

CHAPTER XIV EXPLOSIVES AND SHOTFIRING

183. Type of explosives to be used in mines– (1) No explosive shall be used in a mine except that which is provided by the owner, agent or manager which shall be of good quality and in good condition.
(2) No explosive, other than a fuse or a detonator shall be issued for use in a mine, or taken into or used in any part of a mine, unless it is in the form of a cartridge:

Provided that in case of opencast mine, site mixed slurry or emulsion explosives or ammonium nitrate fuel oil may be issued for use or taken into or used in non-cartridge form.

(3) Explosive cartridges shall be used in mine only in the form in which they are received.

(4) No liquid oxygen explosives shall be used in any mine.

184. Storage of explosives.– (1) No owner, agent or manager shall store, or knowingly allow any other person to store, within the premises of mine any explosive otherwise than in accordance with the provisions of the rules made under the Explosives Act, 1884 (4 of 1884).

(2) Explosives shall not be taken into or kept in any building except a magazine duly approved by the Licensing Authority under the provisions of the Explosives Act, 1884 (4 of 1884).

(3) Explosives shall not be stored belowground in a mine except with the approval in writing of the Chief Inspector and subject to such conditions as he may specify therein and such storage shall be done only in a magazine or magazines duly licensed in accordance with the provisions of rules made under the provisions of the Explosives Act, 1884 (4 of 1884).

(4) Every license granted by the Licensing Authority under the provisions of the Explosives Act, 1884 (4 of 1884) for the storage of explosives, or a true copy thereof, shall be kept at the office of the mine.

185. Magazines, stores and premises to store explosives.– (1) Every magazine, or store or premises, where explosives are stored shall be in charge of a competent person who shall be responsible for the proper receipt, storage and issue of explosives.

(2) Explosives shall not be issued from the magazine unless they are required for immediate use:

Provided that if any explosive is returned to the magazine or store or premises, they shall be reissued before fresh stock is used.

(3) Explosives shall be issued only to competent persons upon written requisition signed by the shot-firer or by an official authorised for the purpose, and only against their signature or thumb impression, which shall be preserved by the person in charge of the magazine or store or premises.

(4) The person in charge of the magazine or store or premises shall maintain, in a bound paged book kept for the purpose, a clear and accurate record of explosives issued to each competent person and a similar record of explosives returned to the magazine or store or premises.

186. Cases and containers for carrying explosives.– (1) No explosive shall be issued from the magazine or taken into any mine except in a case or container of substantial construction which is securely locked:

Provided that cases or containers made of iron or steel shall be heavily galvanised and no case or container provided for carrying detonator shall be constructed of metal or other conductive material.

(2) No detonator shall be kept in a case or container which contains other explosives, materials or tools and two or more types of detonators shall not be kept in the same case or container:

Provided that nothing in this sub-regulation shall restrict the conveyance of primer cartridges fitted with detonators in the same case or container for use in a wet working or in a sinking shaft.

(3) No detonator shall be taken out from a case or container unless it is required for immediate use.

(4) Except as otherwise provided for in regulation 188, no case or container shall contain more than five kilograms of explosives, and no person shall have in his possession at one time in any place more than one such case or container :

Provided that the Chief Inspector may, by an order in writing and subject to such conditions as he may specify therein, permit the carrying of a larger quantity of explosives in a single case or container, or the use, at one time in one place, of more than one such case or container.

(5) Every case or container shall be numbered and as far as practicable, the case or container shall be issued to the same shot-firer or competent person, as the case may be, every day.

(6) The key of every case or container shall be retained by the shot-firer in his own possession throughout his shift.

187. Transport of explosives.— (1) While explosives are being carried on a ladder, every case or container shall be securely fastened to the person carrying it.

(2) No person other than a shot-firer shall carry any priming cartridge into a shaft which is in the course of being sunk and no such cartridge shall be so carried except in a thick felt bag or other container sufficient to protect it from shock.

188. Transport of explosives in bulk.— The conditions and other details for transport of explosives in bulk shall be specified by the Chief Inspector in a general order.

189. Reserve Station.— (1) No case or container containing explosives shall be left or kept in a mine except in a place appointed by the manager for the purpose and legibly marked “RESERVE STATION”.

(2) The conditions for site selection and other details for establishing a reserve station in a mine shall be specified by the Chief Inspector in a general order.

190. Shot-firers.— (1) The preparation of charges and the charging and stemming of holes shall be carried out by or under the personal supervision of a competent person, in these regulations referred to as a “shot-firer”, who shall fire the shots himself.

(2) No person shall be appointed to be a shot-firer unless he holds -

- (a) a Manager’s Certificate or Overman’s Certificate or a Sirdar’s Certificate together with a gas-testing certificate in case of belowground mines; and
- (b) a Manager’s Certificate, Overman’s Certificate or a Sirdar’s Certificate in the case of open cast working;

Provided that, after coming into force of these regulations, shot-firer holding a Shot-firer’s Certificate granted under regulation 12 of the Coal Mines Regulations, 1957, shall also deemed to be a shot-firer under this regulation.

(3) The competent person appointed as shot-firer shall not be given any other duty nor any one performing any other duty shall be allowed to perform shot firing.

(4) No person whose wages depend on the amount of coal, rock or debris obtained by firing shots, shall be appointed to perform the duties of a shot-firer.

(5) The manger shall fix, from time to time, the maximum number of shots that a shot-firer may fire in any one shift and such number shall be based on:

- (a) the time normally require to prepare and fire a shot in accordance with the provisions of these regulations;
- (b) the time required for that shot-firer to move between places where shots are fired;
- (c) the assistance, if any, available to him in the performance of his said duties; and shall not in any case exceed,-
 - (i) in the case of a gassy seam of second or third degree or a fiery seam, forty, if a single shot exploder is used and eighty, if a multi-shot exploder is used;
 - (ii) in the case of other seams, fifty, if a single-shot exploder is used and hundred, if a multi-shot exploder is used;
 - (iii) in the case of opencast mines, sixty, if a single shot exploder is used or if blasting is done with ordinary detonators and one hundred and twenty, if a multi-shot exploder is used;

Provided that where special conditions exist, the Chief Inspector may by an order in writing and subject to such conditions as he may specify therein, permit number of shots to be fixed in variance with the aforesaid provisions.

(6) The number of detonators issued to, and in the possession of, a shot-firer during his shift shall not exceed the maximum number of shots that he is permitted to fire under sub-regulation (5).

191. Shot-firing tools.— Every shot-firer on duty shall be provided with-

- (a) a suitable shot-firing apparatus;

- (b) a suitable shot-firing cable;
- (c) a suitable electric lamp or torch, a whistle and a stop watch;
- (d) a tool, made entirely of wood, suitable for charging and stemming shot-holes;
- (e) a scraper made of brass or wood suitable for cleaning out shot-holes;
- (f) a pair of suitable crimpers for crimping detonators;
- (g) where detonators are used, a pricker made of wood or of a non-ferrous metal for priming cartridges;
- (h) a suitable tool for detecting cracks;
- (i) a methanometer for detection of inflammable gas in case of solid blasting;
- (j) a circuit tester for checking shot-firing circuits.

(2) No tool or appliance other than that provided under sub-regulation (1) shall be used by a shot-firer.

192. Drilling, charging, stemming and firing of shot-holes.— (1) No drill shall be used for drilling a shot-hole unless it allows a clearance of at least 0.3 centimeters over the diameter of the cartridge of explosives, which it is intended to use.

- (2) No shot-hole shall be charged before it is thoroughly cleaned.
- (3) Before any shot-hole is charged, the direction of the hole shall, where practicable, be distinctly marked on the roof or other convenient place.
- (4) No detonator shall be inserted into a priming cartridge until immediately before it is to be used, however that in case of wet workings, priming cartridges may be prepared at the nearest convenient dry place and such primed cartridges shall be carried to the working place in a securely closed case or container.
- (5) Detonators once inserted into a priming cartridge shall not be taken out.
- (6) In belowground workings the explosive used in any shot-hole shall be of the same type.
- (7) In opencast mines, to use two types of explosives in any shot-hole, the manager shall frame and enforce standing orders for the safe use of explosives and a copy of the same shall be submitted to the Regional Inspector.
- (8) The shot-firer shall, to the best of his judgment, ensure that no shot-hole is over-charged or under-charged, having regard to the task to be performed.
- (9) Shots shall be fired electrically or by any other means or instruments or apparatus as approved by the Chief Inspector.
- (10) Every shot-hole shall be stemmed with sufficient and suitable non-inflammable stemming so as to prevent the shot from blowing out.
- (11) Only sand loosely filled in, or soft clay lightly pressed home, or a compact but not hard mixture of sand and clay or water shall be used as stemming and in no case, shall coal dust be used for the purpose of stemming.
- (12) In charging or stemming a shot-hole, no metallic tool, scraper or rod shall be used and no explosive shall be forcibly pressed into a hole of insufficient size.
- (13) No shot shall be fired except in a properly drilled, charged and stemmed shot-hole.
- (14) All surplus explosives shall be removed from the vicinity of a shot hole before connecting the shot firing cable to the shot holes.
- (15) As far as practicable, a shot shall be fired by the same shot-firer who charged it.
- (16) No shot-hole shall be charged except those which are to be fired in that round and all shot-holes which have been charged shall be fired in one round.
- (17) Where a large number of shots have to be fired, shot-firing shall, as far as practicable, be carried out between shifts.

(18) No person shall remove any stemming, or pull out any detonator lead, or remove any explosive from a shot-hole either before firing or after a misfire, or bore out a hole that has once been charged, or deepen or tamper with empty holes or sockets.

193. Use of ammonium nitrate fuel oil.— Conditions for use of ammonium nitrate fuel oil in a mine shall be specified by the Chief Inspector in a general order.

194. Deep-hole blasting.— Conditions for conduct of deep hole blasting in a mine shall be specified by the Chief Inspector in a general order.

195. Electric shot-firing.— (1) No shot shall be fired except by means of a suitable shot-firing apparatus of a type approved by the Chief Inspector and the number of shots fired at any one time by the apparatus shall not exceed the number for which it is designed.

(2) Every electrical shot-firing apparatus shall be so constructed and used that –

- (a) it can only be operated by a removable handle or plug;
- (b) the handle or plug shall not be placed in position until a shot is about to be fired and shall be removed as soon as a shot has been fired;
- (c) the firing circuit is made and broken either automatically or by means of a push-button switch.

(3) No shot-firing apparatus shall be used which is defective and every apparatus shall once at least in every three months, be tested by a competent person to ascertain whether it is in safe working order.

(4) If the apparatus fails to fire all the shots in a properly connected circuit, the shot-firer shall return the apparatus to the manager or assistant manager as soon as possible, and it shall not be used again unless it has been tested on the surface and found to be in safe working order.

(5) The result of every test made under sub-regulations (3) and (4) shall be recorded in a bound paged book kept for the purpose and shall be signed and dated by the competent person making the test.

(6) No current from a signalling, lighting or power circuit shall be used for firing shots.

(7) The shot-firer shall-

- (a) retain the key of the firing apparatus in his possession throughout his shift;
- (b) use a well-insulated cable of sufficient length to permit him to take proper shelter and in case of belowground working sufficient to take two right angle turns of pillar, and in no case, shall this cable be less than 50 meters in length;
- (c) before coupling the cable to the firing apparatus, couple up the cable himself to the detonator leads;
- (d) take care to prevent the cable from coming into contact with any power or lighting cable or other electrical apparatus;
- (e) take adequate precautions to protect electrical conductors and apparatus from injury;
- (f) himself couple the cable to the firing apparatus and before doing so, see that all persons in the vicinity have taken proper shelter as provided under regulation 196;
- (g) after firing the shots and before entering the place of firing, disconnect the cable from the firing apparatus.

(8) Where more than one shot are to be fired at the same time,-

- (a) care shall be taken that all connections are properly made;
- (b) all shots, if fired belowground, shall be connected in series;
- (c) the circuit shall be tested, either for electrical resistance or for continuity, before connecting it to the firing apparatus, which shall be made with an apparatus specifically designed for the purpose and only after all persons in the vicinity have taken proper shelter as provided under regulation 196;
- (d) the cable to the shot-firing apparatus shall be connected last;
- (e) detonators of the same electrical resistance shall only be used.

196. Taking shelter before firing shots.— (1) The shot-firer shall, before a shot is charged, stemmed or fired, see that all persons other than his assistants, if any, in the vicinity, have taken proper shelter, and he shall also take suitable steps to prevent any person approaching the shot and shall himself take adequate shelter, along with his assistants, if any, before firing the shots.

(2) In the case of an opencast working, the shot-firer shall not charge or fire a shot-

- (a) unless he has taken the precautions laid down in sub-regulation (1);
- (b) unless sufficient warning, by efficient signals or other means approved by the manager, is given over the entire area falling within a radius of 500 meters from the place of firing (hereinafter referred to as the danger zone) and also he has ensured that all persons within such area have taken proper shelter;
- (c) where any part of a public road or railway lies within the danger zone, unless two persons are posted, one each in either direction at the two extreme points of such road or railway which fall within the danger zone who have, by an efficient system of telephonic communication or hooter or loudspeakers or other means intimated clearance of traffic to the shot-firer and have also warned the passersby and whenever possible the vehicle also, if any, which have passed by such road or railway.

(3) In the case of an opencast working, where any permanent building or structure of permanent nature not belonging to the owner lies within the danger zone, the aggregate maximum charge per delay and per round shall not exceed the amount fixed by the Chief Inspector, by a permission in writing granted on the basis of a scientific study, and subject to such other conditions as he may specify therein.

(4) Notwithstanding anything contained in sub-regulation (3), the Chief Inspector may, by an order in writing and subject to such conditions as he may specify, exempt any mine or part thereof from the operation of the provisions of sub-regulation (3), on the ground that the observance of its provisions is not necessary or reasonably practicable on account of the special conditions existing thereat.

(5) Where the workings, either above or belowground, offer insufficient protection against flying fragments or missiles, adequate shelters or other protection shall be provided.

(6) When two working places belowground have approached within 9 meters of each other, the shot-firer shall not fire any shot in any one of the said workings unless all persons have been withdrawn from the other working place and the same has been so fenced off as to prevent persons inadvertently coming in direct line of the shot.

197. Precautions against dry coal dust.— No shots shall be fired at any place belowground unless the place itself and all accessible places, including roof and sides, within a distance of 18 meters have been treated in the manner specified in clause (b) of sub-regulation (3) of regulation 144 unless such places are naturally wet as specified in the said regulation.

198. Conditions requiring use of permitted explosives.— (1) Notwithstanding anything contained in these regulations, no shots shall be charged or fired in the belowground working if the explosive used is not a permitted explosive, except in—

- (a) a stone-drift, if it does not contain dry coal dust; or
- (b) a shaft which is in the course of being sunk.

(2) In a gassy seam of the second or third degree, no explosive other than the permitted sheathed explosives or other explosives equally safe or any device or apparatus for breaking coal approved by the Chief Inspector shall be used, while in a gassy seam of the first degree, in addition to the above, permitted explosives may also be used:

Provided that the Chief Inspector may by an order in writing and subject to such conditions as he may specify therein, permit, in any gassy seam of the first degree, the use of any explosives other than the permitted explosives.

(3) Notwithstanding anything contained in sub-regulation (1), if blasting is done in any stone drift or sinking shaft within five meters of any coal seam or in coal measure drifts or staple shaft from one seam to another only permitted explosives of such types as may be required by the Chief Inspector shall be used:

Provided that in case of special difficulties, the Chief Inspector may exempt any stone drift or sinking shaft from the provisions of this sub-regulation subject to such conditions as he may specify therein.

199. Precautions in the use of permitted explosives.— (1) No detonator shall be used, unless it is of a type approved by the Chief Inspector.

(2) Where more than one shots are charged for firing, the shots shall be fired simultaneously.

(3) The aggregate charge in any shot to be fired in coal shall not exceed such permissible maximum charge, as the Chief Inspector may, by a general or special order, specify for the kind of permitted explosives used.

200. Approved shot-firing apparatus.— No shot shall be fired in a mine except by means of a shot-firing apparatus of a type approved by the Chief Inspector and subject to such conditions as he may, from time to time, specify by a general or special order:

Provided that where special conditions exist, the Chief Inspector may, by an order in writing and subject to such conditions as he may specify therein, permit the use of any other shot-firing apparatus.

201. Additional precautions in belowground mines.— (1) If in a ventilating district, presence of inflammable gas is detected in any place, no shot-hole shall be charged, stemmed or fired in that place or in any other place situated on its return side till such place has been cleared of gas and declared safe.

(2) Immediately before charging a shot-hole or a round of shot-holes, and again before firing the shots the shot-firer shall carefully test for inflammable gas at all places within a radius of eighteen meters of the place of firing.

(3) No shot-hole shall be charged if any break is found therein, or if inflammable gas is found issuing therefrom.

(4) If after charging a shot-hole, inflammable gas is found in any place within the radius specified in sub-regulation (2), no shot shall be fired until the place has been cleared of gas and declared safe.

(5) No delay-action detonator shall be used, except with the previous permission in writing of the Chief Inspector and subject to such conditions as he may specify therein.

202. Blasting in fire areas in opencast mines.— Conditions for conduct of blasting in fire areas in opencast mines shall be specified by the Chief Inspector in a general order.

203. Inspections after shot-firing.— (1) After a shot has been fired, the shot-firer shall not enter or allow any other person to enter the place until the atmosphere in the area is free from dust, smoke or fumes:

Provided that the shot-firer shall before any other person enters the place, make a careful examination and with his assistants, if any, make the place safe.

(2) No other person shall enter the place, and where guards have been posted they shall not be withdrawn, until the examination has been made and the place has been declared safe in all respects.

(3) In the case of opencast working, after shots have been fired, an all-clear signal shall be given except in the case of a misfire.

204. Misfires.— (1) After firing the shots electrically, no person shall re-enter or be permitted to re-enter the place until five minutes after the source of electricity has been disconnected from the cable.

(2) In the event of a misfire, the entrance or entrances to the working place shall be fenced so as to prevent inadvertent access and no work other than that of locating or relieving the misfire shall be done therein until the misfire has been located and relieved.

(3) In opencast working, it shall be sufficient to mark the place of the misfire with a red flag.

(4) In the event of a misfire, a second charge shall not be placed in the same hole.

(5) If the misfire contains a detonator, the leads thereof shall be attached by a string to the shot-firing cable or some distinctive marker.

(6) Except where the misfire is due to faulty cable or a faulty connection, and the shot is fired as soon as practicable after the defect is remedied, another shot shall be fired in a relieving hole which shall be so placed and drilled in such a direction that at no point shall it be nearer than thirty centimeters from the misfired hole:

Provided that the new hole shall be bored in the presence of a shot-firer, preferably the same person who fired the shot.

(7) After a relieving shot has been fired, a careful search for cartridges and detonators, if any, shall be made in the presence of the shot-firer, amongst the material brought down by the shot:

Provided that in the case of working belowground if such cartridge or detonator is not recovered, the tubs into which the material is loaded shall be marked and further search made on the surface, and as far as possible, the search for the detonators and cartridges and the loading of any coal, stone or debris which may contain a detonator, shall be carried out without the aid of tools.

(8) If a misfired hole is not dislodged by a relieving shot, the procedure laid down in sub-regulations (6) and (7) shall be repeated.

(9) A misfired hole which cannot be dealt with in the manner so provided, shall be securely plugged with a wooden plug, and no person other than a shot-firer, an official or a person authorised for the purpose shall remove or attempt to remove any such plug.

(10) When a misfired shot is not found, or when a misfired shot is not relieved, the shot-firer shall, before leaving the mine,-

- (a) give information of the failure to such shot-firer or official as may relieve or take over charge from him;
- (b) record, in a bound paged book kept for the purpose, a report on every misfire, whether suspected, and whether the shot-hole is relieved or not relieved;
- (c) sign the report and, to record in the said book the action taken for relieving the misfired shot-hole.

(11) The shot-firer of the next shift shall locate and blast the misfired hole, but if after a thorough examination of the place, the place where the misfire was reported to have occurred he is satisfied that no misfire has actually occurred, he may permit drilling in the place.

(12) In case of opencast mines, the owner, agent and manager of a mine shall draw up a plan which shall instruct all shot-firers the detailed procedure to be followed in the event of a misfired shot.

205. Special precautions in stone drifts.- In stone drifts,-

- (a) after shots have been fired, all loose rock shall be removed from the face, and the area lying within a distance of 1.2 meters from the face shall be thoroughly cleaned or washed down with water and carefully examined for presence of misfires or sockets, and without taking such precautions, the next round of shots shall not be fired; and
- (b) if any socket is found, it shall be dealt with in the manner provided in regulation 204.

206. Duties of shot-firer at the end of his shift.- Immediately after the end of his shift, the shot-firer-

- (a) shall return all unused explosive to the magazine, or where a store or premises is provided under regulation 184, to such store or premises;
- (b) shall record, in a bound paged book kept for the purpose, the quantity of explosive taken, used and returned, the places where shots were fired and the number of shots fired by him, and misfires, if any, which shall be signed and dated by him.

207. General precautions regarding explosives.- (1) No person, whilst handling explosives or engaged or assisting in the preparation of charges or in the charging of holes, shall smoke or carry or use a mobile phone or light other than an enclosed light, electric torch or lamp.

(2) No person shall take any mobile phone or light other than an electric torch or an enclosed electric lamp into any explosive magazine or store or premises.

(3) The owner, agent or manager shall take adequate steps to prevent pilferage of explosives during its storage, transport and use in the mine.

(4) No person shall have explosives in his possession except as provided for in these regulations or hide or keep explosives in a dwelling house.

(5) Any person finding any explosives in or about a mine shall deposit the same in the magazine or store or premises and every such occurrence shall be reported to the manager in writing.

(6) Shot-firers and their helpers shall-

- (a) not use battery operated watches, mobile phone, synthetic clothes and socks;
- (b) use only conductive type of foot-wears; and
- (c) in case of leather shoes or boots, the sole shall also be of leather and without hobnails.