

INTERNATIONAL LABOUR OFFICE

MODEL CODE OF SAFETY REGULATIONS
FOR UNDERGROUND WORK
IN COAL MINES



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CHAPTER I

GENERAL

REGULATION 1. DEFINITIONS

1. In this Code the following terms have the meanings hereby assigned to them:

- (a) the term "national laws or regulations" includes laws and regulations, orders and decrees having the force of law issued by a competent authority;
- (b) the term "competent authority" means a Minister, Government department, or other public authority having powers to issue regulations, orders, decrees, or other instructions having the force of law in respect of safety in coal mines;
- (c) the term "mine" includes all underground excavations with shafts or other entrances, slopes, levels, drifts, and other roadways and workings for the extraction of coal, with winding (hoisting), haulage, ventilating and other equipment on the mine premises for generating and transmitting energy used underground, and every shaft in the course of being sunk, and every incline or level in the course of being driven from the surface.

A mine is to be considered as a distinct mine if it has a separate system of ventilation and is operated as a unit: Provided that two or more adjoining mines, which have separate systems of ventilation but are worked by the same operator under one general management, may be considered as one mine by the competent authority for the purposes of certain provisions of this Code, in particular those contained in Chapters XIX-XXIII;

- (d) the term "mine operator" means any person or body corporate who is the immediate proprietor or lessee, concessionaire, or occupier of any mine or of any part thereof, including his agent;
- (e) the term "manager" means a duly qualified and appointed person legally responsible for the management and technical direction of the mine, whether he is the mine operator or a person appointed by him;

- (f) the term "supervisory official" means a person appointed by the manager to supervise or perform certain work, or to supervise the operation of certain machinery, plant, or equipment, and who is competent and responsible for the duties so assigned to him, and has been provided by the manager with the necessary instructions and facilities for their proper performance;
- (g) the term "authorised person" means a person appointed or selected by the manager to carry out special duties and competent and responsible for the work he has been directed to perform;
- (h) the term "shotfirer" means a person authorised to fire shots under conditions specified in national laws or regulations;
- (i) the term "face" means the moving front of any working place, entry, slope or drift;
- (j) the term "firedamp" means any flammable gas, chiefly methane given off from the coal or other strata in a mine.

2. In order to indicate to users of the Code the provisions the application of which is considered absolutely necessary and the other provisions the application of which, without being absolutely necessary, is considered desirable, the word "shall" is used in the first case and the word "should" in the second.

REGULATION 2. GENERAL PROVISIONS

1. In every country where coal is mined, there shall be national laws or regulations governing the safe conduct of coal-mining operations.

2. Whenever this Code mentions danger or provides that anything shall be safe, sufficient or adequate, or shall be done in a safe, sufficient, or adequate manner, the competent authority, as defined in national laws or regulations, should so far as possible specify in special regulations or instructions what shall be considered dangerous, safe, sufficient or adequate.

3. All mines shall be registered with the competent authority.

4. The competent authority shall be notified—

- (a) before any mining operations are begun at a new mine;
- (b) before any new working is begun for the purpose of—
 - (i) opening a new shaft, other outlet or seam; and
 - (ii) where national laws or regulations require, exploiting a new level, or any other important extension of any existing mine; and

(c) before recommencing the working of any shaft or outlet or of any seam after any abandonment or discontinuance for a period to be defined in national laws or regulations.

5. (1) The abandonment of any mine or seam, or where national laws or regulations so require, the abandonment of any considerable area of a mine or seam shall be notified to the competent authority within a period to be specified in national laws or regulations.

(2) Where the national laws or regulations so require, such precautions shall be taken on abandonment as are necessary to ensure the safety of workings in adjacent mines, or in parts of the mine where work is continued.

6. All mines shall be operated in accordance with a general development or projection plan, which, if not otherwise specified in national laws or regulations, shall be submitted to the competent authority at the intervals, and contain the particulars, to be specified in national laws or regulations.

7. Any exceptional circumstances, to be defined in national laws or regulations, that endanger the mine as a whole or a substantial part of it, or the workers employed therein, shall be immediately notified to the competent authority.

8. Where safety rules for a mine are framed in compliance with a statutory requirement the competent authority shall specify which of these rules shall be submitted to it in advance for approval.

9. Persons with physical or mental infirmities shall only be employed on work at which they cannot endanger themselves or others.

10. All plant and equipment that serves to maintain the safety of the mine or to safeguard the life and health of the workers shall—

(a) be inspected at intervals to be specified in national laws or regulations; and

(b) be kept in a safe working condition.

11. All safety devices required by national laws or regulations shall be provided by the mine operator and properly used by the mine workers.

12. No plant, equipment or safety device shall be altered or interfered with in any way without proper authorisation from a responsible official of the mine.

13. (1) Supervisory officials shall be sufficiently acquainted with all means of egress to the surface, or to a neighbouring mine if there is a travelling connection to it.

(2) All employees shall be acquainted with those means of egress to the surface that they may have to use.

(3) Route indicators should be provided where necessary and maintained in proper condition.

14. Anyone who observes any danger to life or limb or to the mine—

(a) shall take immediate steps to remove the danger; or

(b) where this is not possible, he shall—

(i) take immediate steps to warn all persons in danger;

(ii) advise them to withdraw; and

(iii) withdraw himself and notify the supervisory official.

15. (1) Workers shall be immediately withdrawn from any place in which they are found to be in imminent and serious danger.

(2) This requirement shall not apply to special shifts working with due precautions under the direction of a supervisory official to eliminate a dangerous condition.

16. The supervisory officials of an outgoing shift shall inform the supervisory officials of the next incoming shift of any dangers that require attention in the workings under their respective supervision.

CHAPTER II

MEANS OF ACCESS AND EGRESS

REGULATION 3. GENERAL PROVISIONS

1. Except for the duration of shaft sinking and the necessary development operations, and unless national laws or regulations provide otherwise for special cases, from all sections or districts underground there shall be accessible at all times two separate adequately travellable means of egress.

2. In all new installations the two means of egress to the surface shall—

- (a) be of sufficient cross-sectional area throughout;
- (b) be separated by sufficient thickness of strata; and
- (c) not have their surface openings in the same building.

3. In mines in which the two means of egress are shafts in close proximity one to the other, these shafts shall both be sunk to the lowest level in operation, unless other safe means of egress are provided to the satisfaction of the competent authority.

4. Both means of egress shall be kept in a safe condition for easy travelling.

5. In all mines employing more than a certain number of men to be specified in national laws or regulations, shafts or other inclined outlets shall be provided with adequate transport equipment that is suitable for the conveyance of persons and is constantly maintained in safe working order.

6. In new installations all practicable precautions shall be taken to ensure that, where the only means of egress are winding shafts, the two winding engines do not fail simultaneously and in particular—

- (a) in the case of steam winding engines, the boilers supplying the steam shall not be in the same boiler house; and
- (b) in the case of electric winding engines, the engines shall be capable of being connected to two separate power supplies:

Provided that the requirements under (a) and (b) shall not apply where emergency winding gear is available or where ladder-

ways are provided in shallow shafts not exceeding 50 m (150 ft.) in depth.

7. (1) In all mines employing more than a certain number of men to be specified in national laws or regulations, all shaft approaches used by men, both on the surface and underground, shall be permanently and adequately lighted throughout working hours.

(2) The illumination over this area shall enable men to work and pass easily and safely and without the aid of their portable lamps.

8. If landings are laid out on both sides of a winding shaft, there shall be an adequate run-round to enable persons to pass safely from one side of the shaft to the other, unless the operations at such landings do not require men to cross the shaft.

REGULATION 4. LADDERWAYS

1. Where ladderways are used the provisions of paragraphs 2 to 8 of this Regulation shall apply.

2. (1) All man-winding shafts shall be provided either—

(a) with ladders over their whole length; or

(b) with an emergency winding installation entirely independent of the main winding installation.

(2) In winding shafts and staples, the ladders shall be in a separate compartment, adequately fenced off from the winding compartment.

3. Ladderways shall be—

(a) so installed as to allow of safe travel;

(b) kept in a safe condition; and

(c) regularly inspected at intervals to be specified in national laws or regulations.

4. Every ladder shall be of strong metallic construction, securely fixed in position and maintained in good repair.

5. (1) Ladders shall not be sloped at an angle exceeding 80°.

(2) Subparagraph (1) shall not apply in sinking pits, or in staples, not exceeding a depth to be specified in national laws or regulations, if the ladders are so arranged that continuous support is afforded to the worker's back.

6. (1) In all ladderways, rest platforms shall be installed wherever practicable and not more than 10 m (30 ft.) apart.

(2) The ladders shall extend at least 1 m (3 ft.) above the platforms and the bank, or else fixed hand grips shall be fitted.

7. Ladders shall be so placed as to cover the manholes of the rest platforms immediately below.

8. When men are travelling on ladders, mine lamps, tools, and any other objects carried by them shall be carefully secured against falling.

CHAPTER III

PLANS

REGULATION 5. GENERAL PROVISIONS

1. Every mine shall keep accurate and adequate plans showing separately for each seam worked particulars of all the workings and such other particulars of use from the safety standpoint as may be specified in national laws or regulations.

2. One copy of the plans shall be kept by the mine operator and another should be communicated to the competent authority once a year, or at such other intervals as it may require, after being brought up to date.

3. (1) All mine plans shall be brought up to date at regular intervals, to be specified in national laws or regulations.

(2) No mine or part of a mine shall be abandoned before the mine plans have been brought up to date in agreement with the competent authority, who shall be notified of the abandonment as required by Regulation 2, paragraph 5.

(3) The requirements of subparagraph (2) shall not apply if the abandonment results from an unforeseen emergency that makes access to such workings impossible or highly dangerous; in such case the mine plans shall be supplemented as far as possible from indications furnished by the manager.

4. (1) At every mine a duly certificated surveyor¹ shall be responsible for the accuracy of all statutory mine plans.

(2) If mine plans are found deficient by the competent authority, this authority shall be empowered to have the mine surveyed and to have fresh plans prepared at the expense of the mine operator.

¹ "Surveyor" is equivalent to "mining engineer".

CHAPTER IV

EXPLOSIVES

REGULATION 6. GENERAL PROVISIONS

1. Only explosives and ignition appliances approved by the competent authority and provided by the mine operator shall be taken into or used in the mine.

2. The delivery, conveyance, storage, issue and return of explosives shall be effected by authorised persons, specially instructed by the manager for these purposes.

3. Possession and use of explosives by other persons than those authorised by the manager shall be prohibited.

4. (1) Frozen or deteriorated explosives shall not be taken into the mine.

(2) If found underground, such explosives shall be brought to the surface.

(3) On the surface frozen explosives shall be thawed with due precautions, and deteriorated explosives shall be destroyed as directed by the manager.

5. (1) In fiery or dusty mines only safety explosives of an approved type shall be used for coal getting and in certain work in stone to be specified by national laws or regulations.

(2) Exemptions from the requirements of subparagraph (1) shall be permitted only under conditions to be specified by the competent authority.

6. The competent authority should issue special regulations regarding—

- (a) classification of explosives from the safety standpoint;
- (b) rules to be complied with by explosives manufacturers as regards cartridging;
- (c) particulars to be marked on cartridges; and
- (d) substances and appliances designed to produce a similar effect to that of explosives.

REGULATION 7. CONVEYANCE OF EXPLOSIVES TO
THE MAGAZINE

Surface

1. (1) When delivered to the mine, explosives shall be immediately conveyed in a safe manner to the explosives magazine, under the supervision of an authorised person.

(2) Explosives shall only be transported as packed by the factory.

2. Detonators shall not be conveyed together with other explosives in the same container unless the container is divided into insulated compartments having dimensions to be specified by the competent authority.

Underground

3. When carried in the same container, explosives and detonators, shall be conveyed underground in the conditions laid down in paragraph 2 of this Regulation.

4. In mines where large quantities of explosives are stored or transported underground, special regulations on their handling, storage and transport shall be drawn up by the manager and approved by the competent authority.

5. For the mines referred to in paragraph 4 of this Regulation special rules respecting underground magazines shall be laid down in national laws or regulations, or by the competent authority, as regards—

- (a) design and installation;
- (b) situation, isolation and protection against humidity;
- (c) ventilation and removal of fumes in case of ignition; and
- (d) precautions against explosion and fire.

REGULATION 8. ISSUE, RETURN AND RECORDING
OF EXPLOSIVES

1. Explosives shall only be issued at the place and in the manner designated by the manager.

2. Each kind of explosive shall, as far as possible, be issued in the same chronological order in which it was delivered at the mine.

3. (1) Explosives shall be issued only to persons authorised to receive them and to persons authorised to fire shots.

(2) All such authorised persons shall, at the end of the shift—

- (a) return all unused explosives to the place of issue; and

(b) except where an automatic receiving device is in operation at the place of issue, personally hand the explosives over to the persons responsible for collecting them.

4. The maximum quantity of explosive to be issued to any one man at one time shall be—

(a) fixed by a supervisory official appointed by the manager; and

(b) limited to the requirements of the shift.

5. Admittance to the explosives magazine of any person not authorised by the manager shall be prohibited.

6. Except in cases specified by national laws or regulations, or by the competent authority—

(a) the explosives issued shall be carried only by authorised persons and only in adequate closed containers (powder boxes);

(b) the maximum quantity of explosives to be carried shall be specified by national laws or regulations;

(c) powder boxes with adequate locks shall be provided by the mine operator and shall be kept locked by the authorised person whenever they are unattended;

(d) special regulations shall be made by the competent authority in cases where explosives are conveyed by trolley locomotive haulage; and

(e) in mines using electricity (otherwise than for lighting) detonator boxes shall be constructed of substantial non-conducting material.

7. (1) For every explosives magazine a register of a type specified by the competent authority shall be kept and shall contain particulars, including the names or the identification numbers of the persons concerned, of the delivery, issue and return of explosives.

(2) The delivery, issue and return of explosives shall be immediately entered in the register.

(3) The return of any unused explosives deposited in the automatic devices referred to in paragraph 3 (2) (b) shall be recorded before the next distribution begins.

(4) The register shall be balanced daily, compared with stock, and signed by the responsible person in charge of the magazine.

8. If any explosive is missing the manager shall be immediately notified.

9. No person shall take away from a mine any explosive without the permission of the manager.

10. The requirements of this Regulation shall also apply to detonators.

REGULATION 9. KEEPING OF EXPLOSIVES AND IGNITION
APPLIANCES BY SHOTFIRERS DURING THE SHIFT

1. (1) Shotfirers who are appointed for a number of work-places and carry their own explosives shall keep the reserve of explosives in a special chest that shall be kept securely locked.

(2) Tools shall not be placed in a powder box or the special chest referred to in subparagraph (1).

2. (1) Detonators, whether they are permanently attached to the fuses or not, shall be kept—

(a) in their special safe containers; or

(b) in a special compartment in the powder boxes or special chests separated from the cartridges.

(2) In every case detonators shall be kept securely under lock and key.

3. The key of the powder box or special chest shall be carried by the authorised shotfirer and shall never be out of his possession.

4. (1) Notwithstanding Regulation 8, paragraph 3, and only where a shotfirer is appointed for a number of working places with continuous shift working, such shotfirer may, subject to the approval of the competent authority, at the end of the shift hand over unused explosives to a similarly appointed shotfirer, on the succeeding shift, provided that the exchange of explosives is noted in detail in the shotfirers' register mentioned in Regulation 10, paragraph 3.

(2) Notwithstanding Regulation 9, paragraph 3, and only in the case of continuous stone-drift work, the leading miner or shotfirer may, subject to the approval of the competent authority, hand over the key of his powder box to the shotfirer or leading miner on the succeeding shift, provided that the exchange of explosives is noted in detail in the shotfirers' register mentioned in Regulation 10, paragraph 3.

5. The requirements of this Regulation shall also apply to detonators.

CHAPTER V

SHOTFIRING

REGULATION 10. GENERAL PROVISIONS

1. Shotfiring shall only be allowed in such mines or parts of mines as are specified by the competent authority or by national laws or regulations and in the conditions laid down by the competent authority.

2. Shotfiring shall only be done by authorised persons who possess suitable qualifications as specified in national laws or regulations.

3. (1) Shotfirers shall keep a register of a type to be approved by the competent authority and as soon as possible after firing enter in it all particulars of the shots fired.

(2) The register shall be balanced and signed at the end of each shift.

REGULATION 11. CHARGING, TAMPING (STEMMING) AND FIRING

1. No shot charged with explosives shall be fired except in a properly drilled and tamped (stemmed) shothole.

2. (1) For tamping (stemming), use shall only be made of—

- (a) suitable non-flammable material provided by the mine operator; or
- (b) devices approved by the competent authority and provided by the mine operator.

(2) The tamping (stemming) referred to in subparagraph (1) (a) of this paragraph—

- (a) shall extend along a sufficient length of the shothole;
- (b) shall, over its entire length, fill the cross-section of the hole; and
- (c) should as far as practicable exceed 20 cm (8 in.) in length.

(3) A supervisory official shall see that supplies of tamping (stemming) material or devices are available near the workplace where firing is being done.

3. Before the charge is inserted, the shothole shall be thoroughly cleaned out and cleared of all dust.

4. (1) The shotfirer shall himself connect the shots together and to the shotfiring lines and fire them.

(2) The charging and tamping (stemming) shall be done by him or under his supervision.

5. (1) Cartridges shall only be used in the form in which they are delivered.

(2) Cartridges shall not be forced into the shothole.

(3) The tamping rod shall be entirely free of metal.

(4) The charge in any shothole shall not be larger than a maximum to be specified by the competent authority.

6. (1) Shots shall not be charged until immediately before firing.

(2) Cartridges shall not be fitted with detonators or fuses until immediately before use.

(3) The use of powder fuses or squibs shall only be permitted, under conditions approved by the competent authority, in mines where there is no danger from firedamp or coal dust.

(4) If a number of shots are charged together they shall be fired at the same time.

7. When more than four shots are to be fired simultaneously in any one place they shall be fired electrically in series.

8. Holes drilled in rock shall be drilled wet, or dust-collecting apparatus provided by the competent authority shall be used.

REGULATION 12. PROTECTION AGAINST FLYING FRAGMENTS

1. (1) Before the shotfirer connects the firing line to the exploder or (where fuses or squibs are permissible) before the fuses or squibs are lighted, he shall see that men are posted at all approaches to the workplace where firing is to be done.

(2) If enough men are not available for this purpose, the unguarded approaches shall be effectively fenced off.

(3) The shotfirer shall, before firing the shot, ensure that all persons in the vicinity have taken adequate cover and shall be the last to leave the workplace and shall himself take proper shelter.

(4) If guards have been posted or fencing has been erected, they shall not be withdrawn or removed until the shotfirer has authorised access to the workplace.

2. If two workings approach each other and one of them is likely to be broken into by a shot fired in the other, the supervisory official shall stop work in the latter working in good time before the shot is fired and fence it off.

3. Where the workings offer insufficient protection against flying fragments from shots, adequate shelters or other protection shall be provided.

REGULATION 13. PROCEDURE AFTER FIRING

1. The shotfirer shall not allow the workplace to be re-entered after firing until the fumes have sufficiently dispersed and a responsible person has carefully examined the place and ascertained that work can be resumed safely.

2. If shots are known or are suspected to have misfired or a residue of explosives to have remained in any shothole—

- (a) work shall not be resumed in dangerous proximity to such shots;
- (b) no person shall approach the firing area until an interval has elapsed of at least 5 minutes in the case of electrical firing, and at least an hour in the case of shotfiring by fuses or squibs;
- (c) misfires and residues of explosives shall be rendered harmless only by an authorised shotfirer, preferably the same man who has charged and fired the shot, and in a manner authorised by the competent authority; during this work only persons employed on it shall remain in the firing area; and
- (d) if the shotfirer cannot render the misfire or the unexploded residue of explosive harmless, he shall fence off the firing area and indicate it personally to the supervisory official, who shall see that the relieving shotfirer is informed.

3. It shall be prohibited to scrape out or drill out shots wholly or partly or to drill farther into sockets.

REGULATION 14. ADDITIONAL REGULATIONS FOR ELECTRICAL SHOTFIRING

1. Electrical shotfiring apparatus shall be regularly inspected, cleaned and overhauled at intervals to be specified by the competent authority and maintained in a safe condition.

2. (1) Electrical shotfiring apparatus shall be used only by an authorised shotfirer.

(2) The shotfirer shall couple the machine to the shotfiring lines only at the moment of firing the shot.

(3) No more shots shall be charged than can safely be fired simultaneously by the shotfiring apparatus used.

3. For shotfiring lines only insulated conductors should be used.

4. Precautions shall be taken to prevent shotfiring wires from coming into contact with other electrical conductors.

5. Where firing from the mains is permitted by national laws or regulations—

- (a) the connection of the firing line to a power line shall only be effected through a switch that is under lock and key and cuts off the current on all poles;
- (b) a second disconnecting device, also under lock and key, shall be inserted between the switch and the firing line; and
- (c) shotfiring wires shall not be laid in the same conduits as wires for other purposes.

6. When several shots have to be fired at the same time—

- (a) care shall be taken that all connections are properly made;
- (b) all shots to be fired shall, unless otherwise directed for mines liable to sudden outbursts of gas, be connected in series; and
- (c) the main conductor to the machine or the mains shall be connected last and shall be of sufficient length.

7. Delay-action devices in electrical detonators shall only be used with the approval of the competent authority.

REGULATION 15. ADDITIONAL PROVISIONS FOR SHOT FIRING IN MINES OR PARTS OF MINES THAT ARE DEFINITELY DANGEROUS ON ACCOUNT OF FIREDAMP OR COAL DUST

1. Explosives shall not be used—

- (a) in any place where firedamp is indicated by the lowered flame of the flame safety lamp, or where methane indicators show 1 per cent. or more of methane in the general body of the air;
- (b) in any place where it might be liable to break through into a coal seam already worked out or any known excavation or breaks in which firedamp is likely to have accumulated; or
- (c) for the unblocking of chutes.

2. Electrical shotfiring apparatus shall be of a type approved by the competent authority, and only apparatus provided by the mine operator shall be used.

3. In places where firedamp may be liberated by a shot or in other particularly dangerous environments, permitted sheathed

explosives or other permitted explosives not less safe should be used under conditions to be specified by the competent authority.

4. (1) Immediately before charging each shot and before firing, the shotfirer shall test the air for firedamp within a radius from the shothole to be specified by national laws or regulations; in particular, cavities, breaks and holes in the roof shall be tested.

(2) Immediately before charging the hole, he shall examine it for breaks and for firedamp issuing from it.

(3) The hole shall not be charged if—

(a) any break is found in the hole;

(b) firedamp is found to be issuing from it; or

(c) firedamp is found in the general body of the air.

(4) If, after charging, firedamp is found within the prescribed radius, the charge shall not be fired until the firedamp has been cleared.

(5) For the purpose of this paragraph, firedamp is found when it is indicated by the lowered flame of the flame safety lamp or, where methane indicators are used, they indicate 1 or more per cent. of firedamp.

5. (1) When firing in coal seams liable to produce dangerous dust, before charging the shots the firing area shall be adequately protected by stone dust or by watering.

(2) In stone workings away from the coal these precautions may be dispensed with.

6. Detonators and ignition appliances shall not be fired alone.

7. In mines liable to sudden outbursts of gas, shotfiring shall be subject to special regulations issued by the competent authority.

CHAPTER VI

SUPPORTS

REGULATION 16. GENERAL PROVISIONS

1. All mine workings shall at the time of their construction be protected against falls of rock and coal and be maintained in a safe condition for the whole time that they are in use.

2. (1) The supports shall be of adequate strength and shall be installed in accordance with specific rules (mine support rules) to be laid down by the manager and supplemented or modified by him as and when required.

(2) In the mine support rules, for every workplace, district or seam, the method of supporting and the maximum intervals between the various parts shall be specified, in particular the intervals between—

- (a) supports on roadways;
- (b) each row of props at the face;
- (c) adjacent props in the same row;
- (d) the front row of props and the face;
- (e) holing props or sprags;
- (f) chocks; and
- (g) packs.

3. Overhanging coal and sides that threaten to fall shall be taken down or safeguarded against premature collapse by adequate spragging.

4. On roads, cavities in the roof shall be filled up as far as practicable above the roof supports.

5. When repairing, changing or withdrawing supports special precautions shall be taken against falls of rock and coal.

6. In repairing fallen-in places the neighbouring supports shall be specially protected against thrust.

7. (1) Supports shall be withdrawn only under the general charge of a supervisory official and only by experienced workers.

(2) The work shall be done from a safe place and a safe distance, by means of appropriate tools and safety contrivances, the pro-

cedure to be specified by the manager, or his deputy, in accordance with principles laid down by the competent authority.

8. Sufficient and suitable material for supports shall be provided by the mine operator, and the supervisory officials shall see that it is constantly and readily available for use in each working place and that it is used whenever necessary.

9. In addition to the supervisory officials every person working at the coal face or in stone work or on timbering shall be responsible in his own place for the timely and proper installation of supports and for their replacement or strengthening whenever necessary.

10. The supervisory staff and the workers concerned shall examine and test the roof and sides and the supports as often as possible and especially before work is resumed after interruptions of any considerable length.

11. In thick or steeply inclined seams, holing props or sprags shall not be removed until the coal is about to be taken down, nor until the new roof supports have been erected near the face in the manner specified in the mine support rules.

12. (1) In inclined seams the supporting props or chocks shall be set so as to ensure maximum support, having regard to the inclination of the seam and probable strata movements.

(2) If necessary on account of side pressure, and more particularly in inclined seams and roads, the supports shall be specially reinforced to prevent displacement.

13. A register in which the general methods of supporting are regularly described shall be kept at each mine.

REGULATION 17. HAND OR MECHANICAL PACKING AND STOWING

1. (1) The manager shall lay down general rules for packing and stowing.

(2) The packs shall be built as tightly as possible to the roof.

(3) Where strip packs are used they shall be well built and placed at suitable intervals.

(4) Where the manager or the competent authority is of opinion that conditions as regards firedamp or spontaneous combustion make the leaving of open spaces in the goaf dangerous, they shall be avoided as far as practicable.

2. Whenever necessary, roadways shall be stowed before they are abandoned.

CHAPTER VII

HAULAGE OF MATERIAL

Section 1. General

REGULATION 18. GENERAL PROVISIONS

1. Every haulage road shall be—
 - (a) of adequate dimensions; and
 - (b) as regular in gradient and cross-section, and as straight, as is practicable.
2. All tracks, tubs, mechanical gear, ropes and appliances used in connection with haulage shall be—
 - (a) of sound construction;
 - (b) regularly inspected; and
 - (c) maintained in an efficient and safe condition.
3. The manager or his deputy shall appoint one or more competent officials who will be responsible throughout the mine for all haulage plant, operations and staff.
4. (1) The code of signals for mechanical haulage operations shall be specified by the mine manager unless a uniform code for all mines in the same district has been specified by the competent authority.
 - (2) The code shall be posted up or otherwise made known to the workers.
5. At all places where tubs are coupled or uncoupled there shall be at least 60 cm (24 in.) clear space—
 - (a) between the tubs and the side of the road; and
 - (b) where there are two or more parallel lines of rails, between the lines of rails.
6. (1) On roadways where haulage is done by animals or by any mechanical means whatever, and where any person is allowed to work or pass while the haulage is in motion, shelters in which at least two persons can take refuge shall be built in the sides at suitable intervals: Provided that this provision shall not apply to conveyer roads.

(2) Every such shelter shall be—

- (a) of adequate dimensions;
- (b) made readily visible by whitewashing or other means; and
- (c) kept clean and unobstructed.

7. (1) Where there is considerable traffic, haulage roads shall be kept adequately lighted, and effectively whitewashed at—

- (a) all sidings, landings, passbyes and junctions (offtakes); and
- (b) all places where tubs are being coupled or uncoupled, except within 100 m (300 ft.) of the working face.

(2) Every haulage road shall be kept clear as far as possible of pieces of coal and other obstructions.

8. Riding on tubs or their attachments without the authorisation of the supervisory official shall be prohibited.

9. (1) Whenever possible, places where tubs are coupled or uncoupled shall not be on a gradient.

(2) Sufficient and suitable sprags, lockers or drags or other devices shall be provided by the management and shall be used for the purposes of controlling tubs in motion and holding tubs while they are being coupled or uncoupled.

(3) On all haulage roads adequate precautions shall be taken to prevent tubs, and in particular, sets of tubs¹, running away.

(4) Wherever persons are exposed to danger from runaway tubs effective safety devices shall be installed and used.

10. (1) Where roads are not permanently lighted, drawers and horse drivers should as far as practicable so place or carry their lamp during haulage that the light can be seen from in front.

(2) Locomotive-hauled sets shall carry a conspicuous red warning light on the last tub.

11. Wherever reasonably practicable, tubs should be equipped with buffers that project beyond the ends to a distance of at least 10 cm (4 in.).

12. (1) Except at landings and loading places and during shunting, tubs that are moved together shall be coupled.

(2) Arrangements shall be made so that the tubs can be coupled and uncoupled with safety.

13. (1) In horse-haulage, derailed tubs shall not be rerailed until the horse has been unhitched.

(2) In mechanical road haulage, derailed tubs shall not be rerailed by hand until the haulage engine or the rope has been stopped.

¹ "Set of tubs" is equivalent to "trip of cars".

(3) On mechanical haulage inclines, derailed carriages, counterweights and tubs shall not be rerailed by hand until both the carriage or the tub and the counterweight have been secured against running away by means independent of the haulage or braking equipment.

14. The haulage of persons shall be subject to the provisions of Chapter VIII of the present Code.

Section 2. Haulage on Level and Inclined Roads

REGULATION 19. HAND AND ANIMAL HAULAGE

1. (1) Unless national laws or regulations contain special provisions concerning hand and animal haulage, these operations shall be carried out in conformity with rules laid down by the manager and approved, if necessary, by the competent authority.

(2) These rules should, in particular, contain provisions respecting—

- (a) the handling and blocking of tubs on gradients;
- (b) the conditions in which, when this is authorised under Regulation 18, paragraph 8, the drivers may ride on tubs or their attachments; and
- (c) the coupling, uncoupling and rerailing of tubs.

2. When workers have to push tubs in low places their hands shall be protected by suitable devices.

3. Hand haulage of tubs in close succession shall be prohibited.

REGULATION 20. MECHANICAL HAULAGE. GENERAL PROVISIONS

1. (1) Haulage with locomotives shall be subject to special rules to be approved by the competent authority.

(2) Petrol locomotives shall not be permitted.

(3) Diesel locomotives for use in mines shall be of a type approved by the competent authority.

(4) Compressed-air locomotives shall not be used on roadways where a clear lookout is not ensured.

(5) The use of electric locomotive haulage shall be subject to the authorisation of the competent authority, and, in mines where there is any danger from firedamp or coal dust, electric locomotives shall be of types approved by the competent authority.

2. No locomotive shall be taken into use or kept in use if any serious defect of any kind is noticed.
3. In the case of haulage with a rope and stationary engine, proper means shall be provided for signalling to the engine-man from a sufficient number of points in the road.
4. Tracks shall be constructed of rails of adequate section and be properly laid.
5. (1) The frames of pulleys, sheaves and rollers on rope haulages shall be made of non-flammable material.
(2) All pulleys, sheaves and rollers shall be securely fixed.
(3) Pulleys, sheaves and rollers that alter the direction of the rope shall be securely protected or otherwise rendered safe.
6. On main and tail rope haulages the coupling or uncoupling of tubs in motion shall be prohibited.

REGULATION 21. ELECTRIC LOCOMOTIVE HAULAGE

Trolley Locomotive Haulage

1. Trolley locomotive haulage shall only be used subject to such conditions affecting safety as may be prescribed by the competent authority.
2. Trolley locomotive haulage shall only be permitted in mines or parts of mines on main haulage roads where the firedamp content in the general body of the air does not exceed 0.3 per cent., and the following rules shall be observed:
 - (a) the maximum voltage, the character of the current and the electrotechnical details of the installation shall be approved by the competent authority with due regard to safety;
 - (b) the minimum height of the trolley wire above the top of the rails shall be fixed by the competent authority; and
 - (c) at shunting places, crossings and approaches, conspicuous light signals shall be placed so as to show when the trolley wire is live.
3. For the whole length of the trolley wire the roadway shall be adequately protected against falls, or deformation that might result in a reduction of the height of the trolley wire above the top of the rails exceeding 10 per cent. of the normal height.

Storage-Battery Locomotives

4. Storage-battery locomotives shall only be permitted in mines or parts of mines subject to such rules as may be specified

by the competent authority, particularly as regards the prevention of explosion of firedamp or hydrogen.

5. Where storage-battery locomotives are used, national laws or regulations shall contain provisions respecting the safe construction and use of batteries.

6. (1) Batteries shall not be charged or changed below ground except at a charging station approved by the competent authority.

(2) The station shall be constructed of non-flammable material.

(3) The station shall be well ventilated by a separate split of intake air which shall pass directly into a main return airway.

REGULATION 22. DIESEL LOCOMOTIVES

1. Diesel locomotives shall be kept in such state of repair and so operated that their exhaust gases are diluted and rendered harmless.

2. The fuel shall conform to a standard approved by the competent authority.

3. The fuel shall be taken into the mine in sealed metal drums or in tank cars which shall be removed from the mine as promptly as possible.

4. The transfer of fuel to a reserve tank or a locomotive shall only be done in an approved filling station by means of a pump or syphon from sealed metal drums or tank cars.

5. The filling station and the housing station for the locomotives shall be well ventilated and shall be separated from the roadway and constructed of incombustible material.

6. Greasy or oily waste shall be kept in closed metal receptacles and removed daily.

7. The return airway from the station shall be so arranged that in the event of a fire harmful gases pass directly into the main return airway.

8. Efficient fire extinguishers shall be kept on the locomotives and in the filling and housing stations.

9. (1) The principal parts of the locomotive shall be examined every day by a competent person.

(2) The locomotive shall be thoroughly examined once a month by a qualified engineer.

(3) Cylinders and pistons shall be reground or the piston rings changed whenever necessary.

10. The flame traps shall be carefully attended to and cleaned at frequent intervals, and the baffle plates renewed as often as may be necessary.

11. (1) In the event of any irregularity in the running or sound of the engine and in particular any excessive emission of smoke, any open sparking, any stoppage in the circulation of water, and any leakage of fuel, the locomotive shall be immediately examined.

(2) Any defects found to affect the safe use of the locomotive shall be remedied without delay or the locomotive shall be immediately withdrawn from service.

12. The results of inspections and any irregularities in running should be entered in a register.

13. The manager shall issue instructions setting out the precautions to be taken for the conveyance of fuel underground, and the filling of tanks.

REGULATION 23. COMPRESSED-AIR LOCOMOTIVES

1. (1) Every day before being taken into use every compressed-air locomotive shall be carefully and thoroughly inspected by the driver.

(2) Once in every week the locomotive shall be thoroughly examined by a qualified engineer.

(3) The results of this examination should be entered in a register.

2. (1) Compressed-air locomotives shall be properly maintained, and the air containers examined and tested under adequate pressure when necessary and at intervals to be specified by the competent authority.

(2) The cylinders and preheaters shall, on the occasion of extensive repairs or every four years, be cleaned inside and outside, taken to pieces, rinsed out with warm suitable oil and subjected to a pressure test.

3. All repairs and tests should be recorded in the register mentioned in paragraph 1 (3) of this Regulation.

REGULATION 24. CONVEYORS

1. Where practicable, all roadway conveyors shall—
- (a) be installed so as to provide sufficient clearance above and below and on both sides of the conveyors; and
 - (b) have a travelling road free from obstruction not less than 0.60 m (2 ft.) wide between the conveyor and one side.

2. As far as practicable—
 - (a) no flammable material shall be used for support or other purposes within a distance of not less than 4 m (13 ft.) from the driving unit of the conveyor; and
 - (b) the space under the conveyor structure shall be kept clear of wood and other combustible material.
3. Suitable and adequate means of extinguishing fires shall be provided along conveyor roads and at the driving unit of every conveyor.
4. Travelling or riding on a moving conveyor shall only be allowed with special permission of the supervisory official and provided that the clearance between conveyor and roof is sufficient.
5. Conveyors shall be provided with effective means of signalling to the engine attendant¹ or means to stop the engine from any point along the conveyor.
6. There shall be adequate and constant patrolling of all roadway conveyors while they are at work.
7. (1) Dangerous parts of belt conveyors, in particular the driving unit and the return end, shall be safely fenced.
 - (2) It shall be possible to clean these parts without danger; they should preferably be self-cleaning.
 - (3) Manual cleaning of such parts shall be prohibited while the belt is in motion.
8. Where the inclination of any conveyor gives rise to danger from sliding objects, devices shall be used to afford adequate protection against such danger.
9. The scraping of conveyors against wooden props shall be avoided.
10. The anchoring of return stations of conveyors shall be independent of face or road supports.

Section 3. Haulage on Inclines

REGULATION 25. GENERAL PROVISIONS

1. No person shall be employed as onsetter, brakesman or haulage engineman unless he is qualified for the work.
2. (1) Braking appliances (except portable brakes) and winches shall be properly fixed in position.

¹ "Engine attendant" is equivalent to "engine operator".

(2) Portable brake pulleys or other braking appliances that are attached to a prop should be fastened to a second prop by an emergency chain.

3. All braking appliances and winches shall be properly constructed, maintained and operated.

4. If hewers or drawers do their own braking they shall be able to operate the braking appliances from a safe position.

5. Where carriage inclines are in use they shall be installed and operated in accordance with rules drawn up by the manager and approved by the competent authority.

6. (1) All approaches to haulage inclines shall be so protected that tubs cannot be pushed on inadvertently.

(2) Where the gradient is steep, protection shall also be afforded against the risk of persons falling into the incline.

7. For mechanical or gravity haulage inclines, appliances shall be provided for communicating distinct and definite signals between all regular landings and the ends of the incline.

8. During interruptions in haulage and at the end of the shift the haulage engineman shall cut off the power from the engine or winch, and see that the engine or winch is blocked with the brake.

9. (1) When a tub is derailed or is stopped by an accident, the necessary steps shall be taken by the brakesman or engineman and the incline attendants, so that it cannot run away.

(2) The haulage shall not be restarted until all the men employed in the rerailing and handling of the tub are in safety.

Section 4. Face Haulage

REGULATION 26. GENERAL PROVISIONS

In so far as they are practicable, the provisions of the regulations of this chapter shall also apply to haulage operations at the face.

CHAPTER VIII

TRAVEL AND TRANSPORTATION OF WORKERS ON ROADS AND INCLINES

REGULATION 27. GENERAL PROVISIONS

1. (1) As far as practicable, roads or inclines separate from the haulage roads or inclines shall be provided for the passage of persons.

(2) Where this is not practicable the haulage operations shall be stopped while persons are travelling to and from their work unless special arrangements have been made to ensure the safety of the persons travelling.

2. (1) The haulage equipment in roads and inclines shall not be used for riding, save in so far as is allowed by national laws or regulations.

(2) Where such use is prohibited a notice shall be posted up on the landings of inclines and at such other suitable places as the competent authority may direct.

(3) This prohibition shall not apply to the transport of—

(a) the sick and injured; or

(b) persons employed in maintenance, examinations, testing or measuring, in so far as the nature of their work makes riding necessary and they are authorised by the manager.

(4) Enginemen, brakemen and signalmen shall be responsible for the enforcement of the provisions of this regulation in so far as they are concerned.

3. Every main road used for travelling shall be of adequate height and cross-sectional area.

4. Every travelling road, incline or compartment shall be regularly inspected at intervals that should be specified by the competent authority, and shall be maintained in a safe condition.

5. Parts of the underground workings that are closed to travel shall be effectively indicated.

REGULATION 28. TRAVEL ON FOOT

On Level or Slightly Inclined Roads

1. For the purposes of the present Regulation "level or slightly inclined roads" means roads with a gradient not exceeding 3° or 1:20.

2. (1) On mechanical haulage roads ordinarily used for travel, a footpath of at least 0.60 m (2 ft.) clear width, free of all obstruction, and of sufficient height, shall be provided along the whole length of one side.

(2) Subparagraph (1) shall not apply to gate roads in which the haulage speed does not exceed 1.50 m per sec. (300 ft. per min.) but on these roads it shall always be possible to travel and pass vehicles safely.

(3) For ropeways the footpath may be in the middle of the road.

On Inclines

3. (1) On haulage inclines with a slope exceeding 3° but not exceeding 25° the haulage road may be used for travel, subject to such rules as may be specified by the competent authority.

(2) Inclines used for haulage and having a gradient of over 25° shall have separate compartments for the travel of workers unless—

(a) a special travel incline is available; or

(b) all other effective arrangements have been made in accordance with Regulation 27, paragraph 1 (1) or 1 (2).

4. The travel compartments shall have sufficient width to make them passable for men wearing breathing apparatus.

5. (1) In travel inclines and travel compartments with a gradient from 25° to 45° either—

(a) steps shall be cut or ladders provided; or

(b) a rope or a fixed bar shall be provided to serve as a hand-rail.

(2) Where the slope exceeds 45° ladders shall be provided.

(3) If the slope exceeds 70° rest landings shall be provided not more than 10 m (30 ft.) apart.

6. (1) Haulage inclines shall only be entered when the operations so require, and haulage is stopped.

(2) The persons concerned shall make the necessary arrangements beforehand by reliable means.

REGULATION 29. MECHANICAL PASSENGER HAULAGE

1. The use of power-operated haulage equipment for the regular conveyance of the workers shall be subject to requirements to be specified by the competent authority.

2. All equipment used for mechanical passenger haulage shall be—

- (a) of sound construction;
- (b) inspected at regular intervals to be specified in national laws or regulations; and
- (c) maintained in good and safe condition.

3. In each individual case the competent authority, or the manager, as national laws or regulations may require, shall fix—

- (a) the maximum number of persons that may be carried in a tub, car, or train; and
- (b) the maximum speed of the trains.

4. Every passenger train shall be under the entire control of a specially appointed person, whose orders shall be obeyed.

5. (1) The conveyance of persons in trains hauled by electric trolley locomotives shall only be permitted under conditions to be specified by the competent authority, and, unless other effective safeguards are provided, only in cars with well earthed roofs, adequately protecting passengers against contact with live conductors.

(2) At all stations where a shift enters or leaves the cars, the current shall be switched off from the trolley wire while persons are entering or leaving, and a special light signal shall indicate whether the trolley wire is dead.

6. All trains shall carry a powerful headlight, and a red tail light.

7. (1) While persons are being conveyed all the places along the track where persons enter and leave the train shall be well lighted; these places shall be specially secured against falls of ground.

(2) No persons shall be allowed to enter or leave moving trains.

8. (1) Only materials that do not project beyond the edge of the tub or car shall be carried in trains conveying persons.

(2) The transport of tools or materials in tubs or cars occupied by persons shall be prohibited.

CHAPTER IX

WINDING OF MEN AND MATERIAL

REGULATION 30. GENERAL PROVISIONS

1. (1) The regulations in the present chapter shall apply to vertical shafts leading to the surface, and staples assimilable to them by reason of their similarity of purpose, provided that they are used for man-winding.

(2) The competent authority shall provide for the necessary adaptation of the regulations to shafts that are not vertical.

(3) "Man-winding"¹ means any use of the winding plant for the raising or lowering of persons; "regular man-winding" means the use of the winding plant for the raising or lowering of the general body of workers at the beginning or end of the shift.

2. The conditions under which man-winding is allowed shall be specified in national laws or regulations.

3. Man-winding in small staples not covered by the present chapter shall be subject to the conditions laid down by the competent authority having regard to local circumstances, and such conditions shall provide for periodical examinations of all parts of the winding installation.

4. (1) All parts of winding installations shall be of sound construction and adequate strength, and be maintained in safe working order.

(2) All damage to the winding installation shall be immediately reported to the supervisory official.

5. (1) Competent persons appointed by the manager for the purpose, shall—

(a) once at least in every twenty-four hours, examine thoroughly the state of—

- (i) the external parts of the machinery;
- (ii) the guides in the shafts; and
- (iii) the headgear, ropes, chains, connecting pieces, cages, and other similar appliances which are in actual use for the purpose of raising or lowering persons in a mine; and

¹ "Winding" is equivalent to "hoisting".

(b) once at least in every week, examine thoroughly the state of the shafts in which persons are lowered or raised.

(2) The results of the examinations specified in subparagraph (1) (a) and (b) above shall be entered in a register which shall be available for inspection by authorised representatives of the workers.

REGULATION 31. SHAFTS

eneral

1. All entrances to shafts shall be—

(a) adequately lighted throughout working hours;

(b) whitewashed; and

(c) provided with appropriate fences or doors so that tubs cannot be inadvertently pushed on without opening the enclosure.

2. (1) Obstructions and accumulations of ice in shafts shall be as far as possible prevented and be immediately removed when found to have formed, but this shall not be done in such a way as to interfere with the safety of persons.

(2) All surface and seepage water shall be conducted in such a way as to prevent it from falling freely into the shaft.

(3) Shafts shall as far as possible be kept clear of accumulations of coal and dirt.

Guides

3. (1) All winding shafts in which cages or skips are used shall be provided with guides.

(2) The guides, buntons and fastenings shall be of sufficient strength.

(3) The clearance of the cages from each other and also from the shaft sides shall be such that the free passage of the cages remains ensured in all circumstances.

Sumps

4. (1) Where national laws or regulations make the provision of sumps compulsory, under the lowest position of the cage at the bottom landing place there shall be a space, the depth of which shall be at least equal to the clear height provided at the top of the shaft under paragraph 8 of this Regulation.

(2) At an appropriate depth there should be an appliance to stop a descending cage.

5. The sump shall be kept cleared of water to an extent that will prevent any danger of submerging persons riding in the cage if it is lowered too far.

6. The sump shall be provided with a ladder leading to the nearest landing, or with other suitable means of egress.

Keps

7. If keps¹ are used, arrangements shall be made to block them securely in the off position, and when in the off position they shall leave the shaft clear for the passage of the cage.

Headgear and Rope Pulleys

8. (1) An appropriate clear height shall be provided between the pulley and the top of the cage when in its highest position at the top landing place.

(2) Headgear keps or other safety appliances to obviate dangers from overwinding shall be fitted.

9. The headgear shall be maintained in sound structural condition and any accumulation of grease shall be promptly removed.

10. Headgear keps shall be tested weekly as to their working order.

11. Rope pulleys shall be of ample diameter having regard to the size and construction of the rope used.

REGULATION 32. WINDING ENGINES

General

1. All winding engines shall be—

(a) so designed, constructed and maintained, that with the power provided, the raising and lowering of persons can be carried out with ease, regularity and safety; and

(b) firmly connected to a rigid foundation.

2. Where drum clutches are used, every winding engine shall have a suitable interlocking device fitted so that it is impossible—

(a) to unclutch any drum unless the brakes of such drum are on; and

(b) to release the brakes until the drum clutch is fully engaged and securely locked.

¹ "Keps" is equivalent to "safety stops".

3. Koepe pulleys shall be—

- (a) of ample diameter, having regard to the size and construction of the rope used; and
- (b) kept in such condition that slipping is reduced to a strict minimum.

Drums

4. Cast-iron drum shafts shall be prohibited.

5. Drums shall be provided with flanges or horns, and also, if the drum is conical, with other appliances that effectively prevent the rope from slipping.

6. Except for Koepe pulleys, the rope end shall be properly secured to the drum and there shall not be less than three turns of rope on the drum when the cage is at the lowest point of its travel.

Depth Indicators

7. Winding engines shall be equipped with a reliable depth indicator and a bell that will automatically ring at the appropriate moment.

8. Markings indicating crucial points in the shaft shall also be made on the drums, or, in the case of Koepe winding, on the rope.

9. The depth indicators shall be tested after every adjustment of the cage's travel.

Speed Indicators

10. National laws or regulations should require the regular man-winding plant in main shafts of mines employing more than a certain number of men, to be specified in such laws or regulations, to be provided with automatically recording speed indicators.

Brakes

11. (1) Where the apparatus used for raising or lowering persons is worked by mechanical power, there shall be provided one or more brakes on the drum shaft which—

- (a) if there are two cages, will hold the cages when the maximum torque is applied in either direction when the loads are balanced; or
- (b) if there is only one cage, will hold the loaded cage in mid-shaft when the maximum torque is applied downwards.

(2) The brake or brakes shall be arranged to act automatically, or by means of a clutch that can be actuated at all times if the power fails.

Overwind Preventers and Speed Controllers

12. Winding engines of which the man-winding speed is more than 6 m (20 ft.) per sec. shall be equipped with an effective automatic speed controller.

13. Unless exemption has been granted by the competent authority every winding engine which is used for regular man-winding shall be equipped with an automatic overwind preventer.

14. During man-winding the automatic speed controller and overwind preventer shall—

- (a) prevent any descending cage from passing the bottom landing place at a speed exceeding 4 m (13 ft.) per sec. where the sump and headgear are in accordance with Regulation 31, paragraphs 4 and 8, and the requirements of the competent authority;
- (b) prevent any descending cage from landing on the pit bottom or other permanent landing at a speed exceeding 1.5 m (5 ft.) per sec.; and
- (c) cut off the supply of power to the engine and apply the brakes when any cage travels too far above its normal highest position at the top landing place.

15. (1) Unless the automatic speed controller and overwind preventer are in full and fixed engagement with the winding engine they shall be fully engaged, either automatically or by the winding engineman, whenever persons are to be raised or lowered, and a proper automatic indicator to show that this has been done shall be provided in such a position as to be easily seen by the banksman.

(2) No person shall be allowed to enter any cage until the indicator shows that the automatic speed controller and the overwind preventer have been fully engaged.

16. The automatic speed controller and overwind preventer shall be tested in the manner and at the intervals to be prescribed by the competent authority.

17. The results of the tests shall be entered in a register.

Trial Winds

18. Notwithstanding the daily inspections provided for in Regulation 30, paragraph 5 (1) (a), before the beginning of every period of regular man-winding after a cessation of winding exceed-

ing four hours, trial winds shall be carried out between the points in the shaft between which regular man-winding is to be undertaken.

REGULATION 33. CAGES

General

1. (1) The cage shall be provided with a strong protective roof.

(2) On each deck bars or hand-rails should be provided for the passengers to hold on to.

(3) During man-winding the cage shall be provided with gates, and on the other sides shall be safely enclosed in such a way that nothing can project through the enclosure.

(4) The gates should not open outwards, and they shall be so set that they cannot be thrown open by heavy jolting of the cage.

(5) The cage shall be provided with catches or other suitable contrivances to prevent tubs falling out.

2. The manager shall specify the maximum number of persons allowed on each cage or each deck of a cage subject to such requirements as may be specified by the competent authority.

Safety Gear

3. Where safety gear is used for holding a cage that is detached from the rope, national laws or regulations shall lay down requirements concerning the construction, installation, maintenance, inspection and testing of such gear.

Suspension Gear

4. The connecting pieces between the winding rope and the cage shall possess an ample safety factor in relation to the maximum static load and with due allowance for dynamic stresses.

5. Where emergency chains are used their length shall be such that if the king bolt breaks, the shock with which the cage is held is as slight as possible.

6. Ample provision shall be made for the safety of the connecting pieces between the tail rope and the cage.

7. (1) Once at least in every year or such other period as national laws or regulations may require—

(a) the suspension gear between the winding rope and the cage (chains, detaching hooks and other attachments) shall be taken apart; and

(b) the separate parts shall be examined as to wear and tear (where necessary by gauging), and for rust and cracks:

(2) The responsible engineer shall see that defective parts are changed or receive such treatment as is necessary.

(3) All parts of suspension gear should be renewed after a period of service specified in national laws or regulations.

(4) Before a new or renewed set of suspension gear is used, it shall be tested with an ample load.

(5) The results of the annual tests and the treatment specified in subparagraphs (1) to (4) shall be entered in a register.

8. If any part of suspension gear between the cage and the main winding rope or the tail rope is broken, all pieces of the broken part shall be kept for inspection—

(a) by the manager or by a competent person appointed by him; and also

(b) by a person appointed by the competent authority.

REGULATION 34. ROPES

Main Ropes

1. (1) All winding ropes shall be of generally recognised sound material and construction and of adequate strength, in accordance with the requirements of national laws or regulations.

(2) The national laws or regulations should prescribe the quality of the materials to be used and fix the conditions under which the testing of ropes (and, in respect of wire ropes, of the individual wires) shall be conducted and the standards to be satisfied.

(3) A certificate from the manufacturers should be furnished for every winding rope, and inserted in a register.

2. Every drum or reel winding rope shall at all times possess an ample safety factor in relation to the maximum static load in material winding, with due allowance for dynamic stresses.

3. Where any system of winding is in operation which does not permit of periodically cutting off pieces of the rope for testing, the safety factor of the rope shall be correspondingly increased or its life shall be limited.

4. The maximum load in man-winding should not exceed a percentage of the maximum load in mineral winding to be specified in national laws or regulations.

5. (1) Before its first use for regular man-winding, every winding rope shall make at least 20 winds with the ordinary load of mineral and be found free from any visible defect.

(2) Subparagraph (1) shall also apply when the rope capping or the suspension gear on the cage has been renewed.

6. Without due permission of the competent authority, no winding rope shall be used for regular man-winding beyond a period to be specified by national laws or regulations.

7. No round spliced rope shall be used for man-winding.

8. Turned ropes and flat spliced ropes shall only be used for man-winding under conditions laid down by the competent authority.

9. (1) Every winding rope and counterweight rope shall undergo the following daily and monthly examinations:

- (a) a daily inspection shall be carried out by a competent person with the rope passing at a speed not exceeding 1 m (3 ft.) per sec.; and
- (b) a monthly examination shall be undertaken by a specially appointed competent person in a good light, the rope being passed at a speed not exceeding 0.5 m (20 in.) per sec. immediately in front of the testing official, and after the rope has been cleaned of any encrusted dirt and grease.

(2) In addition, parts of the rope not more than 100 m (300 ft.) apart, and especially those which experience shows to wear most, shall be inspected while at rest.

(3) For wire ropes these parts shall be thoroughly cleaned before the inspection, so that the condition and wear of wires can be seen from the outside.

10. After prolonged interruptions in their use the winding ropes shall be examined as provided in paragraph 9 (1) (b) of this Regulation.

11. Particulars of the above-mentioned examinations shall be recorded in a register.

12. (1) Except in systems which do not permit of periodically cutting off pieces for testing, every wire rope shall be recapped after a piece of sufficient length has been cut off, at intervals of time and under conditions to be fixed by the competent authority.

(2) Each piece cut off or a part thereof shall be opened up and its internal condition examined by a competent person approved by the manager.

(3) In addition, suitable tests of the rope and of the individual wires should be applied as required by national laws or regulations.

Tail Ropes

13. (1) When tail ropes are used they shall be of sound material and construction.

(2) National laws or regulations should define the conditions under which tail ropes may be used, for example the working life, the tests to be made, and the standards to be satisfied.

14. Withdrawn winding ropes shall not be used as tail ropes unless they are carefully examined and found to be in good condition.

15. (1) The free hang at the bottom of the shaft shall be such that the upper cage can travel to the highest possible position in the headframe without being hindered by the tail rope.

(2) Devices shall be fitted to prevent loops forming in the tail rope.

(3) The shaft sump shall be kept clear of water to an extent that will prevent the tail rope from running in water.

16. (1) When making the weekly examinations required by Regulation 30, paragraph 5 (1) (b), the tail rope shall be passed directly before the testing official in a good light at a rate not exceeding 0.5 m (20 in.) per sec.

(2) The results of the examinations shall be entered in a register.

REGULATION 35. SIGNALLING

Signalling Appliances

1. (1) Every man-winding plant shall have an efficient signalling device for signalling by sound or otherwise—

(a) from each landing to the bank¹ and vice versa, and

(b) from the bank to the winding-engine room.

(2) All signals transmitted from the landings to the surface shall be transmitted to the banksman and to the engineman.

2. Defects in the signalling installations shall be immediately reported to the supervisory official and remedied.

3. (1) In shafts with two winding installations, if sound signalling devices are used, each man-winding plant shall, in addition to the sound signalling device, be provided with a visual signalling device.

(2) The sound signals of the two winding installations shall differ distinctly in tone.

4. If in man-winding two or more decks of a cage are entered and/or left simultaneously—

(a) each floor at the landing or at the bank shall be connected by an effective signalling device with the main loading point of the

¹ "Bank" is equivalent to "surface landing" or "top of the shaft".

landing or bank, and only the signalman at that loading point shall give the action signal, after all decks are known to be clear and closed; and

- (b) electrical signalling installations shall be so arranged that the action signal cannot be given until both cages are clear on all decks and closed.

5. When messages cannot be clearly exchanged otherwise, the landings and the bank, and the bank and the winding engineman's stand, shall be connected by telephone or speaking tube.

Signalling Operations

6. For the purpose of transmitting and receiving signals a competent person shall be in constant attendance—

- (a) at the top of every shaft by which any persons are about to be lowered;
- (b) so long as any persons are in the mine below ground, at the top of every shaft from which persons may need to be raised; and
- (c) unless all persons in the mine are supervisory officials or persons authorised in writing by the manager or his deputy to give signals; at every shaft inset from which persons may need to be raised.

7. (1) At the bank and the landings, only one signalman shall give signals for each winding plant.

(2) Signalmen shall be responsible for the clear and safe operation of signals.

8. (1) The code of signals shall be fixed or approved by the competent authority, and, as far as practicable, shall be uniform for all mines in the same district; in any case the stop signal (one ring) shall be uniform everywhere.

(2) Wherever signals are given or received, the code shall be posted up and observed, and no signals shall be given without proper authority.

9. Before persons enter a cage to be wound, a special signal shall be given by the signalman at the landing concerned to the signalman at the bank and an acknowledgment signal shall be received.

10. The manager shall fix the signals and the manner in which they shall be given—

- (a) at times when no signalman is on duty; and
- (b) for shaft inspections or repair work.

11. Electrical signalling equipment shall be examined yearly by a qualified person, and a report thereon shall be entered in a register.

REGULATION 36. MAN-WINDING OPERATIONS

1. (1) During regular man-winding, in no compartment of the shaft shall material winding be in operation.

(2) With the consent of the competent authority exceptions may be made for a shaft equipped with two winding plants.

(3) Occasional man-winding in conjunction with material should only be allowed in accordance with the requirements of national laws or regulations or of the competent authority.

2. During regular man-winding an assistant capable of continuing to work the engine or of stopping it in the case of sudden indisposition of the person in charge of man-winding shall keep near the controls, unless an effective automatic speed controller and overwind preventer are provided.

3. During regular man-winding, banksmen and onsetters shall constantly be present at all landings between which regular man-winding is carried on.

4. Whenever the winding engineman has occasion to leave his engine he shall first cut off the power and secure the engine with the brake.

5. The use of skip-winding plant for man-winding shall only be permitted under conditions approved by the competent authority.

6. (1) Man-winding otherwise than in cages or skips shall be prohibited, except—

- (a) in shafts or winzes being sunk;
- (b) for repair work in ventilation shafts;
- (c) for rescue work; and
- (d) in mines employing underground not more than a number of men to be specified in national laws or regulations.

(2) In such cases the manager shall make the necessary arrangements for securing safety.

7. Conditions concerning winding speed, behaviour of passengers, safety precautions and appliances in cages, shall be fixed by the competent authority.

8. In electrically lighted engine-rooms emergency lighting shall be provided that either burns continuously or is automatically switched on when the main lighting fails.

9. At the surface a notice shall be posted up specifying the maximum number of persons who may ride in the cage or on the several decks at one time.

10. (1) In the event of any defect in the man-winding plant, or any obstruction in the shaft, man-winding shall not take place or shall not be continued.

(2) In the event of defects during regular man-winding, the manager shall decide whether man-winding may be continued.

11. Only qualified, reliable and physically fit persons shall be employed as winding enginemen.¹

12. Only competent persons shall be employed as signalmen, banksmen and onsetters.

¹ "Winding engineman" is equivalent to "hoisting engineer".

CHAPTER X

VENTILATION

REGULATION 37. GENERAL PROVISIONS

1. All underground workings accessible to the workers shall be traversed by a regular air current sufficient to keep them in a fit state for working and in particular to avoid any excessive rise in temperature, and to dilute firedamp or any noxious gases or fumes to safe proportions, in ordinary operating conditions.

2. Failing an exemption granted by the competent authority, the air velocity in shafts and roadways should not exceed 8 m (25 ft.) per sec., except in shafts, cross-cuts, or main return airways which are not ordinarily used for the transport of mineral or the travel of workers.

3. (1) A place shall not be deemed to be in a fit state for working if the air contains either less than 19 per cent. of oxygen, or more than certain percentages of carbon-dioxide and firedamp respectively, to be specified in national laws or regulations.

(2) Every current of air vitiated by loss of oxygen, an admixture of noxious or flammable gases, or heated to an excessive extent, shall as far as practicable be conducted to the surface by the shortest route.

(3) The extent of the workplaces shall be limited, if necessary, so as to safeguard workers against excessive deterioration or temperature of the air.

4. (1) In every district through ventilation shall be provided before coal-getting is proceeded with.

(2) All airways, with the exception of air shafts and raises not ordinarily used for the transport of mineral or the travel of workers, shall be maintained with sufficient dimensions to permit the easy and normal transport of men and materials.

5. (1) No changes shall be made in the general ventilation system of a mine except by order of the manager.

(2) No major change shall be made unless all employees are out of the mine, except mine officials and the employees in charge during the change.

(3) Provided that in cases of urgency, the responsible supervisory officials may take the necessary immediate measures, reporting subsequently to the manager.

6. Where main intake and main return airways are connected, all stoppings between them and all main air crossings shall be so constructed as not to be easily liable to be destroyed in the event of an explosion or a fire.

7. The packs built to support the roof or to separate the haulage roads from the corresponding airways, or worked-out areas from airways, shall be as dense and as impermeable as circumstances require, to prevent excessive leakage.

8. (1) All main airways shall be of adequate dimensions.

(2) All airways shall be periodically examined by a supervisory official and maintained in good condition in accordance with requirements to be prescribed by national laws or regulations.

9. Ventilation furnaces shall be prohibited.

10. The top of every shaft or drift through which air is forced into or exhausted from the mine should be provided with a properly constructed air lock.

11. (1) In new installations ventilators installed on the surface shall be—

- (a) in fireproof housing, situated at a safe distance from the nearer side of the opening or shaft;
- (b) equipped with fireproof ducts and ample pressure-relief devices; and
- (c) so constructed that the current of air can be reversed when necessary.

(2) Such ventilators shall be equipped with a water-pressure gauge, and, where practicable, with an instrument automatically recording variations in pressure.

12. (1) If the main mechanical ventilators are not permanently attended or visited and examined at frequent intervals, arrangements shall be made so that every irregularity in the working of the ventilator can be immediately noticed at a permanently occupied place.

(2) Mechanical ventilators shall be examined weekly by a supervisory official.

13. The air currents produced by mechanical means shall, as far as possible, be given the same direction as the air currents resulting from natural ventilation.

14. (1) The workings shall be so arranged as to reduce as far as possible the number of doors for guiding or dividing the air current.

(2) In much frequented roadways and in connections between main intakes and main returns, and where other circumstances exist which might cause serious disturbances in one or more main air currents, only suitably spaced multiple doors shall be used.

(3) Steps shall be taken to ensure that at least one of these doors is always closed.

(4) The doors shall be self-closing.

15. (1) Brattice cloths instead of ventilation doors shall only be allowed at places where for reasons of operation ventilation doors cannot be installed.

(2) At such places the brattice cloths shall be sufficient in number and be so placed that at least one cloth remains closed even when haulage is in progress.

16. (1) Unless stricter regulations are laid down for any mine, in every mine at least once in every month measurements shall be taken of the main air current and the branch air currents at places to be specified by the competent authority.

(2) Samples shall be taken periodically of the air current in every ventilating district and shall be analysed, unless such sampling has been shown to be unnecessary.

(3) The results of these measurements and analyses shall be entered in a register.

17. Abandoned or insufficiently ventilated roadways and workings shall be made inaccessible to the workers.

18. Every mine shall have a ventilation plan kept up to date, on which shall be indicated—

(a) the direction and distribution of the air current;

(b) the position of the main doors and of the measuring stations; and

(c) such other information as may be specified by the competent authority.

19. For the supervision of the entire ventilation arrangements one or more supervisory officials shall be appointed by the manager.

20. (1) In mines or districts of mines where the cooling power of the air as determined by its velocity and the wet and dry bulb temperature falls regularly below a limit to be fixed by national

laws or regulations, the cooling power of the air shall be measured periodically at appropriate places.

(2) These measurements shall be entered in a register.

(3) The frequency of the measurements, and the ventilation requirements and working conditions in such cases shall be laid down in special rules to be provided for in national laws or regulations.

CHAPTER XI

PRECAUTIONS AGAINST FIREDAMP

REGULATION 38. GENERAL RULES. DEFINITIONS

1. The ventilation of mines, or parts thereof, which are liable to danger from firedamp shall comply with the provisions of Chapter X of the present Code, subject to the additions and modifications contained in the present chapter.

2. (1) Only mines, seams or ventilating districts in which no accumulation of firedamp, however small in extent, has been detected on the lowered flame of a safety lamp or otherwise, at any time or in any working place, shall be considered as not liable to danger from firedamp.

(2) National laws or regulations may provide for a more comprehensive classification or reclassification of mines, according to their liability to danger from firedamp, and such classification may provide in particular for a class of mines where there is definite danger from firedamp and for additional regulations to apply to such mines.

3. (1) Where any workings are proceeding towards old workings in which accumulations of firedamp may be feared, they shall be preceded by trial borings not less than 5 m (16 ft.) in depth.

(2) If the trial bore-hole reveals the presence of such accumulations the workers shall stop work, leave the workplace, fence off the entrance, and notify a supervisory official.

REGULATION 39. RULES APPLYING TO ALL FIERY MINES

1. In addition to the rules for the prevention of explosions, contained in this or other chapters of this Code, the following rules shall apply to all mines or parts of mines that are fiery.

2. (1) Mines shall be divided into as many independent ventilation districts as necessary, and specially dangerous workings shall be segregated.

(2) The operation of mines shall, except in quite exceptional cases, be undertaken by levels and workings succeeding each other downwards, so that there are no dangerous old workings below the workings in use.

3. Generally, the ventilation shall be ascensional.

4. Ventilation, except for preparatory work, or for the special purpose of dispersing local accumulations of firedamp, shall not be effected by partitions or ducts, unless this practice is recognised in national laws or regulations.

5. The intake and return air currents shall be separated from one another by means sufficiently strong to withstand the violence of an explosion, and the means of separation shall be sufficiently air-tight to prevent an excessive leakage of air.

6. (1) Abandoned workings or levels which might be a source of air deterioration shall be effectively walled off or otherwise isolated from the air passing through workings in operation or roadways in use.

(2) If this is not practicable, any gases escaping from such abandoned workings or levels should be conducted to the surface by the shortest route.

7. (1) Large accumulations of firedamp shall be dispersed only with the greatest caution, and so as not to create any danger; the mine manager shall himself direct these operations, or delegate an official to carry them out according to his instructions.

(2) Accumulations of firedamp, whether large or small, shall not be dispersed by blowing compressed air from a hose.

8. The use of explosives and electricity shall be subject to special rules and regulations, as indicated elsewhere in this Code, or in national laws or regulations.

9. The use of open lights shall be prohibited.

10. The use of open flames or arcs, for welding, steel cutting or any other purposes, shall only be permitted under conditions to be defined by the competent authority.

11. (1) In addition to the flame safety lamps or other firedamp detectors used by the supervisory officials, a sufficient number of flame safety lamps or other effective firedamp detectors shall be provided by the mine operator for every ventilating district, for use in the conditions defined by national laws or regulations.

(2) The regulations should specify the conditions under which tests are to be made in the working places.

(3) The design of each type of firedamp detector shall be approved by the competent authority.

(4) Any person carrying a flame safety lamp or other firedamp detector shall have received practical instruction in its use.

12. (1) The number of workplaces in operation simultaneously in the same air current shall be regulated according to the volume of air and the emanation of firedamp.

(2) The permissible maximum content of firedamp in return airways shall be regulated by national laws or regulations.

13. (1) Open spaces in the goaf should be avoided as far as practicable; the packing shall be as dense and airtight as possible, and fill all cavities against the roof.

(2) Where caving is practised the roof shall be so controlled that it breaks as early as possible and collapses as completely as possible.

REGULATION 40. SUDDEN OUTBURSTS OF FIREDAMP OR OTHER HARMFUL GASES

1. Work in workplaces or roadways where sudden outbursts of firedamp or other harmful gases are to be feared shall be carried on in conformity with requirements to be laid down by the competent authority.

2. Adequate steps shall be taken at the surface to prevent any firedamp issuing from the mine from igniting.

REGULATION 41. VENTILATORS IN FIERY MINES

1. Every mine shall be equipped with at least one mechanical ventilator and there shall be a reserve ventilator available for immediate use.

2. The ventilator shall not be stopped except on the order of, and in conformity with the conditions laid down by, the manager.

3. Main ventilators on the surface shall be connected to two separate sources of power.

4. Every accidental stoppage of the mechanical ventilation shall be immediately reported to the manager, or in his absence to the senior supervisory official present, who shall immediately take the necessary steps to ensure the safety of the workers underground and, if necessary, evacuate the mine, or certain districts of the mine.

5. If the mine or certain districts have been evacuated, the workers shall not return except on the order of, and with the

precautions laid down by, the manager or the senior supervisory official present.

6. In mines in which mechanical means are necessary for the purpose of auxiliary ventilation, such ventilation plant shall be driven by safe and efficient means.

REGULATION 42. WITHDRAWAL OF WORKERS FROM MINES OR PARTS OF A MINE ENDANGERED BY FIREDAMP

1. (1) Except for the performance of essential work, or in the case of rescue of men in imminent danger, it shall be prohibited to work, travel or remain in any part of a mine where in the general body of air, firedamp shows on a flame safety lamp, or approved gas detectors show a content exceeding a figure to be specified in national laws or regulations.

(2) If, in the case of rescue or imminent danger, or essential work for dealing with the danger, it is necessary to work in places where there exists a dangerous accumulation of firedamp, the work shall only be done—

- (a) under the direct instructions of the manager or his deputy;
- (b) by specially trained men; and
- (c) under the supervision and in the continuous presence of a specially appointed supervisory official.

(3) If there is imminent danger, the competent authority shall immediately be notified, and shall, if necessary, give special instructions.

2. (1) Working places which have been evacuated on account of firedamp shall be effectively fenced off.

(2) No one, without special orders, apart from the manager or supervisory officials, shall enter such a place except as provided in paragraph 1 (2).

REGULATION 43. AIR MEASUREMENTS, SAMPLING AND ANALYSES

1. The measurements of the air current shall be undertaken in every fiery mine at intervals of not more than two weeks: Provided that where the firedamp content exceeds one per cent., air samples and measurements shall be taken daily.

2. Air measurements shall be renewed whenever, owing to a new entry, an alteration in the doors, or any other cause whatever, there has occurred or may have occurred, a considerable change in the direction, distribution or division of any one of the main branches of the air current.

3. The competent authority shall define the places and the manner in which air measurements shall be taken.

4. In addition to such air measurements, the firedamp content of the return airway shall be ascertained and recorded periodically in accordance with the requirements of national laws or regulations.

5. The results of the air measurements and analyses shall be entered in a register.

CHAPTER XII

PRECAUTIONS AGAINST COAL DUST

REGULATION 44. GENERAL PROVISIONS

1. (1) National laws or regulations shall define dangerous coal dusts as to their explosive qualities in order to determine how dusty mines are to be classified, and the precautions to be taken in each case shall depend upon the classification.

(2) This classification shall not be undertaken by the competent authority without prior consultation with employers' and workers' representatives.

REGULATION 45. PREVENTION AND SUPPRESSION OF DANGEROUS COAL DUST

1. (1) Where necessary, water shall be conveyed to all working faces and used for allaying dust, or other effective measures shall be taken for this purpose at working faces.

(2) Tubs shall be so constructed and maintained as to prevent coal dust escaping through their sides, ends or floor.

(3) When coal produces fine and dangerous dust, the tubs loaded with coal shall be amply wetted with water, or water with a wetting agent, at the latest when they enter the main haulage roads.

2. In roads that are regularly used for haulage or travel, and in main airways, any considerable quantities of dangerous dust shall be periodically collected and removed.

3. The manager shall make all such arrangements as are practicable for the reduction of dust on conveyor roads, and at conveyor junctions and loading points.

4. (1) Precautions shall be taken at the surface to prevent coal dust from entering the downcast shaft in considerable quantities, and the shafts and their approaches shall be cleared of any accumulation periodically.

(2) In the case of a mine newly opened, no plant for the screening or sorting of coal should be situated within a distance of 80 m (260 ft.), or such other distance as may be specified in

national laws or regulations, from any downcast shaft, unless measures are taken to collect the dust produced by these installations at the point of origin.

REGULATION 46. MEANS OF LIMITING EXPLOSIONS

1. Mines or districts in which seams presenting a danger from coal dust are opened out or worked, shall be protected against coal-dust explosions by means of stone dust, or by water or by such other means as are approved or required by national laws or regulations or by the competent authority.

2. (1) Stone-dusting shall be effected in all roadways by the addition of inert dust or by such other means as may be authorised by national laws or regulations or by the competent authority.

(2) Except in the immediate vicinity of the face, all mine workings and roadways which are accessible shall be stone-dusted unless natural conditions render this unnecessary.

(3) The minimum percentages of incombustible matter to be maintained in the dust on roadways shall be specified by national laws or regulations.

(4) Dusting shall be carried out in such a manner and at such intervals as will ensure the constant maintenance of these percentages.

(5) Before stone-dusting, large deposits of coal dust on the roof, floor and sides, including all timbers and supports, shall be removed so far as practicable.

3. Where coal dust is of an explosive nature as defined in accordance with Regulation 44, stone-dusting shall be carried out throughout the cycle of shifts.

4. Stone dust shall be reasonably harmless to health and possess the properties specified by national laws or regulations.

5. Stone dust intended for use in the mine shall be tested at intervals as to fineness and dispersibility.

6. (1) The dust on the floor, roof and sides in the dusted mine workings shall be regularly tested for combustible content, and as often as may be necessary.

(2) Average samples shall be taken and analysed in accordance with the conditions to be fixed by national laws or regulations.

7. Accumulations of deteriorated or contaminated stone dust shall be collected and removed from the mine.

8. (1) Every mine where stone-dusting is required by national laws or regulations shall keep a special register (dust register).

- (2) In this register shall be entered—
- (a) particulars of the place and date of sampling;
 - (b) the results of the tests as to the amount of combustible matter in the samples of dust collected; and
 - (c) the respective dates on which different parts of the roadways and workings were treated with stone dust.
9. Stone-dusting shall be under the general direction of a competent person specially appointed for the purpose.

REGULATION 47. MEANS OF ARRESTING EXPLOSIONS

1. For the purpose of isolating explosions and preventing their spreading to other districts, stone-dust barriers shall be erected at suitable places in main intakes and returns connecting two or more districts.

2. (1) Stone-dust barriers shall be entirely in a free and unobstructed section of the road.

(2) Stone-dust barriers shall be situated near the roof but at a sufficient distance from it to provide a sufficient clearance over the top of the dust.

(3) Stone-dust barriers shall be properly constructed and maintained with a sufficient quantity of suitable dust.

3. The dust on the barriers shall be tested as often as necessary as to dispersibility.

4. (1) The position of main stone-dust barriers shall be indicated on the ventilation plan.

(2) The dates on which main stone-dust barriers were erected and on which the dust on barriers was last renewed shall be entered in the register kept under Regulation 46, paragraph 8.

CHAPTER XIII

MINERS' LAMPS

REGULATION 48. GENERAL PROVISIONS

1. (1) In mines liable to danger from firedamp, only safety lamps approved by the competent authority and provided by the mine operator shall be used.

(2) As far as practicable, approved electric cap or hand lamps should be used by the general body of the workers in all mines.

(3) In all mines, all lamps shall be numbered.

2. In non-fiery mines where safety lamps are not used, use shall only be made of lamps with a protected flame.

3. The safety lamps shall be constantly maintained in good order.

4. Every person who receives a lamp shall—

(a) as far as practicable satisfy himself that it is complete and in good order; and

(b) refuse any lamp that does not appear to fulfil these conditions.

5. (1) Lamps shall be carefully handled.

(2) Flame safety lamps shall not be placed before the openings of ventilation ducts.

6. (1) The attempted opening of safety lamps in the workings shall be formally prohibited.

(2) If a flame safety lamp goes out in the mine it shall not be relighted except in conformity with the provisions laid down in national laws or regulations or by the competent authority.

7. Every lamp that has become defective during work shall be immediately extinguished, and returned to be exchanged.

8. It shall be prohibited to relight a flame safety lamp, even with an internal relighter, if there is any uncertainty as to the presence of firedamp or the safe condition of the lamp.

9. Any person who does not return to the lampman the same lamp that the lampman handed him shall notify the lampman of the causes and circumstances of the exchange.

10. Electro-pneumatic lamps and electric cap lamps shall satisfy requirements to be specified in national laws or regulations.

REGULATION 49. SERVICING OF LAMPS

1. (1) The lamps shall be serviced and kept in a special room (lamp room).

(2) The manager shall be responsible for the proper maintenance of the lamps.

2. (1) Unauthorised persons shall not enter the lamp room.

(2) Stoves, open lights and smoking shall be prohibited in a lamp room where petrol lamps are being handled.

(3) Such lamps shall be cleaned, fitted and refilled in a room separated from the place where petrol is stored and if practicable separated also from the place where the lamps are handed out.

(4) This prohibition shall be posted up at the entrances of the lamp room.

(5) Internal relighters shall not be taken out of lamps and be cleaned, repaired, or refilled, on the same table where petrol lamps are being refilled or cleaned.

(6) Adequate fire extinguishers shall be kept in every room where petrol lamps are being cleaned or refilled.

(7) For the purpose of this paragraph petrol includes benzol or any other volatile spirit.

3. Before being handed out, flame safety lamps shall be tested as to tightness by the lamp foreman, and found to be in good order.

4. (1) Every lamp room shall be in charge of a competent person.

(2) A record shall be kept of all damaged lamps.

5. The manager shall make or have made periodically a detailed inspection of the lamp room.

6. A system of control carried on in the lamp room, under the lamp foreman's or lampman's responsibility, shall make it possible to ascertain—

(a) the name of every person who has gone down into the mine;
and

(b) the number of the lamp handed to him.

CHAPTER XIV

PRECAUTIONS AGAINST INRUSHES OF WATER

REGULATION 50. GENERAL PROVISIONS

1. Mine operators shall be bound to acquire and record on their plans all useful information concerning the position, extent and depth of old workings and natural reservoirs (water-bearing strata, known water-bearing faults, and natural springs at the surface) that may exist in or near their mines.

2. (1) Exploratory borings in the coal or the rock shall be made whenever there is reason to suspect the existence of bodies of water near the workings.

(2) The number, length and arrangement of such trial borings shall be fixed by the mine manager in conformity with the requirements laid down in national laws or regulations or by the competent authority.

(3) Work shall not be carried on in a mine below the level of known bodies of water, dammed or held back by natural or artificial means, in the same mine, except in conformity with the requirements of the competent authority.

3. (1) In mines under strata that are, or are suspected to be, waterlogged, a "protective roof" should be left intact.

(2) The thickness of this roof, together with such other requirements as may be considered necessary in each particular case, shall be specified by the competent authority.

(3) In areas where soluble rocks or gypsum overlie coal measures situated at workable depths, bore holes from the surface, even if they have not reached the coal measures, shall be so filled before abandonment that no considerable volume of water can penetrate through them into the coal measures or into any overlying beds of soluble rocks or gypsum.

(4) In areas where salt deposits overlie coal measures situated at workable depths the salt shall not be worked by solution from bore holes.

4. For mine workings in which the tapping of bodies of water or of quicksand is to be feared, or is deliberately intended, national

laws or regulations should define the conditions under which work is to be carried on so as to secure safety.

5. Where, in any mine, water encountered has been observed to give off sulphuretted hydrogen (H_2S), special precautions shall be taken against poisonous gases when deliberately drawing off water under a considerable head.

CHAPTER XV

PREVENTION AND EXTINCTION OF MINE FIRES

REGULATION 51. GENERAL PROVISIONS

Mine Fires

1. In the installation and operation of mines the necessary precautions shall be taken for the prevention of fire.

2. (1) Every mine employing more than a number of persons to be specified in national laws or regulations, unless it is naturally wet throughout and not liable to spontaneous combustion, shall have at its disposal a fire-fighting organisation for fire prevention and fire control.

(2) The manager shall draw up a plan and shall enforce rules for the organisation and conduct of fire-fighting work and of fire drills.

3. Combustible material shall be avoided as far as possible for stowing, or in the building of packs, and not be left in the goaf in greater quantities than absolutely necessary.

4. The head frame, pit-head buildings and underground haulage rooms shall be kept reasonably clear of highly flammable material such as grease and coal dust.

5. In pit-head buildings and adjacent structures every precaution shall be taken to obviate the risk of fire.

Spontaneous Combustion of Coal

6. In mines subject to spontaneous combustion, the manager shall draw up, subject to any provisions required by the competent authority, special regulations relating to the precautions to be taken, and in particular relating to the methods of working, stowing, supplies of adequate material for stoppings and sealings, and the provision of water mains.

7. Special inspections shall be carried out regularly, especially on days following idle days, before work is resumed, with a view to ascertaining whether there are any spontaneous fires or heatings.

REGULATION 52. FIREPROOF CONSTRUCTION

1. (1) Except during sinking operations the lining in main shafts in all new installations shall be made fireproof as far as practicable.

(2) The head frame and pit-head buildings shall not be made of wood, except where permitted by the competent authority.

2. Haulage rooms, engine rooms and workshops underground, together with their equipment, shall be constructed in a fireproof manner.

REGULATION 53. FIRE-EXTINGUISHING EQUIPMENT

1. Adequate means of extinguishing fires shall be provided—

(a) at all parts of a mine where flammable material is stored;

(b) at all insets where timber is used in the construction of the staging;

(c) at all driving units of roadway conveyors; and

(d) near stables and fodder depots.

2. (1) In every mine, other than small mines which are naturally wet throughout, there shall be kept, ready for immediate use, at appropriate places in relation to each working face, and along such main roads as are not of incombustible construction, a sufficient supply of suitable stone dust or sand, and of portable fire-extinguishers, except in so far as water is provided at these places with equipment which can readily be used in case of a fire.

(2) At each place where dust, sand, or water is so kept, means shall be provided for readily conveying the material and for using it for fire-fighting.

3. At every mine which is not naturally wet throughout, and at which more than a certain number of persons to be specified in national laws or regulations are employed underground, there shall be provided and kept ready for immediate use—

(a) a supply of water, sufficient for the purpose of fighting fires underground; and

(b) efficient means for conveying the water and delivering it promptly at adequate pressure and in adequate volume, to all parts of the mine in ordinary use for working or travelling, where a fire might break out.

4. Whenever a coal-cutting machine is liable to ignite gas—

(a) effective means to prevent such ignition shall be provided on the machine; or

(b) a suitable supply of inert dust or sand or a suitable fire-extinguisher shall either be carried on the machine, or, if that is impracticable, shall be kept at suitable places.

5. (1) Fire-extinguishers shall be examined and discharged and refilled as often as may be necessary to ensure that they are kept in good working order.

(2) A record of the dates of refilling shall be kept.

6. Fire-extinguishers containing chemicals which are liable to give off poisonous or noxious fumes or gases shall not be provided or used underground.

7. A sufficient number of men shall be trained in the use of fire-extinguishers.

8. At regular intervals to be specified in national laws or regulations and at least once a month, all the equipment and material provided for fire-fighting shall be examined by a competent person, appointed by the manager.

REGULATION 54. STORAGE OF FLAMMABLE MATERIALS

1. With the exception of the quantities required for current use, stocks of combustible or flammable materials shall not be kept in the immediate vicinity of a shaft.

2. No oil, grease, canvas or other highly flammable material, with the exception of timber in constant use, shall be stored underground except in a fireproof receptacle or chamber.

3. In underground engine rooms, greasy or oily waste shall be placed in closed metal receptacles and regularly removed from the mine.

4. Stables, and other places where combustible or flammable materials may accumulate, shall as far as possible be so arranged that, in the case of a fire, smoke will be directly evacuated, without flowing through travelling roads or past working places.

REGULATION 55. PROCEDURE IN CASE OF FIRE

1. (1) When a fire occurs underground, every workman who notices it shall, if possible, try to extinguish it and warn the nearest supervisory official as soon as possible; the competent authority shall be notified without delay.

(2) Suitable precautions, including where necessary the use of safety lamps, shall be taken to prevent danger to persons from any noxious, asphyxiating or flammable gases or smoke emanating from any fire.

2. (1) The workers shall be withdrawn without delay from all workings endangered by fire or smoke; the approaches shall be fenced off.

(2) The workings shall only be re-entered as the manager directs.

3. Adequate measures shall be taken to remove or render harmless by treatment with stone dust or otherwise the coal dust accumulated in all accessible parts of a mine contiguous to the seat of a fire.

4. The installation of fire barriers or stoppings shall only be carried out in the presence of a supervisory official.

5. (1) So long as fire may be suspected behind them, fire stoppings shall be regularly inspected as to air-tightness, heat, and, if reopening of the area is contemplated, as to temperature and atmosphere behind the stoppings.

(2) The results of the inspections shall be entered in a register and any unusual circumstance shall be immediately reported to the supervisory official and the manager.

6. (1) The reopening of districts that have been isolated by stoppings shall only be carried out in the presence of a supervisory official and, where practicable, after consultation with the competent authority.

(2) A rescue party equipped with breathing apparatus shall be stationed near any place where fire stoppings are being opened.

7. (1) If a mine, or part of a mine, has been filled with water for the purpose of drowning a fire, such mine or part of a mine shall only be reopened in the presence of a supervisory official and after consultation with the competent authority.

(2) It shall be carefully ascertained whether the water gives off sulphuretted hydrogen (H_2S), and if such gas is found or is suspected, adequate measures shall be taken to protect the workers against poisoning.

CHAPTER XVI

SHAFT SINKING OR DEEPENING

REGULATION 56. GENERAL PROVISIONS

1. In addition to the other examinations of the shaft required by the present Code, the master sinker, or a competent person appointed by him or by the manager, shall at least once in every twenty-four hours examine thoroughly the state of the shaft and the state of all gear by which cradles, platforms or pumps are slung in the shaft.

2. Every cradle or platform used in the shaft shall be constructed with a grid or other suitable contrivance, when necessary to secure the efficient ventilation of the whole of the shaft.

3. National laws or regulations shall specify the precautions to be taken while men are working on any cradle or platform in the shaft, and particularly to prevent falls of persons.

4. If sinking is done from the surface, and work is carried on during the night, the surface at the shaft top shall be adequately lighted.

5. A supervisory official (chargeman or foreman) shall, during his shift, have entire charge of the operations at the shaft bottom, subject to the directions of the master sinker, the contractor or the manager.

6. (1) Immediately before the descent of the shift, or if work is carried on without any interval by a succession of shifts, during his shift, the supervisory official shall carry out a general safety examination and satisfy himself that the shaft is in a safe condition for men to work at the bottom.

(2) When men are engaged in walling or tubbing a shaft, a similar examination shall be made by a competent person appointed by the manager.

7. The supervisory official shall be the last man to ride at the end of the shift, and if this shift is succeeded immediately by another shift, he shall not leave the bottom of the shaft until the descent of the supervisory official of the next shift.

8. (1) No person shall be allowed to descend after any cessation of work in the shaft, caused by the withdrawal of the

workmen for shotfiring or other purposes, until the supervisory official has examined the shaft and found it to be safe in all respects.

(2) If firedamp has been found or is likely to be found in the shaft, the examinations shall be made with a flame safety lamp or an approved firedamp detector.

9. The banksman shall at all times keep the shaft top and landing edge free from loose material.

10. When a shaft is being sunk through water-bearing strata, adequate means of escape from the bottom of the shaft shall be provided.

11. When a shaft is being sunk through dangerous water-bearing strata, the work shall be conducted in accordance with provisions to be laid down by the competent authority.

REGULATION 57. WINDING OR HOISTING OF MATERIAL AND MEN

1. All winding or hoisting equipment, including winches, guides, ropes, chains, connecting pieces, buckets and similar appliances, shall be—

(a) of sound material and construction;

(b) inspected in accordance with the general rules laid down in Chapter IX of the present Code; and

(c) maintained in a safe working condition.

Shaft

2. An appropriate clear height shall be provided between the pulley and the top of the bucket when resting at the surface.

3. As soon as a shaft, or the newly deepened part of a shaft, reaches a depth to be specified by national laws or regulations, rope guides for the bucket shall be installed.

4. Both at the shaft top and at working levels at which men are wound, the shaft shall be closed by flaps or trap doors which shall only be opened when required for the passage of the bucket or of material.

5. Throughout working hours, the shaft bottom shall be adequately lighted.

Winding Engine or Winch

6. The winch shall be provided with a reliable depth indicator and with such other means as may be necessary to indicate to the engineman when the bucket or the counterweight is approaching the shaft top.

7. The winch shall be provided with brakes satisfying the requirements of Regulation 32, paragraph 11, of the present Code.

Suspension Gear

8. National laws or regulations shall specify the requirements to be satisfied by suspension gear, and in particular as regards breaking strength, anti-spin devices and capels.

Signalling Appliances

9. Efficient signalling appliances shall be provided for signalling between the working places in the shaft, the shaft top and the winchman.

10. (1) Signalling appliances shall only be operated by the chargemen or the signallers appointed for the purpose.

(2) It shall, however, be possible for any person to operate the signalling appliances from the bucket at any point in its course.

(3) Signalling appliances shall be examined every day.

Winding Operations

11. National laws or regulations should fix the maximum man-winding speed.

12. (1) Precautions shall be taken to prevent a bucket when being lowered from striking persons in the shaft bottom.

(2) The bucket shall be centred and steadied before commencing its ascent.

13. No person shall be wound or hoisted without a light.

14. No person shall enter or leave a bucket at the top of the shaft or at any working platform before the flaps or trap doors at the top of the shaft or at the working platform have been closed.

15. (1) Except for the purpose of shaft inspection, no person shall be carried on the edge of the bucket.

(2) Any inspecting person standing on the edge of the bucket while it is being moved shall be protected against falling by means of a safety belt.

(3) No person shall be carried in a partly or fully loaded bucket.

16. If two buckets are used, no bucket shall be used for material-winding while man-winding is in progress.

17. The competent authority shall specify the precautions to be taken in winding material, and in particular as regards—

- (a) the loading of the bucket;
- (b) the lowering and raising of the bucket; and
- (c) the operation of signals.

REGULATION 58. SHOT FIRING

1. Subject to the provisions of the present chapter, shotfiring during shaft sinking shall comply with the provisions of Chapter V of the present Code.

2. Shotfiring shall only be carried on by competent and properly authorised persons.

3. The primers shall only be prepared in a special place designated by the manager.

4. (1) The explosives shall be brought to the bottom in closed containers.

(2) Separate containers shall be provided for detonators.

5. All shots shall be fired electrically, unless otherwise permitted by the competent authority.

6. (1) While the leads are being joined and the connection made to the firing line, only the necessary minimum number of men, in addition to the supervisory official, shall be present.

(2) The cable shall not be coupled to the firing apparatus until all persons are in a place of safety.

(3) The supervisory official shall be the last to leave the bottom.

CHAPTER XVII

ELECTRICITY

Section 1. General

REGULATION 59. DEFINITIONS

In this chapter the following terms have the meanings hereby assigned to them:

- (a) the term "apparatus" means electrical apparatus and includes all machines, apparatus and fittings in which conductors are used, or of which they form a part;
- (b) the term "hand-held portable apparatus" means apparatus that is held in the hands while working, with or without a special movable support;
- (c) the term "portable apparatus" means apparatus that from the nature of its use requires to be moved while it is working, or that is designed so that it can be moved while it is working;
- (d) the term "transportable apparatus" means apparatus that from the nature of its use requires to be moved to a new position from time to time between the periods when it is working;
- (e) the term "conductor" means an electrical conductor arranged to be electrically connected to a system;
- (f) the term "cable" means one or more stranded conductors, separately insulated throughout their length, and when more than one, laid up together, and generally provided with a mechanical protective covering;
- (g) the term "flexible cable" means a cable containing one or more cores each formed of a group of wires, the diameters of the cores and of the wires being sufficiently small to afford flexibility;
- (h) the term "circuit" means an electric circuit forming a system or branch of a system;
- (i) the term "electric line" means a wire or wires, conductor, or other means used for the purpose of conveying, transmitting or distributing electricity with any casing, coating, covering, tube, pipe, or insulator enclosing, surrounding, or supporting the same, or any part thereof;

- (j) the term "circuit-breaker" means a mechanical device capable of making and breaking the circuit under normal and abnormal conditions such as that of short-circuit. Unless otherwise specified a circuit-breaker is designed to break the current automatically;
- (k) the term "fuse" means a device for protecting a circuit from damage by overload, by means of the fusion of a specially designed part thereof;
- (l) the term "earth¹ electrode" means a metallic plate, or a metallic pipe or pipes, or other metallic objects adequately serving the same purpose, inserted in the ground and in adequate electrical contact with the general mass of earth;
- (m) the terms "connected with earth" and "earthed" mean connected with the general mass of earth in such a manner as will ensure at all times an immediate and safe discharge of energy;
- (n) the terms "insulation" and "insulating material" mean non-conducting material enclosing, surrounding or supporting a conductor or any part thereof, and of such quality and thickness as to be suitable for the purposes of the paragraph in which the term is used;
- (o) the term "isolated" means disconnected from the source of energy;
- (p) the term "sub-station" means any premises or enclosure or part thereof, being large enough to admit the entrance of a person after the apparatus therein is in position, containing apparatus for transforming or converting energy to or from a voltage above medium voltage (other than transforming or converting solely for the operation of switchgear or instruments), with or without other apparatus for switching, controlling or otherwise regulating the energy, and includes the apparatus therein;
- (q) the term "switch station" means any premises or enclosure or part thereof, being large enough to admit the entrance of a person after the apparatus therein is in position, containing apparatus for switching, controlling or otherwise regulating energy at a voltage above medium voltage, but not for transforming or converting energy (other than transforming or converting solely for the operation of switchgear or instruments), and includes the apparatus therein;
- (r) the term "system" means an individual electrical system in which all the conductors and apparatus are electrically connected to a common source of voltage, and includes all the said conductors and apparatus;

¹ "Earth", "earthing", "earthed" are equivalent to "ground", "grounding", "grounded".

- (s) in the case of alternating current, the term "voltage" means virtual voltage or root mean square value;
- (t) the term "miniature voltage" means a voltage not normally exceeding 42 volts between poles or phases, or such other lower value as may be laid down in national laws or regulations;
- (u) the term "low voltage" means a voltage not exceeding approximately 250 volts direct current or 127 volts alternating current between poles or phases, under normal conditions, as specified in national laws or regulations;
- (v) the term "medium voltage" means a voltage exceeding low voltage but not exceeding 500-650 volts under normal conditions, as specified in national laws or regulations;
- (w) the term "high voltage" means a voltage normally exceeding a voltage of a magnitude between 500 and 650 volts, as specified in national laws or regulations;
- (x) the term "leakage current" means a current passing through or over the surface of insulating material from one conductor to earth or to another conductor, other than the electrostatic charging current;
- (y) the term "live" means electrically charged;
- (z) the term "dead" means at, or about, earth potential, and disconnected from any live system;
- (aa) the term "danger" means danger to health or danger to life or limb from shock, explosion, burn or other injury incidental to the generation, transformation, distribution or use of energy.

REGULATION 60. GENERAL PROVISIONS

1. Electricity shall only be used in any mine or part of a mine in so far as is allowed and in the conditions laid down by national laws or regulations, due regard being paid to the risks from firedamp, coal dust, and fire.

2. (1) Except in small mines exempted under national laws or regulations, the entire electrical installation at every mine shall be in charge of a chief electrician appointed by the manager.

(2) Every chief electrician shall possess at least minimum qualifications to be specified in national laws or regulations and should also possess a certificate of competency.

(3) No person, except an electrician or a competent person acting under his supervision, shall undertake any work where technical knowledge or experience is required adequately to avoid danger.

(4) A sufficient number of assistant electricians for the proper performance of statutory duties shall be appointed by the manager.

3. The duties of the electrical staff shall be either prescribed in national laws or regulations or laid down by the manager and shall include—

- (a) the thorough examination of all apparatus as often as may be necessary to prevent danger; and
- (b) the examination and testing of all new apparatus and of all apparatus re-erected in a new position in the mine before it is put into service in the new position.

4. Notices shall be sent by the manager to the competent authority in the form and manner to be specified in national laws or regulations as follows:

- (a) notice of the intention to introduce or reintroduce apparatus into any mine or into any ventilating district in any mine; and
- (b) at regular intervals to be specified by the competent authority, a return giving the size and type of all the apparatus in use and any other particulars that may be required by the competent authority.

5. A proper scale plan shall be kept in the office at the mine showing the position of such apparatus as may be specified by national laws or regulations, and the plan shall be constantly kept up to date.

6. The following notices shall be kept exhibited where necessary:

- (a) a notice prohibiting any unauthorised person from handling or interfering with apparatus;
- (b) a notice containing directions as to procedure in case of fire;
- (c) a notice containing directions as to the restoration of persons suffering from the effects of electric shock; and
- (d) a notice containing instructions how to communicate with the person appointed under paragraph 17 of this Regulation.

7. The chief electrician shall keep at the mine a register (electricity register) in a form to be specified by the competent authority and shall enter in it—

- (a) particulars of all examinations, inspections and tests carried out in accordance with national laws or regulations; and
- (b) such other particulars as are specified by national laws or regulations or by the competent authority.

8. In all places lighted by electricity where a failure of the electric light would be likely to cause danger, one or more safety lamps or other proper lights shall be kept continuously burning.

9. Adequate working space and means of access clear of obstruction and free from danger shall be provided for all fixed

apparatus that has to be worked or attended to by any person, and all handles intended to be operated shall be conveniently placed for that purpose.

10. (1) Unless the apparatus is so constructed, protected and worked as to obviate the risk of fire, no flammable material shall be used in the construction of any room, recess, compartment or box containing apparatus or in the construction of any of the fittings therein.

(2) Each such room, recess, compartment or box shall be so constructed as to be safe against danger from falls of ground and shall be protected against water.

11. Where necessary to prevent danger or mechanical damage, transformers and switchgear shall be placed in a separate room, recess, compartment or box.

12. Flammable or explosive material shall not be stored in any room, recess, compartment or box containing electrical apparatus, or in the vicinity of such apparatus, with the exception of approved lighting equipment.

13. Fire buckets of suitable capacity, filled with clean dry sand or other approved substitute, or approved fire-extinguishers, ready for immediate use in extinguishing fires, shall be kept in or near every place containing apparatus, other than cables, telephones, and signalling apparatus.

14. All apparatus, conductors, and electric lines shall be—

- (a) of a standard of construction not lower than standard specifications approved by the competent authority;
- (b) sufficient in size and power for the work they may be called upon to do; and
- (c) so constructed, installed, protected, worked, and maintained as to prevent danger so far as is reasonably practicable, and, in particular, shall be of adequate mechanical strength to withstand such rough usage as they may be subject to.

15. Electrical installations shall be equipped with suitable measuring and control apparatus.

16. All apparatus shall be installed and worked so as not to exceed the designed temperature rise, due regard being paid to the ambient temperature.

17. (1) Properly constructed switchgear for cutting off the entire supply of current to the mine shall be provided at the surface of the mine.

(2) During the time any conductor is live a person authorised to operate the said switchgear shall be available within reach thereof.

18. Efficient means, suitably placed, shall be provided for cutting off all current from every part of a system, as may be necessary to prevent danger.

19. Where necessary to prevent danger, suitable means shall be provided at the surface of the mine to protect the installation below ground from abnormal voltage due to atmospheric electricity.

20. The main switch station at the surface and the main sub-stations underground shall be connected with one another by telephone.

Section 2. Installation Regulations for Low- and Medium-Voltage Systems (excluding Special Regulations applying to Places where there is a Risk of Firedamp and/or Coal-Dust Explosions)

REGULATION 61. INSULATION

1. (1) All insulating material shall be chosen with special regard to the circumstances of its proposed use.

(2) Insulating material shall be—

- (a) of mechanical strength sufficient for its purpose; and
- (b) so far as is practicable, of such a character or so protected as fully to maintain its insulating properties under working conditions, including conditions as to temperature and moisture.

2. (1) All parts of underground electrical systems shall be kept efficiently insulated from earth except in so far as national laws or regulations may permit or require one point to be earthed, for example:

- (a) the neutral point of a polyphase system; and
- (b) the mid-voltage point of any two-wire system.

3. Efficient means should be provided for indicating any defect in the insulation of a system.

REGULATION 62. EARTHING SYSTEMS

1. The following rules shall apply except where the national laws or regulations provide for protective devices other than earthing.

2. In the case of—

- (a) hand-held portable, portable or transportable apparatus where the voltage exceeds miniature voltage; and

(b) all other installations where the voltage exceeds low voltage, all metallic structures (other than live conductors) forming part of or enclosing or protecting apparatus or electric lines, or adjacent to live conductors so as to be liable to become charged by contact therewith or leakage therefrom, shall be connected with earth.

3. (1) Earthing systems for the protection of persons shall at all times be such that no dangerous voltage can arise between earthed parts and the earth.

(2) Neutral wires of a polyphase system shall not be used as parts of earthing systems.

4. All metallic structures that are required to be connected with the earthing system shall be connected by a special conductor for this purpose, which conductor shall have an adequate cross-sectional area.

5. All earthing conductors shall be electrically continuous throughout and in efficient electrical connection with earth and with the apparatus that they are intended to earth.

6. (1) Earthing conductors and their connections shall be efficiently protected against corrosion.

(2) Earthing conductors shall, as far as reasonably practicable, be—

(a) laid so as to be visible; and

(b) efficiently protected against mechanical damage:

Provided that this requirement shall not apply to earthing conductors in multi-core cables.

(3) Earth electrodes shall be efficiently constructed and maintained.

7. Except for testing and such other purposes, as may be specified in national laws or regulations, no automatic circuit-opening device shall be introduced between the system and the earth electrode.

8. Where any point of an underground system is earthed it shall be earthed by connection to an earthing system at the surface of the mine, unless national laws or regulations permit another equivalent earthing system.

REGULATION 63. PROTECTION AGAINST ACCIDENTAL CONTACT

1. All conductors, unless so placed and safeguarded as to prevent danger, shall be covered with insulating material: Provided that this requirement shall not apply to circuits in which the voltage does not exceed miniature voltage.

2. Inspection covers of electrical apparatus shall be securely fixed in position.

3. Where cables protected by metallic covering are connected to apparatus, the metallic covering shall be securely attached both mechanically and electrically to the casing of the apparatus.

4. Mesh or wire netting used as protection against accidental contact shall be of strong construction and the openings shall be sufficiently small to prevent danger.

REGULATION 64. OVERLOAD PROTECTION

1. The current in all systems shall be so controlled that when in any circuit the current exceeds the specified current so as to involve danger the current shall be automatically cut off.

2. Every circuit-breaker and fuse shall be—

(a) of adequate breaking capacity for the circuit in which it is used having regard to the energy in the system; and

(b) of sufficiently rapid action to avoid danger.

3. Circuit-breakers shall be housed in strong enclosed casing such that they can be operated without any possibility of coming into contact with their live parts.

REGULATION 65. APPARATUS AND CONDUCTORS

Oil-filled Apparatus

1. (1) Apparatus of all types containing a quantity of oil in excess of a quantity laid down by national laws or regulations shall be provided with adequate means (oil sump or other) to localise a fire resulting from ignition of the oil.

(2) As far as practicable, the apparatus shall be so placed that if the oil catches fire, no smoke or other combustion gases can be carried in dangerous quantities to occupied places.

Transformers

2. The provisions of paragraphs 3 and 4 of this Regulation shall apply to transformers used for power and lighting.

3. (1) The places where transformers are installed shall be adequately ventilated so that the heat generated by them is efficiently carried off.

(2) It shall be possible to switch off every transformer separately: Provided that this requirement shall not apply to transformers permanently connected in parallel, in which case it

shall be possible to cut off the current simultaneously from the entire set of such transformers.

(3) Transformers shall be of entirely enclosed construction, unless they are so installed or protected that they are not exposed to any danger from the penetration of dust or water.

4. Where oil-filled transformers exceeding a capacity to be specified by national laws or regulations are used, they shall be—

- (a) installed in fireproof places in the immediate vicinity of which there shall be no easily combustible materials; and
- (b) equipped with thermal control or other effective protection against fire through internal defects.

Switchgear and Distribution Apparatus

5. Switchgear shall be so constructed and installed that—

- (a) the lodgement of any matter likely to diminish the insulation on or close to live parts shall be prevented; and
- (b) switches cannot accidentally be closed by gravity, impact or any other cause.

6. Where the rupturing capacity of switchgear is inadequate for the position in which it is installed in the event of a short-circuit, additional protection by fuses or circuit-breakers or other means shall be provided.

Current-consuming Apparatus

7. (1) Motors shall be provided with switches by means of which the current can be completely cut off from each motor separately.

(2) The preceding requirement shall not apply to motors forming part of a set of motors belonging to one and the same tool or machine, provided that there is a switch by means of which the entire set can be cut off at the same time.

(3) The switches referred to in the preceding paragraphs, or the operating devices of these switches, shall be in the immediate vicinity of the motors.

Conductors

8. The types of conductors that may be used and the conditions in which they may be used shall be specified in national laws or regulations.

9. (1) Flexible cables used with hand-held portable, portable or transportable apparatus shall—

- (a) be multi-core cables; and

(b) comprise an earthing conductor of adequate cross-sectional area and conductance.

(2) If a flexible metallic covering is used as a means of protection from mechanical damage, the same shall not alone be used to form an earthing conductor for the portable apparatus.

(3) At every point where flexible cables are joined to main cables a device capable of entirely cutting off the current from the flexible cables shall be provided.

10. (1) All cables in winding shafts or travel compartments shall be specially well insulated and securely fixed in position.

(2) Shaft and slope cables whose conductors or coverings are not capable of sustaining their own weight shall be secured at suitable intervals by adequate supports.

(3) The cables shall be completely enclosed or otherwise suitably protected against falling material.

11. Cables on haulage roads shall be protected from damage by locomotives or tubs by the provision of adequate clearances and by other suitable means.

12. When roads are being repaired or shotfiring is being carried on, apparatus and conductors shall, where necessary, be given suitable additional protection against damage.

Fittings, Accessories and Components

13. Fuses shall be installed in places where they can be conveniently attended to and which can be reached without any special equipment.

14. Plug and socket connections shall be so arranged that when the plug is out of the socket, live parts are not accessible.

15. When plug and socket connections are used in any circuit exceeding low voltage, an interlock should be provided to prevent removal of the plug under load.

16. For miniature voltages use shall only be made of plugs that cannot fit into sockets for higher voltages.

Hand-held Portable, Portable and Transportable Apparatus

17. (1) Energy shall not be supplied to any portable hand lamp above low voltage direct current or miniature voltage alternating current.

(2) Energy shall not be supplied to any hand-held portable apparatus above low voltage or such other voltage as may be laid down in national laws and regulations.

18. On hand-held portable, portable and transportable tools and machines, switching-off devices shall form part of the tool or machine.

19. Except in non-fiery mines, hand-held portable, portable and transportable current-consuming apparatus shall be of flame-proof (explosion-proof) construction.

Lighting Systems

20. Except as otherwise laid down in national laws and regulations, the voltage in any lighting system shall not exceed low voltage.

21. In places where lamps are exposed to damage, they shall be—

(a) enclosed in a substantial fitting; and

(b) protected by an outer transparent covering enclosed in a strong metal cage.

Means of Communication (Signalling and Telephone Systems)

22. Adequate precautions shall be taken to prevent signal and telephone wires from touching cables, electric lines and other apparatus.

23. (1) Bare wires shall not be used for any voltage exceeding miniature voltage.

(2) Bare wires for magneto telephones may be allowed for voltages up to 130 volts.

24. The source of current for operating signalling apparatus and telephones shall be of a type authorised by national laws or regulations.

25. (1) In the shaft, only armoured cables should be used for signalling purposes.

(2) The signal wires of different winding installations shall not run in a common cable.

(3) The cables shall not include any other circuit wires excepting only wires provided for a telephone circuit.

26. In the winding-engine room a device should be installed that clearly indicates any failure of the signalling current.

**Section 3. Installation Regulations for High-Voltage Systems
(excluding Special Regulations applying to Places where
there is a Risk of Firedamp and/or Coal-Dust Explosions)**

REGULATION 66. GENERAL PROVISIONS

1. The general requirements laid down in Section 2 of the present chapter shall also apply to high-voltage systems, subject to the additions and modifications contained in paragraphs 2 to 8 of this Regulation.

2. Electricity distributed at high voltage shall not be used without transformation to a lower voltage, except for fixed motors exceeding a horse-power to be fixed by national laws or regulations.

3. Where energy is transformed, suitable provision shall be made to protect the lower-voltage system from becoming charged above its normal voltage by leakage or electrostatic induction from the higher-voltage system, either by connecting with earth a point of the lower-voltage system, or by other equally effective means.

4. Special precautions shall be taken to protect persons against accidental contact with conductors that are or may become live.

5. The current in an alternating current system shall be so controlled that, when in any circuit the leakage current to earth exceeds 15 per cent., or other percentage to be fixed by national laws or regulations, of the rated current for the circuit, the circuit shall be automatically isolated.

6. (1) In the case of high-voltage switches, means shall be provided to isolate the switch from the source of current.

(2) Where such switches can be electrically charged from duplicate sources of supply, means shall be provided to isolate the switches from both sources.

(3) Where two or more switches control a single unit, it shall be sufficient to provide one means of isolation for the combination.

7. The exception to Regulation 65, paragraph 7 (2), shall not apply.

8. The cases of indicating and measuring instruments working at high voltage, if accessible and of metal, shall be earthed.

Section 4. Special Installation Regulations applying to Places where there is a Risk of Firedamp and/or Coal-Dust Explosions

REGULATION 67. GENERAL PROVISIONS

1. According to the degree of explosion risk as referred to in Regulation 38, mines or parts of mines should be divided into risk classes for the purposes of electrical rules and regulations.

2. The provisions of Regulations 60 to 66 together with the additions and modifications contained in paragraphs 3 to 11 of this Regulation shall apply to places where there is a risk of fire-damp explosion.

3. In mines liable to sudden outbursts of firedamp, the use of electricity except for portable safety lamps and for shotfiring shall be prohibited, except with the authorisation of, and in the special conditions laid down by, the competent authority.

4. (1) All electrical apparatus shall be of a design and construction satisfying the requirements of national laws or regulations.

(2) In particular it shall be certified as flameproof by a testing station approved by the competent authority.

5. Power transformers should be adequately protected against overloads and short circuits.

6. Bare conductors shall only be used in earthing systems.

7. Hand-held portable, portable and transportable apparatus and conductors for such apparatus shall only be used in accordance with requirements to be specified in national laws and regulations.

8. Where pressure-relieving devices are included in the design of flameproof apparatus, this apparatus shall be used in accordance with requirements to be specified in national laws or regulations.

9. Electric lighting from a source of electrical power external to the lighting unit shall only be allowed in the places and conditions to be specified in national laws or regulations.

10. (1) For lighting apparatus, plugs shall be—

(a) so interlocked with the switch, either mechanically or electrically, that they cannot be inserted and withdrawn under load; or

(b) so constructed that the current is broken under flameproof conditions.

(2) Use shall only be made of lamps with bulbs or tubes that are hermetically sealed and secured against loosening or are otherwise suitably protected against the effects of loosening.

11. (1) In mines or parts of mines where there is a risk of coal-dust explosions, all apparatus and conductors shall be so designed, installed, operated and maintained as to prevent as far as practicable the accidental occurrence of arcs, violent sparking and ignitions.

(2) Coal dust shall not be allowed to accumulate on or near apparatus that might be liable to ignite it.

Section 5. Examinations and Tests

REGULATION 68. GENERAL PROVISIONS

1. (1) All parts of electrical installations shall be examined and/or tested at intervals and in conditions to be specified in national laws or regulations.

(2) All electrical apparatus, cables and electric lines should be—
(a) examined externally at least once a week; and
(b) tested for insulation at least once every three months.

(3) The entire electrical installation of the mine should be thoroughly examined at least once in every year.

(4) All electrical apparatus and cables in use at the face, and all portable and hand-held portable apparatus together with their flexible cables should be examined at least once in every 24 hours.

(5) The motors of electrically-driven conveyors and loaders shall also be examined whenever the apparatus is re-erected in a new position.

(6) Flameproof apparatus shall be examined externally at such regular intervals as may be necessary to prevent danger.

(7) All protective devices including relays and circuit-breakers shall be tested at least once in every month.

2. Testing instruments shall be so designed that they are incapable, in normal use, of producing a spark that can ignite firedamp.

3. (1) Every flexible cable shall be examined periodically (if used with a portable machine, at least once in each shift by the person authorised to work the machine), and if found damaged or defective it shall forthwith be repaired or replaced by a spare cable in good repair.

(2) Such damaged or defective cable shall not be further used underground until it has been properly repaired and tested.

(3) All flexible cables shall be periodically inspected and tested at intervals to be specified in national laws or regulations.

4. All parts of electrical installations that are found to be defective shall either be repaired or replaced by parts in proper condition.

5. The results of all examinations, inspections and tests shall be entered in the electricity register.

Section 6. Operating Regulations

REGULATION 69. GENERAL PROVISIONS

1. For all mines the operating rules and regulations for electricity in industrial undertakings generally shall apply as far as practicable in coal mines; in addition, paragraphs 2 to 12 of this Regulation shall apply.

2. The enclosures of remote-controlled apparatus shall only be opened when the remote controls are reliably blocked.

3. Plugs and sockets that are not provided with an interlock or otherwise protected under Regulation 65, paragraph 15, shall be disconnected while the circuit is live.

4. Special keys for locked enclosures and special tools required to open casings of apparatus shall not be allowed to come into the possession of unauthorised persons.

5. The current shall always be cut off from all conductors and apparatus which are not in use.

6. No unauthorised person shall enter a sub-station or transformer room or interfere with the working of any apparatus connected therewith.

7. In oil-immersed apparatus, the quantity and condition of the oil shall be properly maintained.

8. (1) No work shall be done on any live conductor or live part of apparatus.

(2) When work is being done on apparatus or conductors special care shall be taken to ensure that they remain dead and connected to earth, in so far as may be required by national laws and regulations.

(3) Switches that serve this purpose shall be locked unless they are of a special type that can only be operated by the electrician and with a special key.

9. Repairs shall only be done by competent persons or under their direction.

10. If repairs are made to electrical windings or parts, the apparatus shall be properly tested before it is again put into use.

11. If any defect occurs in the enclosure or any irregularity occurs in the working of the apparatus, the apparatus shall be immediately switched off, and shall not again be used until the defect or irregularity has been remedied.

12. Whenever the current has to be cut off because of a defect or danger, as specified in the preceding paragraph, the supervisory official shall be immediately notified and the circumstances recorded in the electricity register.

REGULATION 70. ADDITIONAL PROVISIONS APPLYING TO PLACES WHERE THERE IS A RISK OF FIREDAMP AND/OR COAL-DUST EXPLOSIONS

1. For mines or parts of mines where there is a danger of firedamp and/or coal-dust explosions, in addition to Regulation 69, paragraphs 2 to 7 of this Regulation shall also apply.

2. (1) No enclosure of any apparatus shall be opened, and no conductor shall be exposed to the atmosphere while the circuit is live, unless the atmosphere has first been tested and ascertained to be free from firedamp.

(2) Subparagraph (1) shall not apply to any circuit such as a telephone or signalling circuit which is so designed as to render sparking incapable of igniting firedamp.

3. Persons entrusted with the charge or supervision of electrical installations shall take special care that the flameproof protection of apparatus is always in proper condition, and such apparatus shall only be opened by authorised persons.

4. The earthing and short-circuiting of parts that have been made dead shall only be allowed when the freedom of the place concerned from firedamp has been ascertained by the supervisory official, and is frequently verified during the work.

5. The gaps between pressure-relieving plates of flameproof enclosures shall be kept as clean as possible and shall be neither stopped up nor widened.

6. (1) The efficiency of flameproof protection shall not be reduced by repairs.

(2) When changing parts of flameproof apparatus use shall only be made of spare parts made to the same specifications.

(3) No alteration shall be made in any flameproof apparatus.

7. (1) If the firedamp content of the general body of air in any place or area exceeds a percentage to be fixed by national laws or regulations, the current—

- (a) shall be immediately cut off from all conductors and apparatus affected; and
- (b) shall not be switched on again so long as the said percentage remains exceeded.

(2) Subparagrah (1) shall also apply in other circumstances, such as obstruction of the ventilation, likely to result in an accumulation of firedamp.

(3) Such circumstances shall be specified in national laws or regulations or by the competent authority.

CHAPTER XVIII

MACHINERY AND PLANT

REGULATION 71. GENERAL PROVISIONS

1. All machinery and plant used in or in connection with underground work, shall as far as is practicable in mining conditions, and in so far as no special requirements on the subject are laid down in the present Code, comply with the provisions of national laws or regulations relating to the design, construction, installation, maintenance, inspection, testing and operation of machinery in industrial undertakings.

2. In particular, all flywheels, gears, belts and other moving parts that are liable to cause injury shall be efficiently fenced.

3. The fencing of machinery at the face, and in gateways and main mechanical haulage roads, shall be inspected daily by a supervisory official.

4. In so far as no special requirements on the subject are laid down in the present Code, all machinery, gear and other appliances of the mine which are actually in use, shall be thoroughly examined at least once in every week by a supervisory official.

5. Clearances between machines, and between machinery and walls—

(a) shall be as ample and safe as the conditions permit; and

(b) should be specified in national laws or regulations or by the competent authority.

6. If persons passing machinery, or handling machinery, at points distant from the driving engine or motor, can be endangered thereby, there shall be installed effective signals or other means that enable such persons to stop the engine or motor.

REGULATION 72. INTERNAL-COMBUSTION ENGINES

1. (1) Internal-combustion engines shall not be used underground without the authorisation of the competent authority.

(2) If internal-combustion engines are used underground, they shall be of a type approved by the same authority.

REGULATION 73. BOILERS AND STEAM PLANT

1. (1) No steam boiler or other steam generating plant shall be installed underground.

(2) Subparagraph (1) shall not apply to approved devices for vulcanising purposes.

REGULATION 74. COMPRESSED-AIR EQUIPMENT

1. (1) Any compressor that compresses air used underground in the mine shall be so designed, constructed, operated and maintained that—

- (a) air entering the compressor is as dry, clean and cool as practicable;
- (b) the maximum temperature of the air in the compressor is at least 30° C. below the flash point of the compressor lubricating oil;
- (c) effective arrangements are made so that the compressor is stopped either automatically or by the engineman when—
 - (i) the air temperature is too high; or
 - (ii) there is any interruption in the flow of fluid used in the cooling system of the compressor; and
- (d) the compressed air flowing in the pipe range to the top of the shaft is as dry and cool as practicable.

(2) For lubricating the compressor only a high-quality mineral oil shall be used, having a flash point not less than 195° C. when determined in the manner approved by the competent authority.

(3) To ensure that the flash point of the oil complies with the requirements of subparagraph (2) of this paragraph, samples shall be taken and tested—

- (a) of all fresh supplies of oil; and
- (b) as often as necessary, of the oil in the compressor.

(4) Reciprocating air compressors and their accessories shall be dismantled, thoroughly examined and repaired, as often as may be necessary, and in any case at least once in every 8,000 working hours.

2. All receivers containing compressed air for use underground shall comply with the requirements of the competent authority.

CHAPTER XIX

QUALIFICATIONS AND DUTIES OF MANAGING OFFICIALS, SUPERVISORY OFFICIALS AND MINERS

REGULATION 75. MANAGING OFFICIALS

1. Every mine shall be under the management and technical direction of a responsible manager appointed by the mine operator.

2. In mines exceeding a certain size, or employing more than a certain number of workers, to be specified in national laws or regulations, these laws or regulations should require the appointment of one or more assistant managers or under-managers.

3. The mine operator, and the manager, shall be responsible for the observance and enforcement of all safety rules laid down in the national laws or regulations; their duties shall only be deputed to subordinate officials in so far as—

- (a) such officials have been duly appointed in accordance with national laws or regulations;
- (b) their duties and responsibilities have been clearly defined in instructions given them in writing;
- (c) they have been given all necessary facilities for carrying out these instructions and all other orders given them; and
- (d) an adequate system of supervision and control has been instituted and maintained by the mine operator and the manager.

4. Every appointment of an agent, manager or assistant manager shall be notified to the competent authority.

5. Only competent and reliable persons who satisfy requirements to be specified in national laws or regulations as regards age, qualifications and experience shall be eligible for appointment as agents, managers or assistant managers.

6. No person shall take part in the technical management of a mine unless he is qualified to do so in accordance with national laws or regulations.

7. A responsible official shall always be in technical charge of the mine on shifts when neither the manager nor the under-manager (if any) is on duty.

REGULATION 76. SUPERVISORY OFFICIALS

1. (1) The mine operator or manager shall appoint a sufficient number of supervisory officials to ensure proper control, management, direction and inspection of the underground workings.

(2) National laws or regulations shall specify the cases in which the appointment of supervisory officials shall be notified to the competent authority.

2. No person shall be appointed to be a supervisory official unless he satisfies requirements to be specified in national laws or regulations as regards age, qualifications and experience.

3. The general duties of supervisory officials shall be specified in writing by the manager or an assistant manager and shall be in accordance with national laws or regulations.

REGULATION 77. MECHANICAL AND ELECTRICAL ENGINEERS

1. At every mine possessing power plant exceeding a size or horse-power to be specified in national laws or regulations, all boilers, engines and other machinery shall be under the general charge of a qualified engineer whose appointment shall be notified to the competent authority.

2. At other mines possessing power plant, all boilers, engines and other machinery shall be under the general charge of a competent and experienced person.

REGULATION 78. MINERS

1. No unskilled or inexperienced person shall be employed at the coal face, or for other work whereby he or other workers can be seriously endangered, except under the supervision and guidance of a skilled person.

2. No person shall be considered skilled or experienced unless he satisfies such requirements as may be specified by national laws or regulations in regard to the work he has to do.

3. Every miner who enters a mine shall comply with the provisions of national laws or regulations and with any instruction not contrary to national laws or regulations given him by the manager or supervisory officials with a view to ensuring the safety of persons and of the mine.

CHAPTER XX

NOTIFICATION, INVESTIGATION AND RECORDING OF ACCIDENTS AND DANGEROUS OCCURRENCES

REGULATION 79. . GENERAL PROVISIONS

1. (1) All accidents causing loss of life or serious personal injury, and such other accidents as may be specified in national laws or regulations, shall be notified forthwith to the competent authority.

(2) All other accidents causing incapacity for work for three days or more shall be notified to the competent authority within such time and in such form as may be specified in national laws or regulations.

2. Such dangerous occurrences as may be specified in national laws or regulations or by the competent authority, for example underground fires, breakage of winding ropes, cases of overwinding, inrushes of water or gas, or dust explosions, shall be notified forthwith to the competent authority, whether any personal injury has been caused or not.

3. The competent authority should undertake an investigation into the causes and circumstances of any fatal or serious accident or dangerous occurrence.

4. Whenever an accident has resulted in loss of life or serious injury, the scene of the accident shall be left undisturbed until it has been visited by the competent authority, unless compliance with this requirement would tend to increase or continue a danger, or would seriously impede the working of the mine.

5. The mine operator shall keep records, in the form required by national laws or regulations, of the accidents which occur at the mine, and shall make annually (or at other specified intervals) to the competent authority a full return of all the accidents.

CHAPTER XXI

FIRST AID AND RESCUE

REGULATION 80. FIRST AID

Surface Organisation

1. At every mine where the total number of persons employed in any one shift exceeds a figure to be specified by national laws or regulations, there shall be provided and maintained in good order a suitable first-aid room.

2. (1) The first-aid room shall be—

- (a) a room of easy approach, and of easy entrance to persons carrying a stretcher;
- (b) separated from accommodation used for other purposes; and
- (c) used only for first-aid and ambulance work.

(2) The room shall be situated on the surface conveniently near the main entrance to the mine and shall be of adequate size and be adequately heated and lighted, and kept clean.

3. The first-aid room shall be adequately equipped and shall contain at least minimum equipment to be specified in national laws or regulations.

4. (1) The first-aid room shall be under the charge of a competent person or persons, appointed by the manager.

(2) No person other than a qualified nurse or doctor shall be appointed, unless he is the holder of an approved first-aid certificate, or has undergone an approved course of medical training.

(3) The person or persons in charge shall always be immediately available during working hours.

(4) At large mines where the total number of persons employed in any one shift exceeds a figure to be specified in national laws or regulations, a person or persons in charge of the first-aid room shall be in continuous attendance while persons are at work in or about the mine.

5. (1) At small mines where the total number of persons employed in any one shift does not exceed the figure specified in accordance with paragraph 1 of this Regulation, and where accord-

ingly a first-aid room is not provided, there shall be provided and kept constantly available for use a suitable place under shelter at the surface of the mine, where sick and injured persons can receive first-aid treatment and, when necessary, be protected from exposure until they can be removed in an ambulance.

(2) In this shelter, or in some other place in or about the mine, if more convenient, there shall be provided and maintained in good order at least such equipment as is specified in national laws or regulations.

(3) These arrangements shall be placed in charge of a responsible person or persons appointed by the manager and one such person shall always be readily available during working hours.

6. The competent authority may allow two or more mines to establish a joint first-aid room and service as defined above, provided that the room is easily and readily accessible from each of the mines.

Underground Organisation

7. (1) A sufficient number of the persons employed underground shall hold approved first-aid certificates or possess equivalent qualifications.

(2) As far as practicable, each of these persons should regularly work with the same group of workers.

(3) A list of the first-aid men employed underground should be kept posted up in the first-aid room or elsewhere at the surface of the mine.

8. Dressings and antiseptics for use underground shall be—

- (a) provided by the mine operator in airtight coverings; and
- (b) distributed to the first-aid men, in such manner as may be specified in national laws or regulations.

9. Every first-aid outfit shall be taken to the surface daily, and shall there be examined and, if necessary, replenished by the person in charge of the first-aid room, or other competent person appointed by the manager:

10. (1) Equipment such as stretchers, splints and tourniquets shall be provided by the mine operator, and maintained at as many convenient places underground in the mine as may be advisable, and kept as clean as possible.

(2) Blankets should be kept separately in suitable dustproof tins or zinc containers.

(3) It shall be the duty of the first-aid men employed underground to see that this equipment is kept in good order and is replenished when necessary.

11. Whenever a person receives a serious injury underground, the first-aid room shall be notified forthwith (if possible by telephone) and advised whether a doctor or a nurse is required and whether the person is being taken to the surface.

Transport for Cases of Accident and Sickness

12. The operator or manager of every mine shall make such arrangements as will provide an effective motor ambulance service for the transport of sick and injured workers to hospital or to their homes.

13. At every shaft or staple in which injured persons are raised and where the cage is not large enough to permit of a stretcher being laid flat, and at every shaft or staple where persons can only be raised otherwise than in a cage, and at every sinking pit, there shall be provided and used a suitable jacket or contrivances to prevent aggravation of an injury.

Inspection

14. (1) A qualified person, appointed in accordance with national laws or regulations, shall inspect at intervals to be specified by the competent authority, the accommodation, equipment and material provided at the mine and the working of the first-aid and ambulance organisation of the mine.

(2) All defects and shortcomings shall be remedied without delay.

Training and Retraining

15. In order to make the organisation of first aid and rescue of injured persons more effective, in every mine all the technical personnel as well as the greatest possible number of workers shall be so trained that in each mine as many persons as possible are acquainted with first aid and the rescue of persons injured or trapped.

16. All first-aid men shall undergo retraining courses in such manner and at such intervals as shall be prescribed in national laws or regulations, but at least once in every five years.

Reporting of Injuries

17. Every person who suffers an injury, however slight, shall report for examination or treatment at the first-aid room before leaving the mine, even if the injury has been treated underground.

REGULATION 81. RESCUE

1. It shall be the duty of the mine operators or managers jointly and severally, or of the competent authority, in every coal-mining district to make adequate provision for the safe conduct of rescue and other necessary work in mines, after an explosion or a fire, or otherwise, in an atmosphere which may be dangerous to life.

General Organisation

2. (1) There should be provided and maintained, at convenient centres, adequate central rescue stations, fully equipped for rescue work and for the training of rescue workers, unless stations rendering equally efficient service are maintained by the individual mines and approved by the competent authority.

(2) As a rule the radius of action of a station should not exceed 25 to 35 km (15 to 22 miles).

3. Every rescue station shall be placed under the immediate control of a competent superintendent, who has been fully trained in rescue work, and has had at least five years' practical experience underground in a mine.

4. (1) Unless exempted by the competent authority—

- (a) the operator or manager of every mine shall affiliate the mine to the central rescue station, if one exists in the mining district, in such a manner as to acquire the right of calling for and obtaining the full services of the station at any time; and
- (b) every mine shall be connected by telephone to its central rescue station, if one exists, or if not to other nearby mines maintaining their own rescue stations.

5. Rescue workers, in sufficient numbers to be prescribed by national laws or regulations, shall be maintained and organised, either—

- (a) by the provision of a permanent rescue corps at the central rescue station and of trained rescue workers at the mine; or
- (b) by the provision of rescue brigades at the mine.

6. (1) Subject to any exemption that may be granted by the competent authority, a sufficient number of members of a permanent rescue corps shall be continuously employed at the station, and in constant residence there.

(2) Effective arrangements shall be made at every mine for summoning other rescue workers immediately their services are required.

Selection of Rescue Workers

7. (1) The persons to be trained in rescue work shall be carefully selected on the grounds of their coolness, powers of endurance, and general suitability for the work, and in the case of men from mines to be trained to co-operate with the permanent rescue corps, also on the ground of their knowledge of the layout of the mine.

(2) In particular, rescue workers shall have had at least two years' working experience underground in a coal mine, and hold an approved first-aid certificate.

(3) Every rescue worker shall be medically re-examined every twelve months, and shall not continue to act unless he is certified as fit.

Instruction and Practice

8. At every central rescue station there shall be a sufficient number of competent instructors to train rescue workers.

9. (1) Every person selected for training in rescue work shall undergo courses of instruction and practices prescribed by the competent authority.

(2) Rescue workers who have been certified as efficient, shall periodically undergo further practices and instruction as prescribed or approved by the competent authority.

Rescue Apparatus and Equipment

10. (1) At every central rescue station and at all other stations approved under paragraph 2 (1) of this Regulation there shall be provided and maintained in good order, and permanently ready for immediate use, adequate and suitable rescue equipment to be specified by the competent authority.

(2) The breathing apparatus and the materials to be used in it, smoke helmets and similar apparatus, carbon monoxide detectors, carbogen apparatus and first-aid boxes shall be of officially approved types.

(3) There shall also be kept, at every mine affiliated to a central rescue station and exceeding a size to be specified by national laws and regulations, effective carbogen or other reviving apparatus (inhalator) and such other equipment as may be required by the competent authority.

(4) All such equipment should, as far as possible, be of the same types as the corresponding equipment provided at the central rescue station.

11. (1) Every breathing, carbogen and other apparatus, and every flow-meter shall be adjusted and tested periodically.

(2) The purity of the oxygen and carbogen gas used shall also be tested.

(3) In each case these tests shall be carried out in the manner prescribed by the competent authority.

12. Any accidents or dangerous occurrences from the use of breathing apparatus, smoke helmets or the like, shall be reported to the competent authority.

13. (1) At every mine there shall be provided and maintained a room or other suitable accommodation for rescue workers and equipment in accordance with national laws or regulations.

(2) Rescue equipment shall be stored in such room or accommodation and not underground in the mine.

14. National laws or regulations shall provide for periodical inspections of the accommodation, apparatus, and equipment provided for rescue work, training and practice.

15. (1) At every mine there shall be kept in a form suitable for use by rescue workers and for training practices a sufficient number of clear and legible tracings of the general ventilation system reasonably up to date and showing—

(a) all principal doors, stoppings and air crossings; and

(b) all regulators and telephone stations.

(2) On these tracings, the intake airways shall be distinguished from the return airways by a different colour.

16. The code of signals for use in rescue work and training shall be as uniform as possible for all mines and shall be approved by the competent authority.

17. Instructions for persons engaged in rescue work shall be adopted at the central rescue station or the rescue stations of individual mines, and shall embody a code of instructions, as uniform as possible, laid down or approved by the competent authority.

CHAPTER XXII

GENERAL INSPECTIONS BY MANAGERS AND SUPERVISORY OFFICIALS

REGULATION 82. GENERAL INSPECTIONS BY MANAGERS AND SUPERVISORY OFFICIALS

1. (1) Safety inspection by supervisory officials shall be made of all sections or districts of a mine during each working shift.

(2) The inspections made by the official in charge of each section or district of the mine shall include matters such as—

- (a) the getting of coal;
- (b) the presence of firedamp;
- (c) ventilation generally;
- (d) the state of the supports, roof, and sides;
- (e) the handling of lamps;
- (f) the fencing of dangerous places;
- (g) the condition of the haulage equipment; and
- (h) the checking of the number of workers in each district.

2. (1) The manager shall fix the points that the workers may not pass before the supervisory officials have reported everything safe.

(2) Such points shall be marked in the mine by conspicuous signs.

3. (1) Irrespective of any other inspections that may be prescribed by the present Code every district beyond the points referred to in paragraph 2 of this Regulation shall be inspected throughout as to safety by a supervisory official of the mine within a period not exceeding two hours before each shift begins work in the district.

(2) No unauthorised person shall enter the district to begin work before such inspection has been made.

(3) For the purposes of this Regulation, two or more shifts immediately succeeding one another shall be deemed one shift.

4. Every workplace underground shall be inspected as to safety by a supervisory official of the mine at least twice in every

shift or more frequently, as may be specified in national laws or regulations.

5. Except in mines in which firedamp is definitely unknown, every inspection shall be made with a flame safety lamp or other approved firedamp detector.

6. (1) On each inspection a report shall be made in the form and manner to be fixed by the manager.

(2) On the inspections required under paragraph 3 of this Regulation written reports shall be made in a register.

7. The districts into which the mine is divided for the purpose of safety inspections shall not be too large to allow the supervisory officials undertaking such inspections to carry out their duties in a thorough manner.

8. Independently of the above inspections by supervisory officials, every mine shall be inspected periodically in every accessible part by the manager or his assistants.

CHAPTER XXIII

SAFETY ORGANISATION

REGULATION 83. GENERAL PROVISIONS

1. All the mines in a coal-mining district should affiliate to a central safety organisation for the district and have their own safety organisation, headed by a competent official who, except in small mines, should have no other duties or responsibility than the safety of the workings of the mine.

2. (1) Every mine employing such number of persons as may be specified by national laws or regulations should make periodical analyses of the accidents occurring in the mine, in accordance with rules to be laid down by the competent authority.

(2) The manager should use these statistics for ascertaining and dealing with—

(a) districts that need increased supervision;

(b) particular sources of danger that call for changes in methods; or

(c) particular defects that need to be remedied.

(3) A copy of the analyses should be sent to the competent authority, at intervals to be prescribed in national laws or regulations.

3. If a mine has a consistently bad record of accidents, the competent authority may require the setting up of a special safety organisation for that mine.

REGULATION 84. WORKERS' SAFETY DELEGATES

1. Authorised representatives of the workers shall be permitted to inspect the mine, and all written reports and mine plans relative to the safety of the mine and the mine employees shall be made available at the mine for their examination.

2. In the case of a serious or fatal accident, such authorised representatives of the workers shall have the right to examine the place where, and the circumstances under which, the accident occurred.

CHAPTER XXIV

MISCELLANEOUS

REGULATION 85. TELEPHONES

1. In every mine employing a minimum number of persons, and having workings extending beyond a minimum distance from the entrance to the mine, both to be specified by national laws or regulations, telephones shall be installed at a sufficient number of suitable points underground, so as to allow communication between the different parts of the mine, and also between the underground workings and the surface.

2. If there is a central exchange below ground, it shall be situated at the intake shaft, in a recess appropriately protected against damage and screened from noise or interference.

REGULATION 86. CARRYING OF MATCHES, SMOKER'S MATERIALS, LIGHTERS, ETC.

In all mines in which safety lamps are required in any part—

- (a) it shall be prohibited to smoke, to bring in pipes, tobacco for smoking, cigarette papers, matches, or any other device or material capable of producing a flame, or any tool capable of being used for improperly opening flame safety lamps;
- (b) the manager shall cause either all persons who enter a mine or such of them as may be selected on a system approved by the competent authority to be searched to see whether they are carrying any object prohibited in paragraph (a) of the present Regulation; and
- (c) no person who refuses to allow himself to be searched shall enter the mine.

REGULATION 87. PROTECTIVE EQUIPMENT

1. Suitable protective hats should be used by all persons employed underground.

2. Shaft repairers and persons performing similar work shall be provided with and use effective safety belts unless they are otherwise efficiently protected against the risk of falling.

3. Underground, strong footwear with reinforced toe-caps should be worn.

4. Men working in connection with compressed-air stowing appliances or with appliances for mechanical stone-dusting, or at any other work specified by the competent authority, should be provided with and wear efficient goggles and respirators.

5. The competent authority may require the provision and use of gauntlets or gloves and other protective equipment in respect of persons engaged on particular kinds of work.

REGULATION 88. EMPLOYMENT OF JUVENILES

1. (1) National laws or regulations shall fix a minimum age for the employment of boys underground and require them to be certified to be physically fit for underground work and to be properly trained.

(2) Where practicable such training should include—

- (a) employment at the surface for an adequate period; and
- (b) attendance at approved courses of training.

2. (1) On commencing work underground, a boy shall be placed for instruction and supervision in the charge of a competent person, appointed by the manager, until he is fully competent for his duties.

(2) Further instruction and supervision shall be given whenever the boy takes up fresh duties.

3. No boy shall be employed on heavy work underground that is likely to cause physical injuries or is manifestly in excess of his strength.

REGULATION 89. INTOXICATED OR SICK PERSONS

1. No person shall be admitted to a mine if he is manifestly intoxicated or incapacitated by illness.

2. No person shall take any intoxicating liquor into a mine without the permission of the manager.

REGULATION 90. EMPLOYMENT OF WORKERS SPEAKING DIFFERENT LANGUAGES, AND ILLITERATE WORKERS

For districts where considerable numbers of workers speaking different languages or illiterate workers are employed, national laws or regulations should prescribe the measures to be taken to ensure that such workers are enabled to understand such regulations, instructions and orders as concern the safe performance of their duties and their safe behaviour in the mine.

REGULATION 91. SHAFT MAINTENANCE AND REPAIRS

1. Repairs in shafts shall be so carried out that the workers are properly protected.
2. (1) Fixed or mobile working platforms in shafts shall be safely constructed and operated.
(2) In particular they shall have an adequate safety factor in relation to the maximum load.
(3) If wood is used, it shall be specially examined periodically by the supervisory official.
3. Solitary employment on shaft retimbering or shaft repair work shall be prohibited.

REGULATION 92. PROTECTION AGAINST FALLS OF PERSONS
AND FALLS OF OBJECTS

1. (1) The top and all openings and approaches of all shafts, staples, roads and mine workings with a gradient of more than 30°, except face workings, shall be efficiently fenced so as to prevent the fall of persons or objects.
(2) On inclines with a slope exceeding 45° repairs should only be undertaken from platforms or with adequate safety belts.
(3) The sides of winding shafts shall be safely enclosed or securely fenced up to a height of 1.5 m (5 ft.) above every landing level.
2. At any shaft fitted with guided cages, the main landings in constant use shall be provided with devices which effectively close the openings into the shaft at all times when the cage is not at the landing.
3. (1) Loose objects such as tools, timber and stones shall be kept at such distance from vertical and inclined mine workings that they cannot fall in.
(2) The supports, buntons and other equipment of such workings shall, when necessary, be cleared of such loose objects.
4. (1) Coal and waste bunkers, chutes and the delivery ends of conveyors and the like shall be so arranged that no one can be endangered by the falling of coal, waste or other objects.
(2) If coal or waste bunkers or chutes that are not empty have to be entered, this shall only be done if special precautions are taken and if a second competent person is present.
5. At the face of steep seams the workplaces shall be specially protected against falling pieces of coal and stone.

6. Stairs, platforms and dangerous walks in the mine shall be provided with rails, fences or gates as may be necessary for the protection of persons.

REGULATION 93. SOLITARY EMPLOYMENT

It shall be prohibited to make a workman work alone in dangerous or remote places where, if an accident occurred, he would not soon be discovered and assisted.

REGULATION 94. CHECKING OF WORKERS

1. Every mine shall keep a daily record of the workers employed underground.

2. The record should be such as to show as far as practicable at all times the location of the various workers.

3. At the close of the shift, the official in charge of the shift shall satisfy himself that none of his men has remained underground unless left in charge of a responsible person.

4. No person shall enter or leave the mine without recording this in an approved manner.

REGULATION 95. IDLE WORKINGS

1. Abandoned or temporarily idle workings shall be blocked up or so fenced off that no person can inadvertently enter them.

2. Abandoned or temporarily idle workings shall only be entered by supervisory officials, or by persons accompanied by such officials.

REGULATION 96. REGISTERS

All registers required by national laws or regulations, or correct copies of them, shall be kept at the office of the mine.

REGULATION 97. ADMISSION OF OUTSIDE PERSONS

1. No person not employed at the mine shall enter the mine, unless he is permitted by the manager to do so and is accompanied by a responsible person.

2. Every person who enters a mine, for whatever reason, shall comply with the provisions of national laws or regulations,

and with any instructions given him by the manager and supervisory officials or the responsible person accompanying him, with a view to ensuring his own safety and the safety of the mine and of the workers.

REGULATION 98. NOTIFICATION, POSTING UP, ETC.,
OF REGULATIONS

1. The mine operator shall bring to the notice of all concerned, in such manner as is prescribed by the competent authority—

- (a) laws or regulations relating to safety, or such extracts from them as are prescribed by the competent authority;
- (b) instructions issued by the competent authority in matters of safety, or such extracts from them as are prescribed by the competent authority; and
- (c) instructions drawn up by the mine manager in matters of safety or extracts from those instructions, the publication of which is prescribed by the competent authority.

2. All notices that are required to be posted up shall be promptly renewed whenever they are defaced, obliterated, or destroyed.

REGULATION 99. EXEMPTIONS

1. In cases where full compliance with any provision of the present Code would cause undue hardship, exemptions from the provision in question may be granted by the competent authority in respect of existing installations.

2. Exemptions, including any special conditions or restrictions to which they are subject, shall be given in writing.
