricity outside an insulated conductor system.

Sympathetic Propagation - The detonation of an explosive material as the result of receiving an impulse from another detonation through air, earth, or water.

Theft-Resistant - Construction designed to deter illegal entry into facilities used for the storage of explosive materials.

Trunkline - The line of detonating cord on the ground surface that connects detonating cord downlines.

Volt - The unit of electromotive force. It is the difference in potential required to make a current of 1-ampere flow through a resistance of 1 ohm.

Warning Signal - A visual or audible signal that is used for warning personnel in the vicinity of the blast area of the impending explosion.

Watt - A unit of electrical power equal to 1 joule/second.