
Mining — Vocabulary —
Part 5:
Drilling and blasting

Exploitation minière — Vocabulaire —
Partie 5: Forage et abattage à l'explosif

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 82, *Mining*.

A list of all parts in the ISO 22932 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 22932 series has been prepared in order to standardize and to co-ordinate the global use of technical terms and definitions in mining, for the benefit of the experts working on different types of mining activities.

The need for the ISO 22932 series arose from the widely varying interpretation of terms used within the industry and the prevalent use of more than one synonym.

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Mining — Vocabulary —

Part 5: Drilling and blasting

1 Scope

This document specifies the drilling and blasting terms commonly used in mining. Only those terms that have a specific meaning in this field are included.

2 Normative references

This document does not contain normative references.

3 Terms and definitions

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 Rock drilling concepts

3.1.1

back-reaming

enlargement of a bore by pulling back a tool of a larger diameter than that previously used to form the bore

3.1.2

bench drilling

drilling (3.1.11) of blast holes (3.3.2) on benches (3.3.1) in open pit mines

3.1.3

blast hole drilling

drilling (3.1.11) of holes to be charged with explosive (3.25.1.4) for blasting (3.30.1.1)

3.1.4

consolidation drilling

drilling (3.1.11) of long holes in the front or at an angle of the drift direction to be injected with consolidation fluid

EXAMPLE Grout (3.15.4).

3.1.5

coverage area

area that the rock drill can drill from one stationary position of the rock drill rig (3.8.15)

Note 1 to entry: The coverage area depends largely on the boom (3.13.11) configuration and if of the rock drill rig, and if there is a turn able superstructure.

Note 2 to entry: Hole deviation (3.4.8) is due to the drill bit (3.11.1) changing direction as a result of, for example, inhomogeneity in the rock or a bent drill rod (3.13.2) is bent. Hole deviation (3.4.8) can be minimised by sturdy drill string (3.13.1) support and proper guidance while collaring (3.3.3).

3.1.6

dimensional stone drilling

drilling (3.1.11) of holes for quarrying natural stone

3.1.7

drainage drilling

drilling (3.1.11) of drainage holes for methane or water

3.1.8

drifting

drilling (3.1.11), *blasting* (3.30.1.1) and excavating rock to create *transportation* (3.16.16) and access openings to ore bodies in an underground mining operation

3.1.9

drill instruction

instruction for how *drilling* (3.1.11) should be carried out

3.1.10

drillability

relative speed at which a material may be penetrated by a *drill bit* (3.11.1)

Note 1 to entry: High drillability denotes easy penetration at a fast rate.

[SOURCE: Reference [2]]

3.1.11

drilling

process by which a borehole is produced in any geological formation by rotary, rotary percussive, percussive or thrust methods and in any predetermined direction in relation to the drill rig

[SOURCE: ISO 22475-1:2021, 3.1.5]

3.1.12

drilling for secondary breaking

drilling (3.1.11) of *blast holes* (3.3.2) in the boulders remaining after a blast

3.1.13

exploratory drilling

application of the mechanical engineering technology of deep *drilling* (3.1.11) to determine the profile of the formation and retrieve strata samples to obtain the relevant geological parameters

[SOURCE: IWA 33-1:2019, 5.19]

3.1.14

face drilling

drilling (3.1.11) of *blast holes* (3.3.2) in the front wall at the end of a drift, rock *chamber* (3.22.6) or tunnel

3.1.15

fan drilling

long hole production drilling (3.1.17) where the holes are drilled in the same plane but at different angles, both left and right of vertical, to form a fan like array

3.1.16

line drilling

technique involving a single row of closely spaced, uncharged, small diameter holes drilled along the required excavation line, thereby providing a plane of weakness to which the primary blast can break

[SOURCE: BS 3618-6:1972]

3.1.17**long hole production drilling**

drilling (3.1.11) of blast holes (3.3.2) of extended length to excavate ore

3.1.18**probe drilling**

*drilling (3.1.11) of long holes with a *face drilling (3.1.14)* rig in the direction of the drift to examine the rock formation*

3.1.19**reaming**

enlargement of a drill hole by using a larger drill or *blasting (3.30.1.1)*

Note 1 to entry: The term reaming also refers to widening a shaft, drift or tunnel.

3.1.20**shaft sinking drilling**

drilling (3.1.11) of blast holes (3.3.2) for sinking a shaft

3.2 Rock drilling technologies**3.2.1****boxhole boring**

drilling (3.1.11) method where an opening upwards from a drift to a production room is achieved by boring it to its full diameter in a single pass with a machine designed specifically for the purpose

3.2.2**down-the-hole drilling****DTH**

in-the-hole drilling

ITH

*drilling (3.1.11) of holes using a *down-the-hole hammer rock drill (3.10.3)**

3.2.3**percussive drilling**

method of *drilling (3.1.11)* whereby repeated *blows (3.30.1.15)* are applied by the bit, which is repositioned by intermittent rotation

[SOURCE: BS 3618-6:1972]

3.2.4**raise boring**

connection of two levels by *drilling (3.1.11)* a pilot hole down to the lower level, removing the *drill bit (3.1.1.1)* and replacing it by a reamer head which is then rotated and pulled back up towards the machine to create the raise

3.2.5**rotary drilling**

method of *drilling (3.1.11)* in which rotation and thrust are applied to the bit, producing a continuous *cutting (3.3.4)* action

Note 1 to entry: The ground or rock at the bottom of the borehole is crushed or cut by pressure, shear or tensile stress produced by the different drilling tools. The *collarings (3.3.3)* are periodically or continuously removed out of the bore hole.

Note 2 to entry: Drill bits can be of the roller or drag types.

[SOURCE: BS 3618-6:1972, modified — Notes to entry have been added.]

3.2.6

rotary-percussive drilling

method of *drilling* (3.1.11) in which repeated *blows* (3.30.1.15) are applied to the *bit* (3.11.1) which is continually rotated under power

Note 1 to entry: The piston is typically powered by either hydraulic fluid or compressed air. At the same time the drill bit is rotated either continuously or intermittently.

Note 2 to entry: The *collarings* (3.3.3) can be continuously removed out of the borehole by a *flushing medium* (3.18.1), which is carried to the drilling tool.

[SOURCE: BS 3618-6:1972, modified — Notes to entry have been added.]

3.2.7

tube drilling

drilling (3.1.11) method where a rotation *torque* (3.16.13) is transferred to the *drill bit* (3.11.1) through relatively thin wall tubes rather than rods, with a minimum-sized flushing fluid canal

3.3 Bore holes, bench and cuttings

3.3.1

bench

part of the face of a large excavation which is not advanced as part of the round but as a separate operation

[SOURCE: BS 3618-6:1972]

3.3.2

blast hole

drilled hole for charging with *explosive* (3.25.1.4) for *blasting* (3.30.1.1) of rock

3.3.3

collaring

operation of starting to bore a hole

[SOURCE: BS 3618-6:1972]

3.3.4

cutting

particles of geological formations formed in the borehole by the *collaring* (3.3.3) action of the *drilling* (3.1.11) tool

3.3.5

flanking hole

shothole (3.30.1.27) drilled at an acute angle to the coal face for the purpose of trimming it

[SOURCE: BS 3618-6:1972]

3.3.6

lifter

shothole (3.30.1.27) drilled at floor level

[SOURCE: BS 3618-6:1972]

3.3.7

top hole

horizontal or upwardly inclined *shothole* (3.30.1.27) placed at the foot of a face

Note 1 to entry: Top holes are placed generally in quarries.

[SOURCE: BS 3618-6:1972]

3.4 Hole properties

3.4.1

alignment deviation

difference of actual and intended alignment of drilled hole

3.4.2

bolt hole

drilled hole where *rock bolts* ([3.15.7](#)) can be anchored

3.4.3

drill pattern

pattern of holes drilled to excavate a specified size of opening in mining and construction

3.4.4

hole depth

length of the hole in the vertical/horizontal direction

3.4.5

hole depth measurement

function for automatic measuring of drill depth

3.4.6

hole length

length of the hole, parallel to the *drilling* ([3.1.11](#)) direction

3.4.7

hole length measurement

function for automatic measuring of drill length

3.4.8

hole deviation

difference of actual and intended position of drill holes that occurs during *drilling* ([3.1.11](#))

3.4.9

look-out angle

angle between the practical (drilled) and the theoretical tunnel profile

3.5 Rock reinforcement methods

3.5.1

cable bolting

process of fixing cables with *cement grout* ([3.15.3](#)) or chemical compounds to stabilize the rock mass, in long holes being drilled in rock

3.5.2

grouting injection

input of material (which normally hardens) in joints and voids of the rock for sealing or reinforcement

EXAMPLE Cement, resin and plastic.

3.5.3

meshing

netting

installing a net as rock support on ceiling or walls

3.5.4

pipe roofing

pre-reinforcement of the ground ahead of the tunnel face with steel pipes, arranged like an umbrella or canopy around the excavation line, to ensure that the excavation can proceed safely

Note 1 to entry: See [Figure 1](#).

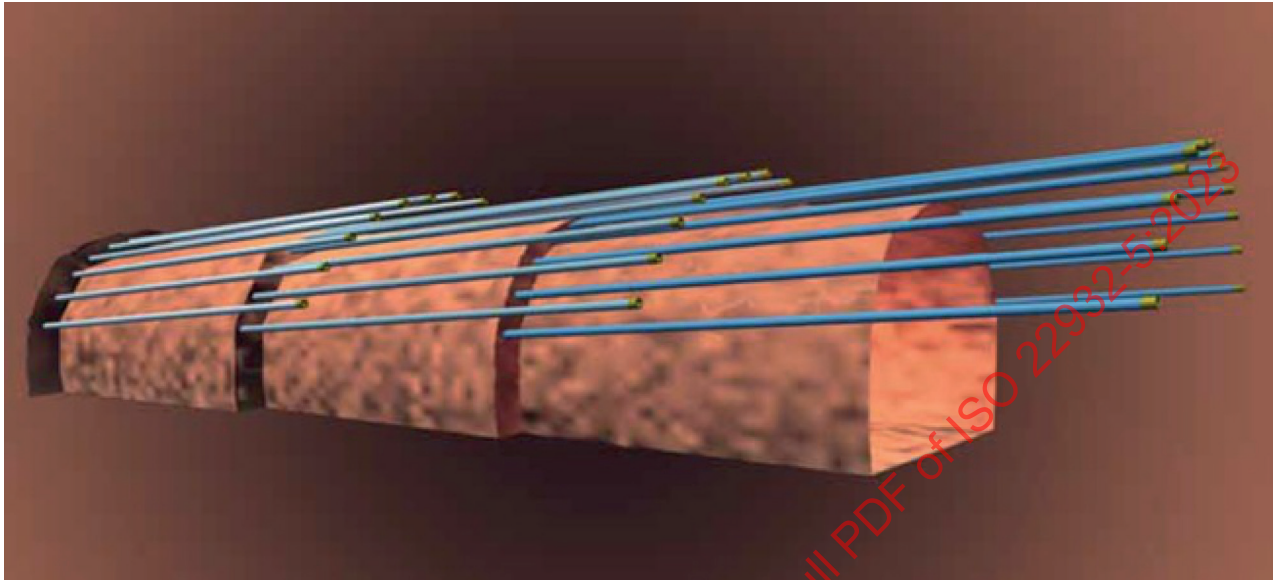


Figure 1 — Pipe roofing

3.5.5

rock bolting **bolting**

method of securing or strengthening closely jointed or highly fissured rocks by inserting and firmly anchoring *rock bolts* ([3.15.7](#)) oriented perpendicular to the rock face or mine opening, in mine workings, tunnels, or rock abutments

3.5.6

selective bolting

bolting ([3.5.5](#)) of weak sections or loose rock

3.5.7

systematic bolting

bolting ([3.5.5](#)) in a pre-determined pattern

3.6 Hand-held machines

3.6.1

airleg

device, incorporating a pneumatic cylinder, providing support and thrust for a *jackhammer* ([3.6.5](#))

[SOURCE: BS 3618-6:1972]

3.6.2

burster

hydraulic mechanism which, when inserted into a large diameter *shothole* ([3.30.1.27](#)), breaks down the strata by means of pistons operating transversely

[SOURCE: BS 3618-6:1972]

3.6.3**hammer drill**

percussive drill

[SOURCE: BS 3618-6:1972]

3.6.4**hydraleg**device, incorporating a hydraulic cylinder, providing support and thrust for a *jackhammer* ([3.6.5](#))

[SOURCE: BS 3618-6:1972]

3.6.5**jackhammer**

light percussive drill used by hand or with some light support

[SOURCE: BS 3618-6:1972]

3.6.6**stopper**light percussive drill incorporating a pneumatic cylinder to provide support and thrust when *drilling* ([3.1.11](#)) steeply upward

[SOURCE: BS 3618-6:1972]

3.7 Equipment mainly for hand-held machines**3.7.1****hollow drill rod**

hollow drill steel

hollow drill stem

drill rod ([3.13.2](#)) or *stem* ([3.7.5](#)) having an air to remove *collaring* ([3.3.3](#)) from a drill hole, or for the extraction of collarings by suction

[SOURCE: BS 3618 6:1972]

3.7.2**line oiler**

device for lubricating a drill by feeding oil gradually into the compressed air supply

[SOURCE: BS 3618-6:1972]

3.7.3**scroll**helical projection on a *drill rod* ([3.13.2](#)) or *stem* ([3.7.5](#)) to remove the *collarings* ([3.3.3](#)) from the hole

[SOURCE: BS 3618-6:1972]

3.7.4**shank**end of the rod that engages with the *chuck* ([3.12.1](#)) of the *drilling* ([3.1.11](#)) machine

[SOURCE: BS 3618-6:1972]

3.7.5**stem**

drill steel

integral steel

<drilling> round or hexagonal steel rod for boring

Note 1 to entry: Compare with [3.22.18.2](#).

[SOURCE: BS 3618-6:1972]

3.8 Rigs

3.8.1

bench drill rig

rock drill rig (3.8.15) designed to drill *blast holes* (3.3.2) on *benches* (3.3.1)

3.8.2

blasthole drill rig

rock drill rig (3.8.15) designed to drill *blastholes* (3.27.1)

3.8.3

cable bolting drill rig

rock drill rig (3.8.15) for *drilling* (3.1.11) long holes in rock and fixing cables in them with *cement grout* (3.15.3) to stabilize the rock mass

3.8.4

dimensional stone rig

rock drill rig (3.8.15) designed for *drilling* (3.1.11) holes for quarrying of natural stone

3.8.5

drill boom

adjustable arm projecting from a *drill carriage* (3.8.6) to carry a drill and hold it in selected positions

[SOURCE: BS 3618-6:1972]

3.8.6

drill carriage

vehicle on which one or more *drill booms* (3.8.5) are mounted to permit drills to be brought easily to their work and to be removed before *blasting* (3.30.1.1)

Note 1 to entry: See also *jumbo* (3.8.8).

[SOURCE: BS 3618-6:1972]

3.8.7

drill rig for soil and rock mixture

self-propelled or towed machine on wheels, crawlers or legs, having equipment to drill soil and a mixture of soil and rock, such as: geothermal drill rig, water well drill rig, water jet drill rig, micro pile drill rig, surface horizontal directional drill rig

3.8.8

jumbo

drill carriage (3.8.6) or mobile scaffold on which several drills of *drifter* (3.10.2) type are mounted

Note 1 to entry: It is used in tunnels and large headings.

[SOURCE: Reference [2]]

3.8.9

long-hole drill rig

rock drill rig (3.8.15) designed for *drilling* (3.1.11) long production *blast holes* (3.3.2) in a mine

3.8.10

meshing rig

netting rig

rock drill rig (3.8.15) for installing net (mesh)

3.8.11**raise bore machine**

RBM

rock drill rig (3.8.15) for *raise boring* (3.2.4)**3.8.12****raise climber***rock drill rig* (3.8.15) on rails, designed for *drilling* (3.1.11) and *blasting* (3.30.1.1) vertical or near vertical shaft or raise**3.8.13****rock boring machine***rock drill rig* (3.8.15) used to create an underground opening, drift or tunnel by mechanically boring out the rock**3.8.14****rock bolting drill rig***rock drill rig* (3.8.15) designed for *drilling* (3.1.11) holes and installing *rock bolt* (3.15.7)**3.8.15****rock drill rig**

rock drill machine

self-propelled or towed machine on wheels, crawlers or legs, having equipment to drill rock

Note 1 to entry: Rock drill rigs are designed to provide one or more of the rock *drilling* (3.1.11) concepts of [Clause 3.1](#), using one or more of the rock drilling technologies of [Clause 3.2](#). They can be designed for use on the surface or underground or both. Rock drill rigs normally consist of a carrier carrying one or more rock drills and the supporting systems needed to carry out the drilling.

Note 2 to entry: Machinery can be of a type either directly controlled by an operator riding or not riding on the machine, or can be remotely controlled by wired or wireless means with or without direct view on the *working area* (3.20.14). See ISO 6165:2022, Annex B for types of operator control configurations.

[SOURCE: EN 16228 1:2014]

3.8.16**rock reinforcement rig***rock drill rig* (3.8.15) equipped for *bolting* (3.5.5), *meshing* (3.5.3) or *grouting* (3.5.2) or a combination of them**3.8.17****scaling machine**

self-propelled or towed machine on wheels, crawlers or legs, having equipment to scale rock

3.8.18**wagon drill***drilling* (3.1.11) machine mounted on a light, wheeled carriage

[SOURCE: BS 3618-6:1972]

3.9 Support components and systems**3.9.1****articulated carrier machine***carrier machine* (3.9.2) with an articulated frame which accomplishes the steering of the machine

[SOURCE: ISO 6165:2022, 3.2.6.2, modified — “dumper” has been replaced with “carrier machine”.]

3.9.2

carrier machine

machine that provides mobility for, and supports, the mass of a *rock drill rig* (3.8.15)

[SOURCE: ISO 11886:2002, 3.2, modified — “piling equipment, together with the pile” has been replaced by “rock drill rig”.]

3.9.3

hose reel

drum-like structure around which the hose is wrapped when *tramping* (3.16.15) the machine, on a *rock drill rig* (3.8.15),

Note 1 to entry: On a rock drill rig, the winding mechanism of the reel is powered.

3.9.4

power pack

unit consisting of a power source and a means of transmitting that power to one or more functions on a machine

Note 1 to entry: Typical power sources are diesel engine and electric motors. The typical output is hydraulic or pneumatic.

3.10 Rock drilling and rock reinforcement units

3.10.1

bolting unit

rock bolting (3.5.5) equipment on the machine

3.10.2

drifter

heavy percussive drill requiring some form of rigid mounting

[SOURCE: BS 3618-6:1972]

3.10.3

down-the-hole hammer rock drill

DTH hammer

down-the-hole drill

cylindrical pneumatic percussive rock drill, fitted with a *drill bit* (3.11.1) and attached directly to the bottom of the *drill string* (3.13.1) so that it can be inserted into the hole as it drills

3.10.4

front head

forward housing of a *top hammer rock drill* (3.10.9)

3.10.5

grouting unit

unit for mixing, pumping or injecting *grout* (3.15.4), cement, concrete or *drilling* (3.1.11) fluids, on a *rock reinforcement rig* (3.8.16)

3.10.6

piston rod

element transmitting mechanical force and motion from the piston

3.10.7

rotation unit

set of gears enclosed in a housing, with a protruding threaded spindle that attaches to the *drill pipes* (3.13.2), that is rotated by a hydraulic, electric or pneumatic motor

Note 1 to entry: Rotation units are used on *down-the-hole drilling* (DTH) (3.2.2) and some explorations drill rigs.

3.10.8**shank**

internal part of a *top hammer rock drill* (3.10.9) to transfer energy, rotation and impact

Note 1 to entry: It is normally equipped with one threaded end and one end with splines for transfer of rotation and percussion energy.

3.10.9**top hammer rock drill**

machine that transforms hydraulic or pneumatic energy into percussive and rotary energy and transfers it to the *drill bit* (3.11.1) through one or more *drill rods* (3.13.2), is mounted on a *rock drill cradle* (3.13.21) and fed forward by a *drill feed* (3.13.6) along a *feed beam* (3.13.5)

3.10.10**top sub**

short threaded tube forming the upper part of a *DTH hammer* (3.10.3)

3.11 Drill bits**3.11.1****bit****drill bit**

device attached to, or forming an integral part of, the *drill string* (3.13.1), used as a *cutting* (3.3.4) tool to penetrate the formation being drilled by the *drilling* (3.1.11) method employed

[SOURCE: ISO 22475-1:2021, 3.2.2, modified — "bit" has been added as a term and "being drilled by the drilling method employed" in the definition has been added.]

3.11.1.1**chisel bit**

percussive *bit* (3.11.1) having a single *cutting* (3.3.4) edge

[SOURCE: BS 3618-6:1972]

3.11.1.2**cruciform bit**

cross bit

percussive *bit* (3.11.1) having two *cutting* (3.3.4) edges intersecting at right angles

Note 1 to entry: See ISO 1721:1974 for standardised dimensions.

[SOURCE: BS 3618-6:1972]

3.11.1.3**fir tree bit**

rotary *bit* (3.11.1) in which a number of *cutting* (3.3.4) edges are arranged behind a pilot bit to enlarge the hole to the required diameter

Note 1 to entry: See [Figure 2](#).



Figure 2 — Fir tree bit

[SOURCE: BS 3618-6:1972]

**3.11.1.4
tipped bit**

drill bit (3.11.1) in which the *cutting* (3.3.4) edge is made of especially hard material

[SOURCE: BS 3618-6:1972]

**3.11.1.5
button bit**

drill bit (3.11.1) having button-like spherical, cemented carbide inserts that engage and remove the rock during *drilling* (3.1.11)

Note 1 to entry: See ISO 10207:1991, Figure 7, button type, and ISO 22475-1:2021, Figure C.12.

**3.11.1.6
eccentric drill bit**

drill bit (3.11.1) where the *cutting* (3.3.4) surfaces are positioned in a non-symmetrical pattern, over the bit face

**3.11.1.7
roller bit**

drill bit (3.11.1) that breaks rock by creating a shear force that fragments it as it rolls over the rock

Note 1 to entry: See ISO 22475-1:2021, Figures C.11 and C.12.

**3.11.2
bit magazine**

storage device on a drill rig used to hold and supply the machine with *drill bits* (3.11.1)

**3.11.3
cutter wheel**

rotating wheel with cutters mounted on its outer diameter surface

**3.11.4
backreamer**

cutting (3.3.4) head attached to the leading end of a *drill string* (3.13.1) to enlarge the pilot bore during a pull-back operation

3.11.5**drill collar**

thick-walled pipe or tube designed to provide stiffness and concentration of mass at or near the bit

[SOURCE: ISO 10407-2:2008, 3.18]

3.11.6**drill grinding**

grinding of worn *drill bit* (3.11.1)

3.11.7**gauge wear**

wear on the *drill bit* (3.11.1) diameter

3.12 Chuck**3.12.1****chuck**

component of the *drill string* (3.13.1) that provides the connection to the *drill rod* (3.13.2) to transmit *torque* (3.16.13) and thrust from the rock drill or *shank* (3.7.4) to the drill rod

3.12.2**deep chuck**

chuck (3.12.1) type to provide overlapping connection to a *drill rod* (3.13.2) of 75 mm minimum

Note 1 to entry: This is typical for roof *bolting* (3.5.5).

3.13 Drill string**3.13.1****drill string**

all components, such as *drill rods* (3.13.2), bit, stabilizers, etc., that are coupled together for transforming the rotation and/or percussion energy from the drill or *rotation unit* (3.10.7) and are inserted into the hole when *drilling* (3.1.11)

3.13.1.1**drifting drill string**

arrangement of bit, rod and adapter used to drill holes when excavating horizontal *transport* (3.16.16) openings or drifts in underground mining

3.13.2**drill rod****drill pipe**

rod (bar) designed to transfer flushing media, rotation and percussion energy from the rock drill to the *drill bit* (3.11.1)

Note 1 to entry: It can have either threaded or tapered ends, or integral with a drill bit at one end and a striking surface at the other.

3.13.2.1**drifter rod**

robust hexagon-shaped *drill rod* (3.13.2) used for *drilling* (3.1.11) *blast holes* (3.3.2) in tunnels and mining drifts

3.13.2.2**drill rod thread**

thread on a *drill rod* (3.13.2)

Note 1 to entry: For some standardized dimensions see ISO 10208:1991.

3.13.3

extension rod

threaded or tapered rod that transfers flushing media, rotation and percussion energy between the rock drill and the *drill bit* ([3.11.1](#))

Note 1 to entry: For some standardized dimensions see ISO 1721:1974, Clause 6.

3.13.4

shank adapter

rod that connects the *drill string* ([3.13.1](#)) to a rock drill

3.13.4.1

crossover adapter

threaded sleeve (adapter) used to connect two dissimilar threads

3.13.4.2

crossover sub

short threaded drill tube used to connect to dissimilar threads

3.13.5

feed beam

structure on which a rock drill is mounted providing linear movement to the rock drill, with all its attachments and parts, and fitted with a rock *drill cradle* ([3.13.21](#)) that is connected to a hydraulic cylinder or motor by pulleys and a cable, or by chains and sprockets

3.13.6

drill feed

mechanism for advancing the rock drill along the *feed beam* ([3.13.5](#))

3.13.7

feed holder

device on which the *feed* ([3.16.7](#)) is mounted that allows it to move forwards and back to position it against the rock

3.13.8

feed inclination

angle of *feed* ([3.16.7](#)) relative to horizontal plane

3.13.9

chain feed

rock *drill feed* ([3.13.6](#)) where the force applied to move the drill forwards and back is transmitted through a roller chain

3.13.10

chain tensioner

threaded arrangement used to apply tension to the chain of a *chain feed* ([3.13.9](#))

3.13.11

boom

structure for positioning of the *mast* ([3.13.20](#)) or *feed beam* ([3.13.5](#)) or *boom-mounted working platform* ([3.20.1](#))

[SOURCE: EN 16228-2:2014+A1:2021, 3.5, modified — "or boom-mounted working platform" has been added.]

3.13.12

boom beam

main ridged portion of a drill rig boom

3.13.13**boom extension**

part of the *boom* ([3.13.11](#)) which is capable of telescopic movement to vary its length

3.13.14**boom bracket**

fabricated structure, attached to the rig frame in such a way as to form an attachment for the boom

3.13.15**boom head**

structure at the front end of the *boom* ([3.13.11](#)) having attachment points for hydraulic cylinders and the rock *drill feed* ([3.13.6](#))

3.13.16**boom link**

device forming an articulation point in the boom

3.13.17**boom support**

attachment structure for the boom

3.13.18**boom system**

boom ([3.13.11](#)) with all its components and controls

3.13.19**boom walkway**

walkway used mainly on long *booms* ([3.13.11](#))

3.13.20**mast**

structure for supporting and guiding the *drilling* ([3.1.11](#)) tools on large surface *rock drill rigs* ([3.8.15](#))

[SOURCE: EN 16228-2:2014+A1:2021 3.2, modified — "on large surface rock drill rigs" has been added.]

3.13.21**drill cradle**

metal channel on which a heavy rock drill is fed forward along the *feed beam* ([3.13.5](#)) or along the *mast* ([3.13.20](#)) as *drilling* ([3.1.11](#)) proceeds

3.13.21.1**cradle indexer**

device used to move the rock *drill cradle* ([3.13.21](#))

3.13.21.2**cradle position**

rock *drill cradle* ([3.13.21](#)) position on the *feed beam* ([3.13.5](#))

3.13.22**drill rod rack**

drill pipe rack

structure that holds *drill rods* ([3.13.2](#)) or *drill pipes* ([3.13.2](#))

3.13.23**carousel**

device used for storage and *transport* ([3.16.16](#)) of rods or pipes which rotates around an axis, and from which the *drill rods* ([3.13.2](#)) or *drill pipes* ([3.13.2](#)) are being fed into the *drill string* ([3.13.1](#))

3.13.24**jaw**

device that can grip the *drill rods* ([3.13.2](#)) to couple and uncouple them

3.13.25

breakout wrench

device used on a *rock drill rig* ([3.8.15](#)) to grip and turn threaded drill tubes to uncouple them

Note 1 to entry: Common when using down-the-hole hammers.

3.13.26

vertical drill string support

device for achieving a correct *collaring* ([3.3.3](#)) and to guide the *drill string* ([3.13.1](#)) during the *drilling* ([3.1.11](#)) with the objective to achieve a straight hole and temporarily supporting the drill string from falling down the hole during adding or removal of drill sections on multi-pass or deep hole surface drill rigs

3.13.27

horizontal drill string support

structure for supporting the free length of the *drill rod* ([3.13.2](#))

3.13.28

floating adapter

threaded connector on a *drill rotation unit* ([3.10.7](#)), usually splined, to allow limited axial movement when connecting and disconnecting *drill rods* ([3.13.2](#))

3.14 Rod and bit handling systems

3.14.1

automatic rod handling system

system that automatically adds and removes rods to the *drill string* ([3.13.1](#)) without the intervention of the operator

3.14.2

automatic bit changing system

system that automatically exchanges *drill bits* ([3.11.1](#)) without the intervention of the operator

3.14.3

mechanical rod handling system

system that allows the operator to add and remove rods to the *drill string* ([3.13.1](#)) without coming directly in contact with the drill string

3.14.4

mechanical bit handling system

system that allows the operator to exchange *drill bits* ([3.11.1](#)) without coming directly in contact with the *drill string* ([3.13.1](#))

3.14.5

powered break out system

system that obviates the need to use hand tools in the break out operation

3.15 Rock support components

3.15.1

bolt magazine

storage *magazine* ([3.25.1.9](#)) on a *rock bolting* ([3.5.5](#)) drill rig used to hold a number of *rock bolts* ([3.15.7](#))

3.15.2

cable bolt

bolt made of steel-wire rope

3.15.3**cement grout**

mixture of cement, water, and, in some cases, admixtures

[SOURCE: ISO 16311-4:2014, 3.2]

3.15.4**grout**

mixture of cement, bentonite or other additive and water

3.15.5**measuring bolt**

rock bolt ([3.15.7](#)) that can be equipped with an instrument for measuring, e.g. stress or deformation in the bolt material

3.15.6**polymer grout**

polymer based mixture that hardens

Note 1 to entry: Mainly resin or polyester based curing liquid substances for rock consolidation or rock reinforcement.

3.15.7**rock bolt**

bolt for anchoring in solid rock to stabilise the rock

Note 1 to entry: Examples of bolts are solid steel bar, hollow steel bar, steel cable. The bolts may be *grouted* ([3.15.4](#)) with, for example, cement, resin or plastic.

Note 2 to entry: There exist rock bolts that can be equipped with an instrument for measuring, e.g. stress or deformation, in the bolt material.

3.15.8**rock bolt washer**

washer on *rock bolt* ([3.15.7](#)) for transfer of force from rock to bolt

3.16 Movement and force**3.16.1****auto-feed**

feed ([3.16.7](#)) function that advances the rock drill at a set rate

3.16.2**boom lift**

up and downward movement of the *boom* ([3.13.11](#))

3.16.3**boom rotation**

angle, in degrees, from the longitudinal axis of the machine to the longitudinal centre of the *boom* ([3.13.11](#)) at maximum swing position

3.16.4**boom swing**

right and left movement of the *boom* ([3.13.11](#))

3.16.5**breakout**

action of loosening the threaded joints between *drill string* ([3.13.1](#)) components such as *drill rod* ([3.13.2](#)), *drill bit* ([3.11.1](#)) or any other subs

3.16.6

cradle index

movement of the *drill cradle* (3.13.21) laterally

3.16.7

feed

move a *drill string* (3.13.1) to cause the bit to cut and penetrate the formation being drilled

3.16.8

feed extension

linear movement of the *feed* (3.16.7) to extend and retract its length

3.16.9

feed force

force acting on the rock drill in the *drilling* (3.1.11) direction

3.16.10

feed swing

rotational movement of the *feed beam* (3.13.5)

3.16.11

penetration rate

speed at which a bit advances while *drilling* (3.1.11)

3.16.12

rig stabiliser

device and system used to stabilise the machine by supporting or levelling of the complete structure

EXAMPLE Jacks, suspension locking devices, outriggers, extending axles.

[SOURCE: EN 16228-1:2014, 3.37]

3.16.13

torque

rock drill rotational torque

[SOURCE: ISO 22476-15:2016, 3.9, modified — “drill head” has been replaced by “rock drill”.]

3.16.14

track contact area

area of the crawler track that is in contact with the ground

3.16.15

tramming

short movements of a *rock drill rig* (3.8.15) in *drilling* (3.1.11) condition on site

3.16.15.1

cornering

tramming (3.16.15) of the *rock drill rig* (3.8.15) with the carrier steered and boom(s) turned maximum to the allowed angle defined by the manufacturer in the operator's manual

3.16.15.2

sweep radius

outer radius, R , of the turning circle for a *rock drill rig* (3.8.15) with *booms* (3.13.11) in *tramming* (3.16.15)

3.16.16

transport

move the *rock drill rig* (3.8.15) by trailer, ship, etc.

3.16.17**travelling**

moving of the *rock drill rig* (3.8.15) in non-operating condition

3.17 Drill rig winch and hoist**3.17.1****hoist**

machine for lifting and lowering loads, freely suspended or guided or supported on inclined planes, over predetermined distances, with or without trolleys

Note 1 to entry: For examples see EN 14492-2:2019, Annex A.

[SOURCE: EN 14492-2:2019, 3.1.9]

3.17.2**recovery winch**

machine installed on the *carrier machine* (3.9.2) for the purpose of self-recovery

3.17.3**main winch**

hoist (3.17.1) installed on a machine for the purpose of lifting the *drill string* (3.13.1)

3.17.4**service winch**

hoist (3.17.1) installed on a machine for the purpose of lifting *drill pipes* (3.13.2), *rock drill*, *rotation unit* (3.10.7) and other tools or equipment

3.17.5**survey winch**

hoist (3.17.1) installed on a machine for the purpose of lower survey and probe equipment

Note 1 to entry: The holes are normally dry.

3.17.6**tramming winch**

machine installed on the *carrier machine* (3.9.2) for the purpose of *tramming* (3.16.15)

3.17.7**wireline winch**

hoist (3.17.1) installed on a machine for the purpose of recovering the core sample down the hole

Note 1 to entry: The hole is filled with water or other liquids.

3.18 Flushing**3.18.1****flushing medium**

liquid or gaseous medium used to move *collarings* (3.3.3) or samples and to lubricate and cool the *drilling* (3.1.11) tool from the borehole

Note 1 to entry: It is normally water or air or a combination of both.

3.18.2**flush pump**

pump used to pump flushing fluid into a hole during *drilling* (3.1.11) to remove the *rock cutting* (3.3.4)

3.18.3

water swivel

flush head

water coupling

means by which flushing water can be fed into a *hollow drill rod* ([3.7.1](#)) or *stem* ([3.7.5](#)) as it rotates

[SOURCE: BS 3618-6:1972]

3.19 Drill dust suppression

3.19.1

cyclone dust collector

apparatus for the separation, by centrifugal means, of fine particles suspended in the air

Note 1 to entry: It is a dust separator or droplet separator of cylindrical or conical form, used for the removal of particles from the air, mainly utilizing the centrifugal force produced by the air flow

[SOURCE: ISO 1213-1:2020, 6.4.4, modified — Note 1 to entry has been added.]

3.19.2

mist

stream of liquid in the form of very small drops

[SOURCE: ISO/TR 27912:2016, 3.40]

3.20 Rock drill rig operator station

3.20.1

boom-mounted working platform

working platform used for raising or lowering personnel, consisting of a platform fitted onto an articulated or telescopic *boom* ([3.13.11](#))

[SOURCE: EN 16228-2:2014+A1:2021, 3.7]

3.20.2

elevating operator station

operator station ([3.20.4](#)) that can be elevated

3.20.3

elevating operator enclosure

operator enclosure ([3.20.5](#)) that can be elevated

3.20.4

operator station

area on-board the machine from which an operator controls the travel and work functions of the machine

[SOURCE: ISO 2867:2011, 3.1.6, modified — "on-board the machine" has been added.]

3.20.5

operator enclosure

enclosed operator station

operator station ([3.20.4](#)) which completely surrounds the operator, preventing the free passage of external air, dust or other substances into the area around the operator

[SOURCE: ISO 10263-1:2009, 3.14, modified — "enclosed operator station" has been added as a term, "part of the machine" has been replaced by "operator station".]

3.20.6**operator canopy**

overhead operator protective structure covering an open *operator station* ([3.20.4](#))

Note 1 to entry: Open-style enclosure from where the operator drives and operates the machine, only protected with a roof, no doors.

3.20.6.1**adjustable operator canopy**

operator canopy ([3.20.6](#)) with adjustable height

Note 1 to entry: This enables the machine to traverse low sections of a mine.

3.20.7**rectangular boundary**

line on the ground reference plane located at 1 m distance from the outside rectangular boundary of the machine

[SOURCE: ISO 5006:2017, 3.3.2, modified — Subordinate clause removed.]

3.20.8**remote operator enclosure**

remote operator station ([3.20.9](#)) which completely surrounds the operator, preventing the free passage of external air, dust or other substances into the area around the operator

[SOURCE: ISO 10263-1:2009, 3.14, modified — "remote" has been added to the term and "part of the machine" has been replaced by "remote operator station".]

3.20.9**remote operator station**

area from which an operator remotely controls the travel and work functions of the machine

[SOURCE: ISO 2867:2011, 3.1.6, modified — "remote" has been added to the term and "remotely" to the definition.]

3.20.10**temporary roof support system**

TRS

device on a *rock drill rig* ([3.8.15](#)) that provides temporary roof support, protecting the *bolting* ([3.5.5](#)) rig operator from roof falls

3.20.11**tilting operator enclosure**

operator enclosure ([3.20.5](#)) that can be tilted

3.20.12**tilting operator station**

operator station ([3.20.4](#)) that can be tilted

Note 1 to entry: The purpose is often to enable a better view of work.

3.20.13**tramming stand**

platform on the *rock drill rig* ([3.8.15](#)) from where the standing operator controls the *tramming* ([3.16.15](#))

3.20.14**working area**

area near a machine in which its tools are moved in order to carry out work

3.21 Rock drill rig operation modes

3.21.1

full drill cycle automation mode

operating mode in which the *rock drill rig* (3.8.15) automatically drills a pre-programmed hole pattern automatically

Note 1 to entry: This includes automatic *boom* (3.13.11) and *feed* (3.16.7) positioning.

3.21.2

manual rod handling mode

operating mode in which the *rock drill rig* (3.8.15), initiated by the operator, drills one rod and then stops with the possibility of additional rods being added and removed manually using clamps or directly into the *drill string* (3.13.1)

3.21.3

operating mode selector switch

switch or another selection device, which allows the use of the machine in several control or operating modes, requiring different protective measures and/or work procedures and which can be locked in each position

Note 1 to entry: The selection device includes but is not limited to software.

[SOURCE: ISO 11553-1:2020, 3.17, modified — "laser processing machines" has been removed.]

3.21.4

single hole automation mode

operating mode in which the *rock drill rig* (3.8.15), initiated by the operator, drills the full length of the *drill rod* (3.13.2) and then adds rods automatically; when the pre-programmed *hole length* (3.4.6) has been drilled, the rock drill rig stops and the rods can be removed automatically or semi-automatically

3.21.5

single rod automation mode

operating mode in which the *rock drill rig* (3.8.15), initiated by the operator, drills the full length of the single *drill rod* (3.13.2) and then returns automatically

3.22 Charging loading - explosive loading

3.22.1

base charge

<quarry blasting> bottom *charge* (3.22.7) in a deep borehole in quarry *blasting* (3.30.1.1)

Note 1 to entry: Compare with 3.24.1.

[SOURCE: BS 3618-6:1972]

3.22.2

break detector

tool used to detect breaks or fissures intersected by a *shothole* (3.30.1.27)

Note 1 to entry: Usually combined with a *scraper* (3.22.16)

[SOURCE: BS 3618-6:1972]

3.22.3

burden

distance between a *charge* (3.22.7) and a *free face* (3.22.14)

Note 1 to entry: The burden is a measure of the work to be done by the charge.

[SOURCE: BS 3618-6:1972]

3.22.4**bursting time**

time between the application of an electric current and the setting off of *charge* (3.22.7)

Note 1 to entry: Compare with “bursting time” in ISO 22932-4.

[SOURCE: Reference [2]]

3.22.5**cap crimper**

mechanical device for *crimping* (3.22.9) the metallic *shell* (3.30.1.25) of a *fuse* (3.28.4) *detonator* (3.24.7) or *igniter cord* (3.27.8) connector securely to a section of inserted *safety fuse* (3.28.5)

[SOURCE: Reference [2]]

3.22.6**chamber**

excavation to accommodate a *charge* (3.22.7)

[SOURCE: BS 3618-6:1972]

3.22.7**charge**

quantity of *explosive* (3.25.1.4) in any particular *shothole* (3.30.1.27)

[SOURCE: BS 3618-6:1972]

3.22.8**column charge**

continuous *charge* (3.22.7) in a *shothole* (3.30.1.27)

Note 1 to entry: Column charge generally is used in quarries.

Note 2 to entry: Compare with *deck charge* (3.22.11).

[SOURCE: BS 3618-6:1972]

3.22.9**crimping**

action of squeezing the open end of a *plain detonator* (3.24.14), or a *detonating relay* (3.28.3), over a length of *fuse* (3.28.4)

[SOURCE: BS 3618-6:1972]

3.22.10**cutoff shot**

shot (3.22.17) in a delay round in which the *charge* (3.22.7) has been exposed to atmosphere by reason of the *detonation* (3.24.6) of an earlier shot in the round

[SOURCE: BS 3618-6:1972]

3.22.11**deck charge**

charge (3.22.7) which is divided into several separate components along the *shothole* (3.30.1.27)

Note 1 to entry: Deck charges are generally used in quarries.

Note 2 to entry: Compare with *column charge* (3.22.8).

[SOURCE: BS 3618-6:1972, modified — Note 1 to entry was originally part of the definition.]

3.22.12

excitation time

minimum time during which an electric current must flow in the *fusehead* (3.24.8) of a *detonator* (3.24.7) to ensure its ignition

[SOURCE: BS 3618-6:1972]

3.22.13

foam injection

injection (3.5.2) of foam into *shotholes* (3.30.1.27) and connecting breaks

Note 1 to entry: A foam injection is carried out in order to displace any firedamp present and to minimize further firedamp omission into the shotholes.

Note 2 to entry: A foam injection thereby can reduce the potential negative effect of ignition of the gas during *shotfiring* (3.29.2).

[SOURCE: BS 3618-6:1972, modified — Notes 1 and 2 to entry were originally part of the definition.]

3.22.14

free face

surface in the vicinity of a *shothole* (3.30.1.27) at which the rock is free to move under the force of the explosion

[SOURCE: BS 3618-6:1972]

3.22.15

group

number of *shots* (3.22.17) sufficiently close together to be treated in common in respect of preparation for *firing* (3.27.5)

[SOURCE: BS 3618-6:1972]

3.22.16

scraper

tool designed to remove *drill collarings* (3.11.5) from a *shothole* (3.30.1.27) before the insertion of the *charge* (3.22.7)

Note 1 to entry: Usually combined with a *break detector* (3.22.2).

[SOURCE: BS 3618-6:1972]

3.22.17

shot

charge (3.22.7) contained within a *shothole* (3.30.1.27)

[SOURCE: BS 3618-6:1972]

3.22.18

stemming

inert material packed between the *charge* (3.22.7) and the outer end of the *shothole* (3.30.1.27), or between adjacent charges in *deck charging* (3.22.11)

[SOURCE: BS 3618-6:1972]

3.22.18.1

gel ampoule

fire resistant plastic container of gel which is used as a safety precaution in the *stemming* (3.22.18) of *shotholes* (3.30.1.27)

[SOURCE: BS 3618-6:1972]

3.22.18.2**stem
tamp**

<blasting> insert and pack *stemming* (3.22.18) in *shothole* (3.30.1.27)

Note 1 to entry: Compare with 3.7.5.

[SOURCE: BS 3618-6:1972]

3.22.18.3**stemming rod**

stemming stick

tamping rod

non-metallic rod used to push *explosive* (3.25.1.4) cartridges into position in a *shothole* (3.30.1.27) and to ram tight the *stemming* (3.22.18)

[SOURCE: BS 3618-6:1972]

3.22.18.4**water ampoule**

fire resistant plastic container of water which is used as a safety precaution in the *stemming* (3.22.18) of *shothole* (3.30.1.27)

[SOURCE: BS 3618-6:1972]

3.22.19**tamping**

act of inserting and packing *explosive* (3.25.1.4) and *stemming* (3.22.18) in a *shothole* (3.30.1.27)

[SOURCE: Reference [2]]

3.23 Cuts**3.23.1****cut**

sump

group (3.22.15) of holes fired first in a round to provide additional *free faces* (3.22.14) for the succeeding *shots* (3.22.17)

[SOURCE: BS 3618-6:1972]

3.23.2**Angled-hole cuts****3.23.2.1****cone cut**

cut (3.23.1) which a number of central holes are drilled towards a focal point

Note 1 to entry: When cone cut fired, break out a conical section of strata.

[SOURCE: BS 3618-6:1972]

3.23.2.2**drag cut**

cut (3.23.1) in which *groups* (3.22.15) of holes are drilled at increasing heights above floor level and at increasing angles from the *free face* (3.22.14)

Note 1 to entry: The *shot* (3.22.17) is fired to break out successive wedges of strata across the width of the face.

[SOURCE: BS 3618-6:1972]

3.23.2.3

fan cut

cut (3.23.1) in which holes of equal or increasing length are drilled in a pattern on a horizontal plane or in a selected stratum

Note 1 to entry: The fan cut breaks out a considerable part of the cut before the rest of the round is fired.

Note 2 to entry: The holes are fired in succession in accordance with the increasing angle they form in relation to the face.

[SOURCE: BS 3618-6:1972, modified — Note 1 to entry was originally part of the definition and Note 2 to entry has been added.]

3.23.2.4

pyramid cut

diamond cut

cut (3.23.1) in which four central holes are drilled towards a focal point

Note 1 to entry: When a pyramid cut is fired, it breaks out a tetrahedral section of strata.

[SOURCE: BS 3618-6:1972, modified — Note 1 to entry was originally part of the definition.]

3.23.2.5

V-cut

type of cut employed in which the cut holes meet in a V to pull the cut to the bottom of the holes properly

Note 1 to entry: A single pair of holes may do in one kind of rock, but in another, two or three sets of V-holes entirely across the face may be needed.

[SOURCE: Reference [2]]

3.23.2.6

wedge cut

cut (3.23.1) in which the central holes are positioned to break out a wedge-shaped section of strata when fired

[SOURCE: BS 3618-6:1972]

3.23.3

Parallel-hole cuts

3.23.3.1

burn cut

cut (3.23.1) consisting of a number of holes drilled parallel and close together

Note 1 to entry: Some of these holes remains uncharged to provide a *free face* (3.22.14).

Note 2 to entry: Some of these can be of larger diameter than the *shothole* (3.30.1.27).

[SOURCE: BS 3618-6:1972, modified — Notes 1 and 2 to entry were originally part of the definition.]

3.23.3.2

coromant cut

drill hole pattern in which two overlapping holes of diameter about 5,7 cm are drilled in the tunnel center and left uncharged

Note 1 to entry: These holes form a slot roughly 10,2 cm x 5,1 cm to which the easers can break. All the holes in the round are parallel and in line with the tunnel. *Short delay detonators* (3.24.15) are used for the easer holes and 1/2-s delays for the rest of the round.

[SOURCE: Reference [2]]

3.23.3.3**crater cut**

cut (3.23.1) consisting of one or several fully charged holes in which *blasting* (3.30.1.1) is carried out towards the face of the tunnel, i.e., toward a free surface at right angles to the holes

Note 1 to entry: These represent in principle a completely new type of cut and make use of the crater effect that is obtained in blasting a single hole at a free rock surface. The possibility of a uniform enlargement can be counted on. This means that if the scale is enlarged so that the diameter and depth of hole and length of the charge are all doubled, e.g., a crater of double the depth will be obtained. The number of holes can be increased instead of increasing the diameter of the holes.

[SOURCE: Reference [2]]

3.23.3.4**cylinder cut**

cut (3.23.1) which in the *blasting* (3.30.1.1) is performed toward an empty hole in such a way that, as the *charges* (3.22.7) in the first, second, and subsequent holes detonate, the broken rock is thrown out of the cut

Note 1 to entry: The opening is successively and uniformly (cylindrically) enlarged in its entire length.

[SOURCE: Reference [2]]

3.23.3.5**fagersta cut**

parallel hole cut of cylinder type with one center hole 75 mm in diameter, that consists of two rows of *blast holes* (3.3.2) with four holes in the first row and six holes in the second row

3.24 Detonation**3.24.1****base charge**

detonating component in a *detonator* (3.24.7), initiated by the priming *charge* (3.22.7)

Note 1 to entry: Compare with 3.22.1.

[SOURCE: BS 3618-6:1972]

3.24.2**blasting cap**

detonator (3.24.7) containing an ignition *explosive* (3.25.1.4) mixture, a primary initiating *charge* (3.22.7), and a *high explosive* (3.25.1.7) *base charge* (3.24.1), encapsulated in an aluminum or copper *shell* (3.30.1.25)

[SOURCE: Reference [2]]

3.24.3**deflagration**

burning of a detonating *explosive* (3.25.1.4) subsequent to its failure to detonate

[SOURCE: BS 3618-6:1972]

3.24.4**delay detonator**

detonator (3.24.7) in which there is a designed interval of time between the application of an electric current to the detonator and its *detonation* (3.24.6)

[SOURCE: BS 3618-6:1972]

3.24.5

delay element

part of a *delay detonator* (3.24.4) interposed between the *fusehead* (3.24.8) and the *priming charge* (3.22.7)

[SOURCE: BS 3618-6:1972]

3.24.6

detonation

action of converting the chemicals in *charge* (3.22.7) to gases at a high pressure, by means of a self-propagating shock wave passing through the charge

[SOURCE: BS 3618-6:1972]

3.24.7

detonator

cap

device for producing *detonation* (3.24.6) in a *charge* (3.22.7)

Note 1 to entry: The detonator is initiated by a *safety fuse* (3.28.5) or electricity.

[SOURCE: BS 3618-6:1972, modified — Note 1 to entry was originally part of the definition.]

3.24.7.1

NONEL detonator system

shock tube *detonator* (3.24.7) designed to initiate explosions where a hollow plastic tube delivers the *firing* (3.27.5) impulse to the *delay detonator* (3.24.4), making it immune to most of the hazards associated with stray electric current

3.24.7.2

electronic system

device for producing *detonation* (3.24.6) in a *high explosive* (3.25.1.7), and initiated by a *safety fuse* (3.28.5) or by electricity

3.24.8

fusehead

part of an electric *detonator* (3.24.7) consisting of twin metal conductors bridged by fine resistance wire and surrounded by a bead of igniting compound which burns when the *firing* (3.27.5) current is passed through the bridge wire

[SOURCE: BS 3618-6:1972]

3.24.9

high tension detonator

detonator (3.24.7) requiring an electrical potential of about 50 volts for *firing* (3.27.5)

[SOURCE: BS 3618-6:1972]

3.24.10

instantaneous detonator

detonator (3.24.7) in which there is no designed delay period between the passage of an electric current through the detonator and its bursting

[SOURCE: BS 3618-6:1972]

3.24.11**jointing sleeve**

insulating sleeve

insulating thimbles placed over the connected ends of *detonator* (3.24.7) *lead* (3.24.12) coupled in large rounds of *shots* (3.22.17), and also over the connections between the detonator lead and the *shotfiring* (3.29.2) cable

[SOURCE: BS 3618-6:1972]

3.24.12**lead****leading wire**

wire, forming part of an electric *detonator* (3.24.7), to which the *shotfiring* (3.29.2) cable is attached

[SOURCE: BS 3618-6:1972]

3.24.13**low tension detonator**

detonator (3.24.7) requiring a current of about 1 ampere for *firing* (3.27.5) and having a resistance of about 1 ohm

[SOURCE: BS 3618-6:1972]

3.24.14**plain detonator**

detonator (3.24.7) for use with *safety fuse* (3.28.5)

[SOURCE: BS 3618-6:1972]

3.24.15**short delay detonator**

millisecond delay detonator

detonator (3.24.7) in which the interval of time delay is expressed in milliseconds

[SOURCE: BS 3618-6:1972]

3.25 Explosive**3.25.1****Conceptual****3.25.1.1****blasting gelatine**

high explosive (3.25.1.7) consisting of nitroglycerin and nitrocotton

Note 1 to entry: It is a strong *explosive* (3.25.1.4), and a rubberlike, elastic substance, unaffected by water.

[SOURCE: Reference [2]]

3.25.1.2**cartridge**

individual unit of *explosive* (3.25.1.4)

Note 1 to entry: Individual unit of explosive, usually wrapped in the form of a cylinder.

[SOURCE: BS 3618-6:1972]

3.25.1.3

cooling agent

chemical added to an *explosive* ([3.25.1.4](#)) during manufacture to suppress or inhibit the flame produced in *blasting* ([3.30.1.1](#))

[SOURCE: BS 3618-6:1972]

3.25.1.4

explosive

mixture or chemical compound by whose decomposition or combustion gas is generated with such rapidity that it can be used for *blasting* ([3.30.1.1](#)) or in firearms

Note 1 to entry: In coal mining, there are two main classes permissible and nonpermissible; i.e., those safe for use in coal mines and those that are not.

[SOURCE: Reference [\[2\]](#)]

3.25.1.5

gelatine

substance in which a principal constituent, nitroglycerine, is given a gelatinous consistency by mixing it with nitro cotton

[SOURCE: BS 3618-6:1972]

3.25.1.6

gelignite

type of *explosive* ([3.25.1.4](#)) of the *gelatine* ([3.25.1.5](#)) containing a proportion of woodmeal and oxygen containing salts

3.25.1.7

high explosive

explosive ([3.25.1.4](#)) which requires to be detonated

[SOURCE: BS 3618-6:1972]

3.25.1.8

licensed store

place or building licensed by the local authority for the storage of *explosive* ([3.25.1.4](#))

[SOURCE: BS 3618-6:1972]

3.25.1.9

magazine

powder house

building for the storage of *explosive* ([3.25.1.4](#)) licensed under government authority to provide for circumstances where the more usual *licensed store* ([3.25.1.8](#)) is inadequate or inappropriate

[SOURCE: BS 3618-6:1972]

3.25.1.10

registered premise

premise registered with the local authority for the storage of not more than 27 kg of *explosive* ([3.25.1.4](#))

[SOURCE: BS 3618-6:1972]

3.25.1.11

low density explosive

explosive ([3.25.1.4](#)) having a relatively low specific weight compared with that of *blasting gelatine* ([3.25.1.1](#))

[SOURCE: BS 3618-6:1972]

3.25.1.12**low explosive**

explosive ([3.25.1.4](#)) which can be ignited by *safety fuse* ([3.28.5](#)), but cannot be detonated

[SOURCE: BS 3618-6:1972]

3.25.1.13**non permitted explosive**

explosive ([3.25.1.4](#)) which is not approved in law for use in permitted light (safety lamp) mines

[SOURCE: BS 3618-6:1972]

3.25.1.14**permitted explosive**

explosive ([3.25.1.4](#)) of a type which has been tested and approved under government authority for use in mines where permitted lights (safety-lamps) are statutorily required (i.e. loosely, where there is a risk of ignition of firedamp)

Note 1 to entry: Permitted explosive are divided into *groups* ([3.22.15](#)) P1, P2, P3, etc., each explosive being classified according to the tests it has passed.

[SOURCE: BS 3618-6:1972]

3.25.1.15**squib**

thin tube filled with *black powder* ([3.25.3.2](#)), forming a slow burning *fuse* ([3.28.4](#))

Note 1 to entry: The squib is applied to explode a *stemmed* ([3.22.18](#)) *charge* ([3.22.7](#)) of black powder.

[SOURCE: BS 3618-6:1972, modified — Note 1 to entry was originally part of the definition.]

3.25.2**Explosive properties****3.25.2.1****bulk strength**

strength of an *explosive* ([3.25.1.4](#)) per unit volume expressed as a percentage of the value for *blasting gelatine* ([3.25.1.1](#)) as a standard

[SOURCE: BS 3618-6:1972]

3.25.2.2**cartridge count**

number of cartridges in a standard case, which typically contains about 22,7 kg of *explosive* ([3.25.1.4](#)) material

[SOURCE: Reference [\[2\]](#)]

3.25.2.3**critical diameter**

minimum *explosive* ([3.25.1.4](#)) diameter which produces the propagation of a *detonation* ([3.24.6](#)) wave at a stable velocity

Note 1 to entry: It is affected by conditions of confinement, temperature and pressure on the *explosive* ([3.25.1.4](#)).

[SOURCE: BS 3618-6:1972]

3.25.2.4

explosive strength

measure of the amount of energy released by an *explosive* (3.25.1.4) on *detonation* (3.24.6) and its capacity to do useful work

Note 1 to entry: Several methods of expressing explosive strength are used, but in most cases the figures are calculated from the deflection of a freely suspended ballistic mortar in which small explosive *charges* (3.22.7) are fired.

[SOURCE: Reference [2]]

3.25.2.5

oxygen balance

amount of oxygen in an *explosive* (3.25.1.4) mixture, expressed in weight percent, liberated as a result of complete conversion of explosive material to CO₂, H₂O, SO₂, Al₂O₃, and other non-toxic gases

Note 1 to entry: Referred to as positive oxygen balance; negative oxygen balance is a deficient amount of oxygen leading to incomplete oxidation of explosive materials resulting in the possible formation of toxic gases, such as CO and NO.

[SOURCE: Reference [2]]

3.25.2.6

sensitivity

measure of the ease with which a substance can be caused to explode and its capacity to maintain explosion through the length of a *shothole* (3.30.1.27)

[SOURCE: Reference [2]]

3.25.2.6.1

cap sensitivity

sensitivity (3.25.2.6) of an *explosive* (3.25.1.4) to initiation by a *detonator* (3.24.7)

[SOURCE: Reference [2]]

3.25.2.6.2

heat sensitivity

flammability of an *explosive* (3.25.1.4) brought into contact with flame or heat

[SOURCE: Reference [2]]

3.25.2.6.3

impact sensitivity

sensitivity (3.25.2.6) of an *explosive* (3.25.1.4) to detonate when impacted

[SOURCE: Reference [2]]

3.25.2.6.4

sympathetic detonation

detonation (3.24.6) of an *explosive* (3.25.1.4) material by means of an impulse from another detonation through air, earth, or water

[SOURCE: Reference [2]]

3.25.2.6.5

flash over

tendency of a *shothole* (3.30.1.27) to be detonated by the shock wave from an adjacent shothole

[SOURCE: Reference [2]]

3.25.2.7**velocity of detonation**

velocity with which the shock wave traverses *charge* (3.22.7) on *detonation* (3.24.6)

[SOURCE: BS 3618-6:1972]

3.25.2.8**water resistance**

qualitative measure of the ability of an explosive or *blasting agent* (3.30.1.2) to withstand exposure to water without deteriorating or becoming desensitized

[SOURCE: Reference [2]]

3.25.2.9**weight strength**

strength of an *explosive* (3.25.1.4) per unit weight

Note 1 to entry: Weight strength is expressed as a percentage of the value for *blasting gelatine* (3.25.1.1) as a standard.

[SOURCE: BS 3618-6:1972, modified — Note 1 to entry was originally part of the definition.]

3.25.3**Types of explosives and blasting agents****3.25.3.1****ANFO**

mixture of ammonium nitrate and fuel oil in such proportions that the mixture can be detonated with a suitable initiator

[SOURCE: BS 3618-6:1972]

3.25.3.2**black powder**

black blasting powder

gunpowder

low explosive (3.25.1.12) composed of sodium or potassium nitrate, charcoal and sulphur

[SOURCE: BS 3618-6:1972]

3.25.3.3**booster**

explosive (3.25.1.4) of special character to improve the performance of another explosive

Note 1 to entry: Booster is used in small quantities.

Note 2 to entry: Booster is the minor portion of the *charge* (3.22.7).

[SOURCE: Reference [2]]

3.25.3.4**dynamite**

general term relating to *explosive* (3.25.1.4) in which the principal constituent, nitroglycerine, is contained within an absorbent substance

[SOURCE: BS 3618-6:1972]

3.25.3.5

slurry explosive

waterproof colloidal *explosive* ([3.25.1.4](#)) of medium power, based upon reduction oxidation reactions and used in fluid form

[SOURCE: BS 3618-6:1972]

3.25.3.6

water gel

explosive material containing substantial portions of water, oxidizers, and fuel, plus a cross-linking agent

[SOURCE: Reference [\[2\]](#)]

3.26 Primer

3.26.1

inert primer

cylinder of inert material which enshrouds a *detonator* ([3.24.7](#)), but which does not interfere with the *detonation* ([3.24.6](#)) of the *charge* ([3.22.7](#))

[SOURCE: BS 3618-6:1972]

3.26.2

primer

contrivance containing percussion powder or other compound for igniting a *charge* ([3.22.7](#))

Note 1 to entry: The primer can be a *cap* ([3.24.7](#)), tube, or wafer.

Note 2 to entry: The primer is ignited by friction, percussion, or electricity.

[SOURCE: Reference [\[2\]](#)]

3.26.3

primer cartridge

cartridge ([3.25.1.2](#)) into which the *detonator* ([3.24.7](#)) has been inserted

[SOURCE: BS 3618-6:1972]

3.26.4

primer charge

boosting *charge* ([3.22.7](#)) placed in contact with a *detonator* ([3.24.7](#)) or *detonating fuse* ([3.28.2](#)) to ensure *detonation* ([3.24.6](#)) of the main charge

[SOURCE: BS 3618-6:1972]

3.26.5

pricker

non-ferrous tool for making a hole in the *primer cartridge* ([3.26.3](#)) to receive the *detonator* ([3.24.7](#))

[SOURCE: BS 3618-6:1972]

3.27 Firing

3.27.1

blasthole

hole drilled in a material to be blasted, for the purpose of containing a *charge* ([3.22.7](#))

[SOURCE: Reference [\[2\]](#)]

3.27.2**circuit tester**

instrument used to test series circuits in electrical *shotfiring* (3.29.2) for continuity and resistance

[SOURCE: BS 3618-6:1972]

3.27.3**delay firing**

firing (3.27.5) of several *shots* (3.22.17) in sequence, at designed intervals of time

Note 1 to entry: Usually by means of *delay detonators* (3.24.4), *detonating relays* (3.28.3) or sequence switches.

[SOURCE: BS 3618-6:1972, modified — Note 1 to entry was originally part of the definition]

3.27.4**exploder****battery**

device designed specifically for producing an electric current for *firing* (3.27.5) *detonators* (3.24.7)

[SOURCE: BS 3618-6:1972]

3.27.5**firing**

process of initiating a *charge* (3.22.7) or of a technical process which results in which results in *blasting* (3.30.1.1)

[SOURCE: BS 3618-6:1972]

3.27.6**fuse lighter**

hand held device for lighting *safety fuse* (3.28.5)

[SOURCE: BS 3618-6:1972]

3.27.7**igniter**

blasting (3.30.1.1) *fuse* (3.28.4) or other contrivance

Note 1 to entry: The igniter is used to fire a *charge* (3.22.7).

[SOURCE: Reference [2]]

3.27.8**igniter cord**

cord which passes an intense flame along its length at a uniform rate to light *safety fuses* (3.28.5) in succession

[SOURCE: BS 3618-6:1972]

3.27.9**mains firing**

firing (3.27.5) of a round by means of current supplied by a transformer fed from a mains power supply

[SOURCE: BS 3618-6:1972]

3.27.10**multi shot firing**

multiple shot firing

firing (3.27.5) several *shothole* (3.30.1.27) either simultaneously or by *delay firing* (3.27.3)

[SOURCE: BS 3618-6:1972]

3.27.11

parallel firing

firing (3.27.5) of *detonators* (3.24.7) in a round by dividing the total supply current between the individual detonators

Note 1 to entry: Compare with *series firing* (3.27.12).

[SOURCE: BS 3618-6:1972]

3.27.12

series firing

firing (3.27.5) of *detonators* (3.24.7) in a round by passing the total supply current through each of the detonator

Note 1 to entry: Compare with *parallel firing* (3.27.11).

[SOURCE: BS 3618-6:1972]

3.27.13

series parallel firing

firing (3.27.5) of *detonators* (3.24.7) in a round by dividing the total supply current into branches, each containing a certain number of detonators wired in series

[SOURCE: BS 3618-6:1972]

3.27.14

trunk line

detonating cord line used to connect the down lines or other detonating cord lines in a blast pattern

[SOURCE: Reference [2]]

3.28 Fuses

3.28.1

capped fuse

detonator (3.24.7) fitted with a length of *safety fuse* (3.28.5)

[SOURCE: BS 3618-6:1972]

3.28.2

detonating fuse

fuse (3.28.4) containing a detonating *explosive* (3.25.1.4)

[SOURCE: BS 3618-6:1972]

3.28.3

detonating relay

device used intermediately in a *detonating fuse* (3.28.2) circuit to obtain a short time delay

[SOURCE: BS 3618-6:1972]

3.28.4

fuse

igniting or *explosive* (3.25.1.4) device in the form of a cord, consisting of a flexible fabric tube and a core of *low explosive* (3.25.1.12) (*safety fuse* (3.28.5)) or *high explosive* (3.25.1.7) (detonating cord)

Note 1 to entry: See examples under *detonating fuse* (3.28.2) and safety fuse.

[SOURCE: Reference [2]]

3.28.5**safety fuse**

fuse (3.28.4) with a black power core, having a prescribed covering and designed to burn at a specified speed

[SOURCE: BS 3618-6:1972]

3.29 Shotfiring**3.29.1****infusion shotfiring**

pulsed infusion

shotfiring (3.29.2) in which a *charge* (3.22.7) is fired in a *shothole* (3.30.1.27) which is filled with water under pressure and in which the strata around the shothole have been infused with water

[SOURCE: BS 3618-6:1972]

3.29.2**shotfiring**

firing (3.27.5) a *charge* (3.22.7) in a *shothole* (3.30.1.27)

3.29.3**simultaneous shotfiring**

shotfiring (3.29.2) in which a round uses *instantaneous detonators* (3.24.10)

3.30 Blasting**3.30.1****Blasting concepts****3.30.1.1****blasting**

technical process to break material into smaller pieces by use of *explosive* (3.25.1.4)

3.30.1.2**blasting agent**

explosive (3.25.1.4) material that meets prescribed criteria for insensitivity to initiation

Note 1 to entry: It is a material or mixture consisting of fuel and oxidizer used in *blasting* (3.30.1.1), but not otherwise defined as an explosive.

[SOURCE: Reference [2]]

3.30.1.3**blasting circuit**

shotfiring (3.29.2) cord together with connecting wire and electric *blasting caps* (3.24.2) used in preparation for the *firing* (3.27.5) of a blast in mines, quarries, and tunnels

[SOURCE: Reference [2]]

3.30.1.4**blasting curtain**

screen erected to prevent damage to equipment and supports in the vicinity of the *blasting* (3.30.1.1) point

[SOURCE: Reference [2]]

3.30.1.5

blasting galvanometer

instrument that provides a simple means for testing electric *blasting* (3.30.1.1) circuits

Note 1 to entry: The blasting galvanometer enables the blaster to locate breaks, short circuits, or faulty connections before an attempt is made to fire the *shot* (3.22.17).

Note 2 to entry: With its use, *misfires* (3.30.1.22) can be prevented to a great extent. To test a circuit, one wire should be placed on one terminal of the instrument and the other wire on the other terminal.

[SOURCE: Reference [2]]

3.30.1.6

blasting machine

portable dynamo that generates enough electric current to detonate electric *blasting caps* (3.24.2) when the machine rack bar or handle is given a quick, downward push

[SOURCE: Reference [2]]

3.30.1.7

blasting mat

mat of woven steel wire, rope, scrap tires, or other suitable material or construction to cover *blastholes* (3.27.1) for the purpose of preventing flying rock missiles

[SOURCE: Reference [2]]

3.30.1.8

blasting needle

pointed instrument for piercing the wad or *tamp* (3.22.18.2) of a *charge* (3.22.7) of *explosive* (3.25.1.4), to permit introducing a *blasting* (3.30.1.1) *fuse* (3.28.4)

[SOURCE: Reference [2]]

3.30.1.9

blasting off the solid

blasting (3.30.1.1) the working face in a coal mine without providing a second *free face* (3.22.14) by *collaring* (3.3.3) or shearing before blasting

[SOURCE: Reference [2]]

3.30.1.10

blasting supply

everything used in *blasting* (3.30.1.1), except *explosive* (3.25.1.4)

EXAMPLE Electric *blasting caps* (3.24.2), ordinary blasting caps, *fuse* (3.28.4), *blasting machines* (3.30.1.6), galvanometers, rheostats

[SOURCE: Reference [2]]

3.30.1.11

blasting switch

switch used to connect a power source to a *blasting* (3.30.1.1) circuit

Note 1 to entry: It is sometimes used to short-circuit the *leading wire* (3.24.12) as a safeguard against premature blasts.

[SOURCE: Reference [2]]

3.30.1.12**blasting timer**

instrument that utilises a powerline as a source of electrical current and that closes the circuits of successive *blasting caps* (3.24.2) with a delay time interval

Note 1 to entry: The timer provides for the circuits of 15 *charges* (3.22.7) and affords positive surveillance of the duration of intervals.

[SOURCE: Reference [2]]

3.30.1.13**blasting unit**

portable device including a *battery* (3.27.4) or a hand-operated generator designed to supply electric energy for *firing* (3.27.5) *explosive* (3.25.1.4) *charges* (3.22.7) in mines, quarries, and tunnels

[SOURCE: Reference [2]]

3.30.1.14**blasting vibration**

energy from a blast that manifests itself in earthborne vibration that are transmitted through the Earth away from the immediate blast site

[SOURCE: Reference [2]]

3.30.1.15**blow**

shot (3.22.17) that blows part of the unfired *explosive* (3.25.1.4) out of the hole

[SOURCE: Reference [2]]

3.30.1.16**bottom cut**

cut (3.23.1) designed as the lower of two converging lines of horizontally spaced *shotholes* (3.30.1.27)

Note 1 to entry: Bottom cuts are generally used when *drilling* (3.1.11) and *blasting* (3.30.1.1) a tunnel.

[SOURCE: Reference [2]]

3.30.1.17**cut shot**

shot (3.22.17) which initially breaks ground to provide a *free face* (3.22.14) for subsequent *shots* (3.22.17)

[SOURCE: BS 3618-6:1972]

3.30.1.18**delay interval**

nominal period between the *firing* (3.27.5) of successive *delay detonators* (3.24.4) in a series of *shots* (3.22.17)

[SOURCE: BS 3618-6:1972]

3.30.1.19**easer**

one of a number of *shotholes* (3.30.1.27) surrounding the *cut* (3.23.1) and fired immediately after it

[SOURCE: BS 3618-6:1972]

3.30.1.20**induction time**

interval between the bursting and *lag times* (3.30.1.21) of a *detonator* (3.24.7)

[SOURCE: BS 3618-6:1972]

3.30.1.21

lag time

total time between the initial application of current and the rupture of the circuit within the *detonator* ([3.24.7](#))

[SOURCE: BS 3618-6:1972]

3.30.1.22

misfire

shot ([3.22.17](#)) which has failed to explode

[SOURCE: BS 3618-6:1972]

3.30.1.23

pull

linear advance that results from the *firing* ([3.27.5](#)) of a *round*

[SOURCE: BS 3618-6:1972]

3.30.1.24

relieving shot

shot ([3.22.17](#)) fired to dislodge or expose a *misfire* ([3.30.1.22](#))

[SOURCE: BS 3618-6:1972]

3.30.1.25

shell

steel tube from which air or other gas at high pressure is discharged with *explosive* ([3.25.1.4](#)) force in a *shothole* ([3.30.1.27](#))

Note 1 to entry: As used with *Cardox* ([3.30.2.5](#)), *Hydrox* ([3.30.2.13](#)), *air blasting* ([3.30.2.1](#)).

[SOURCE: BS 3618-6:1972]

3.30.1.26

shoot

break down by *air blasting* ([3.30.2.1](#))

[SOURCE: BS 3618-6:1972]

3.30.1.27

shothole

hole drilled for the purpose of *shotfiring* ([3.29.2](#))

[SOURCE: BS 3618-6:1972]

3.30.1.28

shooting valve

control valve provided for the purpose of admitting compressed air to an *air blasting* ([3.30.2.1](#)) *shell* ([3.30.1.25](#)) and of venting residual air, in the shell and hose, to atmosphere

[SOURCE: BS 3618-6:1972]

3.30.1.29

socket

back of a *shothole* ([3.30.1.27](#)) which remains after the *firing* ([3.27.5](#)) of a *shot* ([3.22.17](#))

[SOURCE: BS 3618-6:1972]