

(2.) Fire-buckets of suitable capacity, filled with clean dry sand ready for immediate use in extinguishing fires, shall be kept in every place containing apparatus, other than cables, telephones, and signalling-apparatus.

165. (1.) Where necessary to prevent danger or mechanical damage, transformers and switch gear shall be placed in a separate room, compartment, or box.

(2.) Unless the apparatus is so constructed, protected, and worked as to obviate the risk of fire, no inflammable material shall be used in the construction of any room, compartment, or box containing apparatus, or in the construction of any of the fittings therein. Each such room, compartment, or box shall be substantially constructed and shall be kept dry.

(3.) Adequate working-space and means of access clear of obstruction and free from danger shall be provided for all apparatus that has to be worked or attended to by any person, and all handles intended to be operated shall be conveniently placed for that purpose.

166. (1.) All apparatus and conductors shall be sufficient in size and power for the work they may be called upon to do, and so constructed, installed, protected, worked, and maintained as to prevent danger so far as is reasonably practicable.

(2.) All insulating-material shall be chosen with special regard to the circumstances of its proposed use. It shall be of mechanical strength sufficient for its purpose, and so far as is practicable it shall be of such a character, or so protected, as fully to maintain its insulating properties under working-conditions of temperature and moisture.

(3.) Every part of a system shall be kept efficiently insulated from earth, except that (a) the neutral point of a polyphase system may be earthed at one point only; (b) the mid-voltage point of any system, other than a concentric system, may be earthed at one point only; and (c) the outer conductor of a concentric system shall be earthed. Where any point of a system is earthed it shall be earthed by connection to an earthing-system at the surface of the mine.

(4.) Efficient means shall be provided for indicating any defect in the insulation of a system.

167. (1.) All metallic sheaths, coverings, handles, joint-boxes, switch-gear frames, instrument-covers, switch and fuse covers and boxes, and all lampholders unless efficiently protected by an earthed or insulating covering made of fire-resisting material, and the frames and bed-plates of generators, transformers, and motors (including portable motors) shall be earthed by connection to an earthing-system at the surface of the mine.

(2.) Where the cables are provided with a metallic covering constructed and installed in accordance with Regulation 171 (c) such metallic covering may be used as a means of connection to the earthing-system. All the conductors to an earthing-system shall have a conductivity at all parts and at all joints at least equal to 50 per cent. of that of the largest conductor used solely to supply the apparatus, a part of which it is desired to earth: Provided that no conductor of an earthing-system shall have a cross-sectional area of less than 0.022 square inch.

(3.) All joints in earth conductors, and all joints to the metallic covering of the cables, shall be properly soldered or otherwise efficiently made, and every earth conductor shall be soldered into a lug for each of its terminal connections. No switch, fuse, or circuit-breaker shall be placed in any earth conductor.

This rule shall not apply (except in the case of portable apparatus) to any system in which the pressure does not exceed low-pressure direct current or 125 volts alternating current.

168. (1.) Where electricity is distributed at a pressure higher than medium pressure (a) it shall not be used without transformation to medium or low pressure except in fixed machines in which the high or extra-high pressure parts are stationary; and (b) motors under 20 horse-power shall be supplied with current through a transformer stepping down to medium or low pressure.

(2.) Where energy is transformed, suitable provision shall be made to guard against danger by reason of the lower-pressure apparatus becoming accidentally charged above its normal pressure by leakage from or contact with the higher-pressure apparatus.

169. Switch gear and all terminals, cable-ends, cable-joints, and connections of apparatus shall be constructed and installed so that—

(a.) All parts shall be of mechanical strength sufficient to resist rough usage.

(b.) All conductors and contact areas shall be of ample current-carrying capacity, and all joints in conductors shall be properly soldered or otherwise efficiently made.

(c.) The lodgment of any matter likely to diminish the insulation, and of coaldust on or close to live parts, shall be prevented.

(d.) All live parts shall be so protected or enclosed as to prevent accidental contact by persons and danger from arcs or short circuits, fire or water.

(e.) Where there may be risk of igniting gas, coaldust, or other inflammable material, all parts shall be so protected as to prevent open sparking.

170. (1.) Properly constructed switch gear for cutting off the supply of current to the mine shall be provided at the surface of the mine, and during the time any cable is live a person authorized to operate the said switch gear shall be available within easy reach thereof. Lightning-arresters, properly adjusted and maintained, shall be provided where necessary to prevent danger.

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

(3.) Such efficient means shall be provided for cutting off all pressure automatically from the part or parts of the system affected in the event of a fault as may be necessary to prevent danger.

(4.) Every motor shall be controlled by switch gear for starting and stopping, so arranged as to cut off all pressure from the motor and from all apparatus in connection therewith, and so placed as to be easily worked by the person appointed to work the motor.

(5.) If a concentric system is used, no switch, fuse, or circuit-breaker shall be placed in the outer conductor, or in any conductor connected thereto, except that, if required, a reversing-switch may be inserted in the outer conductor at the place where the current is being used. Nevertheless, switches, fuses, or circuit-breakers may be used to break the connection with the generators or transformers supplying the electricity, provided that the connection of the outer conductor with the earthing-system shall not thereby be broken.

171. All cables, other than flexible cables for portable apparatus and signalling-wires, shall comply with the following requirements:—

(a.) They shall be covered with insulating-material (except that the outer conductor of a concentric system may be bare). The lead sheath of lead-sheathed cables, and the iron or steel armouring of armoured cables, shall be of not less thickness respectively than is recommended by the British Engineering Standards Committee.

(b.) They shall be efficiently protected from mechanical damage, and supported at sufficiently frequent intervals and in such a manner as adequately to prevent danger and damage to the cables.

(c.) Concentric cables, or two-core or multi-core cables protected by a metallic covering, or single-core cables protected by a metallic covering which shall contain all the conductors of the circuit, shall be used (i) where the pressure exceeds low pressure, (ii) where the roadway conveying the cables is also used for mechanical haulage, and (iii) where there may be risk from igniting gas, coaldust, or other inflammable material:

Provided that if the medium-pressure direct-current system is used—(i) two single-core cables protected by metallic coverings may be used for any circuit if the said metallic coverings are bonded together by earth conductors so placed that the distance between any two consecutive bonds is not greater than 100 ft. measured along either cable, and (ii) two single-core cables covered with insulating-material efficiently protected or otherwise than by a metallic covering may be used in gate-roads (except in gate-roads which are also used for mechanical haulage, or where there may be risk of igniting gas, coaldust, or other inflammable material) for the purpose of supplying portable apparatus.

(d.) Cables unprotected by a metallic covering shall be properly secured by some non-conducting and readily breakable material to efficient insulators.

(e.) The metallic covering of every cable shall be—(i) electrically continuous throughout; (ii) earthed, if it is required by Regulation 167 (1) to be earthed, by a connection to the earthing-system of not less conductivity than the same length of the said metallic covering; (iii) efficiently protected against corrosion where necessary; (iv) of a conductivity at all parts and at all joints at least equal to 50 per cent. of the conductivity of the largest conductor enclosed by the said metallic covering; and (v) where there may be risk of igniting gas, coaldust, or other inflammable material so constructed as to prevent as far as is reasonably practicable any fault or leakage of current from the live conductors from causing open sparking:

Provided that where two single-core cables protected by metallic coverings bonded together in accordance with paragraph (c) of this regulation are used for a circuit, the conductivity of each of the said metallic coverings at all parts and at all joints