CENTRAL ELECTRICITY AUTHORITY (MEASURES RELATING TO SAFETY AND ELECTRIC SUPPLY) REGULATIONS, 2010

AND

CENTRAL ELECTRICITY AUTHORITY (MEASURES RELATING TO SAFETY AND ELECTRIC SUPPLY) AMENDMENT REGULATIONS, 2015.

AS APPLICABLE TO MINES

2. Definitions: -

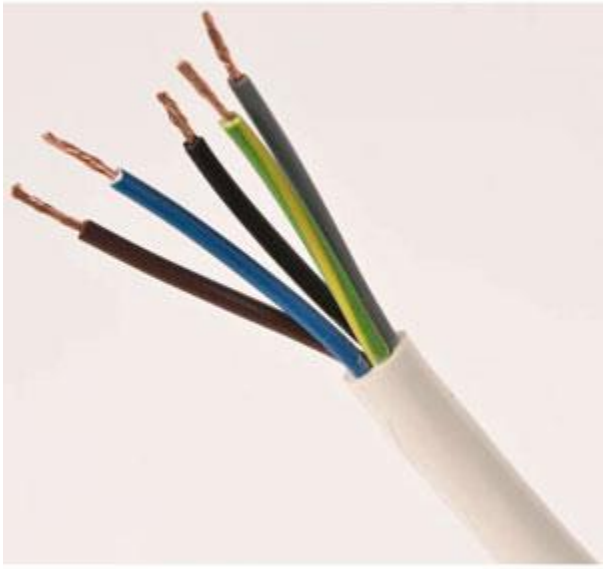
(1) In these regulations, unless the context otherwise requires

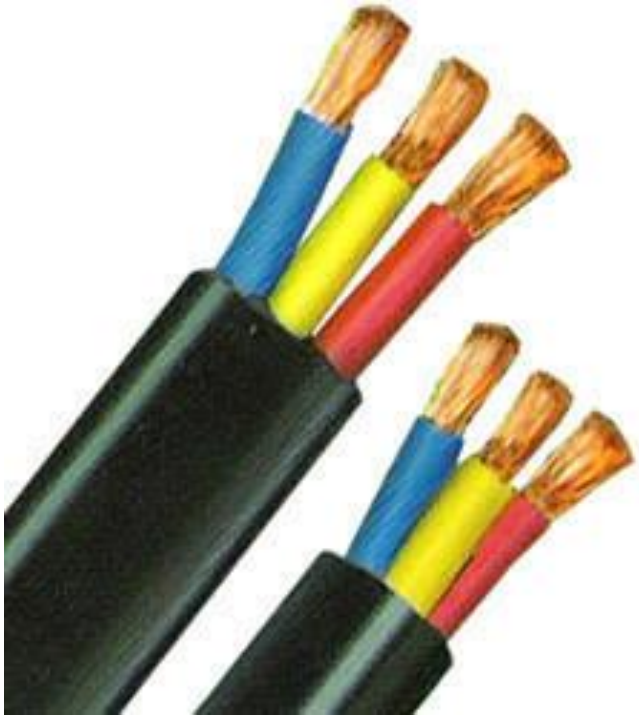
(f) "Cable" means a length of insulated single conductor (solid or stranded) or of two or more such conductors each provided with its own insulation, which are laid up together. Such insulated conductor or conductors may or may not be provided with an overall mechanical protective covering;

(i) "Concentric cable" means a composite cable comprising an inner conductor which is insulated and one or more outer conductors which are insulated from one another and are disposed over the insulation of, and more or less around, the inner conductor;

(w) "flexible cable" means a cable consisting of one or more cores each formed of a group of wires, the diameter and the physical properties of the wires and insulating material being such as to afford flexibility.

(j) "conductor" means any wire, cable, bar, tube, rail or plate used for conducting electricity and so arranged as to be electrically connected to a system;





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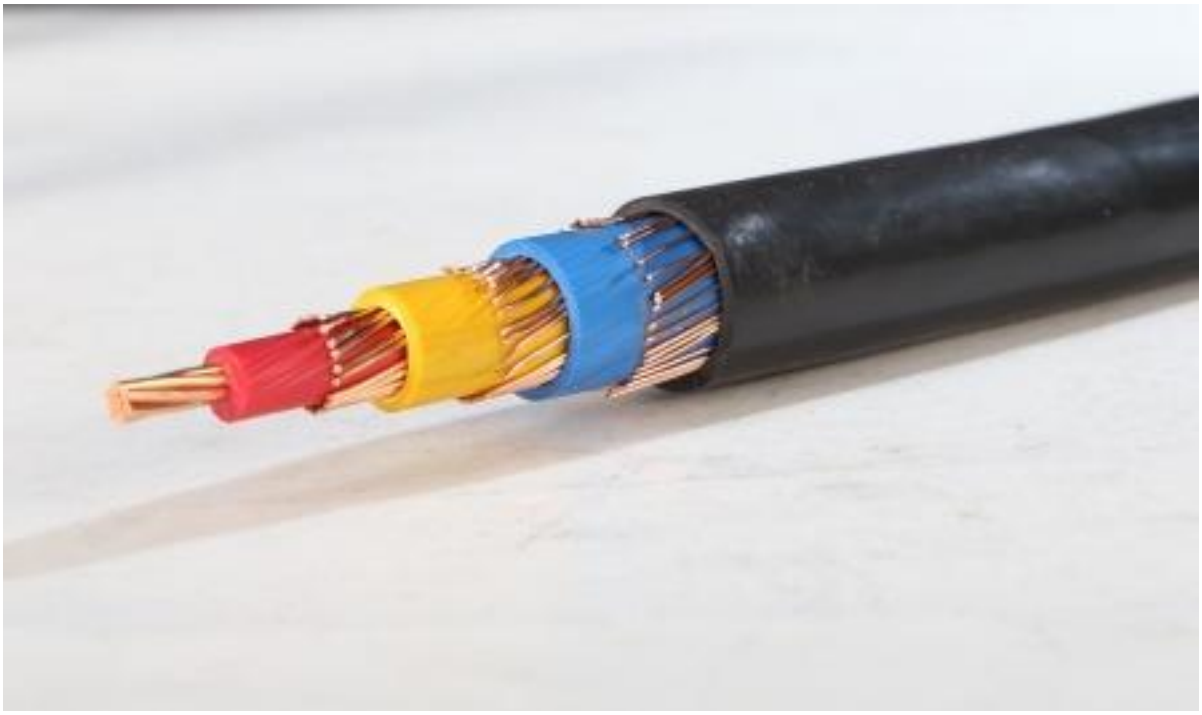
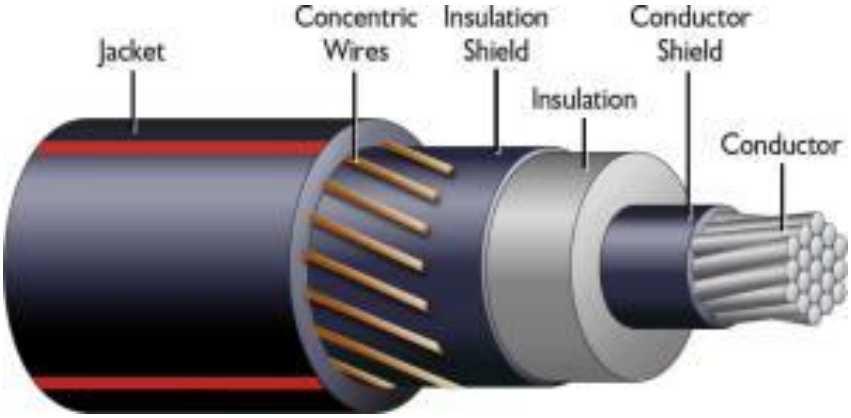
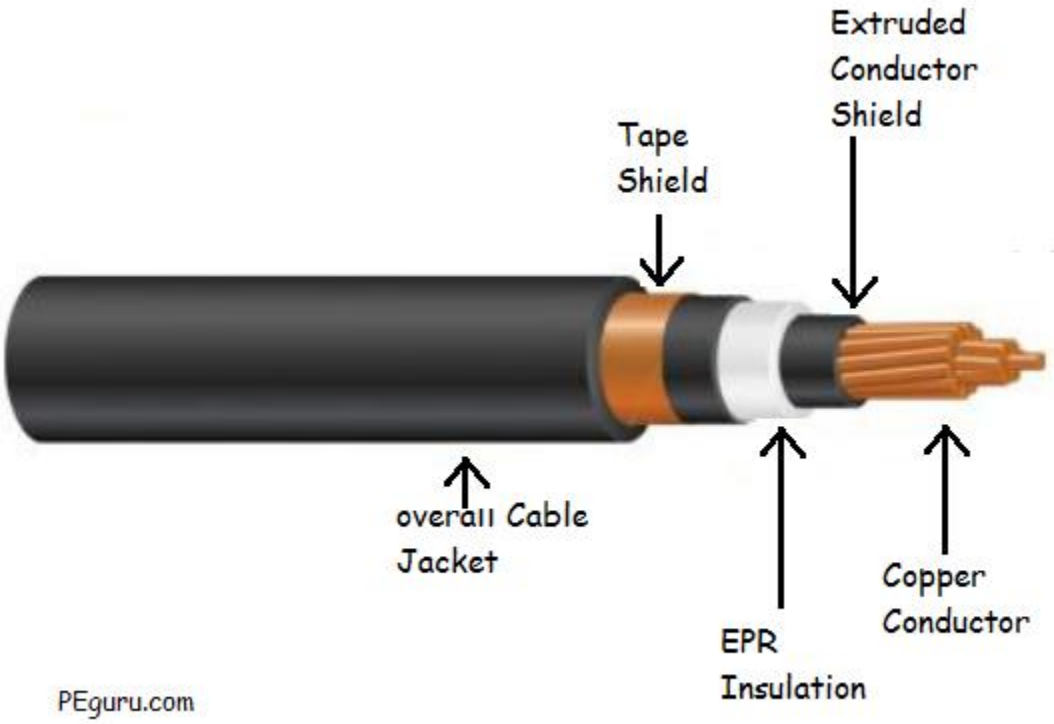
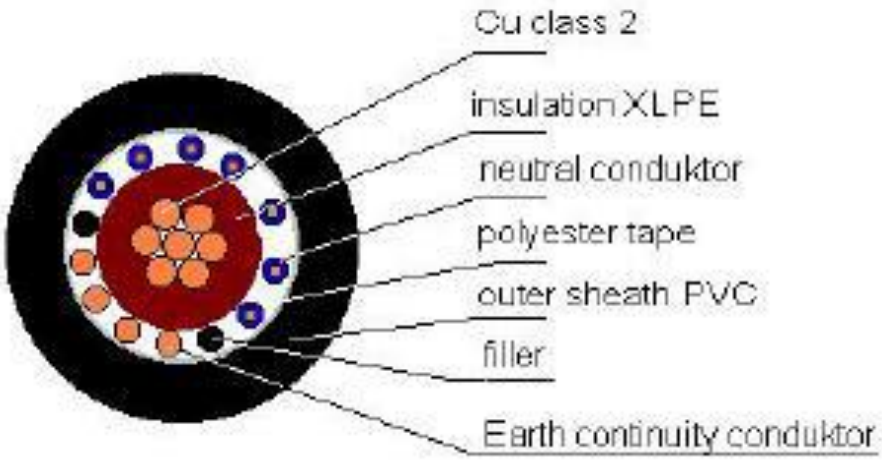


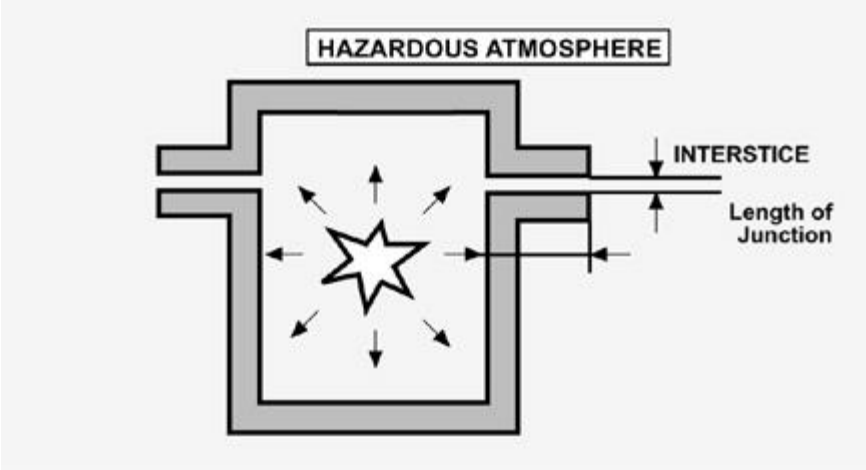

Jacket
Concentric Wires
Insulation Shield
Insulation
Conductor Shield
Conductor


Extruded
Conductor
Shield
Tape
Shield
overall Cable
Jacket
EPR
Insulation
Copper
Conductor
PEguru.com


Cu class 2
insulation XLPE
neutral conduktor
polyester tape
outer sheath PVC
filler
Earth continuity conduktor

(r) “earthed" or "connected with earth" means connected with the general mass of earth in such manner as to ensure at all times an immediate discharge of electricity without danger;

‘(v) **“flameproof enclosure”** means an enclosure in which the parts which can ignite an explosive atmosphere are placed and which can withstand the pressure developed during an internal explosion of an explosive mixture and which prevents the transmission of explosion to the explosive atmosphere surrounding the enclosure;’
(Substituted by CEA(MSE) Amendment Regulations, 2015)


HAZARDOUS ATMOSPHERE
INTERSTICE
Length of
Junction

(y) "hand-held portable apparatus" means an apparatus which is so designed as to be capable of being held in the hands and moved while connected to a supply of electricity;

‘(zc) **“intrinsically safe circuit”** shall denote any circuit operating under its normal operation and specified fault condition as specified in the Bureau of Indian Standards, which when exposed to any spark, ignition, or any thermal effect whilst operating under the above said conditions, is not capable of causing ignition of a given explosive gas atmosphere; *(Substituted by CEA(MSE) Amendment Regulations, 2015)*

(zca) **“intrinsically safe apparatus”** shall denote electrical apparatus in which all the circuits are intrinsically safe circuits;’ *(Inserted by CEA(MSE) Amendment Regulations, 2015)*


Ex


Hytera

(zd) **"increased safety type ‘e’ "** means a-method of protection by which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of occurrence of arcs and sparks in apparatus which does not produce arcs or sparks in normal service;

(zk) **"neutral conductor"** means that conductor of a multi-wire system, the voltage of which is normally intermediate between the voltages of the other conductors of the system and shall also include return wire of the single phase system;

(zn) **"open sparking"** means sparking which owing to the lack of adequate provisions for preventing the ignition of inflammable gas external to the apparatus would ignite such inflammable gas

(zs) **"portable apparatus"** means an apparatus which is so designed as to be capable of being moved while in operation;

(zt) **"portable hand lamp"** means a portable light-fitting provided with suitable handle, guard and flexible cord connected to a plug;

(zzd) **"transportable apparatus"** means apparatus which is operated in a fixed position but which is so designed as to be capable of being moved readily from one place to another;

21. Cables for portable or transportable apparatus: -

(1) Flexible cables shall not be used for portable or transportable motors, generators, transformers, rectifiers, electric drills, electric sprayers, welding sets or any other portable or transportable apparatus unless they are heavily insulated and adequately protected from mechanical injury.

(2) Where the protection is by means of metallic covering, the covering shall be in metallic connection with the frame of any such apparatus and earthed.

(3) The cables shall be three core type and four core type for portable and transportable apparatus working on single phase and three phase supply respectively and the wire meant to be used for ground connection shall be easily identifiable.

Chapter IX

Safety requirements for mines and oil fields

96. Plans.-

(1) A correct plan, on the same scale as the plan kept at the mine in fulfilment of the requirements of the Mines Act 1952 (35 of 1952), shall be available in the office at the mine showing the position of all fixed apparatus and conductors therein, other than lights, telecommunication or signalling apparatus, or cables for the same

(4) The plans specified under this regulation shall be examined and corrected as often as necessary to keep them up-to-date and the dates of such examinations shall be entered thereon by the manager or owner of the mine or wells and such plans shall be available to the Inspector, or inspector of mines, at any time.

99. Method of earthing. –

Where earthing is necessary in a mine it shall be carried out by connection to an earthing system at the surface of the mine and in a manner approved by the inspector of mines.

102. Voltage limits. –

Electricity shall not be transmitted into a mine at a voltage exceeding 11000 Volts and shall not be used therein at a voltage exceeding 6600 Volts:

Provided that-

(i) where hand-held portable apparatus is used, the voltage shall not exceed 125 V;

(ii) where electric lighting is used,-

(a) in underground mines, the lighting system shall have a mid or neutral point connected with earth and the voltage shall not exceed 125 V between phases;

(b) on the surface of a mine or in an, open cast mine, the voltage may be raised to 250 V, if the neutral or the mid point of the system is connected with earth and the voltage between the phases does not exceed 250 V;

(iii) where portable hand-lamps are used in underground working of mine, the voltage shall not exceed 30 V;

(iv) where any circuit is used for the remote control or electric interlocking of apparatus, the circuit voltage shall not exceed 30 V:

105. Disconnection of supply. –

(1) Properly constructed switchgear for disconnecting the supply of electricity to a mine or oil-field shall be provided at a point approved by the inspector of mines.

(2) At any time, when any cable or overhead line supplying electricity to the mine from the aforesaid switchgear is live, a person designated to operate the said switchgears shall be available within easy reach thereof;

Provided that in the case of gassy coal seam of second degree and third degree gassiness, the main mechanical ventilator operated by electricity shall be interlocked with the switchgear so as to automatically disconnect the power supply in the event of stoppage of main mechanical ventilator.

(3) When necessary in the interest of safety, any apparatus suitably placed, shall be provided for disconnecting the supply from every part of a system.

(4) If the inspector of mines in the interest of safety considered it necessary, he may direct that the apparatus specified in sub-regulation (3) shall be so arranged as to disconnect automatically, from the supply, any section of the system subjected to a fault.

(5) Every motor shall be controlled by switchgear which shall be so arranged as to disconnect the supply from the motor and from all apparatus connected thereto and such switchgear shall be so placed as to be easily operated by the person designated to operate the motor.

(6) Whenever required by the inspector of mines the motor shall be controlled by switchgear to disconnect automatically the supply in the event of conditions of over-current, over-voltage and single phasing.

(7) Auxiliary fan shall be interlocked with the switchgear controlling power supply to the in bye face equipment of below ground coal mine for automatic disconnection of power supply in the event of the stoppage of the auxiliary fan.

106. Cables. –

All cables, other than flexible cables for portable or transportable apparatus, shall fulfill the following requirements, namely:-

(i) all such cables, other than the outer conductor of a concentric cable, shall be covered with insulating material and shall be efficiently protected from mechanical damage and supported at sufficiently frequent intervals and in such a manner as to prevent damage to such cables;

(ii) (a) except as provided in clause (iii) no cables other than concentric cables or single core or two core or multi core cables protected by a metallic covering and which contain all the conductors of a circuit shall be used where the voltage exceeds 125 V or when an Inspector considers

that there is risk of igniting gas or coal dust or other inflammable material, and so directs;

(b) the sheath of metal-sheathed cables and the metallic armouring of armoured cables shall be of a thickness not less than that recommended from time to time in the relevant standard of the Bureau of Indian Standards;

(iii) where a voltage exceeding 250 V but not exceeding 650 V direct current system is used, two single core cables may be used for any circuit provided that their metallic coverings are bonded together by earth conductors so placed that the distance between any two consecutive bonds is not greater than thirty metres measured along either cable;

(iv) The metallic covering of every cable shall be -

(a) electrically and mechanically continuous throughout;

(b) earthed, if it is required by sub-regulation (3) of regulation 101 to be earthed by a connection to the earthing system of conductivity specified therein;

(c) efficiently protected against corrosion where necessary;

(d) of a conductivity at all parts and at all joints at least equal to fifty per cent of the conductivity of the largest conductor enclosed by the said metallic covering; and

(e) where there may be risk of igniting gas, coal-dust, or other inflammable material, so constructed as to prevent, as far as practicable, the occurrence of open sparking as the result of any fault or leakage from live conductors.

(v) cables and conductors where connected to motors, transformers, switchgear and other apparatus, shall be installed so that,-

(a) they are mechanically protected by securely attaching the metallic covering to the apparatus; and

(b) the insulating material at each cable end is efficiently sealed so as to prevent the diminution of its insulating properties;

(vi) where necessary to prevent abrasion or to secure gas-tightness, properly constructed glands or bushes shall be provided;

(vii) un armoured cables or conductors shall be conveyed either in metallic pipes or metal casings or suspended from efficient insulators by means of non-conducting materials which will not cut the covering and which will prevent contact with any timbering or metal work and if separate

insulated conductors are used, they shall be installed at least 3.75 cm. apart and shall not be brought together except at lamps, switches and fittings.

107. Flexible cables.-

(1) Flexible cables for portable of transportable apparatus shall be two core or multi core, unless required for electric welding, and shall be covered with insulating material which shall be efficiently protected from mechanical injury.

(2) If flexible metallic covering is used either as the outer conductor of a concentric cable or as a means of protection from mechanical injury, it shall not be used by itself to form an earth conductor for such apparatus, but it may be used for that purpose in conjunction with an earthing core.

(3) Every flexible cable intended for use with portable or transportable apparatus shall be connected to the system and to such apparatus by properly constructed connectors:

Provided that for machines of voltage exceeding 650 V but not exceeding 33 kV a bolted type connector shall be used and the trailing cable shall be suitably anchored at the machine end;

Provided further that, where there are space limitations for multiple onboard motors and equipment for transportable or portable machines; direct entry flexible cable with elastomeric sealing rings, compression gland, packing gland or sealing box which does not alter the flame proof property may be permitted and if a cable entry can accept any sealing ring with same outside diameter but different internal dimension, the ring shall have a minimum uncompressed axial height of twenty millimeter for circular cables of diameter not greater than twenty millimeter and twenty five millimeter for circular cables of diameter greater than twenty millimeter.

(4) At every point where flexible cables are joined to main cables, a circuit breaker shall be provided which is capable of automatically disconnecting the supply from such flexible cables.

(5) Every flexible cable attached to a portable or transportable machine shall be examined periodically by the person designated to operate the machine, and if such cable is used underground, it shall be examined at least once in each shift by such person and if such cable is found to be damaged or defective, it shall forthwith be replaced by a cable in good condition.

(6) If the voltage of the circuit exceeds 250 V, all flexible cables attached to any transportable apparatus shall be provided with flexible metallic screening or pliable armouring and cables of portable apparatus shall be provided with flexible metallic screening on all the power and pilot cores.

Provided that the provision of this regulation shall not apply to flexible cables attached to any transportable or portable apparatus used in open cast mines or below ground mines where reeling and unreeling of such cables is necessary as per design features of the equipment.

(7) All flexible metallic screening or armouring specified in sub-regulation (6) shall

fulfill the requirement specified in clause (iv) of regulation 106.

Provided that in the case of separately screened flexible cables the conductance of each such screen shall not be less than twenty five per cent of that of the power conductor and the combined conductance of all such screens shall in no case be less than that of 0.15 sq. cm. copper conductors.

(8) Flexible cable exceeding hundred metres in length shall not be used with any portable or transportable apparatus:

Provided that such flexible cable when used with coal cutting machines or cutter or loader or armoured face conveyor for long wall operation, or with shuttle cars or load haul dumper or cutter loader or all alike equipment for development and de-pillaring operation shall not exceed two hundred fifty metres in length:

Provided further that the aforesaid cable in case of an open cast mine when used with electrically operated heavy earth moving machinery shall not exceed three hundred metres in length and for bucked wheel excavator at 11 kV shall not exceed one thousand metres in length.

(9) Flexible cable, when installed in a mine, shall be efficiently supported and protected from mechanical injury.

(10) Flexible cables shall not be used with apparatus other than portable or transportable apparatus.

(11) Where flexible cables are used they shall be detached or otherwise isolated from the source of supply when not in use, and arrangements shall be made to prevent the energising of such cables by undesignated persons.

108. Portable and transportable machines. -
The person designated to operate an electrically driven coal-cutter, or other portable or transportable machine, shall not leave the machine while it is in operation and shall, before leaving the area in which such machine is operating, ensure that the supply is disconnected from the flexible cable which supplies electricity to the machine and when any such machine is in operation, steps shall be taken to ensure that the flexible cable is not dragged along by the machine:

Provided that all portable and transportable machines used in underground mines shall operate on remote control from the concerned switchgear with pilot core protection.

110. Precautions where gas exists. –

(1) In any part of a coal-seam of the **first degree gassiness** -

(i) all cables shall be constructed, installed, protected, operated and maintained in such a manner as to prevent risk of open sparking;

(ii) all signaling, telecommunication, remote control and insulation tester circuits shall be so constructed, installed, protected, operated and maintained as to be intrinsically safe;

(iii) all apparatus including portable and transportable apparatus including lighting fittings used at any place which lies in-bye of the last ventilation connection shall be flame-proof:

Provided that electrically operated or battery operated portable or transportable apparatus such as shuttle car, men or material transporting equipment of increased safety type "e" shall be permitted at any place with suitable monitoring devices for detection of gases, if any;

(iv) all electric lamps at any place which lie in-bye of the last ventilation connection and return airways shall be in flame proof enclosure and at other places these shall be in increased safety enclosure type 'e'.

(2) At any place which lies in any part of a coal-seam of **second and third degree gassiness**-

(i) all signaling, telecommunication, remote control and insulation tester circuits shall be so constructed, installed, protected, operated and maintained as to be intrinsically safe;

(ii) all cables shall be constructed, installed, protected, operated and maintained in such a manner as to prevent risk of open sparking;

(iii) all apparatus, including portable and transportable apparatus used at any place within ninety metres of any working face or goaf in case of a second degree gassy mine and within two hundred seventy metres of any working face or goaf in case of third degree gassy mine or at any place which lies in-bye of the last ventilation connection or in any return airways shall be flame proof;

(iv) all electric lamps shall be enclosed in flame-proof enclosures.

(6) In any coal-seam of degree second and degree third gassiness or the hazardous area of oil-mine **the supply shall be discontinued**;

(i) immediately, if open sparking occurs;

(ii) during the period required for examination or adjustment of the apparatus, which shall necessitate the exposing of any part liable to open sparking;

(iii) the supply shall not be reconnected until the apparatus has been examined by the electrical supervisor or one of his duly appointed assistants and until the defect, if any, has been remedied or the necessary adjustment made; and

(iv) a flame safety lamp shall be provided and maintained in a state of continuous illumination near an apparatus, including portable or transportable apparatus,

which remains energised and where the appearance of the flame of such safety lamps indicates the presence of inflammable gas, the supply to all apparatus in the vicinity shall be immediately disconnected and the incident reported forthwith to an official of the mine and such apparatus shall be interlocked with the controlling switch in such a manner as to disconnect power supply automatically in the event of percentage of inflammable gas exceeding one and one quarter in that particular district:

Provided that where apparatus for automatic detection of the percentage of inflammable gas or vapour are employed in addition to the flame safety lamps, such apparatus shall be approved by the inspector of mines and maintained in perfect order.

(7) In any part of a coal-seam of any degree of gassiness or in any hazardous area of an oil-mine, if the presence of inflammable gas in the general body of air is found at any time to exceed one and one quarter per cent, the supply of energy shall be immediately disconnected from all cables and apparatus in the area and the supply shall not be reconnected so long as the percentage of inflammable gas remains in excess of one and one quarter per cent.

(8) In an oil mine where concentration of inflammable gas exceeds twenty percent of its lowest explosive limit, the supply of electricity shall be cut-off immediately from all cables and apparatus lying within thirty metres of the installation and all sources of ignition shall also be removed from the said area and normal work shall not be resumed unless the area is made gas-free:

Provided that such disconnection shall not apply to intrinsically safe environmental monitoring scientific instruments.

(9) Any such disconnection or reconnection of the supply shall be noted in the log sheet which shall be maintained in the form set out in Schedule-XIII and shall be reported to the inspector of mines,

(10) The provisions of this regulation shall apply to any metalliferous mine which may be notified by the inspector of mines if inflammable gas occurs or if the inspector of mines is of the opinion that inflammable gas is likely to occur in such mine.

111. Shot-firing. –

(1) When shot-firing is in progress adequate precautions shall be taken to protect apparatus and conductors, other than those used for shot-firing, from injury.

(2) Current from lighting or power circuits shall not be used for firing shots.

(3) The provisions of regulation 107 *(Flexible Cables)* shall apply in regard to the covering and protection of shot-firing cables, and adequate precautions shall be taken to prevent such cable touching other cables and apparatus.

112. Signalling. –

Where electrical signalling is used,-

(i) adequate precautions shall be taken to prevent signal and telephone wires coming into contact with other cables and apparatus;

(ii) the voltage used in any one circuit shall not exceed 30 V;

(iii) contact-makers shall be so constructed as to prevent the accidental closing of the circuit; and

(iv) bare conductors, where used shall be installed in suitable insulators.

114. Earthing of neutral points. –

Where the voltage of an alternating current system exceeds 30 Volts, the neutral or mid-point shall be earthed by connection to an earthing system in the manner specified in regulation 99.

Provided that when the system concerned is required for blasting, and signalling purposes, the provisions of this regulation shall not apply.

Provided further that in case of unearthed neutral system adequate protection shall be provided with the approval of the Inspector