

## THE UNDERGROUND COAL MINES ELECTRICAL RULES OF 1971

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Department of Mines,  
Brisbane, 16 December, 1971.

HIS Excellency the Governor, acting by and with the advice of the Executive Council and in pursuance of the provisions of the *Coal Mining Act* 1925-1969, has been pleased to rescind all that part of the General Rules set forth in the Second Schedule to the said Act from and after, but not including, Rule 109 to and including Rule 270F, being that part of the Rules described as "General Rules Relating to the Installation Generation Transformation Distribution and Use of Electrical Energy in on or about underground coal mines under the *Coal Mining Act*" and to make the following rules in lieu thereof: Provided that such rescinding shall not—

- (a) Affect any previous operation of any such general rules or anything duly done or suffered thereunder; or
- (b) Affect any right, privilege, obligation or liability acquired, accrued or incurred under any such general rules;
- (c) Affect any penalty, forfeiture or punishment incurred in respect of any offence committed against any such general rules;
- (d) Affect any investigation, legal proceeding or remedy in respect of any such right, privilege, obligation, liability, penalty, forfeiture or punishment as aforesaid,

and that any such investigation, legal proceeding, or remedy may be instituted, continued or enforced and any such penalty, forfeiture or punishment may be imposed as if such General Rules had not been rescinded.

R. E. CAMM,  
Minister for Mines and Main Roads.

These Rules are divided into eighteen sections, as follows:—

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## SECTION I

### PRELIMINARY

1. (1) These Rules may be cited as "The Underground Coal Mines Electrical Rules of 1971".

(2) These Rules are applicable to the installation generation transformation distribution and use of electrical energy in, on or about underground coal mines.

(3) These Rules shall come into force after publication thereof in the *Gazette*.

2. In these Rules unless the context otherwise indicates or requires the terms used shall have the meanings respectively assigned to them by Section 4 of the *Coal Mining Act 1925-1969* and the following terms shall have and include the meanings respectively assigned to them, that is to say:—

"Accessible, readily"—Capable of being reached quickly and without climbing over or removing obstructions or using a ladder, and in any case not more than 2 metres above the floor or platform.

"Active or Active Conductor"—Any one of those conductors of a supply system which is or may be maintained at a difference of potential from the neutral or earthed conductor.

In a system which does not include a neutral or earthed conductor, all conductors shall be considered to be Active Conductors.

- "Apparatus"—All electrical appliances, machines, fittings, consuming devices, control and protective gear in which conductors are used or of which they form a part.
- "Approved"—Approved by the Chief Inspector.
- "Approved Form"—A form approved as provided in these Rules and kept at a mine for the purpose of entering therein reports and records as required by these Rules.
- "Authorised Person"—A capable person authorised by the manager of a mine to carry out the duties incidental to these Rules other than for which electrical knowledge or skill is required.
- "Bare"—Not covered with insulating material.
- "Cable"—One insulated conductor (solid or stranded) or two or more such conductors laid together, either with or without bare conductors, fillings, reinforcements or protective coverings.
- "Cable, Armoured"—A cable provided with a wrapping of metal wires primarily for the purpose of mechanical protection.
- "Cable, Feeder"—A cable intended primarily for use between a transportable or mobile substation, and associated electrical equipment supplied from such substation.
- "Cable, Flexible"—A cable, the conductors, insulation and covering of which are such as to afford flexibility.
- "Cable, Trailing"—A flexible cable normally providing electrical connection between a mobile or portable machine and a fixed point or points in the electrical system or between transportable apparatus.
- "Circuit"—A number of conductors connected together for the purpose of carrying current.
- "Competent Person"—A person appointed by the manager of a mine to undertake the work referred to in the Rules in which the term is used.
- Such person shall possess a certificate of competency in accordance with the provisions of Rule 3 (4).
- "Conductor"—A wire or other form of metal suitable for carrying current, but shall not include wire, cables, or other metallic parts directly employed in converting electrical energy into another form of energy.
- "Danger"—Danger to health or danger to life or limb from shock, burn or other injury to persons or from fire or explosion attendant upon the generation, conversion, transformation, distribution or consumption of electricity.
- "Dead"—A conductor or circuit when it is not live (alive), that is, when the conductor or circuit is at or near earth potential and is disconnected from any live system.

- “Earth”**—The conducting mass of the earth or of any conductor in direct electrical connection therewith.
- “Earthed Effectively”**—Intentionally connected to the conducting mass of the earth in such a manner as will ensure an immediate and safe discharge of electricity at all times, and will ensure the electrical isolation of any defective equipment through the operation of protective apparatus.
- “Earthing System”**—All those cables and other conductors, clamps, earth clips and earth plates, pipes or electrodes which are installed or used for the purpose of maintaining any portions of an electrical installation at earth potential and shall include any buried metallic piping system to which such cables and other conductors, clamps or clips are attached.
- “Earthing Conductor”**—A conductor connecting any portion of the earthing system to the portion of the installation or apparatus required to be effectively earthed, or to any other portion of the earthing system.
- “Flammable (Inflammable) Material”**—Combustible material which if ignited will continue to burn and support combustion after the igniting source is withdrawn.
- “Flameproof Enclosure”**—An enclosure for electrical apparatus that will withstand without injury, any explosion of the prescribed flammable gas that may occur within it under practicable conditions of operation within the rating of the apparatus (and recognised overloads, if any, associated therewith) and will prevent the transmission of flame such as will ignite the prescribed flammable gas which may be present in the surrounding atmosphere.
- Such flameproof enclosure, in accordance with the foregoing definition, will not necessarily or ordinarily be weatherproof or dustproof but shall be operated and maintained in accordance with the requirements of Specification No. C. 98 of the Standards Association of Australia.
- “Flame-Resistant Insulation or Sheath”**—A cable insulation or sheath which will not continue to burn for a longer period than ten seconds after removal of the test flame and the total length of which burnt or charred does not exceed 200 mm when tested in accordance with the requirements of the relevant standard specification of The Standards Association of Australia.
- “Fuse”**—A device for protecting a circuit against damage from an excessive current flowing in it by opening the circuit on the melting of a fuse-element by such excessive current.
- The fuse shall comprise all parts that form the complete device.
- “Fuse Element”**—That part of a fuse which is designed to melt and thus open the circuit.

- "Gassy Mine"**—Any mine in which inflammable gas has been ignited or has been found in the general atmosphere of the mine by a permissible flame safety lamp, or approved gas detector or by air analysis in an amount of one-quarter of one per centum or more.
- "Gassy Place"**—For the purpose of these Rules and so far only as regards the structure, design and installation of electrical apparatus to be used therein, is any portion of a ventilating district situated in an intake airway within a distance of 100 m on the intake side of the first working place in such district and all return airways in any mine or part of a mine.
- "Insulated"**—Separated from adjacent conducting material or protected from personal contact by a non-conducting substance or an air-space, in either case offering permanently sufficient resistance to the passage of current or to disruptive discharges, through or over the surface of the substance or space to obviate danger of shock and/or injurious leakage of current.
- "Intrinsically Safe Apparatus"**—Apparatus so constructed that when connected and used under prescribed conditions any sparking that may occur therein is incapable of causing an explosion of the prescribed flammable gas or vapour.
- "Intrinsically Safe Circuit"**—A circuit so designed that any sparking that may occur therein in normal working is incapable of causing an explosion of the prescribed flammable gas or vapour.
- "Live"**—An object shall be deemed to be live when a difference of potential exists or would exist between it and earth under normal conditions of operation. With the exception of earthing conductors and connections used in installations where the multiple earthed neutral system is employed, all metal which may be connected to the neutral conductor of the supply system, even if such neutral be earthed at the source of supply, shall be deemed to be live for the purpose of these Rules.
- "Mine Electrician"**—A person appointed in accordance with the provisions of Section 56 of the Act.
- "Mobile Machine"**—An electrically operated machine capable of being readily moved about while it is in operation without limiting the meaning of the term, it includes continuous miners, coal cutters, loaders and shuttle cars.
- "Neutral (Neutral Conductor or Mid-wire)"**—That conductor of a three-wire or multi-wire system which is maintained at an intermediate and approximately uniform potential in respect to the active or outer conductors.
- "Non-Hygroscopic Material"**—Material that does not absorb more than five per centum by weight of moisture after 48 hours immersion in water held at a temperature of 15 deg. C. (60 deg. F.).

- "Non-inflammable Material"**—Material that neither burns nor gives off flammable vapours in sufficient quantities to ignite at a pilot flame when tested in accordance with the requirements of the relevant standard specification of The Standards Association of Australia.
- "Non-ignitable Material"**—Material that neither burns nor gives off flammable vapours in sufficient quantities to ignite at a pilot flame when tested in accordance with the requirements of the relevant standard specification of The Standards Association of Australia.
- "Open Sparking"**—Sparking which, owing to lack of adequate provision, would be liable to ignite any flammable gas external to the apparatus.
- "Portable Machine or Apparatus"**—An electrically operated machine or apparatus capable of being borne or carried while it is in operation.
- "Remote Control"**—When applied to switchgear or equipment denotes that its operation can be controlled from a distance by electrical or other means. The term shall not apply when any remote control device is an integral part of a mobile machine in use below ground.
- "Supply-point"**—The common point from which all electricity to a mine is taken.
- "Switchgear"**—Apparatus for controlling the distribution of electrical energy or for controlling and/or protecting circuits, machines, transformers, appliances or other apparatus.
- "System"**—An electrical system in which all the conductors and apparatus are electrically connected to a common source of electro-motive force, or common supply point.
- "the Act"**—the *Coal Mining Act 1925–1969*.
- "Transportable Apparatus"**—Apparatus that from the nature of its use, requires to be moved to a new position from time to time, between periods when it is in operation.
- "Voltage"**—The potential difference between any two conductors of the following values at the supply point—
- "Extra Low Voltage"**—Normally not exceeding 32 volts alternating current or 115 volts direct current;
  - "Low Voltage"**—Normally exceeding 32 volts alternating current or 115 volts direct current but not exceeding 250 volts in either case;
  - "Medium Voltage"**—Normally exceeding 250 volts but not exceeding 1100 volts;
  - "High Voltage"**—Normally exceeding 1100 volts.

## SECTION II

## OBSERVANCE OF RULES

**3. General.** (1) The owner, the agent, the manager, and all subordinate officials of a mine and any engineer, appointed by the owner or agent of a mine, who, not being subordinate to the manager of such mine, supervises the generations, transformation, distribution, or use of electrical energy, or the installation of electrical plant for the purpose of such mine, and any person who by contract or otherwise undertakes for the owner of a mine the installation, alteration, removal, or repair of electrical plant in or about such mine, shall comply with, enforce, and be subject to the provisions of these Rules.

(2) All workmen and persons employed at a mine shall conduct their work in accordance with the provisions of these Rules and shall not knowingly or wilfully cause or permit anything to be done contrary to these Rules.

(3) Nothing in these Rules shall apply to the works of an Electricity Authority within the meaning of the *Electricity Act 1976*, up to and including the point or points of metering provided that the said works are constructed, installed, protected, worked, and maintained in compliance with and are controlled by any other statutory regulations applicable thereto.

(4) Nothing in these Rules shall permit of any electrical work (as defined by the *Electricity Act 1976*) being carried out by any person other than a person possessing a certificate of competency issued under the provisions of such Act or an Apprentice (as defined by the *Apprenticeship Act 1964-1974*) working under the supervision of a competent person.

(5) Except as otherwise provided in these Rules, the minimum requirements for all installations above ground shall be in accordance with the requirements of The Standards Association of Australia Wiring Rules and "The Electric Light and Power Regulations of 1938."

(6) Except as otherwise provided in these Rules, the minimum requirements for all installations below ground shall be, where applicable and practicable, in accordance with the requirements of The Standards Association of Australia Wiring Rules CC1.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**4.** Every addition to or alteration of an existing electrical installation shall be deemed to be a new installation and these rules shall apply to such addition or alteration.

Written notice shall be sent to the Electrical Inspector at quarterly intervals, giving full particulars of any additional load to an existing installation, other than for lighting or general purpose outlets, as well as the date such addition was made.

**5. Exemptions.** Exemption from any of the requirements of any part or parts of these Rules may, on application, be granted by the Chief Inspector on grounds of emergency or special circumstances for such time and to such extent as the Chief Inspector may prescribe.

**6. Conditions affecting safety.** Notwithstanding anything contained in these Rules, any electrical plant or apparatus installed or in use before the coming into force of the Rules may be continued in use for the period specified, subject to such of the Rules, or such conditions affecting safety, as the Electrical Inspector may require, unless, in the opinion of the Electrical Inspector, it would be unsafe for such electrical plant or apparatus to be continued in use.

**7. Notice of intention to introduce.** The manager shall send to the Electrical Inspector a notice of intention to introduce, or where the use of electricity has been discontinued, to reintroduce, electricity in or about a mine.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**7A. New Apparatus.** The Manager shall send to the Electrical Inspector a notice of intention to introduce any new apparatus at a coal mine.

Such apparatus shall not be introduced below ground unless it is of a type approved by the Chief Inspector.

This Rule shall not apply to "prescribed electrical articles" referred to in part IX, Division I of the *Electricity Act 1976*.

Inserted by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**8. Telephonic Communication.** In every mine where electricity is used below ground for power or lighting purposes direct telephonic or other approved means of communication shall be provided between the surface and each main distributing centre below ground.

### SECTION III

#### GENERAL REQUIREMENTS AND WORKMANSHIP

**9. Standards of construction.** (1) All apparatus and conductors shall be constructed and installed in accordance with and be not inferior to the requirements of the relevant Standard Specifications of The Standards Association of Australia in vogue at, or within six months preceding, the time of purchase and installation of such apparatus and conductors.

(2) In the event of a relevant Standard Specification of The Standards Association of Australia not existing, the relevant Standard Specification of The British Standards Institution shall apply in sub-rule (1) of this Rule.

(3) In the event of no relevant Standard specification of The Standards Association of Australia or The British Standards Institution existing, the Chief Inspector may determine a relevant Standard Specification which shall apply in sub-rule (1) of this Rule: Provided that if a relevant Standard Specification is subsequently determined by either of the above two bodies, the Standard Specification determined by the Chief Inspector shall lapse.



(4) The Chief Inspector may from time to time specify requirements in addition to those required by sub-rules (1), (2) and (3) of this Rule. As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**10. Fixing and supports.** All fixings, fastenings, and supports shall be of adequate strength and so arranged as to ensure the installation against mechanical failure under the normal conditions of use, wear and tear.

**11. Apparatus and conductors installed at a mine.** All apparatus including conductors—

- (a) Shall be adequately constructed, and of sufficient capacity for the work it may be called upon to perform;
- (b) Shall be efficiently insulated and have all exposed live parts enclosed, isolated or protected, except that in a compartment or building inaccessible to unauthorised persons the installation shall be so arranged that no person can inadvertently come into contact with live parts;
- (c) Shall be so placed, installed, worked, and maintained as to comply with the conditions of its approval and to minimise the risk of accidental shock, fire, overheating, wetting, excessive dampness, deterioration, or mechanical damage. The enclosure of the apparatus shall not be opened while the circuit is alive;
- (d) Installed below ground at a mine shall be so constructed, worked, and maintained as to exclude all dust and/or moisture from the enclosures thereof.
- (e) Installed at the surface of a mine, where in the opinion of the Electrical Inspector dust or moisture may be present in such quantities as to affect the safe and efficient operation of the apparatus and conductors, shall be so constructed, worked, and maintained as to exclude dust and/or moisture from the enclosures thereof.
- (f) Shall be either—
  - (i) of an Approved type; or
  - (ii) a “prescribed electrical article” referred to in Part IX, Division I of the *Electricity Act 1976*.

Apparatus enclosed in separate dust-proof rooms or compartments may be exempt from the requirements of clause (e) of this Rule.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**12. Switchgear.** (1) Switchgear installed at a coal mine (other than that installed in workshops, offices, bathrooms, laboratories and store-rooms, intrinsically safe circuits or that incorporated on mobile machines operating below ground) shall have its enclosure covers interlocked mechanically with a triple pole isolating switch so as to preclude the opening or removal of any cover whilst the switchgear is alive and when installed below ground or in high voltage circuits at the surface to prevent power being restored to the switchgear until all the enclosure covers have been closed or replaced.

(2) The isolating switch shall have a continuous current rating equivalent to the switchgear with which it is interlocked and shall be contained in a separate compartment which may be internal or external to the switchgear enclosure. The cover or door of such separate compartment shall be marked "Isolate elsewhere before removing this cover".

(3) Where such switchgear is of flameproof design the isolating switch shall be placed in a separate flameproof compartment and the mechanical interlocking shall be by direct mechanical linkage within the enclosure.

(4) Electrically operated mobile mining machines operating below ground and fitted with flameproof enclosures containing power control switchgear, such as contractors, and supplied by a trailing cable shall be fitted with a triple pole "on load" isolating switch contained in its own separate flameproof enclosure.

(5) The triple pole isolating switch shall be rated sufficiently for the maximum duty of the machine and shall be capable of breaking not less than its rated current at the maximum rated voltage. Its enclosure cover shall be interlocked with the isolating device to which the machines trailing cable is connected in accordance with sub-rule (6) of this Rule.

(6) The access and inspection covers of enclosures containing power control switchgear installed on a mobile mining machine shall be mechanically or electrically interlocked with the triple pole "on load" isolating switch or with an isolating device to which the supply end of the machines trailing cable is connected so as to effectively isolate the associated power control switchgear installed on such a machine from the source of supply before the covers of any such switchgear enclosure is removed or opened.

(7) Power shall not be restored whilst a cover is removed or open except as otherwise provided in Rule 34 of these Rules.

Substituted by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**13. Unauthorised entry.** No persons without authority shall enter a machine room or motor room; and no person shall wilfully damage, interfere with, remove, or render useless any electric line, or any machine, apparatus, or part thereof, used in connection with the supply or use of electricity.

**14. Power entering mine.** The manager shall appoint in writing one or more authorised persons as may be necessary to operate the switch or switches, by means of which the supply of electrical energy to a mine can be cut off at the surface of the mine at all times when electrical energy is being used in or about such mine.

**15. Breakdown or injury to apparatus.** The occurrence of any serious breakdown of, or injury or damage to, apparatus, or of overheating or of sparks or arcs outside enclosing casings, or of any portion of the equipment (not being a proper part of the electrical circuit) becoming alive, shall be promptly reported to the manager, who shall record the same in the record book.

**16. Defects.** Should any defect be detected at any time which would render an installation hazardous, the power shall be cut off from the defective part until remedied.

**17. Notice of accidents and dangerous occurrences.** The manager, owner, or agent shall send to the Electrical Inspector notice as follows:—

- (a) Notice of any accident due to the use of electrical energy, resulting in loss of life or personal injury.
- (b) Notice of any ignition of inflammable gas or dust or of any outbreak of fire due to the use of electrical energy, when loss of life or personal injury has not occurred.

**18. Plans.** (1) A plan, of a scale not smaller than 1:2 500 to one inch, shall be kept at a mine showing the position, size and duty of all fixed apparatus and cables of such mine, including signalling and telephone apparatus.

(2) The plan shall be corrected as often as may be necessary to keep it reasonably up to date, and never more than 3 months in arrears.

(3) The plan, or a copy of the plan, shall be produced to the Electrical Inspector at his request.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

## SECTION IV

### APPOINTMENT AND DUTIES OF ELECTRICIANS

**19. Appointment of Electricians.** (1) The manager shall appoint in writing one or more electricians to have charge of the whole or any one or more of the several parts of the electrical installations at a mine or group of mines and as many assistant electricians or competent persons as he considers necessary for the proper fulfilment of the duties prescribed in these rules.

(2) A person so appointed to have charge of the whole or part of the electrical installations at a mine or group of mines shall be the holder of a certificate of competency as a mine electrician under the provisions of the *Coal Mining Act 1925-1969* of Queensland.

(3) The Manager shall within fourteen (14) days of the appointment of the person referred to in sub-rule (2) of this rule forward notice of such appointment in writing to the Electrical Inspector of the District. Such notice shall include the number of the relevant Certificate of Competency as a Mine Electrician and the number of the relevant Certificate of Competency issued by The Electrical Workers and Contractors Board to the person so appointed.

(4) The Mine Electrician shall enter in the Record Book the names of the assistant mine electricians or competent persons employed at the mine together with the number of the relevant Certificate of Competency issued by The Electrical Workers and Contractors Board to each of such persons.

(5) Subject as is hereinafter provided and having regard to the nature of and the circumstances relating to an installation at a particular mine, the Chief Inspector, on the recommendation of the Electrical Inspector, may grant, in writing, an exemption from any of the provisions of sub-rules (1) and (2) of this rule subject to such conditions and for such period as he may prescribe. Notwithstanding any such exemption the installation and periodic supervision of electrical apparatus and other requirements as prescribed by the electrical rules shall be carried out by a competent person.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**20. Duties of Electricians.** The mine electrician shall—

- (a) Subject to the direction of the manager, or in his absence the under-manager, have full control of the electrical installation above and below ground, and such other plant or machinery as the manager may direct and of all workmen employed in connection with the erection and maintenance thereof;
- (b) Receive and attend to all reports made to him as to the state of the machinery under his charge, and shall see that all materials, necessary for the regular working and keeping of the plant and machinery under his control in or about the mine in a proper state of efficiency, are constantly supplied;
- (c) So far as lies within the scope of his authority ensure that all apparatus and cables, including any automatic or other protective devices associated therewith are maintained in a safe working condition, and as promptly as circumstances require have any defects of the installation rectified.
- (d) When necessary carry out any work and duties as set out in Rule 21 (a) of these Rules.

**21. The assistant mine electrician or competent person shall—**

- (a) Subject to the direction of the mine electrician, carry out the installation, maintenance and repair of electrical apparatus and cables including any automatic or other protective devices associated therewith and promptly, as circumstances permit, remedy any defect found in the installation of a mine;
- (b) Carry out routine examinations and tests of all electrical machinery, apparatus, appliances, cables, and trailing cables;
- (c) Carry out routine tests of the effectiveness of the earthing system, the continuity of earthing conductors, and the condition of electrical insulation;
- (d) Carry out the examination and test of all apparatus and cables newly installed or dismantled and reinstalled in a new position, before such apparatus or cables are put into use.
- (e) Report to the mine electrician without undue delay any circumstances affecting or likely to affect the safe use of any electrical installation, apparatus or appliance;

- (f) Forthwith enter on an approved form kept for the purpose, and sign his name to such entry, the result of each routine examination and test carried out by him, together with his opinion as to the condition and safety of the machinery, apparatus, appliances, cables, and trailing cables and earthing system and conductors, and any repairs or alterations required to ensure safety or to comply with the provisions of these Rules.

The routine examinations and tests shall be carried out in accordance with the provisions of these Rules.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**22. Use of safeguards.** It shall be the duty of every person working on electric lines or apparatus—

- (a) To use in a proper manner the appropriate safeguards provided; and
- (b) To satisfy himself that such safeguards are in good physical and mechanical order and condition.

## SECTION V

### TESTING AND REPORTS

**23. Examinations and tests.** (1) The following routine examinations and tests of all apparatus and circuits shall be carried out:—

- (a) An examination of all apparatus including the casing and inspection doors of all portable motors used inside the mine, the casings of their switches, all metallic coverings and earth conductors.
  - (b) A test of the insulation of every complete lighting and power circuit below ground, including all machinery and apparatus forming part of, or in connection with such circuits, either collectively or in parts.
  - (c) A test of the electrical conductance of all earthing conductors and metallic coverings if used as such as well as a test of the insulation resistance of each conductor of every trailing cable.
- (2) Portable and transportable apparatus in use at or in the vicinity of any working face and flexible cables associated therewith shall be removed to the surface of the mine, where approved facilities are not available below ground, for special examination and test.
- (3) Except as otherwise prescribed in these rules:—
- (a) The frequency with which the routine examinations and tests at the mine, as required by sub-rules (1) and (2) of this Rule, are to be carried out shall be prescribed in writing from time to time, by the manager, and a copy of the said prescription shall be sent to the Electrical Inspector.

- (b) If the Electrical Inspector considers that any or all of the intervals prescribed are too long, he may require the Manager to prescribe such shorter intervals as he shall specify in writing and if the Manager disputes the reasonableness of the requirements, the dispute shall be referred to the Chief Inspector, whose decision shall be final.
- (c) Routine testing of all High and Extra High Voltage apparatus and cables shall be carried out by an approved testing authority at intervals not exceeding twelve months.

**24. Recording of tests.** The results of the tests prescribed in Rule 23 hereof with the date upon which each test was made shall be recorded on an approved form provided for the purpose and signed by the person making the test.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**25. New apparatus.** All new apparatus, also that re-erected in a new position in the mine and apparatus about to be used after a stoppage exceeding one month, shall be examined and tested before being put into service. The tests shall be carried out as prescribed in these Rules.

**26. Provision of instrument.** An approved instrument or instruments suitable for carrying out the required tests shall be provided by the manager and shall be used by the person making such a test.

## SECTION VI

### MISCELLANEOUS

**27. Fire extinguishers.** Approved chemical fire extinguishers in good order shall be kept, ready for immediate use in extinguishing fires, at, on, or adjacent to all apparatus other than cables, telephones, or signalling equipment.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**28. Notices.** The following notices shall be exhibited in every place containing fixed apparatus other than cables, switchgear associated with portable or transportable apparatus, isolated remote control switches, telephone and signalling apparatus:—

- (a) An approved notice containing directions as to resuscitation of persons suffering from electric shock.
- (b) A notice containing directions as to the procedure in case of fire.
- (c) A notice prohibiting, except in emergency and for the purpose of cutting off the supply of electrical energy, any person other than an authorised person from handling or interfering with apparatus.

All persons working in connection with apparatus shall acquaint themselves with the contents of the notices as set out in the above Rules.

**29. Notice.** A notice containing instructions for communicating with a person appointed under Rule 14 shall be exhibited at each main distributing centre underground.

**30. Notices. Construction and renewal.** All notices shall be constructed of durable material and, when defaced, obliterated, or destroyed, shall be renewed forthwith.

**31. Motor rooms or switch rooms.** The installation below ground in any mine of apparatus, other than portable or transportable apparatus, or signalling apparatus, or telephones and accessory apparatus associated therewith shall be subject to the following requirements:—

- (a) Where necessary to prevent danger the apparatus shall be housed in a room or in a recess set apart for the purpose, or in a room provided for housing machinery associated with the use of the apparatus, and the apparatus if required, shall be placed on a solid foundation or otherwise firmly fixed and supported as provided by these Rules and to the satisfaction of the Electrical Inspector. The room or recess shall be constructed to provide adequate height and working space.
- (b) Exposed inflammable material shall not be used in the construction of any room or recess that is used for housing apparatus.
- (c) Inflammable material shall not be stored in any room or recess that is used for housing apparatus.
- (d) A room or recess used for housing apparatus shall be constructed so as to protect the apparatus from damage, by falls of ground or from passing traffic and shall be kept clean of all debris.
- (e) A room or recess used for housing apparatus shall be kept dry and shall be adequately ventilated, having regard to the description of the apparatus and its use.

**32. Motor rooms or switch rooms to be kept closed.** Any unattended motor room, switch room, or transformer room on the surface containing exposed conductors or switchgear that can be interfered with shall be kept closed and a notice posted prohibiting entry by unauthorised persons.

**33. Apparatus containing inflammable liquid.** The use below ground in a mine of apparatus, or groups of apparatus containing inflammable liquid filling shall be subject to the following conditions:—

- (a) The apparatus shall not be installed within 25 metres of any shaft bottom or other opening to the shaft.
- (b) When installed below ground a transformer, switchgear or fusegear of the oil immersed type shall be placed in or above a specially prepared sump or container capable of containing the oil content of such transformer, switchgear or fusegear, except where an approved automatic system of fire protection has been installed.

- (c) A power transformer installed below ground and filled with dielectric liquid which will not burn in air is exempt from the provisions of paragraph (b) of this rule. Such a transformer shall be furnished with a pressure relief device.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**34. Adjusting and Testing.** (1) At the surface where live parts of apparatus may be required to be handled for the purpose of adjusting or testing, rubber mats, gloves or shoes, supplied by the Manager, shall be used by the workmen.

(2) Below ground in a coal mine where live parts of electrical apparatus may have to be adjusted or tested such work shall be performed as follows:—

(a)—

- (i) In a "Gassy Mine" or "Gassy Place" the Manager shall apply to the Inspector for permission to authorise the restoration of power to electrical apparatus for the purpose of adjusting or testing such apparatus whilst it is alive;

The Manager shall provide precise details of the work to be performed, the location of such work, the standard of ventilation and whether or not flammable gas has previously been detected at or within 90 metres of such location;

- (ii) In a part of a mine other than in a "Gassy Place" the Manager may authorise the restoration of power to electrical apparatus for the purpose of adjusting or testing such apparatus whilst it is alive;

The Manager shall notify the Inspector within forty-eight (48) hours of such restoration of power and provide precise details of the work performed and the location of such work;

- (b) Any authorisation issued by the Manager in accordance with paragraph (a) of this Rule shall be in writing and subject to the following conditions being observed:—

- (i) The location where such work is to be performed shall be in intake air where it is permissible to fire a shot. A minimum air flow of ten cubic metres per second shall pass over such location whilst power is restored;
- (ii) Coal shall not be produced or transported in any part of the mine ventilated by air passing over such location whilst such work is being performed;
- (iii) Such location and all contiguous accessible places within a radius of 20 metres therefrom shall be thoroughly stonedusted;
- (iv) The names of all persons engaged in such work including the deputy and the person qualified as a mine electrician who shall be in attendance and be responsible for such work, shall be included in such written authority;



- (v) A mine official qualified to act as a deputy shall be instructed by the Manager to ensure that such location is free from flammable gas immediately prior to and during the time such work is performed;
- (vi) No personnel other than those engaged directly in such work shall remain at such location whilst such work is performed;
- (vii) Rubber mats, gloves or shoes supplied by the Manager, shall be used by the workmen whilst performing such work;
- (viii) A copy of such authorisation together with a copy of the Manager's application to the Inspector shall be recorded in the Record Book.

Substituted by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**35. Earthing before handling.** Adequate precautions shall be taken by earthing or other suitable means to discharge electrically any conductor or apparatus, or any adjacent apparatus, if there is any risk of shock therefrom, before it is handled, and to prevent any conductor or apparatus from being accidentally or inadvertently electrically charged when persons are working thereon.

**36. Earthing clips.** Properly designed clips attached to insulated sticks or other equipment approved by the Electrical Inspector shall be used for earthing conductors. Chains shall on no account be used for earthing purposes.

**37. Working on high-pressure apparatus.** In all cases where work is required to be carried out on high or extra-high voltage circuits the supply shall be cut off and the circuits concerned effectively earthed.

**38. Use of Vulcanising Equipment.** Vulcanising equipment shall not be used below ground other than with the written permission of an Inspector and in accordance with such conditions as may be imposed by the Chief Inspector.

Substituted by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

## SECTION VII

### CABLES AND CONDUCTORS

**39. Size of cables and conductors.** The size of the conductors of cables to be used in any portion of an installation shall be determined by consideration of the following:—

#### CURRENT CARRYING CAPACITY

The current carrying capacity of trailing cables, rubber and thermo-plastic-insulated cables and mineral insulated cables shall be assigned for continuous rating in accordance with the appropriate ratings of the relevant standard specification and/or Wiring Rules of The Standards Association of Australia. A conductor used in any part of an installation shall have a current carrying capacity at least equal to the current to be carried by it

which, for the purpose of this rule shall be deemed to be not less than that calculated or assumed where practicable with due regard to the diversity of the load and the conductor temperature, provided that—

- (i) All the active poles or active supply conductors of any one set of mains or sub-mains or any final sub-circuit shall be of the same size; and
- (ii) The neutral main or sub-main shall be of sufficient size to carry the maximum current under the extreme out-of-balance condition which may obtain including the conditions arising through the interruption of one or more active supply conductors.

**40. Temperature limits.** The maximum temperature at which cables may be operated shall, according to the type of insulation employed and its suitability as determined by test, be in conformity with the relevant table contained in The Standards Association of Australia Wiring Rules A.S.C.C. 1.

**41. Cables to comply with standards.** (1) Cables and conductors shall be of an approved type and shall conform to the relevant Standard Specification of the Standards Association of Australia according to the service assigned to such cables and conductors at the time of their installation.

(2) All cables and trailing cables ordered for use at a mine after the coming into force of these rules shall comply with the requirements contained in this Section VII.

**42. Fault protection.** The wiring of any part of an installation shall be of such size and construction and the main control and protective gear shall have such a rupturing capacity that the equipment is capable of withstanding, without damage, the currents which may occur under fault conditions such as a short circuit.

**43. Distinguishing colours of the conductors of cables.** Where the cores or conductors of cables are coloured for the purpose of identification, such colours shall be as follows:—

Power cores	.. .. .	Red, white and blue
Earth core	.. .. .	Green
Pilot, neutral or mid-cores	.. .. .	Black

Where insulated or covered earthing conductors are used, these shall have green insulation, braided or covering as appropriate. Under no circumstances shall the colour green be used for other than the identification of an earthing conductor. The distinguishing colours of trailing cables shall comply with the requirements of A.S.C. 81 of the Standards Association of Australia.

**44. Maximum size of a single conductor.** Stranded cable shall be used where the nominal cross-sectional area of a conductor exceeds  $2.5 \text{ mm}^2$  (1-1-78) except in the case of switchboard and switch gear wiring, mineral-insulated metal-sheathed cables, busbars, battery connections, trolley wires and earthing conductors.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**45. (1)** All conductors, with the exception of bare overhead aerial conductors at the surface of a mine, trolley wires, signal and earthing conductors, shall be continuously covered with insulating material specially chosen with regard to the circumstances of its proposed use. Such insulated conductors shall be comprised of copper or aluminium and shall conform to the appropriate standard specification.

Where the voltage to earth of a circuit operating from a medium voltage supply exceeds the limits of low voltage the cable insulation shall not be less than 650 volt grade.

**(2)** Bare unenclosed aluminium conductors shall not be used in a mine.

**(3)** Aluminium-sheathed cables shall not be installed in a mine except with the approval of the Chief Inspector.

**46. Grouping of conductors in steel conduits.** Conductors of any alternating current circuit, installed in steel conduit troughing or duct, shall be so grouped that the conductors of all phases and the related neutral, if any, are in the same conduit or enclosure.

**47. Ferrous sheaths not permitted on single conductors.** Single core cables armoured with steel wire or tapes or encased in a ferrous sheath shall not be used on alternating current circuits.

**48. Protection of cables.** Multicore cables used on alternating current circuits below ground shall be electrically symmetrical in design and shall in addition to the normal insulation be protected as follows:—

**(a)** Feeder cables and machine wiring cables—

**(i)** By a suitable strong armouring enclosing all conductors; or

**(ii)** By a pliable earthed screen around each power conductor;  
or

**(iii)** By a combination of (i) and (ii);

**(iv)** When the loading does not exceed twenty amperes and the voltage is not in excess of medium voltage a collective metal earthed screen may be used.

**(b)** Distribution—

Multicore cables used for distribution purposes and operating on a voltage in excess of extra low voltage shall include a suitable strong armouring.

**49.** At the surface on a supply which is medium voltage or in excess of medium voltage multicore cables shall include a suitable strong armouring provided that single conductors may be enclosed in galvanised steel conduit or approved casing or ducting.

**50.** Where the voltage of the supply does not exceed the limits of low voltage except as provided in Rule 48 (b) the protection for the cables may be any one of the following:—

**(a)** A multicore cable having a suitable strong armouring enclosing all conductors.

- (b) A multicore cable having an approved type of individual or collective pliable earthed screen.
- (c) Tough rubber sheath or thermo plastic sheath multicore cable provided it is suitably protected where exposed to mechanical damage.
- (d) Single conductors enclosed in galvanised steel conduit, provided that approved thermo plastic conduit or approved casing or ducting may be used at the surface.

**51.** The outer sheathing of multicore cables or any unenclosed cables, when installed below ground, shall be of an approved flame resistant material.

**52. Buried cables.** Cables shall not be permitted to lie on the ground. At the surface of a coal mine where it is not possible to support or protect cables clear of the ground, as required by the rules, they may be buried in the ground.

Cables of any type when buried shall be buried to a depth of at least 600 mm and, unless the cable is threaded through piping, 150 mm of sand shall be placed in the bottom of the trench and the topside of the cable shall be covered by an approved material. Wood shall not be used.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**53. Cable entries to apparatus.** All motors, generators and fully enclosed metal-clad apparatus shall be provided with suitable glands, screwed apertures or clamps for securing thereto the protective covering of the connected conductors or with suitable bushed or shaped apertures for the entry of conductors.

**54. Protection of cables in shafts.** All cables used in shafts shall be adequately protected and substantially fixed and, if not capable of sustaining their own weight, shall be suitably supported at intervals appropriate to the weight and type of conductor.

**55. Joints in the conductors of cables.** Except as provided in Rule 59 (5), joints in the conductors of cables shall be mechanically and electrically efficient and shall be suitably clamped, crimped or soldered. Grub screws, or similar types of connectors or terminals, may only be used for the termination of conductors in switchgear or similar places when the ends of the conductors have been suitably prepared.

**56. Temperature of cable couplers and plugs.** Cable couplers and plug receptacles shall be so maintained that, under normal working current loadings, the surface temperature of the couplers and plugs or receptacles shall not exceed 100°C. Connector pins shall be provided with facilities to enable them to be removed from their sockets without the surface of contact of the pins or sockets being damaged.

**57. Cables to be approved.** (1) Trailing cables shall be of an approved type and shall comply with the requirements of Specification ASC 81 of the Standards Association of Australia as amended at the date of purchase of the cable.

(2) Cables used for the supply of power to portable equipment in a mine, which is relocated from time to time in the ordinary course of winning and working, shall be of a type approved for the purpose.

**58. Trailing cables to be screened.** Trailing cables in use on voltages up to and including medium voltage shall, in addition to the normal insulation, be provided with a pliable earthed screen around each power conductor, provided that in respect of such cables which normally do not carry current loadings in excess of twenty amperes, a collective type of earthed screen may be used.

**59. Repairs to trailing cables.** (1) Save and except as is otherwise provided in sub-rule (3) of this rule, a defective trailing cable shall not be used until it has been efficiently and effectively repaired and tested above ground or at an approved underground workshop.

(2) Where a trailing cable has been severed or a conductor exposed, it shall not be deemed to be effectively repaired until the outer sheath is vulcanised or otherwise equally efficiently bonded or sealed in an approved manner capable of excluding moisture and/or dust of any kind.

(3) Where the outer sheath of a trailing cable is found to be damaged and in the opinion of a competent person no danger would be involved provided a satisfactory repair *in situ* is immediately carried out, then the cable may be continued in use until the end of the last production shift of the day in question, when it shall forthwith be removed.

(4) Repairs to trailing cables shall be carried out, in an efficient manner by a competent person, above ground or at an approved underground workshop.

(5) Joints made in a trailing cable shall be efficient and shall be so executed as to prevent the ingress of water and shall have due regard to the flexibility, conductance and insulating properties of the cable. Joints made in trailing cables used to supply mobile machines, incorporating a cable reel, shall be soldered.

(6) If mechanical connectors are used for the purpose of joining the conductors of trailing cables, such connectors shall be of an approved type.

(7) Repairs to the insulation of the conductors in, and the sheathing of, trailing cables shall be carried out in an efficient manner by a vulcanising process.

(8) The finished outer surface of a repaired trailing cable shall be smooth and free of projections and the outer diameter of a repaired sheath shall be such that the trailing cable will be free to be drawn over surfaces or onto the cable drum of machines without being damaged.

**60. Tests to be made.** (1) A test to detect "pin holes", or other damaged places where the ingress of water may take place, shall be made on unscreened trailing cables undergoing repair, and appropriate steps shall be taken to correct such damage. Such test shall be carried out between the power conductors of the trailing cable and a suitable conductor, such as the conductive rollers of a voltage spark or resistance

testing device, located in close proximity, and external to the sheath of the trailing cable. Alternatively, such test may be carried out by completely submerging the repaired trailing cable in water and testing between the power conductors of the trailing cable and the general mass of the water.

(2) A test shall be made of the electrical continuity of every conductor of a trailing cable under repair.

(3) A test shall be made for partial breaks in every conductor of a trailing cable under repair. Such test shall be capable of detecting failure of strands of such conductors due to fatigue or other causes and where such failure has been detected the cable shall be opened, if necessary, and appropriate repairs effected.

(4) A voltage test shall be carried out on medium voltage trailing cables after the completion of repairs. Such test shall be carried out with alternating current, using approved equipment, at not less than 1,500 volts applied between each power conductor and between each power conductor and the earth conductor. The voltage shall be applied gradually and maintained continuously for three minutes.

(5) A test of the insulation resistance of each conductor of trailing cables, shall be carried out at the time of repairs to such trailing cable.

(6) Comprehensive records of repairs and tests as required by this rule shall be kept at the mine in a form approved for the purpose.

**61. Identification of trailing cables.** Every trailing cable shall be assigned an identification number which shall be affixed to the plug or the outer sheath of the trailing cable at the end near the plug.

**62. Insulation resistance of trailing cables.** The insulation resistance of trailing cables shall be not less than one megohm when measured between each power conductor and the earth screen. Those cables which are not of a screened type shall be tested between each power conductor and between power conductors and the earth conductors collectively connected.

Such tests shall be carried out with direct current at not less than 500 volts for medium voltage systems applied for a sufficient time for the reading of the testing indicator to become steady.

**63. Testing and repair facilities to be provided.** Where testing and repairs to trailing cables are carried out at a mine, testing instruments of approved types, and repair facilities sufficient to enable the requirements of rules 59 and 60 to be carried out, shall be provided by the manager.

**64. Coupling of trailing cables.** Lengths of trailing cables may be coupled together or terminated by means of an approved bolted coupling, such as a flit plug, or a free plug and socket coupling of an approved design, provided that the system is protected in such a manner that the removal of a plug from the socket shall automatically disconnect the supply of power to the trailing cable before the main power conductors are disconnected within the plug or socket.

**65. Connection of trailing cables to plugs or machines.** Where trailing cables are connected to plugs or equipment, the separate conductors of a twin or multi-core trailing cable, shall be divided only for such length as is necessary to make connections. The trailing cable with its outer covering complete shall be securely held by suitable clamps or other devices in such a manner as to protect the trailing cable from injury, and to prevent any mechanical strain at the terminals.

**66. Defective trailing cable to be removed.** Where the trailing cable is attached to a hand held boring machine in such a manner that a spare trailing cable cannot be substituted therefor without the use of tools, and a competent person is not readily available to change the trailing cable, a spare hand held machine complete with trailing cable shall be kept in the mine. The faulty trailing cable shall not again be used until after it has been repaired and tested in the manner prescribed in these rules.

**67. Changing of trailing cables.** Trailing cables, which normally require the use of tools, such as pliers, spanners or wrenches, to enable them to be connected to, or disconnected from, the source of supply or apparatus, shall be so connected or disconnected by a competent person only.

**68. Requirements for high and extra-high voltage.** Trailing cables used on high or extra-high voltage shall, in addition to the normal insulation, be provided with—

- (a) a concentric tinned copper strand screen around each power conductor; or
- (b) a flexible armouring; or
- (c) a combination of (a) and (b).

**69. Trailing cable control panel.** Every trailing cable shall take supply from an approved distribution and control box, which shall include a circuit breaker or magnetic contactor capable of entirely cutting off the supply to the trailing cable. The distribution and control box shall be provided with an interlock to prevent the cable being connected or disconnected while power is switched on.

## SECTION VIII

### CONTROL AND PROTECTION

**70. Fault detectors.** In every system which is not earthed at the point of supply, earth or fault detectors shall be kept connected up in every generating and transformer station, to show immediately any defect in the insulation of the system, except in the following cases:—

- (a) Circuits which are included within a circle of less than 30 metres radius.
- (b) Circuits having approved automatic earth leakage protection equipment.

(c) Signalling and telephone circuits.

These instruments shall be inspected daily by an authorised person.  
As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**71. Protection of circuits.** Every circuit shall be protected by one of the following methods:—

- (a) By an automatic circuit breaker controlling each active pole with suitable overcurrent protection;
- (b) By a switch and fuse combination unit controlling each active pole;

except where the system has a solidly-earthed neutral or mid-wire, in which case no cut-out or unlinked switch shall be inserted in the neutral conductor.

**72. Control of circuits.** (1) The current in the system or in any separate portion of the installation shall be so controlled that when in any circuit the current exceeds the rated current, so as to involve danger, such current shall be cut off automatically.

(2) Circuits from the surface supplying the underground distribution, the mine ventilation, and any vertical or inclined surface haulage used for winding persons shall be controlled and protected automatically as required by Rules 71 (a) and 86 and these circuits shall be independent of each other and also of any other circuit where:—

- (a) They leave the main switchboard of the mine;
- (b) They are supplied from any sub-distribution board which is fed from the main switchboard of the mine;
- (c) They are supplied from any source of supply which does not pass through the main switchboard of the mine.

**73. Limitation of earth fault current.** An approved system of earth fault current limitation shall be provided on all alternating current circuits below ground at a coal mine, which operate above the limits of extra low voltage as follows:—

- (a) Circuits which operate at voltages above the limits of "extra low" and up to and including 650 volts, shall have earth fault currents limited to a value not exceeding five (5) amperes.
- (b) Circuits which operate on voltages above 650 volts shall have earth fault currents limited to a value not exceeding ten (10) amperes.
- (c) Paragraphs (a) and (b) above of this rule shall not apply to circuits which are supplied by single phase transformers rated at 20 kVA or less and used for control, instrumentation, lighting or similar purposes.
- (d) The product of the total impedance of any earthing circuit and the limited fault current as required in clauses (a) and (b) above of this rule shall not exceed 80 volts.



**74. Earth fault protection and testing.** (1) Except for circuits approved as being intrinsically safe, an approved system of automatic earth leakage protection shall be provided on all circuits operating above the limits of extra low voltage and shall be set to operate at an earth leakage current value not exceeding—

(a) One ampere on circuits up to and including 650 volts except as provided in clause (c) of this sub-rule;

(b) Two amperes on circuits above 650 volts;

(c) The rated tripping current values defined in AS3190—CURRENT OPERATED (CORE BALANCE) EARTH LEAKAGE DEVICES—for Type A protection devices or relays, on circuits supplying electrically operated portable hand held tools or apparatus and associated flexible cables or cords.

(2) Hand held electric coal boring machines are exempt from the requirements of paragraph (c) of sub-rule (1) hereof provided they are protected in accordance with Rule 141 (4) of these rules.

(3) (a) Below ground electrical equipment containing earth leakage protective devices shall be provided with an external test button on the enclosure by which tests of the effectiveness of the earth leakage device can be made.

(b) External test buttons shall also be provided in an accessible position, preferably on the main control box or cubicle of an electrically operated mobile or transportable coal face machine, to test the effectiveness of the earth continuity circuits associated with such machine. This paragraph applies only to a machine operating from a supply voltage not in excess of medium voltage and ordered for use at a coal mine after the coming into force of this rule.

(c) For the purpose of the above earth leakage tests, the current shall be limited in the test button circuit to not more than the tripping current setting of the earth leakage relay protecting the equipment or machinery and in any case not more than twenty per cent. (20%) above the current setting of the relay protecting the equipment being tested.

(d) Means shall be provided to prevent the closure of a contactor or circuit breaker electrically, when used in conjunction with a trailing cable, whilst a phase to earth fault exists. The device used shall be of a type certified as intrinsically safe in accordance with The Australian Standard Specification AS 1829-1976 "Intrinsically Safe Electrical Apparatus" as amended from time to time.

Such fault monitoring device shall be capable of functioning at a value in excess of the maximum resistance to earth at which the earth fault protection operates up to at least 25 per cent excess voltage.

(4) (a) A competent person or a person appointed by the manager and to the satisfaction of the electrical inspector, shall—

(i) at least once in each working day make a test of the effectiveness of all earth leakage protective equipment used in conjunction with apparatus and cables associated with

electrically operated mobile and transportable machines operating below ground at or near the coal face on a supply voltage not in excess of medium voltage;

- (ii) at least once in each working week make a test of the effectiveness of earth leakage protective equipment associated with other low and medium voltage apparatus and circuits operating below ground.

(b) Once in each calendar month a competent person shall make a test of the effective operation of all earth leakage protective equipment associated with high voltage apparatus and feeders underground, as well as that associated with low and medium voltage apparatus and circuits operating at the surface.

(c) A defect found in the operation of the earth leakage protective equipment following the above tests shall be recorded and corrected without delay unless otherwise effectively protected.

5. (a) Where discrimination or selective earth leakage protection is used for different portions of an installation the opening time for a circuit breaker or earth fault relay protecting a circuit against earth leakage may be delayed by the use of time delay devices in order to give selective operation. The maximum operating time for the opening of the circuit breaker or relay shall not exceed 500 milli-seconds, and in no case shall be greater than the tripping time of the main circuit breaker.

(b) When the circuit being protected is situated in a gassy place the operation of the circuit breaker or earth fault relay shall not be delayed.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2; 15 January 1983, p. 199.

**75. Provision of linked switches.** Where switches are required to control more than one conductor of a circuit, they shall be linked switches and shall operate simultaneously in all active conductors, excepting single pole link stick operated links, which may be installed for isolating purposes and for testing.

**76. Provisions for insertion of switch in any conductor.** Nothing in these Rules shall prevent the insertion of a switch in any conductor provided it is linked with corresponding switches in all active conductors in the circuit. In the case of a three-wire direct-current supply and multi-phase alternating supply the linked switch shall be so arranged that the neutral switch will not close after the active switches and will not open before the active switches.

**77. Provision of isolating links or switches.** Where necessary to prevent danger means shall be provided near the apparatus to enable all pressure to be cut off from it or from any circuit forming a part of a system.

**78. Provision against abnormal voltage from lightning.** Where necessary to prevent danger, suitable means shall be provided at the surface of the mine to protect the installation in the mine from abnormal voltage due to atmospheric electricity.

**79. Setting of circuit breakers.** The current setting of circuit breakers shall not be adjusted by anyone except the mine electrician or assistant electrician.

**80. Replacement of fuses.** Fuses shall not be replaced by anyone except a competent person or, where such a person is not immediately available, some person authorised by the manager. When fuses are renewed by other than a competent person such fuses shall, as soon thereafter as practicable, be examined by a competent person. Before any fuse is replaced the electricity shall be switched off.

**81. Provision of switchgear controlling power entering the mine.** Switchgear, in a readily accessible position, shall be provided near the main shaft or near any other openings where power is taken below ground, to enable the voltage to be cut off from the installation supplied through the main shaft or other openings. The switchgear shall be of the approved type giving automatic protection to the conductors and apparatus and shall be installed in a room built for the purpose or otherwise enclosed and adequately protected from the weather. Such room or enclosure shall be either kept locked or closed with instructions posted prohibiting unauthorised interference. Effective telephonic communication, between the positions of such switchgear and the main shaft or other openings, shall be provided when the distance between such positions exceeds 360 metres.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

## SECTION IX

### CONTROL EQUIPMENT AND DEVICES

**82. Protection of exposed parts.** All live parts of switches, circuit breakers, fuses, and other apparatus unless placed in proper machine rooms or in compartments specially arranged for the purpose shall be so placed, arranged, and/or protected that no person can accidentally make contact therewith.

**83. Covers, composition of.** Covers shall be of non-ignitable, non-hygroscopic material and shall be of rigid metal or other approved material, clear of all internal mechanism.

**84. Covers, storing of articles prohibited.** Boxes or covers protecting fuses, circuit breakers, or other apparatus shall not be used for storing articles of any description.

**85. Fuses, installation of.** No fuse shall be installed in such a manner that it is merely held in position by its connecting wires, nor shall be mounted on an unprotected inflammable base.

**86. Circuit breakers shall be of trip-free type.** (1) All circuit breakers shall be of the trip-free type. Circuit breakers shall be arranged so that when the contact lever opens outwards no danger exists of its striking the attendant.

(2) Switchgear controlling outgoing circuits from a main switchboard shall be of an approved automatic type fitted with overload protection or any other additional protection which, in the opinion of the Electrical Inspector, may be required.

Heating, lighting and signalling circuits are exempt from the requirements of this clause.

**87. Cut-outs, size and marking of.** Every switch fuse and circuit breaker shall be rated at and marked with the current rating of the circuit in which it is to be used, except that where there is no standard size of switch fuse or circuit breaker of the same rating as the circuit it shall be rated and marked at the next highest standard rating.

All ratings of cut-outs and the apparatus protected by them shall be plainly and indelibly marked below the base or in the compartment in such a position that it will be legible when the cut-out is fixed or mounted in position.

**88. Fuse link, size of.** (1) In any cut-out the fuse link shall be of such size that it would be melted in one minute or less if of tinned copper or in two minutes or less if of lead tin alloy, by a current equal to twice the maximum carrying capacity of the smallest conductor, protected by it.

(2) Unenclosed fuses shall not be used.

**89. Construction of fuses and circuit breakers.** Fuses and automatic circuit breakers shall be so constructed and so adjusted as effectually to interrupt the current in order that the cables, motors, and other current-consuming devices may be adequately protected against overloads.

**90. Fuses, Type of.** Fuses other than those used in outdoor overhead high voltage systems shall be of the non-rewirable type.

Substituted by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**91. Fuses, maximum size.** No circuit having a maximum demand exceeding 250 amperes shall be protected by means of a fusible cut-out unless the cut-out is of the high rupturing capacity type.

**92. High rupturing capacity fuses.** For the purpose of these Rules a fusible cut-out shall be deemed to be of the "high rupturing capacity" type if—

- (a) It has a rupturing capacity or not less than 25,000 kVA and under all conditions will clear a short within 0.05 seconds of its application; and
- (b) The fuse link can be replaced only by the insertion of an element of the cartridge type specially prepared to ensure that the requirements under (a) above will be satisfied.

**93. Control of motors.** (1) Every motor shall be provided with a control switch, circuit breaker, or starter, fixed in a convenient position and capable of entirely cutting off the pressure to the motor and starting resistance if any.

(2) Alternating Current motors shall be provided with undervoltage and overcurrent protection as required by The Standards Association of Australia Wiring Rules.

**94. Provision of ammeters for motors.** Every permanently fixed pump motor below ground over 7.5 kW and every haulage motor over 7.5 kW shall be provided with a suitable ammeter to indicate the load on the machine. This Rule does not apply to portable or transportable machines.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**95. Remote controlled motors or other equipment.** (1) Where a motor or other equipment is operated by means of remote control it shall be so arranged that the motor or other equipment cannot be started until released at the point where it was stopped.

(2) Remote control apparatus used to operate a motor or other equipment shall be so designed that any failure of such apparatus will not endanger any person and will not prevent the motor or other equipment from being operated safely by its manual or normal control.

Provision shall be made for alternative means of stopping and locking out the motor or other equipment in the event of a failure occurring, causing the motor or other equipment to operate against its manual or normal control, until the cause of such failure is remedied.

(3) A motor or other equipment operated by means of remote control apparatus shall be provided with facilities for locking the contactor, circuit breaker or isolater in a safe or isolated position.

**96. Remote control and electrical interlock circuits.** (1) The voltage used for remote control or electrical interlock circuits shall not exceed extra low pressure unless otherwise approved by the Chief Inspector, and below ground such circuits shall be intrinsically safe.

(2) When a plug and socket coupling is designed to be used without an electrical interlock, the plug shall not be withdrawn from the socket while the circuit is alive and the circuit shall not be made alive while the plug and socket are disengaged.

(3) At the surface of a coal mine the voltage for remote control indication and electrical interlock circuits shall not exceed 110 volts alternating current or 120 volts direct current.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**97. Haulage or conveyor systems.** (1) An automatically controlled and operated haulage system or conveyor system (other than a belt conveyor as defined in "The Belt Conveyor Rules of 1964") shall be provided with means of stopping the system in an emergency at any point along its length.

(2) Except where intrinsically safe open wire signalling systems are used, the means provided shall include an adequate number of lockout-stop switches operated by a pull wire extending over the full length of the system.

(3) (a) The switches shall be conveniently placed and installed at regular intervals so as to be readily identified along the full length of the system.

(b) The pull wire shall be installed along the walking or travelling side of the system in a position where it can be readily grasped or reached, and in the case of a belt conveyor as defined above supported, where practicable, at least above the level of the top of the belt.

(4) The switches shall be so designed as to prevent the restarting of the system until the switch at which it was stopped has been released or reset, and the operation shall be subject to the following:—

(a) In the case of inadvertent stoppage, an authorised person shall first check the cause of the stoppage before the switch is reset and the system restarted.

(b) Where the system has been stopped for a specific purpose it shall only be restarted by the person who stopped the system or in the case of extreme urgency or injury by any person who is fully aware of the circumstances of the stoppage.

(5) The lockout switch shall include an approved indicating device which will automatically and clearly identify the point where the system was stopped.

(6) A notice shall be exhibited at suitable positions in or about the mine to the satisfaction of the inspector forbidding other than an authorised person from releasing or resetting the switch whilst the "stop" indicating device is showing.

**98. Control and isolating switches.** Switchgear provided for the control of a motor by Rule 93 shall include means, or have means conveniently placed, to isolate the motor and all ancillary apparatus associated therewith from the source of energy.

This requirement shall not apply to portable apparatus.

**99. Circuit breakers placing and arrangement.** (1) All apparatus shall be so placed that the arc resulting from its operation cannot touch any object other than a part of the piece of apparatus and cannot ignite inflammable material.

(2) Below ground circuit breakers and switch gear required to be mounted clear of the floor shall be attached to non-ignitable and non-inflammable material which shall be of rigid metal or other approved material and where necessary to prevent danger shall be kept clear of rib, timber, or other inflammable material and shall be adequately protected from damage in accordance with the provisions of these Rules.

**100. Generators, protection.** (1) Every generator shall be provided with a switch and fuses or a circuit breaker on each active pole between the generator and the bus-bars.

(2) Linked switches, except in the case of equaliser switches with direct current generators and neutral switches with alternating current machines in excess of 10 kilowatts, shall be provided by means of

which each generator may be completely disconnected from its load and /or from any source of electrical energy.

(3) Suitable instruments shall be provided for indicating the current and pressure of each generator.

**101. Provision of ammeters on main feeders.** Every main feeder connected to the bus-bars in the generating or transformer station or main switchroom supplying a mine shall be furnished with an ammeter on the main switchboard when the total power supplied by such feeder exceeds 5 kilowatts.

**102. Sealing and Dividing Boxes.** (1) For the attachment of incoming, outgoing or throughgoing cables an enclosure or cubicle shall be fitted at either end or both ends as required with—

- (a) an adaptor, with provision for sealing, suitable for the reception of a coupling unit such as a flit plug; or
- (b) a detachable cable sealing and dividing box; or
- (c) a socket, with provision for sealing, for the reception of a suitable plug which, when combined, forms a restrained plug and socket coupling.

The sealing and dividing box and the adaptor or socket shall be constructed in compliance with the relevant Australian Standard Specification of the Standards Association of Australia.

(2) Provision shall be made for the fitting of auxiliary cables, for remote control, interlocking or other external circuits, by the use of suitable glands complying with the requirements of the relevant Australian Standard Specification of the Standards Association of Australia.

## SECTION X

### SWITCHBOARDS

**103. Composition of.** Switchboard panels and/or frames shall consist wholly of durable, non-ignitable, non-hygroscopic materials which, unless all live parts of apparatus mounted on the panels or connected thereto are adequately insulated therefrom, shall also be of insulating material of permanently high electric strength and insulation resistance, and if below ground shall be in accordance with Rule 99 (2).

**104. Use of marble or slate.** A marble or slate panel shall be used only provided all conducting parts to be mounted thereon are insulated from the panel by a coating of suitable varnish or other non-hygroscopic insulating material.

**105. Accessibility of.** Every switchboard shall be installed in an accessible position. The floor at the front and back of every switchboard shall be firm and even.

**106. Space in front of.** Clear space shall be provided and maintained in front of every switchboard ample for the purpose of safety and effectively operating and adjusting all equipment thereon. Such space shall in no case be less than 600 mm. In the case of main generating or substation switchboards, such space shall not be less than 1.2 metres wide measured from the switchboard panels.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**107. Space behind switchboards.** Where it is necessary to have access to the back of a switchboard for wiring purposes or where any exposed live metal is mounted on the back of a switchboard, the switchboard shall be so placed that there is a space between the back of the board and any wall or immovable structure behind the board. Provision shall be made for easy access to such space, and the minimum distance from the back of the board to such wall or immovable structure shall be as required below. Should any live metal project from the back of the board, the minimum distance of the board from the wall or movable structure shall be greater than that required below by the greatest distance any such metal projects from the back of the board.

- (a) In cases where both height and width of the board does not exceed 1.2 metres the space required behind such board shall be as set out in the Standards Association of Australia Wiring Rules.
- (b) In cases where both height and width of the board exceed 1.2 metres the space or passage required behind such board shall be as set out in the Standards Association of Australia Wiring Rules.
- (c) In cases where both the height and width of the board exceed 1.2 metres, all stays and conductors shall be so arranged as to allow a clearance above floor level over the space behind the board of not less than 1.85 metres for stays and insulated conductors and 2 metres for bare conductors.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711; 3 December 1983, pp. 1470-72.

**108. Distinction of switchboards.** For the purpose of these Rules, if a switchboard panel is mounted more than 300 mm from any other panel it shall be deemed to be a separate switchboard, but if a panel is mounted within 300 mm of any other panel such panels shall be deemed to be one switchboard. Where new panels are required because of additions, alterations, or extensions to an installation and any such panel is mounted within 300 mm of an existing switchboard the existing switchboard and new panels shall be deemed to be one switchboard.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**109. Access to passage behind switchboard.** Unless the switchboard is situated in a room accessible only to authorised attendants, the space behind every switchboard which is required to be spaced 760 mm from a wall or immovable structure shall be enclosed so as to make it inaccessible to any but authorised attendants, and access to such space



shall be provided by a door or doors each not less than 450 mm wide and of a height permitting easy access. Such door or doors shall open outwards and shall be kept locked when not open for access, but shall at all times be capable of being opened from the inside without the use of a key.

As amended by Rules publ. Gaz. 9 December 1978, pp. 1710-1711.

**110. Provision of access doors.** Where passage room is provided behind a board which is more than twelve feet in length, an access door as described in Rule 109 shall be provided at each end of the board.

Such passage room shall not be used for the storage of articles.

**111. Method of attaching apparatus to.** All apparatus mounted on a switchboard shall be attached thereto by means of bolts, studs, or screws having metal threads which engage in nuts or suitably threaded holes in metal except that upon the approval of the Electrical Inspector switchgear of the self-contained type may be attached to woodwork by screws of adequate size screwed therein.

**112. Location of.** Every switchboard shall be placed in a position suitable for the safe and effective control of the circuits and apparatus connected thereto and supplied therefrom. Unless special protection against moisture is provided, switchboards shall be placed only in dry, well-ventilated places.

**113. Connection of switches.** Every main switch and every switch required under these Rules to control a circuit outgoing from a switchboard shall be so connected at such board that no corresponding circuit cut-outs are alive when the switch is in the off position.

**114. Switchboards with exposed live parts.** Unless placed in a switch room or compartment specially arranged for the purpose, every switchboard with exposed live conductors shall be enclosed in a protective case.

## SECTION XI

### EARTHING

**115. Prohibited current in earthing conductor.** Earthing conductors shall not be used to carry the normal current of a circuit except when such earthing conductors are used solely for the protection or control of mobile or portable equipment.

**116. Equipment and portions of installations which must be earthed.** On systems operating above the limit of extra-low voltage all conductive coverings and exposed metal of electrical equipment in an earthed situation shall be effectively earthed.

**117. Location of earthing electrodes.** All earthing electrodes installed in order to make effective connection to the general mass of the earth shall be located at the surface of the mine unless approved otherwise.

**118. Installation of earthing electrodes.** (1) An earthing electrode or electrodes as referred to in Rule 117 shall be of an approved type and

shall be installed as far as practicable below permanent moisture level and as close to the power supply as circumstances will permit.

(2) The connection of an earthing electrode or electrodes of a mine installation with, or the separation of such electrode or electrodes from a lighting protection electrode shall be in accordance with Specification M.C. 1, "Manual on Lighting Protection" of the Standards Association of Australia.

**119. Ohmic resistance of earthing electrodes.** The ohmic resistance of an earthing electrode assembly shall be kept as low as possible and shall not exceed two (2) ohms.

**120. (1) Testing of earthing electrodes.** A competent person shall test the ohmic resistance of an earthing electrode assembly required by Rule 119 and shall record the result so obtained in an approved form kept at the mine for such purpose. The frequency of such tests shall be in accordance with Rule 23 (3).

(2) **Electrode testing equipment to be provided.** The Manager shall provide approved facilities to carry out a test as required by sub-rule (1) of this Rule.

**121. Continuous metallic earthing conductor required.** Equipment and portions of installations in a mine which are required to be earthed under Rule 116 shall be connected to the earthing electrodes at the surface of such mine by a continuity of metallic earthing conductors which may form part of the sheath or armouring of the supply cable. Where an earthing conductor is required to be run separately or where an earthing conductor is connected in parallel with an existing earthing conductor such earthing conductor shall be stranded and shall comprise an approved material.

**122. Resistance of continuous metallic earthing conductors.** The resistance of any continuous metallic earthing conductor between the terminals of the earthing electrode assembly at the surface of the mine and any other point in the installation, shall be low enough to permit the passage of the current necessary to trip the earth leakage release of the circuit breaker protecting the circuit.

**123. Earthing conductors to be protected.** Earthing conductors shall, where necessary, be protected against corrosion and against mechanical injury.

**124. Conductivity of earthing conductors.** (1) The metallic earthing conductors of every cable and the individual earth conductors on trailing cables shall be electrically continuous throughout so that the total conductance of such conductors shall be in accordance with the standard specification as appropriate to the type of cable at the time of its purchase.

(2) The conductance of the collective screen, or the combined conductance of the individual screens, when expressed as a percentage of the minimum possible conductance of one power or active conductor of the trailing cable, shall not be less than—

- (a) 50 per cent. for cables having active conductors up to and including 70 mm<sup>2</sup> nominal cross-sectional area;

- (b) 33·33 per cent., but not less than 35 mm<sup>2</sup> equivalent copper area, for cables having active conductors larger than 70 mm<sup>2</sup> nominal cross-sectional area.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711; 3 December 1983, pp. 1470-72.

**125. Size of stranded copper earthing conductor.** (1) Except as provided in sub-rule (2) of this Rule, the minimum size of a copper earthing conductor required for the protection of permanent structures or buildings shall be determined in relation to the current carrying capacity of the largest active conductor protected by such earthing conductor.

(2) Notwithstanding the provisions of sub-rule (1) of this Rule the size of the copper earthing conductor shall comply with the following requirements:—

- (a) The main earthing conductor of an installation, or portion thereof, shall, in no case, have a cross-sectional area smaller than 6 mm<sup>2</sup>.
- (b) An earthing conductor run as an aerial conductor shall in no case be smaller than 6 mm<sup>2</sup> and shall comprise a conductor having not less than seven strands.
- (c) Where an earthing conductor is insulated and enclosed in the same conduit, sheathing or other protective covering as the active conductor or where a bare earthing conductor is laid up in the same protective sheathing as the active conductor, the earthing conductor need not have a cross-sectional area greater than that of the active conductor, provided that it is stranded and has an area not less than 1·5 mm<sup>2</sup>.
- (d) Where the cross-sectional area of the largest live conductor of a flexible cable used with a portable appliance is smaller than 4 mm<sup>2</sup>, the cross-sectional area of the earthing conductor in the flexible cable need not be greater than, but shall be not less than, that of such live conductor.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**126. Additional earthing requirements to be observed.** (1) Unless otherwise provided in these rules the earthing of permanent structures or buildings and installations or part thereof, shall comply with the requirements of The Standards Association of Australia Wiring Rules A.S.C.C.1.

(2) Electrical systems and circuits shall be connected with earth as follows:—

- (a) One pole of a system used for traction where the running rails are used as a conductor, in which the pole that is connected to the running rail shall be earthed.
- (b) One pole of the secondary circuit of a current or voltage transformer, used for indicating or other instruments or accessories of switchgear, including fixed lights associated therewith, in which the pole that is connected to the metallic structures of the apparatus shall be earthed.

- (c) One pole of the secondary circuit of a voltage transformer, used for remote control or electrical interlock circuits where an earthing conductor is used to complete the circuit, in which the pole that is connected to the earthing conductor shall be earthed.
- (d) The neutral point of an alternating current system, where the voltage exceeds the limits of low pressure except as provided in paragraphs (b) and (c) of this sub-rule.
- (e) The neutral point of an insulated direct current system may be connected with earth.

**127. Lightning protection.** (1) Effective lightning arresters shall be provided on all overhead circuits above ground.

(2) Power lines and property shall be protected in accordance with the requirements of Specification M.C.1, "Manual on Lightning Protection," of the Standards Association of Australia.

## SECTION XII

### HIGH VOLTAGE INSTALLATIONS

**128. Danger notices.** Conspicuous danger notices, permanently maintained in a legible condition, shall be erected in the vicinity of all high-pressure apparatus. Every notice shall contain the word "Danger" in bold letters, and shall state the voltage at which the apparatus operates.

**129. Limitations of voltage.** (1) Electrical energy shall not be transmitted or used at a voltage exceeding 11,000 volts below ground in a mine, except with the permission of the Chief Inspector and subject to such conditions as he may require.

As amended by Rules pubd. Gaz. 13 May 1978, pp. 351-2.

**130. Protection of lower-voltage systems.** Where energy is transformed to or from a higher voltage 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.

**131. Enclosures.** All live parts shall be enclosed or isolated so as to be accessible only to authorised persons. The enclosures if of metal shall be effectively earthed. Rooms housing generator, switching, transformer, and similar equipment shall be kept securely locked except while a competent person is present in charge.

**132. Connection of circuits with earth.** Where any high-pressure or extra high-pressure circuit is connected with earth, the connection shall be made at one point only—namely, at the generating station or substation—and the insulation of such circuit shall, except at the point connected to earth, be effectively maintained throughout.

**133. Neutral point of star winding.** The neutral point of the star winding of each distinct polyphase system used for high-pressure or extra high-pressure supply may be connected with earth, or may be insulated. If connected with earth through a resistance, that resistance shall be sufficiently low to ensure that the fuses or automatic circuit breakers in the circuit shall act.

If the neutral point is not connected with earth, a separate electrostatic voltmeter shall be connected permanently between each distinct system and earth; and if the reading of the voltmeter shows that the insulation of any of the circuits of a system is faulty immediate steps shall be taken to restore insulation.

**134. Enclosure outdoor substations.** Where any live parts would otherwise be exposed, every transformer substation shall, unless isolated by elevation, be surrounded by an earthed metal or strong permanent wooden fence extending from the floor or ground to a height of at least 2.5 metres. No aperture in this fence shall be greater or wider than 38 mm, unless it is closed by a door or slide which shall be kept locked.

Access to the substation by climbing shall be obstructed by suitably-placed barbed wire or other effective means, and warning notices indicating the highest operating voltage shall be fixed to the fence or to the pole on all sides in such positions as to be easily read.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**135. Drainage.** Suitable arrangements shall be made for drainage away from adjacent buildings and combustible materials of any oil which may overflow.

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**SECTION XIII**  
CONSUMING DEVICES

**136. (Repealed).**

Repealed by Rules pubd. Gaz. 20 October 1979, p. 697.

**137. Provision in case of failure of electric lighting.** In all machine rooms and other places below ground where a failure of electric light is likely to cause danger some approved alternative system of lighting shall be provided for use in the event of such failure.

**138. Control.** (1) Below ground, the load on any final subcircuit used for lighting shall not exceed 20 amperes, and neither this current nor the calculated current shall exceed the current carrying capacity of the cable supplying each final subcircuit.

(2) The lamp bulb shall be protected by a substantial fitting of bulk-head or other approved type capable of providing adequate and effective lighting.

(3) Except in a gassy mine or place or within the vicinity of any working place multicore cable of an approved type shall be used for lighting installations. All joints shall be made in junction boxes of an approved type and where the junction box is attached to a light fitting the cable used from the inside of the junction box into the light fitting shall be of a heat resisting type.

**139. Pressure of hand-lamps.** Below ground, electrical energy shall not be used in any portable hand-lamps at a voltage exceeding extra low pressure, except that a voltage exceeding extra low pressure may be used in places where persons using the apparatus are effectively insulated from earth.

**SECTION XIV**  
MOTOR AND PORTABLE MACHINES

**140. Pressure allowed for portable and transportable motors.** Except with the permission of the Chief Inspector and subject to such conditions as he may require electrical energy shall not be used below ground in a mine:—

- (a) In any portable or transportable motor at a voltage exceeding 650 volts; or
- (b) In any portable motor having a continuous rating of less than 3.6 kW at a voltage exceeding 250 volts direct current or 125 volts alternating current.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**141. Defects.** (1) If any electric spark or arc be produced outside a portable motor or about the cables or rails, or if the frame becomes alive, the machine concerned shall be stopped, the pressure cut off, and the trailing cable disconnected from the associated switchgear. The machine shall not be worked again until the defect has been remedied. A machine end plug shall not be replaced or removed except when the trailing cable is dead.

(2) A portable, transportable or mobile machine shall not be repaired until the pressure has been cut off at the machine.

(3) Transportable and mobile machinery when supplied by a trailing cable operating above the limits of extra low voltage shall be protected by an approved earth leakage protective device in order to automatically cut off the voltage and separately isolate each individual machine or circuit in the event of a leakage current to earth on the machine or its associated flexible cable.

(4) Transportable and mobile machinery when supplied by a trailing cable and hand held electrically operated machines operating above the limits of extra low voltage shall, in addition to the earth leakage protection, be protected with an automatic earth continuity protective device capable of cutting off the voltage in the event of a break in the earth conductor of the flexible cable supplying the machinery or machine from its gate end box.

**142.** A person operating a transportable or mobile machine shall not leave the controls of the machine while it is working and shall before leaving the working place ensure that the pressure is cut off from the machine.

## SECTION XV

### LOCOMOTIVES, CHARGING STATIONS, &C.

**143. Locomotives.** A storage battery locomotive or any portable machine of an approved flame-proof type may be used in any coalmine.

**144. Charging stations and repair of batteries.** (1) Any room inside a mine used as a charging or repair station shall be of suitable fire-proof construction and adequately ventilated with intake air to render harmless any gases evolved.

(2) No lamp or light other than a locked safety lamp or an electric lamp enclosed in a suitable and substantial fitting and having the lamp globe hermetically sealed shall be used in or within 10 metres of any charging station.

(3) Charging, repairing, or inspection of batteries shall only be done in the charging or repair station, and this work shall be performed by an authorised person only.

As amended by Rules pubd. Gaz. 9 December 1978, pp. 1710-1711.

**145. Construction of battery boxes.** Battery boxes and the covers thereof shall be so constructed as to minimise accidental or unauthorised interference with the battery, but shall be efficiently ventilated. The covers shall be kept securely locked except when in the charging or repair station.

**146. Control and protection.** Every battery shall be provided with—

- (a) Enclosed fuses or circuit breakers;
- (b) An ampere hour meter which shall at all times indicate the condition of charge of the battery.

**147. Connections.** All electrical connections shall be so constructed, inspected, and maintained that the risk of connections becoming loose during working is minimised.

**148. Use of trolley-wire locomotives.** The use of electric locomotives on the trolley-wire system in any coalmine shall be conditional on the prior consent of the Chief Inspector and subject to such special conditions, in addition to the general requirements of these Rules, as the Chief Inspector may prescribe.

## SECTION XVI

### SIGNALLING

**149.** Apparatus used for signalling, telephone, telegraph or other approved means of inter-communication shall have its enclosures constructed of durable, non-ignitable and non-hygroscopic materials. All current carrying parts, terminals and connections of such apparatus shall be completely enclosed and the following requirements shall apply to the installation and use of such apparatus:—

- (a) The pressure used for signalling shall not exceed extra-low voltage;
- (b) The pressure used for telephony and telegraphy shall not exceed extra-low voltage, except that for ringing by means of a hand-operated magneto or other source of power (not exceeding 1,000 watts rated output) the pressure shall not exceed 115 volts;
- (c) Where bare conductors have to be handled for the purpose of signalling a system of automatic excess voltage protection shall, where practicable, be installed and so arranged that the supply likely to cause any excessive pressure will be disconnected when the pressure between the signalling system and earth exceeds 25 volts;
- (d) All proper precautions shall be taken to prevent conductors from coming into contact with other electric conductors whether insulated or not. The conductors shall be kept as far apart from lighting or power cables as possible and where practicable signalling and telephone cables shall be installed on the opposite side or rib to lighting or power cables and where it is necessary for them to cross the lighting or power cables, they shall be incased in rubber hose or otherwise equally efficiently protected;
- (e) Where the power for signalling is obtained from a step-down transformer, the transformer shall be of an approved double-wound type and one of the following methods shall be adopted to prevent the secondary windings becoming charged in the higher potential:—
  - (i) The primary and secondary windings shall be wound on separate legs of the transformer and the core of the transformer shall be efficiently earthed;



- (ii) If the primary and secondary windings are wound on the same cores, an earthed winding or metallic sheath shall be interposed between the two windings and insulated suitably from both primary and secondary windings;
- (f) Contact-makers used for signalling shall be so constructed and installed as to prevent the accidental closing of the circuit.
- (g) The apparatus and associated circuits covered by this rule when used below ground shall be intrinsically safe: Provided that at the surface of a mine where other apparatus is lawfully in use such apparatus shall only be connected to a circuit of the mine, in which approved apparatus is required to be used, through the medium of an intrinsically safe coupling unit.

## SECTION XVII

### REQUIREMENTS IN A "GASSY MINE OR PLACE"

150. The Rules in this section XVII shall not apply to the requirements of the approved types of battery hand nor cap lamps.

151. Electrical equipment shall not be installed in any part of a mine where the percentage of inflammable gas in the general body of the air is one and one-quarter per centum or upwards.

152. All portable flameproof apparatus shall be efficiently overhauled and properly reassembled under approved conditions once every two years, or as more often as may be required by the Inspector.

153. All transforming, rectifying, and generating equipment shall have all their current-carrying parts, terminals and connections completely enclosed in flameproof or other approved enclosures.

154. All switches, starters and other control equipment shall have all their current carrying parts, terminals, and connections completely enclosed in approved flameproof enclosures.

155. The covers of all switches, fuses and circuit breakers, except those incorporated in portable machines, shall be so interlocked with the mechanism as to preclude the opening or removal of the covers while any other circuit-breaker or switch is in the enclosed position or while any fuse is alive.

156. All apparatus and consuming devices, including motors, shall have all their current carrying parts, terminals and connections completely enclosed in approved flameproof enclosures.

157. Electric lamps shall be enclosed by fittings of an approved type.

158. Below ground, apparatus comprising remote control or electrical interlock circuits when associated with plug and socket couplings shall be designed so that the said circuits are intrinsically safe.

159. Portable instruments used below ground shall be intrinsically safe.

**160.** Below ground, circuits comprising signalling bells or telephones and associated apparatus shall be intrinsically safe.

**161.** The electric power supply shall be promptly disconnected from any cables or apparatus in any part of a mine where the percentage of gas in the general body of the air in such part is one and one-quarter per cent. or upwards.

**162.** In the event of the failure of the mine ventilation system the electric power to all face machinery including electric coal-cutting, boring and mobile loading machines shall be cut off as soon as practicable and every storage battery locomotive or mobile loading machine shall be brought out to a main intake airway. If the duration of the stoppage exceeds one half-hour the electric supply shall be cut off and not restored in any part of the mine until an examination of that part of the mine and the airways on the intake side thereof has been made by an authorised person or persons and unless there is less than one and one-quarter per centum of inflammable gas in the general body of the air in that part.

**163.** A storage battery locomotive or other mobile machine of an approved flameproof type may be used in any part of a mine where the percentage of inflammable gas in the general body of the air in such part is less than one and one-quarter per centum.

**164.** All flameproof enclosures in storage-battery locomotives or other mobile machines shall be kept securely locked or sealed and may be opened only at the charging or repair station.

**165.** Where a storage-battery locomotive or other mobile machine is worked below ground, a competent person shall inspect at least once in every twenty-four hours all flameproof enclosures together with their locks or seals, and he shall record the result of his inspection in the approved form kept at the charging or repair station.

**166.** A driver of a storage battery locomotive or other mobile machine of approved flameproof type shall not operate such locomotive or machine outside the charging or repair station unless all seals are intact, except that in the event of a fuse blowing while the locomotive or machine is away from the station, the driver may break the covering seal, open the enclosure, and replace the blown fuse with a spare fuse which has been inspected and passed for the purpose by a competent person. The driver on his return to the station shall report the matter to a competent person who shall see that the enclosure is in proper condition and shall securely lock and reseal it before the locomotive or machine is moved from the station and shall make a record of the occurrence in a book kept at the station.

**167.** In the event of any open sparking being noticed about a storage battery locomotive or other mobile machine or in the event of the frame becoming alive, the driver shall immediately open the main switches and if the sparking still persists he shall close the main switch and get the locomotive or machine into a main intake airway as soon as possible, and report the occurrence to the deputy of the district or other senior officials.

### SECTION XVIII

#### THE USE OF HIGH VOLTAGE MACHINERY AT THE COAL FACE

**168.** The rules in this section apply to machinery which the Chief Inspector of Coal Mines has granted permission to use above a certain power rating to operate at the coal face at a voltage exceeding the limits of medium voltage.

**169. Voltage and conditions.** The Chief Inspector may, on application being made in writing, grant permission for a machine to operate from a three phase, 50 cycle, alternating current supply, not exceeding a voltage of 6,600 volts, in a gassy place, provided that the total connected load of such machine and its ancillary equipment shall not be less than 300 kilo-volt amperes and the equipment shall comply with the general requirements of these rules, and such additional special requirements as may be set out by the Chief Inspector.

**170. Supply.** (1) Such machine and its ancillary equipment shall take supply from a transformer which shall be used only by such machine and its ancillary equipment: provided that—

- (a) Cables, including the feeder cables and/or trailing cables, shall provide continuous monitoring of the earth conductor from the substation or source of supply to the machine for which approval has been granted; and
- (b) The continuous monitoring earth conductor circuit required by paragraph (a) of this subrule (1) shall be intrinsically safe.

(2) Cables and fittings, such as trailing cable plugs, receptacles and flit plugs shall be of the restrained or bolted type which require the use of spanners, special tools or keys to enable them to be separated or joined together as well as the following special features:—

- (a) During the separation and mating of the plugs and receptacles of flit plugs, the earthing conductor connection shall be made first and separated last;
- (b) The design of the plugs, receptacles, flit plugs, bodies and/or the design of mating surfaces of these components shall ensure that every reasonable precaution has been taken to maintain a minimum ohmic resistance between mating surfaces which form part of the earthing system.

**171. Gate end box or distribution and control box.** (1) Notwithstanding the requirements of rule 69 of these Rules, a distribution and control box forming part of the substation or a separate gate end box shall be provided to protect the trailing cable or feeder cable supplying a machine in the manner prescribed in Section VIII of these Rules. Such control box or gate end box shall comply with the requirements of rule 12 of these Rules.

(2) Facilities for earthing the outgoing cables shall also be included as an integral part of high voltage equipment installed either below ground or at the surface. Such earthing facilities shall be interlocked with the main isolator and be capable of being locked in the earthing position.

**172. Protection of operators and other requirements.** Inspection covers and/or hand hole covers, on any high voltage mobile or portable machine or its ancillary equipment, which may be removed without the use of tools, shall be interlocked with the incoming power supply in such a way that the supply to the machine shall be isolated automatically in the event of inspection covers or hand hole covers becoming removed from their normally safe position.

**173. Machine wiring.** All cables used on a machine shall be of the individually or collectively screened type and shall comply with the requirements of Rule 48 (a).

**174. Short circuit protection.** Cables as required by paragraph (a) of subrule (1) of Rule 170 shall be protected against over current by the provision in the circuit at the source of supply of a circuit breaker or high rupturing capacity fuses in each active conductor. The selection of either fuses or circuit breakers or a combination of both shall be based on the premises that minimum fault clearance time is of paramount importance.

**175. Trailing cables and feeder cables.** Trailing cables and feeder cables shall be approved and shall comply with the requirements of these Rules.

**176. Methane monitoring.** Where methane monitoring equipment is required for use in conjunction with a high voltage machine for use at the coal face, such monitoring equipment shall be of an approved type and shall be so arranged that the power shall be automatically interrupted at the source of supply in a gas free area, under the prescribed conditions and shall be automatically locked out until procedures laid down by the Chief Inspector have been carried out.

**177. Fault—Current to be limited.** Notwithstanding paragraph (b) of Rule 73, earth fault current shall be limited to five (5) amperes where machines are required to operate at any voltage exceeding the limits of medium voltage in a gassy place.

**178. Automatic earth fault protection.** Earth fault protection provided in accordance with Rule 74, for machines operating above the limits of medium voltage in a gassy place, shall be set to operate at a current value not exceeding one ampere.